STATE OF LOUISIANA, ET AL.
VS.
THE LOUISIANA LAND AND EXPLORATION COMPANY, ET AL.

(EAST WHITE LAKE FIELD)

EXPERT REPORT
of
John R. Frazier, Ph.D., CHP

I. INTRODUCTION

I have been retained by counsel for Defendants in the case of State of Louisiana, et al. vs. The Louisiana Land and Exploration Company, et al. (Fifteenth Judicial District Court for the Parish of Vermilion, State of Louisiana [Number 82162]), to assess the radiological conditions of a specific parcel of land located in the East White Lake Field in Vermilion Parish, Louisiana. I have been asked to review data provided by Plaintiffs and Defendants in this matter. I have also been asked to determine whether any information and/or data pertaining to the subject property indicate the presence and extent of naturally occurring radioactive material (NORM) due to oil or gas production on the property.

II. OPINIONS

As set forth in detail below, and based on my review of documents related to this case, I have reached the following conclusions with a reasonable degree of scientific certainty:

1. There is no indication of oil field NORM in soil and sediment on the subject property. Results of laboratory analysis of soil and sediment samples from the subject property show that the concentrations of radioactive materials in those media on the subject property are within the range of natural background radionuclide concentrations in soil and sediment in Louisiana.

2. There is no indication of oil field NORM in surface water on the subject property.

3. There is no indication of oil field NORM in groundwater in the Chicot Aquifer on the subject property. Results of laboratory analysis of groundwater samples from the Chicot Aquifer on the subject property show that the concentrations of radioactive materials in those samples to be within the range of natural background radionuclide concentrations in groundwater in Louisiana.

4. Analytical results of groundwater samples collected on May 20-21, 2010, by defendants' representative, MP&A, from the shallow "peat zone" on the subject property show the groundwater in the shallow "peat zone" to be within the range of natural background radionuclide concentrations in groundwater in Louisiana.

5. There is no indication that anyone on or near the subject property can reasonably be expected to receive a radiation dose greater than the range of radiation doses from natural background radiation sources in Louisiana.

6. It is inappropriate to use the maximum contaminant level (MCL) for radium as promulgated by the U.S. Environmental Protection Agency under the Safe Drinking Water Act as the standard for groundwater that is not a current or potential source of drinking water.

III. QUALIFICATIONS

My qualifications are detailed in the attached Curriculum Vitae (Attachment A). My area of expertise is health physics – the scientific discipline of measuring radiation and protecting people from the harmful effects caused by high doses of radiation. My academic degrees include a B.A. in physics, M.S. in physics, and Ph.D. in physics (with emphasis in health physics and radiation protection). I have over thirty-two (32) years of professional experience in health physics, primarily in the areas of environmental dose assessments, external and internal radiation dosimetry, environmental sampling and analysis, and radiation detection and measurement. I have earned Comprehensive Certification by the American Board of Health Physics (ABHP) and I am a Diplomate of the American Academy of Health Physics. The term "Certified Health Physicist" is a certification mark that may only be used by individuals who have received Comprehensive Certification by the ABHP. Certification in health physics by the ABHP is the same as professional certification by other recognized professional organizations, such as certification in diagnostic radiological physics by the American Board of Radiology. I am an elected member of the National Council on Radiation Protection and Measurements (NCRP) and a Fellow and Past-president of the Health Physics Society. I have extensive experience performing radiological characterization surveys of property, assessing external and internal radiation doses from natural and man-made radiation sources, and reviewing/assessing operational data generated by facilities that are licensed to possess and use radioactive materials and other radiation sources. Over the past sixteen years I have performed radiological assessments of several properties impacted by oil field NORM. I have also evaluated current and past radiation exposure conditions on properties impacted by oil field NORM.

IV. BASIS OF OPINIONS

During preparation of my opinions presented in this report I reviewed documents related to the East White Lake Field and natural radiological conditions in the State of Louisiana. Specific documents that I reviewed in preparation of this report are listed in Attachment B.

A. Naturally Occurring Radionuclides in Native Louisiana Soil and Sediment

Naturally-occurring radioactivity is present in essentially everything on, beneath, or above the earth's surface. These radioactive materials are present as primordial radioactivity (as they have been present since the earth was formed) or as naturally-produced radioactivity (e.g., cosmogenic radioactivity) that continues to be formed. The most abundant radionuclides on the earth are the primordial radionuclides in three natural decay series (thorium, uranium, and actinium) and the non-series primordial radionuclide, potassium-40. The concentrations and amounts of these natural radioactive materials that comprise the natural background radioactivity in substances on or in the earth have been described in detail in various reports. The National Council on Radiation Protection and Measurements (NCRP), a group of eminent independent scientists chartered by Congress, has published Report No. 160, "Ionizing Radiation Exposure of the Population of the United States" (NCRP 2009) that includes information on the sources and amounts of natural background radiation exposure being received by the U.S. public. NCRP Report No. 160 notes that concentrations of each of the primordial radionuclides vary with substance (rock, soil, sediment, etc.), location, and other factors. For surface soil in the United States, each radionuclide in the thorium series and each radionuclide in the uranium series is present at a typical average concentration of one (1) picocurie per gram (pCi/g). The typical average concentration of potassium-40 in soil is in the range of approximately 15-25 pCi/g. However, the range of concentrations of these radionuclides in native soil can vary significantly.

Natural background concentrations of selected radionuclides, including radium-226 (Ra-226) and Ra-228, in soil and sediment in Louisiana are given in several publications (DeLaune 1986; Meriwether 1988; Meriwether 1991; Meriwether 1992). The range of concentrations of Ra-226 in native Louisiana soil is approximately 0.2 pCi/g to approximately 3 pCi/g, with an average concentration of approximately 1 pCi/g. The concentrations of Ra-228 in native Louisiana soil are approximately the same as the concentrations of Ra-226. In native soil, both Ra-226 and Ra-228 are continually being produced in their respective natural radioactive decay series (NCRP 2009).

B. Naturally Occurring Radionuclides in Native Louisiana Groundwater

Naturally occurring radionuclides are present in groundwater as a consequence of their presence in natural solids in the groundwater. The only exception to this is the presence of radon (gas) in groundwater (NCRP 2009). Solids may be dissolved in the water (measured as total dissolved solids [TDS]) or suspended in the water (measured as total suspended solids [TSS]). The concentrations of naturally occurring radionuclides are directly proportional to the concentrations of solids in the water. It is generally observed that naturally occurring radionuclides are found more often in the dissolved solids in groundwater rather than in the suspended solids. In Louisiana groundwater, the concentration of solids in groundwater determines the concentrations of natural background radionuclides in that groundwater (USGS 1988). The concentrations of naturally occurring radium-226 (Ra-226) and Ra-228 are approximately equal in background Louisiana groundwater (USGS 1988). Additionally, the concentrations of Ra-226 and Ra-228 per unit mass of solids in the groundwater are approximately equal to the concentrations of the same radionuclides in native Louisiana soil.

C. Oil Field NORM

During production of oil from underground geological formations, water that is co-mingled with the oil is transported to the ground surface. This water is generally referred to as "produced water". In some (but not all) oil-bearing geologic formations there are concentrations of NORM that exceed the natural background concentrations of the same radionuclides in native soil. The chemical compounds that are present in produced water may include trace amounts of the natural element radium. Because all natural radium is radioactive, produced water that contains radium compounds contains NORM. The principal radionuclides in affected produced water are Ra-226 and Ra-228 (NRC 1999). During oil production, some radium compounds in the produced water convert to sulfates or carbonates and are precipitated, or are otherwise deposited, onto surfaces as scale and sludge in tubulars, pipe, and other production equipment. The scale is primarily barium sulfate or barium carbonate with trace amounts (by mass) of radium in the same mineral matrix. The presence (or absence) of oil field NORM at the ground surface (in soil or production equipment) is determined by measurement of external radiation levels near the ground surface or equipment (as the NORM radionuclides emit measurable gamma radiation) and by analysis of soil samples. The presence (or absence) of oil field NORM in water is determined by collection of representative samples of water from suspect locations and analysis of the water samples for the concentrations of Ra-226, Ra-228, and solids in the water.

D. External Radiation Measurements on the Subject Property

Plaintiffs' experts did not report any measurements of external radiation levels on the subject property (ICON 2010a; ICON 2010b). There is no reason to suspect that external radiation levels on the subject property are any greater than natural background radiation levels for Louisiana.

E. Collection and Analysis of Soil and Sediment Samples from the Subject Property

Plaintiffs' experts reported results of radiological analysis of 20 soil and sediment samples from one to three depths at 10 locations collected in April 2008 and November 2006. Concentrations of Ra-226 and Ra-228 in the 20 samples are listed in Table 4-1R of the April 2010 ICON report (ICON 2010b). Based on the reported concentrations and the associated measurement uncertainties (Eberline 2006a; Eberline 2006c), the concentrations of NORM radionuclides (Ra-226 and Ra-228) in the 20 samples of soil or sediment from the subject property are within the range of natural background concentrations of these radionuclides in native Louisiana soil (DeLaune 1986; Meriwether 1988; Meriwether 1991; Meriwether 1992).

F. Collection and Analysis of Surface Water Samples from the Subject Property

Plaintiffs' experts did not report any measurements of concentrations of radionuclides in surface water on the subject property (ICON 2010a; ICON 2010b). There is no reason to suspect that NORM concentrations in surface water on the subject property are any greater than natural background concentrations of these radionuclides in native Louisiana surface water.

G. Collection and Analysis of Groundwater Samples

Plaintiffs' representative, ICON, collected samples of groundwater from the subject property in November 2006 and in March 2010 (ICON 2010a; ICON 2010b). The locations of wells from which groundwater samples were collected by ICON are shown in the figures from Section 4 of the March 2010 ICON report (ICON 2010a). Results of radiological analysis of 14 groundwater samples from the subject property are listed in Table 4-3R of the ICON report (ICON 2010b). Seven (7) of the samples (three collected in November 2006 and four collected in March 2010) were reported by ICON to have been collected from the Chicot Aquifer from depths of 37.5 feet below ground surface (ft. bgs) to 54 ft. bgs. The remaining seven (7) samples of groundwater were reported by ICON to have been collected in November 2006 from the "peat zone" at depths of 8 ft. bgs to 22 ft.bgs (ICON 2010b). The samples collected by ICON in 2006 were shipped under chain of custody to a commercial laboratory, Eberline Services Laboratory (Eberline) in Oak Ridge, Tennessee, for analysis. The Eberline report of analysis for the 10 groundwater samples collected in November 2006 is listed in Attachment B (Eberline 2006b).

Groundwater samples collected by ICON in March 2010 from three (3) wells reportedly in the Chicot Aquifer were shipped under chain of custody to Pace Analytical Services (Pace) in Greensburg, Pennsylvania for analysis (Pace 2010). Concentrations of Ra-226 and Ra-228 that were measured in each of the samples are also listed in Table 4-3R of the April 2010 ICON report (ICON 2010b).

At the time that ICON collected groundwater samples from the three (3) wells in the Chicot Aquifer in March 2010, personnel from Michael Pisani and Associates (MP&A) collected split samples of groundwater from the same locations (and depths). The split samples collected by MP&A were shipped under chain of custody to Eberline for analysis for concentrations of gross alpha emitters, gross beta emitters, Ra-226, and Ra-228. Results of analysis of the split samples are given in the Eberline report of analysis (Eberline 2010a).

Ten (10) samples of groundwater were collected from the Chicot Aquifer on the subject property by personnel from MP&A on May 6-13, 2010, and analyzed for concentrations of gross alpha radionuclides, gross beta radionuclides, Ra-226, and Ra-228 at the Eberline laboratory. The locations of the wells from which MP&A personnel collected those groundwater samples are shown in the sample location maps from MP&A (Pisani 2010). None of those groundwater samples were collected from the "peat zone". The results of those analyses are given in three reports of analysis from Eberline (Eberline 2010b; Eberline 2010c; Eberline 2010d).

Concentrations of Ra-226 and Ra-228 in the groundwater samples collected from the Chicot Aquifer by ICON and by MP&A do not indicate the presence of oil field NORM in the Chicot Aquifer. The results of analysis of the groundwater samples from the Chicot Aquifer show that the concentrations of Ra-226 and Ra-228 in those groundwater samples to be within the range of natural background concentrations of those radionuclides in groundwater in Louisiana (USGS 1988).

As noted above, ICON collected seven samples of groundwater from the shallow "peat zone" on the subject property in November 2006. The report of analysis for those samples noted that the presence of elemental barium in the samples led to smaller aliquots of water to be analyzed (Eberline 2006b). The smaller aliquots led to lower accuracy than normally obtained with the analytical method for Ra-226 and also to decreased sensitivity of the analyses, as indicated in the tabulated results of analysis (Eberline 2006b). To perform a more reliable evaluation of the radionuclides in the "peat zone", three (3) samples of groundwater were collected from the "peat zone" on the subject property by MP&A personnel in May 20-21, 2010, and sent under chain of

custody to Eberline for analysis for concentrations of gross alpha radionuclides, gross beta radionuclides, Ra-226, and Ra-228. Results of analysis of those samples are presented in Eberline report of analysis number 10-05133-OR (Eberline 2010e) and show a normal uncertainty and sensitivity for measurement of Ra-226 in groundwater. The results of analysis of the groundwater samples collected in May 2010 by MP&A personnel from areas within the "peat zone" on the subject property show that the concentrations of Ra-226 and Ra-228 are within the range of natural background concentrations of those radionuclides in Louisiana groundwater.

Samples of solids from the "peat zone" were also collected in late May 2010 by MP&A and sent under chain of custody to Eberline for analysis of radionuclide constituents. Results of those analyses are not yet available from Eberline.

Concentrations of total dissolved solids (TDS) were also measured in the groundwater samples collected by ICON personnel and MP&A personnel (ICON 2010a; ICON 2010b; Eberline 2010a; Eberline 2010b; Eberline 2010c; Eberline 2010d; Eberline 2010e). With few exceptions, there is a direct proportionality between the TDS concentrations in the samples and the concentrations of Ra-226 and Ra-228 in the same samples.

As noted in the previously in this report, every gram of native Louisiana solids (soil or sediment, whether dissolved or suspended) contains an average of approximately 1 pCi of Ra-226 and 1 pCi of Ra-228. Therefore, groundwater samples with more than only 2-3 grams (2,000-3,000 mg) of native Louisiana solids are expected to have greater than 5 pCi/L of naturally occurring Ra-226 and Ra-228; that amount of material may be related in no way to the presence of oil field NORM in that water. The concentrations of Ra-226 and Ra-228 in the groundwater samples in the Chicot Aquifer from the subject property are no different than the concentrations of these same natural radionuclides in water having the same amounts of native Louisiana solids. There is no scientific basis for concluding that the concentrations of Ra-226 and Ra-228 in the groundwater samples from the Chicot Aquifer on the subject property are due to oil field NORM.

H. Maximum Contaminant Level (MCL) for Ra-226 and Ra-228

The December 2009 ICON report lists the maximum contaminant level (MCL) for Ra-226 + Ra-228 (5 pCi/L) as the groundwater remedial standard (ICON 2010a). Mr. Gregory Miller (the author of the ICON report) justifies the use of the MCL for combined radium as a "standard" based on MCL's as "applicable or relevant and appropriate requirement" (ARAR) under Louisiana RECAP (ICON 2010a). However, Mr. Miller does not present any basis for his

determination that the combined radium MCL is an ARAR for groundwater on the subject property.

Drinking water standards promulgated by the U.S. Environmental Protection Agency (USEPA), such as the MCL for Ra-226 + Ra-228 are applicable to community water systems (USEPA 2000). Community water systems are defined by USEPA as those systems that "provide water for human consumption through pipes or other constructed conveyances to at least 15 service connections or serve an average of at least 25 people year-round." (USEPA 2000). The USEPA has noted that drinking water standards, such as the MCL for Ra-226 + Ra-228 (5 pCi/L) promulgated under the Safe Drinking Water Act, generally are not relevant and appropriate for groundwater that is not a current or potential source of drinking water (USEPA 1990, at page 8732).

I. Radiation Doses from Natural Background Sources

Radiation doses to persons from natural background radiation have been studied extensively for many decades. The term "dose" is used to represent the amount of radiation energy per unit mass received by a person exposed to ionizing radiation. External doses are produced by penetrating radiation from sources outside the human body. Internal doses are produced by radioactive material within the body following inhalation or ingestion of that radioactive material. Natural radiation and radioactivity in the environment provide the major source of external and internal radiation doses to humans. NCRP Report No. 160 describes the radiation doses received from natural background radiation sources in the U.S. (NCRP 2009).

It is impossible to avoid exposure to natural background radiation. Each person lives in a virtual "sea" of natural radiation that produces a radiation dose of approximately 0.311 rem (311 millirem) per year to that person (NCRP 2009). We receive about 1 millirem of radiation dose from natural background radiation sources every day of our lives.

J. Radiation Dose from Ingestion of Ra-226 and Ra-228

Every person ingests an average of 1-2 pCi of Ra-226 in food and water every day of our lives (Carter 1988). Similarly, we also ingest an average of approximately 1-2 pCi of Ra-228 in food and water every day. Over a year, the radiation dose from ingestion of 1-2 pCi of Ra-226 and Ra-228 each day is approximately 1-2 millirem (EPA 1988) and this dose is included in the average total radiation dose from natural background radiation sources. The average dose from ingestion of Ra-226 and Ra-228 in our food and water is less than 1 percent of the annual dose we receive from all natural background radiation sources.

Ingestion of Ra-226 and Ra-228 in drinking water is one of several pathways by which every person receives a radiation dose each day. The amount of the radiation dose from ingestion of Ra-226 and Ra-228 in drinking water depends on the concentrations of the two radionuclides in the water from the specific source and the amount of water that is drunk from the specific source. For example, drinking 2 liters (less than 2 quarts) of water with a Ra-226 + Ra-228 concentration of 5 pCi/L will give you a radiation dose of approximately 0.0138 millirem. Of course, if the water containing Ra-226 and Ra-228 is not used for drinking water there is no ingestion dose from the presence of those two radionuclides in that water. From a practical consideration, it is not reasonable to assume that anyone will use near-surface groundwater having thousands of milligrams of solids per liter of water as their drinking water supply.

The observations, conclusions, and opinions noted in this report are based on my personal knowledge and experience and are consistent with accepted practice in the field of health physics. I reserve the right to amend this report should additional data or other information become available to me in the future.

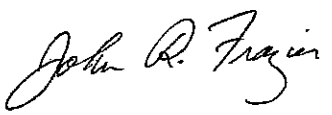
V. RATE OF COMPENSATION

I am being compensated at a rate of $225 per hour for my time to work on this project.

VI. PRIOR TESTIMONY

A list of cases in which I have given sworn testimony at deposition or at trial during the past four (4) years is included in Attachment C.

Prepared and submitted by:



Date: June 15, 2010

John R. Frazier, Ph.D., CHP

ATTACHMENT A

CURRICULUM VITAE OF JOHN R. FRAZIER, Ph.D., CHP

JOHN R. FRAZIER, Ph.D., CHP

Professional Qualifications

Dr. Frazier has over 32 years of health physics experience in external and internal dosimetry, environmental dose assessment, radiation risk assessment, radiation spectroscopy, health physics training, bioassay, radiation detection and measurement, and radiological site characterization. Numerous federal agencies including the Nuclear Regulatory Commission (NRC), Environmental Protection Agency (EPA), U.S. Department of Agriculture (USDA), U.S. Department of Defense (DOD), and U.S. Department of Justice (DOJ) have sought his advice on a wide range of health physics and radiation protection topics from operational health physics program design to environmental radiation dose and risk assessments. He has also served as a consultant to private companies and individuals on numerous health physics issues. He is an elected member of the National Council on Radiation Protection and Measurements (NCRP). Dr. Frazier has made presentations on introductory and advanced health physics and radiation protection topics for professional society meetings, student groups, and public interest forums. His publications are in the areas of fundamental interactions of radiation with matter, radiation detection instrumentation, radiological site assessments, and external and internal radiation dosimetry.

Education

Ph.D., Physics, University of Tennessee, Knoxville, Tennessee; 1978.

M.S., Physics, University of Tennessee, Knoxville, Tennessee; 1973.

B.A., Physics, Berea College, Berea, Kentucky; 1970.

Registrations/Certifications

Certification by the American Board of Health Physics in 1981; recertified through 2013.

Experience and Background

2004 - Present *Independent Health Physics Consultant*

Dr. Frazier provides consultation services on a wide range of radiation protection issues for private companies, government agencies, and individuals. His principal areas of expertise are internal and external radiation exposure assessments, environmental radiation dose and radiological risk assessments from occupational

and environmental exposures, and evaluations and assessments of all aspects of operational health physics programs.

1993 - 2004 ***Senior Radiological Scientist, Auxier & Associates, Inc., Knoxville, Tennessee.***

Dr. Frazier served as senior consultant on radiation protection issues for private companies and government agencies. He performed assessments of internal and external radiation exposures, environmental radiation doses and radiological risks from occupational and environmental exposures. He also performed evaluations and assessments of all aspects of operational health physics programs. Dr. Frazier served as technical advisor to organizations that performed environmental radiological assessments and risk assessments and that provided occupational radiation protection services in government and industry.

1986 - 1993 ***Senior Radiological Scientist, Nuclear Sciences, IT Corporation, Knoxville, Tennessee.***

Dr. Frazier served as senior radiological scientist and technical manager of the health physics consulting group within IT. He was responsible for health physics professional services provided by IT for federal, state, and local agencies, contractors, and private companies. These services included development of all aspects of the health physics programs for nuclear facilities, technical assessments and evaluations of existing health physics programs, and environmental and occupational radiation dose assessments. He served as technical advisor and task manager for radiological aspects of remedial investigations and feasibility studies (RI/FSs). He also served as manager and technical director for specific projects in areas that included design and implementation of environmental monitoring and sampling programs, assessment of operational health physics programs, and radiation dose and risk assessments for occupational exposures and environmental releases. Previous responsibilities included serving as senior technical consultant for upgrading Environmental Health and Safety Programs at the Department of Energy Rocky Flats Plant, Oak Ridge National Laboratory, and the Oak Ridge Y-12 Plant.

1980 - 1986 ***Health Physicist, Oak Ridge Associated Universities, Oak Ridge, Tennessee.***

Dr. Frazier developed and coordinated Oak Ridge Associated Universities (ORAU) health physics training programs. He taught health physics and radiation protection courses for several hundred students each year at ORAU Professional Training Programs. He developed new lectures, laboratory exercises, and training materials for health physics training for the Nuclear Regulatory Commission, Department of Energy, and corporate clients. In addition to his training responsibilities, Dr. Frazier served as division health physicist for the Manpower Education, Research, and Training Division of ORAU. He served as technical consultant to federal and state agencies, other training institutions, and ORAU clientele on environmental, health and safety issues. He evaluated radiation measurement and radiation protection instrumentation equipment.

1978 - 1980 ***Chief Radiation Physics Section, Bureau of Radiological Health, Rockville, Maryland.***

Dr. Frazier supervised research and support activities of a staff of seven health physics professionals and technicians. He planned and implemented radiation research projects pertaining to ionizing radiation detection/ measurement. He scheduled personnel requirements in accordance with the scope of such projects. He coordinated support for external radiation dosimetry by the Radiation Physics Section for all other branches in the Division of Electronic Products. He supervised and performed multi-point calibrations of radiation detection/ measurement instruments per month. Dr. Frazier also assisted in planning radiation dosimetric surveys of large numbers and types of ionizing radiation sources to reduce population exposure. He coordinated environmental radiation dosimetry for extended geographical areas using external radiation dosimeters.

1977- 1980 ***Research Physicist, Bureau of Radiological Health, Rockville, Maryland.***

Dr. Frazier calibrated X-ray detection/measurement instruments. He maintained radiation calibration secondary standards traceable to the National Bureau of Standards. He evaluated new X-Ray detection/measurement instruments with radio-frequency fields under controlled environmental conditions and a wide range of ionizing radiation fields. He also developed external radiation dosimetry techniques with both active and passive dosimeters.

Awards/Activities

Fellow, Health Physics Society, 2000
Elda E. Anderson Award, Health Physics Society, 1988
John C. Villforth Lecture, Conference of Radiation Control Program Directors (CRCPD), 2007
Distinguished Technical Associate, IT Corporation, 1990
National Council on Radiation Protection and Measurements (NCRP)
Council Member, 2002-2014
Scientific Committee 46, 1999-2006
Scientific Committee 2-1, 2004-2006
PAC 2 Committee 2006-2010

Professional Affiliations

Health Physics Society
(Plenary Membership since 1981; President, 2002-3; President-Elect, 2001-2; Board of Directors, 1992-5; Treasurer-Elect, 1997-8; Treasurer, 1998-2000)
American Academy of Health Physics (Secretary, 1996-1997, Director, 1998)
East Tennessee Chapter of the Health Physics Society (Past President)
International Radiation Protection Association (Plenary Membership)

Publications

Dr. Frazier has prepared or contributed to over 100 reports and publications in the fields of health physics and environmental science.

List of Publications

Frazier, J. R., "Negative Ion Resonances in the Fluorobenzenes and Biphenyl" Ph.D. Dissertation, University of Tennessee, Knoxville, Tennessee, 1978.

Frazier, J. R., "Low-Energy Electron Interactions with Organic Molecules: Negative Ion States of Fluorobenzenes," Journal of Chemical Physics, Vol. 69, No. 3807, 1978.

Frazier, J. R., "Performances of X-ray Measurement Instruments in RF Fields," HEW Publication (FDA) 78-8065 Rockville, Maryland, 1978.

Frazier, J. R., "A Dosimetry System for Evaluating Chest X-Ray Exposures," HEW Publication (FDA) 79-I 107, 1979.

Film Badge Dosimetry in Atmospheric Nuclear Tests, National Academy Press, Washington, D.C., 1989.

ATTACHMENT B

LIST OF DOCUMENTS REVIEWED

ATTACHMENT B

Documents Reviewed by John R. Frazier, Ph.D., CHP

Barbee 2010 Barbee, Gary C., and George J. Castille, III, "Investigation of Historical Land Use and Environmental Impacts on the Vermilion Parish School Board Property, Section 16, T. 15 S. – R. 1 E., Vermilion Parish, Louisiana", Canyon, TX, and Baton Rouge, LA, April 15, 2010.

DeLaune 1986 Delaune, R.D., et al., "Radionuclide Concentrations in Louisiana Soils and Sediments", Health Physics, Vol. 51, August 1986.

Eberline 2006a Eberline Services/Oak Ridge Laboratory, Standard Level IV Report of Analysis, Work Order #06-05002-OR, May 21, 2006.

Eberline 2006b Eberline Services/Oak Ridge Laboratory, Standard Level IV Report of Analysis, Work Order #06-11072-OR, December 5, 2006.

Eberline 2006c Eberline Services/Oak Ridge Laboratory, Standard Level IV Report of Analysis, Work Order #06-11071-OR, December 15, 2006.

Eberline 2010a Eberline Services/Oak Ridge Laboratory, Standard Level IV Report of Analysis, Work Order #10-03066-OR, April, 2010.

Eberline 2010b Eberline Services/Oak Ridge Laboratory, Standard Level IV Report of Analysis, Work Order #10-05062-OR, June 10, 2010.

Eberline 2010c Eberline Services/Oak Ridge Laboratory, Standard Level IV Report of Analysis, Work Order #10-05066-OR, June 11, 2010.

Eberline 2010d Eberline Services/Oak Ridge Laboratory, Standard Level IV Report of Analysis, Work Order #10-05084-OR, June 11, 2010.

Eberline 2010e Eberline Services/Oak Ridge Laboratory, Standard Level IV Report of Analysis, Work Order #10-05133-OR, June 15, 2010.

EPA 1988 U.S. Environmental Protection Agency, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion", Federal Guidance Report No. 11, EPA-520/1-88-020, 1988.

EPA 2000 U.S. Environmental Protection Agency, "National Primary Drinking Water Regulations; Radionuclides; Final Rule", Federal Register, Vol. 65, No. 236, 76708-76753, December 7, 2000.

Greenfield 2010 Greenfield Advisors, "The VPSB Property, Vermilion Parish, Louisiana", April 15, 2010.

ICON 2010a ICON Environmental Services, Inc., "VPSB v Louisiana Land , at al, East White Lake Field, Vermilion Parish Assessment Report", Port Allen, LA, March 2010.

ICON 2010b ICON Environmental Services, Inc., "VPSB v Louisiana Land , at al, Feasibility Study and Remediation estimate, East White Lake Field, Vermilion Parish, LA", Port Allen, LA, April 2010.

LDEQ 2009a State of Louisiana Department of Environmental Quality, LAC Title 33 Environmental Quality, Part XV. Radiation Protection, December 2009.

LDEQ 2009b State of Louisiana Department of Environmental Quality, LAC Title 33 Environmental Quality, Part XV. Radiation Protection, Chapter 14. Regulations and Licensing of Naturally Occurring Radioactive Material (NORM), December 2009.

Louisiana 2004 Petition for Damages to School Lands, State of Louisiana and the Vermilion Parish School Board vs. The Louisiana Land and Exploration Company, et al.., 15th Judicial District Court for the Parish of Vermilion, State of Louisiana, Docket No. 82162, Division "D", September 2, 2004.

Meriwether 1988 Meriwether, J.R., et al., "Radionuclides in Louisiana Soils", Journal of Environmental Quality, Vol. 17, 1988.

Meriwether 1991 Meriwether, J.R., et al., "Distribution, Transport and Deposition of Radionuclides in Louisiana Soils, Final Report, LEQSF(1987-1990)-RD-A-27", December 1991.

Meriwether 1992 Meriwether, J.R., et al., "Distribution, Transport, and Deposition of Radionuclides in Louisiana Soils, Soil Survey Data Tables", March 1992.

NCRP 2009 National Council on Radiation Protection and Measurements (NCRP), Report No. 160, "Ionizing Radiation Exposure of the Population of the United States", Bethesda, Maryland, March 3, 2009.

Norman 2010 Norman, Charles R., "Engineering and Operations Report on East White Lake Field Operated by LL & E et al, Vermilion Parish, LA", March 28, 2010.

NRC 1999 National Research Council, "Evaluation of Guidelines for Exposures to Technologically Enhanced Naturally Occurring Radioactive Materials", National Academy Press, Washington, DC, 1999.

Pace 2010 Pace Analytical Services, Inc., Letter Report of Analysis, Project: East White Lake, Pace Project No. 3024016, Greensburg, PA, March 22, 2010.

Pisani 2010 Michael Pisani & Associates, Inc., "MP&A Sampling Locations – East White Lake Field, Vermilion Parish, Louisiana", Houston, TX, May 2010.

Snavely 1989 Snavely, Earl S., Jr., "Radionuclides in Produced Water – A Literature Review, Arlington, TX, August 1989.

Templet 2010 Templet, Paul H., "An Expert Report by Paul H. Templet, Ph.D., in VPSB v. Louisiana Land, et al.; East White Lake Field, Vermilion Parish", April 6, 2010.

USEPA 1990 U.S. Environmental Protection Agency, "National Oil and Hazardous Substances Pollution Contingency Plan," Final Rule, Federal Register (Volume 55, pp. 8666 et seq.), Washington, DC, March 8, 1990.

USEPA 2000 U.S. Environmental Protection Agency, "National Primary Drinking Water Regulations; Radionuclides; Final Rule", Federal Register (Volume 65, Number 236), pp. 76707-76753, Washington, DC, December 7, 2000.

USGS 1988 U.S. Geological Survey (USGS), "Radiochemical Analyses of Ground Water in Louisiana", Water Resources Technical Report No. 44, Louisiana Department of Transportation and Development and U.S. Geological Survey, Baton Rouge, LA, 1988.

Numerous photographs and aerial photographs of the subject property.

ATTACHMENT C

TESTIMONY SINCE JUNE 2006

LITIGATION IN WHICH DR. JOHN R. FRAZIER HAS TESTIFIED SINCE JUNE 2006

LAW FIRM	CASE	CLIENT	DATE
King & Spalding	Evelyn L. Abshire, et al., v. BP Corporation North America Inc., et al.	BP Corporation North America Inc.	August 28, 2006
Frilot Partridge	Donald Marin, Sr., et al., v. ExxonMobil Corporation , et al.	ExxonMobil Corporation	September 7, 2006
Holland & Knight	United States of America v. Science Applications International Corporation	Science Applications International Corporation	September 14, 2006
Miller & Keffer	Harvey TERM Litigation	Chevron, U.S.A.	January 18-19, 2007
Kean Miller	William Tebow, et al., v. Bradex Oil & Gas, Inc., et al.	Bradex Oil & Gas, Inc.	February 23, 2007
Liskow & Lewis	Donald Marin, Sr., et al., v. Exxon Mobil Corporation, et al.	ExxonMobil Corporation	March 28, 2007
Gordon Arata	Brownell Land Company, L.L.C., v. OXY USA, Inc., et al.	OXY USA	August 29, 2007
Greenebaum Doll & McDonald	Bonnie Anderson, et al., v. Ashland Oil, Inc., et al.	Ashland Oil, Inc.	January 18, 2008
Frilot	Tensas Poppadoc, Inc. v. Chevron U.S.A., et al.	Chevron U.S.A.	March 19, 2008
Frilot	Tensas Poppadoc, Inc. v. Chevron U.S.A., et al.	Chevron U.S.A.	May 5, 2008
Frilot	Tensas Poppadoc, Inc. v. Chevron U.S.A., et al.	Chevron U.S.A.	May 30, 2008

Holland & Knight	United States of America v. SAIC	SAIC	July 21-22, 2008
Murphy & Grantland	Charles Davis v. MDS, Inc. and MDS Nordion	MDS, Inc. and MDS Nordion	August 27, 2008
Woolf McClane	Warren Lester, et al., v. Exxon Mobil Corporation, et al.	Exxon Mobil Corporation, et al.	November 12, 2008
Liskow & Lewis	Duplantier Family Partnership, et al., v. BP Amoco, et al.	BP Amoco, et al.	November 24, 2008
Frilot	Tensas Poppadoc, Inc. v. Chevron U.S.A., et al.	Chevron U.S.A.	February 12, 2009
Woolf McClane	Warren Lester, et al., v. Exxon Mobil Corporation, et al.	Exxon Mobil Corporation, et al.	June 24, 2009
Stone Pigman	Belinda Harris, et al., v. BP America Production Company, et al.	BP America Production Company, et al.	December 2, 2009
Woolf McClane	Warren Lester, et al., v. ExxonMobil Corporation, et al.	ExxonMobil Corporation, et al.	February 17-18, 2010