STATE OF LOUISIANA AND THE IBERVILLE PARISH SCHOOL BOARD	*	**DOCKET NO. 72,605**
	*	**DIVISION "A"**
VERSUS	*	**18TH JUDICIAL DISTRICT COURT**
	*	**PARISH OF IBERVILLE**
BP AMERICA PRODUCTION COMPANY, ET AL.	*	**STATE OF LOUISIANA**

EXPERT REPORT OF JOHN R. FRAZIER, Ph.D., CHP

I. INTRODUCTION

I have been retained by counsel for Defendants in the matter of State of Louisiana and the Iberville Parish School Board vs. BP America Production Company, et al. in the Eighteenth Judicial District Court, Parish of Iberville, State of Louisiana [Docket No. 72,605, Division "A"]), to assess the radiological conditions of a specific parcel of land located in the Grand River Field in Iberville Parish, Louisiana. Specifically, I have been asked to review data provided by experts for Plaintiffs and Defendants in this matter to determine whether any information and/or data pertaining to the subject property indicate the presence and extent of naturally occurring radioactive materials (NORM) due to oil or gas production on the subject property. I have also been asked to review and comment on reports by Plaintiffs' experts that pertain to oilfield NORM in this case.

II. OPINIONS

As set forth in detail below, and based on my review of documents related to this case, my visits to the subject property, and results of radiation measurements and environmental sampling on the subject property, I have reached the following conclusions with a reasonable degree of scientific certainty:

1. There are no claims of oilfield NORM in soil on the subject property. Plaintiffs' measurements to assess the presence of oilfield NORM in soil and equipment on the subject property showed only natural background radiation levels from soil and equipment on the property.

2. Results of laboratory analysis of groundwater samples from the subject property show the concentrations of radioactive materials in groundwater on the property are within the range of natural background radionuclide concentrations in Louisiana groundwater, except for water samples from two wells ("SB-5" and "MW-2").

3. 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.

4. Because of the very low concentrations of NORM in the wells on the property and the natural characteristics of the water that show it to be non-potable, remediation of groundwater to remove oilfield NORM is not necessary or required.

5. The expert reports of Paul H. Templet and Charles R. Norman do not present any data they have generated pertaining to the current radiological conditions on the subject property. Nor do they present data or other information to support claims that there are or can be adverse health effects from oilfield NORM on the subject property.

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 safety). I have over thirty-eight 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 Past-president and 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 Distinguished Emeritus member of the National Council on Radiation Protection and Measurements (NCRP) and a Fellow and a 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 twenty-one years I have performed numerous radiological assessments of soil and groundwater on properties for oilfield NORM. I have also evaluated current and past radiation exposure conditions on properties impacted by oilfield NORM.

IV. BASIS OF OPINIONS

During preparation of my opinions presented in this report I reviewed documents related to the subject property and natural radiological conditions in the vicinity of the subject property and throughout the State of Louisiana. I also visited the property on March 7, 2016. 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 NCRP, a council of 100 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 uranium series and each radionuclide in the thorium 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 10-25 pCi/g. However, the range of concentrations of these radionuclides in native soil varies with location, depending on the components of the soil (NCRP 2009).

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 average and range of concentrations of Ra-228 in

native Louisiana soil are approximately the same as the respective concentrations of Ra-226. In native soil, both Ra-226 and Ra-228 are continually being produced in the natural radioactive decay series uranium and thorium, respectively.

B. Natural Background Radioactive Material in Louisiana Groundwater

Groundwater that contains natural solids contains naturally-occurring radioactive materials (NCRP 2009). In Louisiana, groundwater sampling has shown that the concentration of NORM radionuclides (Ra-226) is approximately directly proportional to the concentration of total dissolved solids and chlorides (and salinity) (USGS 1988). Concentrations of Ra-228 are usually greater than, or approximately equal to, the concentrations of Ra-226 in natural background groundwater in Louisiana.

C. 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 deposited in tissue per unit mass of tissue of a person exposed to ionizing radiation. External radiation doses are produced by penetrating radiation (e.g., gamma rays or x-rays) from radiation sources outside the human body. Internal radiation 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).

D. Radiation Doses from Ingestion of Ra-226 and Ra-228

Every person ingests an average of approximately 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 per year (EPA 1988) and this dose is included in the average total radiation dose from natural background radiation sources. The average annual dose from ingestion of natural background Ra-226 and Ra-228 in our food and water is less than 1 percent of the average annual dose we receive from all natural background radiation sources.

E. Oilfield 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 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 with trace amounts (by mass) of radium in the same mineral matrix (Smith 1996; NRC 1999). The chemical forms of scale that have been shown to contain oilfield NORM are highly insoluble and NORM radionuclides (i.e., Ra-226 and Ra-228) in the scale are not readily leached or transported from impacted pipe, other production equipment or soil by surface water or groundwater (IAEA 1990).

The presence (or absence) of oilfield NORM at the ground surface (in soil, pipe, or other production equipment) is determined by measurement of external radiation levels near the ground surface or production equipment (as NORM radionuclides emit measurable gamma radiation) and by analysis of soil samples and/or samples of the contents of production equipment (e.g., scale). The presence (or absence) of oilfield NORM in groundwater is determined by collection of representative samples of groundwater from suspect locations and analysis of the water samples for the concentrations of Ra-226, Ra-228, and total dissolved solids (TDS) in the water.

F. Description of the Subject Property

The property that is the subject of this radiological assessment is a parcel of land (Miller 2015) located in the Grand River Field in Iberville Parish, Louisiana. Descriptions of the location and/or history of oil and gas production operations on the subject property are given in several reports listed in Attachment B.

G. Collection and Analysis of Water Samples

The December 1, 2015 report by Miller and Prejean in this case indicates that seven groundwater samples were collected during June 2015 from wells on the subject property for analysis of Ra-226 and Ra-228 (Miller 2015). In October 2015, six groundwater samples were collected from six additional wells on the subject property for analysis of Ra-226 and Ra-228 (Miller 2015). The locations of groundwater wells that were sampled are shown in Figures 36-37 and 42-43 of the 2015 ICON report (Miller 2015). The samples were shipped by ICON under chain of custody to Pace Analytical Services, Inc. (Pace) in Greensburg, Pennsylvania, for measurement of

concentrations of Ra-226 and Ra-228 in each sample. Results of analysis of the 13 samples are given in two reports of analysis from Pace (Pace 2015a-b).

Split samples of groundwater from the 13 wells were collected by personnel with Hydro-Environmental Technology, Inc. (HET) on behalf of defendants and shipped under chain of custody to Eberline Analytical Corporation (Eberline) in Oak Ridge, Tennessee, for measurement of concentrations of Ra-226, Ra-228, and total dissolved solids (TDS) in each sample. Results of the Eberline analyses of the 13 samples are given in five reports of analysis (Eberline 2015a-e).

With the exception of analytical results for groundwater samples from two wells ("SB-5" and "MW-2"), analytical results produced by Pace and Eberline for the water samples (and split samples) show only naturally-occurring concentrations of Ra-226 and Ra-228 for the amounts of solids in the water samples. With all but the two exceptions noted above, the concentrations of Ra-226 and Ra-228 per unit mass of solids (TDS) in the samples were within the range of natural background concentrations. The concentrations of Ra-226 and Ra-228 in "SB-5" and "MW-2" are consistent with oilfield NORM in the groundwater at the two respective well locations.

H. Removal of Radium from Groundwater

As noted previously in this report, the principal radionuclides in oilfield NORM are two isotopes of the element radium, namely Ra-226 and Ra-228. The element radium is a trace metal in the natural environment, found in very low mass concentrations (IAEA 1990; IAEA 2014). When present in groundwater as radium chloride, it will accompany other, more abundant elements with similar chemical properties (viz., Group IIa elements of the Periodic Table of the Elements), such as barium (IAEA 1990; IAEA 2014). Radium is ordinarily present in groundwater as part of the "dissolved solids" in the water and is removed from the water with other solids (such as other chlorides) during treatment processes designed to remove dissolved solids from the water (IAEA 1990; IAEA 2014).

I. Hypothetical Dose Assessment

There are several guidance documents on which I have relied on numerous prior occasions for assessing potential radiation doses from environmental radiation sources. Some of these are listed in Attachment B (e.g., ICRP 1978; NCRP 1984; NRC 1995; USDOE 1984). Based on my review of the radiological characterization data for the subject property and on my experience assessing potential exposure pathways, exposure durations, and hypothetical radiation doses from environmental sources of radiation, I find that 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.

J. Review of Plaintiffs' Experts' Reports

I have read the December 30, 2015 expert reports of Dr. Paul H. Templet and Charles R. Norman in this matter. I find that neither Dr. Templet nor Mr. Norman present any data they have generated pertaining to the current radiological conditions on the subject property. They do not present data or other information to support claims that there are or can be adverse health effects from oilfield NORM on the subject property.

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.

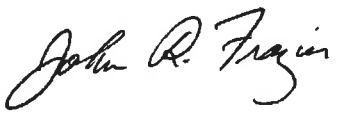
V. RATE OF COMPENSATION

I am being compensated at a rate of $250 per hour for my time to work on this project, including sworn testimony at deposition and trial.

VI. PRIOR TESTIMONY

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

Prepared and submitted by:



Date: March 31, 2016

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 38 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 2017.

Experience and Background

2004 - Present *Independent Health Physics Consultant*

Dr. Frazier provides consultation services to individuals, private companies, and government agencies on a wide range of radiation protection topics. 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)
Distinguished Emeritus Member, 2014-2015
Council Member, 2002-2014
Scientific Committee 46, 1999-2006
Scientific Committee 2-1, 2004-2006
PAC 2 Committee 2006-2015

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 (President, 2012; President-elect 2011; 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.

Key Elements of Preparing Emergency Responders for Nuclear and Radiological Terrorism, NCRP Commentary No. 19, Bethesda, MD, December 31, 2005.

Radiation Protection in Educational Institutions, NCRP Report No. 157, National Council on Radiation Protection and Measurements, Bethesda, MD, June 25, 2007.

Self Assessment of Radiation-Safety Programs, NCRP Report No. 162, National Council on Radiation Protection and Measurements, Bethesda, MD, June 3, 2009.

Radiological Health Protection Issues Associated With Use of Active Detection Technology Systems for Detection of Radioactive Threat Materials, NCRP Commentary No. 22, Bethesda, MD, September 2, 2011.

Investigation of Radiological Incidents, NCRP Report No. 173, National Council on Radiation Protection and Measurements, Bethesda, MD, September 14, 2012.

ATTACHMENT B

LIST OF DOCUMENTS REVIEWED

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

Armstrong 2013 Armstrong, Jon, Letter to Honorable Melvin Lodge, President, Iberville Parish School Board, BP America, Inc., Houston, Texas, June 14, 2013.

Carter 1988 Carter, M.W., et al., "Radionuclides in the Food Chain", Springer-Verlag, New York, New York, 1988.

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

Drury 1984 Drury, J.S., et al., "Radioactivity in Food Crops", ORNL-5963, Oak Ridge, Tennessee, May 1984.

Eberline 2015a Eberline Analytical Corporation, "Standard Level IV Report of Analysis," Work Order #15-06037-OR, Oak Ridge, Tennessee, July 1, 2015.

Eberline 2015b Eberline Analytical Corporation, "Standard Level IV Report of Analysis," Work Order #15-06069-OR, Oak Ridge, Tennessee, July 15, 2015.

Eberline 2015c Eberline Analytical Corporation, "Standard Level IV Report of Analysis," Work Order #15-07001-OR, Oak Ridge, Tennessee, July 31, 2015.

Eberline 2015d Eberline Analytical Corporation, "Standard Level IV Report of Analysis," Work Order #15-10073-OR, Oak Ridge, Tennessee, November 13, 2015.

Eberline 2015e Eberline Analytical Corporation, "Standard Level IV Report of Analysis," Work Order #15-10055-OR, Oak Ridge, Tennessee, November 20, 2015.

IAEA 1990 International Atomic Energy Agency (IAEA), "The Environmental Behaviour of Radium," Technical Reports Series No. 310, Volumes 1 and 2, Vienna, Austria, 1990.

IAEA 2014 International Atomic Energy Agency (IAEA), "The Environmental Behaviour of Radium: Revised Edition," Technical Reports Series No. 476, Vienna, Austria, 2014.

ICRP 1978 International Commission on Radiological Protection (ICRP), "Radionuclide Release into the Environment: Assessment of Doses to Man," ICRP Publication 29, New York, New York, 1978.

ICRP 2012 International Commission on Radiological Protection (ICRP), "Age-dependent Doses to Members of the Public from Intake of Radionuclides," http://www.icrp.org/page.asp?id-145, 2012.

IPSB 2013a State of Louisiana and the Iberville Parish School Board (IPSB), Petition for Damages, Iberville, Louisiana, May 20, 2013.

IPSB 2013b State of Louisiana and the Iberville Parish School Board (IPSB), First Supplemental and Amending Petition for Damages, Iberville, Louisiana, October 21, 2013.

LADEQ 2015 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), Baton Rouge, Louisiana, July, 2015.

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.

Miller 2013 Miller, Gregory W., "Report of Initial Sampling; Iberville Parish School Board Property, Grand River Field, Iberville Parish, LA," ICON Environmental Services, Inc., Port Allen, Louisiana, March 7, 2013.

Miller 2015 Miller, Gregory W., and Wayne Prejean, "Report of Environmental Assessment and Remediation Plan; State of Louisiana and Iberville Parish School Board v BP America Production Company, et al; Docket No. 72605; 18th JDC, Division "A"; Grand River Field, Iberville Parish, Louisiana," ICON Environmental Services, Inc., Port Allen, Louisiana, December 1, 2015.

NCRP 1984 National Council on Radiation Protection and Measurements (NCRP), Report No. 76, "Radiological Assessment: Predicting the Transport, Bioaccumulation, and Uptake by Man of Radionuclides Released to the Environment," Bethesda, Maryland, March 15, 1984.

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 2015 Norman, Charles R., "Engineering and Operations Report on Grand River Field, Iberville Parish, LA; Iberville Parish School Board Property (IPSB); Section 16 T10S, R11E; Iberville Parish, LA; Report No. 2," Iberville Parish, Louisiana, December 30, 2015.

NRC 1995 National Research Council, "Radiation Dose Reconstruction for Epidemiological Uses," Washington, DC, 1995.

Pace 2015a Pace Analytical Services, Inc., "Pace Project No: 30153056," Greensburg, Pennsylvania, July 29, 2015.

Pace 2015b Pace Analytical Services, Inc., "Pace Project No: 30162215," Greensburg, Pennsylvania, November 4, 2015.

Rowland 1994 Rowland, R.E., "Radium in Humans: A Review of U.S. Studies", Argonne National Laboratory, Argonne, Illinois, September 1994.

Smith 1996 Smith, K.P., et al., "Radiological Dose Assessment Related to Management of Naturally Occurring Radioactive Materials Generated by the Petroleum Industry," Argonne National Laboratory, Argonne, Illinois, September 1996.

Templet 2015 Templet, Paul H., "An Expert Report by Paul H. Templet, Ph.D., State of Louisiana and Iberville Parish School Board v BP America Production Co., et al; Docket No. 72605; 18th JDC, Division A; Grand River Field, Iberville Parish, Louisiana," Baton Rouge, Louisiana, December 30, 2015.

USDOE 1984 U.S. Department of Energy (DOE), "Models and Parameters for Environmental Radiological Assessments," DOE/TIC-11468, Washington, DC, 1984.

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

USEPA 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.

USEPA 2011 *U.S. Environmental Protection Agency (EPA), "Exposure Factors Handbook: 2011 Edition," EPA/600/R-09/052F, Washington, DC, September 2011.*

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, Louisiana, 1988.

Miscellaneous Documents:

Bates Numbers – IPSB_ICONrpt_000145-6

ATTACHMENT C

TESTIMONY OF JOHN R. FRAZIER, PH.D., CHP SINCE MARCH 31, 2012

LITIGATION IN WHICH DR. JOHN R. FRAZIER HAS PROVIDED SWORN TESTIMONY SINCE MARCH 31, 2012

LAW FIRM	CASE	CLIENT	DATE
Kean Miller	Ardoin Limited Partnership, et al., v. The Meridian Resource and Exploration LLC, et al.	The Meridian Resource and Exploration LLC, et al.	May 10, 2012
Johnson Gray McNamara	Hazel Richard Savoie, et al., v. Alice T. Richard, et al.	Alice T. Richard, et al.	August 10, 2012
Johnson Gray McNamara	Clarence Hill v. Exxon Mobil Corp., et al.	Exxon Mobil Corp., et al.	November 14, 2012
Kean Miller	Ruby Mhire, et al., v. Total Petrochemicals USA, Inc., et al.	Total Petrochemicals USA, Inc., et al.	November 19, 2012
Kean Miller	Texaco Exploration and Production, Inc., v. Hilcorp Energy Company	Defendants-in-Intervention	December 4, 2012
Kean Miller	Sterling Sugars, Inc., v. BP America Production Company, et al.	BP Production Company, et al.	December 10, 2012
Liskow & Lewis	Avahoula Resources, L.L.C. v. Exxon Mobil Corporation, et al.	Exxon Mobil Corporation, et al.	March 22, 2013
Arnold & Porter	Michelle McMunn, et al. v. Babcock & Wilcox Power Generation Group, Inc., et al.	Atlantic Richfield Co.	June 14, 2013
Liskow & Lewis	Agri-South Group, LLC, et al. v. Exxon Mobil Corporation, et al.	Exxon Mobil Corporation, et al.	July 18, 2013

King & Spalding	Olivia Bailey, et al., v. ExxonMobil Corporation, et al.	ExxonMobil Corporation, et al.	August 21, 2013
Woolf McClane	Naomi Guzman v. ExxonMobil Corporation, et al.	ExxonMobil Corporation, et al.	August 23, 2013
Kean Miller	The Sweet Lake Land and Oil Company, LLC v. Oleum Operating Company, L.C., et al.	Oleum Operating Company, L.C., et al.	November 20, 2013
Kean Miller	Agri-South, LLC, et al. v. Exxon Mobil Corporation, et al.	Exxon Mobil Corporation, et al.	December 11, 2013
Johnson Gray McNamara	Warren Lester, et al. v. Exxon Mobil Corporation, et al. (Bredero Price Flight)	Exxon Mobil Corporation, et al.	December 13, 2013
Liskow & Lewis	Agri-South Group, LLC, et al. v. Exxon Mobil Corporation, et al.	Exxon Mobil Corporation, et al.	August 20, 2014
Kean Miller	State of Louisiana Vermilion Parish School Board v. Louisiana Land & Exploration Company	UNOCAL	September 16, 2014
Jeansonne & Remondet	Clyde A. Tucker, et al. v. Shell Oil Company, et al.	Murphy Oil	December 17, 2014
Adams & Reese	Dwayne Chauvin and Brenda Chauvin v. Exxon Mobil Corporation, et al.	Exxon Mobil Corporation, et al.	March 13, 2015
Liskow & Lewis	Henry Leon Sarpy, et al. v. Exxon Mobil Corporation, et al.	Exxon Mobil Corporation, et al.	March 19, 2015
Kean Miller	State of Louisiana Vermilion Parish School Board v. Louisiana Land & Exploration Company	UNOCAL	April 30, 2015

Kean Miller	The Sweet Lake Land and Oil Company, LLC v. Oleum Operating Company, L.C., et al.	Oleum Operating Company, L.C., et al.	May 22, 2015
Liskow & Lewis	Sterling Sugars, Inc. v. Amerada Hess Corporation, et al.	Amerada Hess Corporation, et al.	June 19, 2015
Jones Walker	State of Louisiana and The Cameron Parish School Board v. Apache Corporation, et al.	Apache Corporation, et al.	September 30, 2015
Adams & Reese	Brittany Roache, et al. v. Alpha Technical Services, et al.	Alpha Technical Services, et al.	October 7, 2015
Liskow & Lewis	Frank B. Allain, et al. v. Exxon Mobil Corporation, et al.	Exxon Mobil Corporation, et al.	November 12, 2015
Liskow & Lewis	Sterling Sugars, Inc. v. Amerada Hess Corporation, et al.	Amerada Hess Corporation, et al.	November 13, 2015