

**MINUTES**  
**PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION**  
**LOW-LEVEL WASTE ADVISORY COMMITTEE (LLWAC) MEETING**

**October 4, 2013**

**Attendance**

LLWAC Members and Alternates

Michael Akins (Vice-Chair), Worley Parsons  
Edward Black, PA State Association of Township Commissioners  
Eric Boeldt, Pennsylvania State University  
Kevin Bohner, University of Pittsburgh  
Sara Clark, PA House of Representatives  
Richard Fox, PA State Senate  
Charlotte Glauser, League of Women Voters  
Marjorie Hughes, PA Citizens Advisory Counsel  
Ed Kohler, PA Society of Professional Engineers  
Jo Ellen Litz, County Commissioners Association of PA  
Jonathan Lutz, PA House of Representatives  
Siobhan O'Dwyer, Exelon Corp.  
William Ponticello, PA Council of Professional Geologists  
Jeff Schmidt, PA Chapter of Sierra Club  
Robert Smith, PA Chamber of Business and Industry  
Katherine Shelly (Chairperson), PA Farm Bureau  
James Wheeler, PA State Association of Township Supervisors

Department of Environmental Protection (DEP) Staff

David Allard, Bureau of Radiation Protection (BRP)  
Robert Altenburg, Policy Office  
Jim Barnhart, BRP  
Martin Felion, BRP  
Rich Janati, BRP  
Cheryl Miller, BRP  
Dave Ralicki, BRP  
Sharon Trostle, Waste, Air, Radiation, Remediation (WARR)

Others

Susanne Akins  
Celeen Miller

## **Committee Business**

### **Election of Officers**

The LLWAC members voted to re-elect Katherine Shelly as Chairperson and Michael Akins as Vice-Chairperson for an additional year.

### **Approval of the Meeting Minutes**

The LLWAC members voted unanimously to approve the minutes of the October 5, 2012, annual meeting.

Mr. Kohler stated that he does not recall receiving the department's "lessons learned" document regarding the low-level radioactive waste (LLRW) disposal facility siting process in PA. Mr. Janati said a copy of the document was mailed to the committee members following the 2012 annual meeting, and some members indicated they had received this document. Mr. Janati committed to providing the "lessons learned" document to all the committee members via email.

### **Next Annual Meeting**

The committee decided to hold its next meeting on October 2, 2014, with an alternate date of October 10, 2014.

## **Status of Commercial LLRW Disposal Facilities and Recent Developments**

Mr. Janati provided an overview of the formation of the regional compacts and discussed the status of the commercial LLRW disposal facilities.

There are currently four commercial LLRW disposal facilities in the United States. These facilities are Barnwell in South Carolina, the EnergySolutions facility in Utah, Richland in Washington and the new Waste Control Specialists (WCS) facility in Texas.

1. The Barnwell facility accepts all classes of LLRW from the three members of the Atlantic Compact (Connecticut, New Jersey and South Carolina). As of July 1, 2008, this facility no longer accepts LLRW from outside the Atlantic Compact.
2. The EnergySolutions Clive facility accepts Class A waste from all states except those in the Northwest and Rocky Mountain Compacts. This facility is not a regional facility, and it is regulated by the State of Utah. In April of 2012, the State of Utah approved a variance request for the disposal of Class A sealed sources at this facility. The variance will have a term of one year from the date the first shipment is received at the Clive facility and will be partially funded by the Conference of Radiation Control Program Directors (CRCPD). Only Class A radioactive sealed sources recovered as part of a round-up coordinated by the CRCPD Source Collection and Threat Reduction (SCATR) Program are authorized for disposal at the Clive facility. The sealed sources will be limited to Class A waste, and the half-lives of the isotopes in the sources to be disposed of should be equal to the half-life of

Cs-137 or less. Mr. Janati stated that under the SCATR Program, a pilot project for collection of Class A, B and C sealed sources began in July of 2013 involving the four states of Illinois, New York, Ohio and Indiana. The first shipment of sealed sources was received at the EnergySolutions facility on September 30, 2013. Mr. Janati said PA DEP issued two separate Information Notices to all radioactive materials licensees in PA to inform them of the disposal options for sealed sources at the EnergySolutions facility in Utah and the WCS facility in Texas.

3. The Richland facility is a regional facility and accepts all classes of LLRW, but only from the member states of the Northwest and Rocky Mountain Compacts. This facility continues to accept radium sources from the Appalachian Compact and other states and compacts.
4. The WCS facility is a regional facility for the Texas Compact (Texas and Vermont) and accepts all classes of LLRW from both commercial and federal facilities. In April 2012, the Texas Commission on Environmental Quality (TCEQ) authorized WCS to accept waste and begin disposal activities including the collection and disposal of sealed sources. Additionally, the Texas Compact Commission has established rules for the importation and exportation of LLRW into and out of the Texas region. Mr. Janati stated that the current facility license limits disposal of out-of-region waste to a maximum of 30 percent of the total facility volume. Also, LLRW from international origins will not be accepted for disposal at the WCS facility. The facility is able to receive and dispose of large components as non-containerized waste, and transportation is authorized by highway or rail. The facility is considering several changes to its original license including removal of the current annual limit on the volume of imported waste, raising the current radioactivity limit for the imported waste, removal of inventory limits for isotopes C-14, TC-99 and I-129, and disposal of large quantities of depleted uranium.

Mr. Wheeler asked who makes the decision to increase disposal limits at the WCS facility. Mr. Janati replied that the State of Texas (an NRC Agreement State) would have to review and approve this request.

Mr. Fox asked where Pennsylvania is sending its LLRW. Mr. Janati replied that, on average, about 98 percent of LLRW (by volume) in PA and the Appalachian Compact is Class A waste and is being sent to the EnergySolutions facility for disposal. He also said the new WCS LLRW disposal facility in Texas is accepting waste from other compacts, including the Appalachian Compact. The majority of the nuclear utilities in the Appalachian Compact now have access to the WCS facility and some have already made shipments of Class B and C wastes (higher concentrations of LLRW) to this facility. Mr. Janati stated that this is a significant development considering that since July of 2008 (closure of the Barnwell disposal facility to waste from outside the Atlantic Compact), LLRW generators in the compact have not been able to dispose of their Class B and C wastes due to the lack of disposal options.

Mr. Janati also provided an overview of a report by the TCEQ, "Capacity Report for Low-Level Radioactive Waste: A report to the Texas Legislature."

Study results indicate that the WCS disposal facility could take significant curies of out-of-compact waste before impeding on space that is required to be reserved for waste from the Texas Compact generators under the current license conditions. Mr. Janati said it is important to point out that projected volumes presented in the report do not consider processing of the waste. He said processing of waste involves volume reduction techniques such as compaction, incineration, and steam reforming that could result in substantial reduction in waste volumes depending on the technique used. The impact of volume reduction techniques on the LLRW generated in the Texas Compact is that the WCS facility could take additional waste from outside the Texas Compact or non-party states.

Mr. Schmidt inquired about the steam reforming process. Mr. Janati replied that steam reforming is a thermal treatment technology that uses high temperatures to release organic gases and water vapor from the waste. This process reduces water content of the waste significantly. Presently, this technique is not being used by any PA licensees.

In response to a question by Ms. Glauser about incineration of low-activity medical waste, Mr. Janati replied that some facilities continue to incinerate medical waste. He also said medical waste constitutes a relatively small quantity of LLRW in our compact. Mr. Allard added that, typically, medical waste that contains short-lived radionuclides for diagnostic purposes are stored for decay, but waste containing long-lived radioisotopes such as animal carcasses from research activities are incinerated. Mr. Janati stated that commercial incineration of radioactive waste is prohibited in PA.

Mr. Bohner asked if an event occurs involving a radiological dispersion device (RDD) or anything of that nature, and a large volume of waste is generated from the cleanup activities of such an incident, would it fall under LLRW? If so, who would be responsible for managing that waste—state or Federal government? Mr. Janati stated that a few years ago, PA DEP participated in an exercise sponsored by the Environmental Protection Agency called Liberty RadEX. The exercise involved the detonation of an RDD in Philadelphia and resulted in a very large quantity of waste. As part of this exercise, the participants developed a plan for the management and disposal of waste associated with the RDD incident and recovery activities. He said this type of radioactive waste is unique because it would not originate from a licensed facility. Mr. Janati said the waste would need to be placed into a temporary waste staging area and all options would have to be considered and evaluated, including disposal in-state (i.e., landfills) and out-of-state (i.e., LLRW disposal facilities). Mr. Janati said disposal options to be considered for the radioactive waste from the RDD incident or a similar incident depend upon the type of waste (i.e., LLRW, low-activity waste, etc.) and its concentration of radioactive materials. He said the affected state and the Federal government share responsibility for the management and disposal of waste from an RDD incident.

### **Update on NRC Low-Level Waste Program Activities**

Mr. Janati provided an overview of the recent NRC Low-Level Waste Program activities as follows:

- Large-Scale Blending of Waste - In March 2011, the NRC issued guidance for reviewing large-scale blending of LLRW. This guidance should assist the NRC staff and Agreement States in making informed decisions regarding large-scale blending applications or requests from licensees. Mr. Janati stated that the concept of blending waste was discussed extensively at the previous meetings of the LLWAC. He also said that, as of now, the department has not received any applications for large-scale blending in PA.
- Storage of LLRW - In August 2011, the NRC issued a Regulatory Issue Summary (RIS 2011-09) associated with extended storage of LLRW to provide licensees with a consolidated list of available resources that will assist with the extended storage of LLRW. The RIS also provides a summary of the types of information contained in the listed resources.
- Volume Reduction Policy Statement - In May 2012, the NRC issued a revised Policy Statement on Volume Reduction. The NRC recognizes that volume reduction is only one aspect of an effective program for managing LLRW. The revised policy statement encourages licensees to also consider other factors such as operational efficiency, reductions in occupational exposures, security, and cost in deciding how to best manage LLRW.
- Branch Technical Position (BTP) on Concentration Averaging - In June 2012, the NRC issued the revised BTP for public comment. One of the key revisions includes the NRC's new position on blending of waste. The BTP serves as guidance and contains acceptable methods for classifying various waste streams or mixtures of these waste streams for disposal in accordance with the NRC LLRW regulations in 10 CFR Part 61 (Licensing Requirements for Land Disposal of LLRW). The publication of the final BTP is expected in December 2013.
- Revisions to NUREG/BR-0204 - The NRC regulations in 10 CFR Part 20 require that NRC Uniform Waste Manifest (UWM) be prepared for waste intended for disposal at a licensed LLRW facility. The information on the shipping manifest is reflected on NRC Forms 540 (Shipping Paper), 541 (Container and Waste Description) and 542 (Manifest Index and Regional Compact Tabulation). Specifically, the shipper must include the activity of the radionuclides H-3, C-14, Tc-99 and I-129 on the UWM. Mr. Janati said these radionuclides ("Phantom 4") were identified by the NRC as being significant to the groundwater pathway and radiation dose to a potential receptor. He also stated that the activities of these radionuclides are difficult to measure (DTM) in radioactive waste and are being over-estimated because of the use of lower limit of detection (LLD) values on the shipping manifest. The NRC NUREG/BR-0204 provides instructions for completing the NRC's UWM. This document states that if these radionuclides are present in a shipment at levels less than the LLD, the LLD values must be reported. Mr. Janati said the concern is that over-reporting of these radionuclides could result in the premature closure of disposal sites due to over-estimation in site inventory and radiation dose assessments. He said the NRC is currently involved in seeking input from various

stakeholders for a potential revision to NUREG/BR-0204 to improve reporting guidance for the DTM radionuclides.

- 10 CFR Part 61 Rulemaking - Mr. Janati provided a discussion of Part 61, Subpart C requirements for land disposal of LLRW, specifically protection of the general population, protection of individuals from inadvertent intrusion, protection of individuals during operations, and stability of the disposal site after closure. Mr. Janati said the NRC is considering a rulemaking to revise Part 61 for several reasons including the emergence of potential waste streams not considered in the original Part 61 rulemaking such as large quantities of depleted uranium, DOE's increasing use of commercial LLRW disposal facilities, and extensive international operating experience in the management of waste.

Mr. Janati provided a summary of the key proposed changes. The NRC staff is proposing that LLRW disposal licensees and license applicants be required to conduct updated and new site-specific technical analyses and to develop site-specific waste acceptance criteria. The site-specific technical analyses required by the proposed changes would include an updated analysis to demonstrate protection of the general population from releases of radioactivity (called performance assessment); a new analysis to demonstrate protection of inadvertent intruders (called an intruder assessment); and new performance period analyses to evaluate how the disposal facility could mitigate the risk from the disposal of long-lived LLRW after the expiration of the compliance period.

Mr. Janati said the NRC staff is proposing a two-tiered approach for the proposed performance assessment analyses with a compliance period of 10,000 years and a performance period beyond 10,000 years. He said he is concerned that site-specific modeling for performance assessment could be complicated due to the uncertainties associated with the 10,000 years performance assessment period (i.e., the performance of the disposal system). This could complicate the licensing process for new LLRW disposal facilities that would only accept routine LLRW for disposal and are not expected to accept unique waste streams such as depleted uranium.

Mr. Janati said the NRC staff is also proposing a radiation dose limit of 500 mrem/yr for an inadvertent intruder. The current radiation dose limit for protection of the general public remains at 25 mrem/yr. The proposed changes would maintain the existing LLRW classification system, and would allow disposal facilities to consider facility design and site-specific characteristics to determine site-specific waste acceptance criteria for disposal of LLRW at their site. Mr. Janati said the NRC has not yet made a decision on the NRC staff proposed changes and whether to proceed with the Part 61 rulemaking.

Mr. Wheeler asked if Pennsylvania would be required to change its LLRW regulations to incorporate the revisions to Part 61. Mr. Janati replied that Pennsylvania is an NRC Agreement State and, as such, is expected to adopt the proposed changes in accordance with the NRC's Agreement State compatibility designations for the revised the Part 61. He said Agreement States will have three years from the published date of the final rule to adopt compatible regulations in the new Part 61.

Ms. Hughes asked what the department's position is on the proposed performance assessment period of 10,000 years. Mr. Janati said the department's position is that Agreement States should be allowed to select a period of performance assessment consistent with disposal site-specific features and waste acceptance criteria. He said the NRC proposed performance assessment period of 10,000 years is overly conservative for the disposal facilities that accept only routine LLRW.

At the conclusion of this discussion and at Ms. Shelly's request, the department agreed to keep the LLWAC members abreast of any significant developments involving the Part 61 rulemaking during the course of the year and via email.

### **Information on LLRW Generation and Storage Information for the Appalachian Compact**

Mr. Barnhart provided an overview of the LLRW classification system and discussed the 2012 waste disposal information for the Appalachian Compact (compact). He said the data was obtained directly from the EnergySolutions facility because the DOE's national database had not yet been updated to reflect the 2012 waste disposal information. Mr. Barnhart stated that, currently, about 98 percent of LLRW by volume from the compact is being sent to the EnergySolutions facility.

During calendar year 2012, the compact generated about 134,841 ft<sup>3</sup> of Class A LLRW. The total radioactivity of this LLRW was about 451 Ci. Pennsylvania disposed of about 102,913 ft<sup>3</sup> or 76 percent of waste by volume, most of which was generated by the utility, government and industrial sectors. Maryland disposed of about 12,364 ft<sup>3</sup> of waste or approximately 9 percent of total volume, most of which was generated by government and utilities. Delaware and West Virginia generated about 75 ft<sup>3</sup> and 21 ft<sup>3</sup>, respectively. Mr. Barnhart also provided information on the radioactivity of Class A LLRW generated in the compact. Pennsylvania disposed of about 449 Ci or 99.5 percent of waste by radioactivity, most of which was generated by the nuclear utilities. Maryland generated about 2.13 Ci or 0.47 percent of waste by radioactivity. Delaware and West Virginia generated about 0.007 and 0.003 Ci, respectively. All Class A waste generated within the compact was shipped to the EnergySolutions disposal facility in Clive, Utah.

Mr. Allard asked if the 2012 data will be amended to include waste disposal information from the WCS facility in Texas. Mr. Barnhart replied that the information from WCS will be captured and reported in 2013. Mr. Janati said that shipments of LLRW from the compact to the WCS facility have been very limited in 2012. He said he expects these shipments to increase in 2013. Ms. O'Dwyer said Exelon is expected to make several shipments of LLRW to the WCS facility in 2013, including waste that is currently being stored at the Peach Bottom Atomic Power Station in PA. She also said the company's contract with WCS is limited to certain amounts of waste by activity, and Exelon will prioritize what is going to be shipped from its nuclear fleet for disposal in Texas.

Mr. Barnhart provided a brief discussion of waste generation trends in the compact for the period of 1993 through 2012. He also presented a chart showing simple radioactive decay of the 2007 compact waste for the top 20 isotopes (containing the largest amounts of radioactivity) for the

periods of 50, 100, 500 and 1000 years. In 2007, the nuclear utilities made several shipments of Class B and C wastes to the Barnwell disposal facility. The shipments contained very large quantities of radioactivity (curies). Mr. Barnhart stated that the majority of isotopes in the LLRW have relatively short half-lives (less than five years) and decay rapidly. In summary, the isotopes with half-lives greater than five years decayed to only a fraction of their original radioactivity content after 100 years and beyond.

Ms. Glauser asked for a copy of Mr. Barnhart's slides that contained information on the longevity of various isotopes in 2007. Mr. Janati committed to providing that information to all committee members via email.

### **Update on PA DEP Radiation Study of Oil and Gas Operations (TENORM Study)**

Mr. Allard provided an update on the department's comprehensive radiation study of oil and gas operations in Pennsylvania. He said the generation of technologically enhanced naturally occurring radioactive material (TENORM) has increased significantly. This is mainly due to the recent expansion in natural gas exploration and production in the commonwealth. Mr. Allard explained that TENORM is defined in the solid waste regulations under the radiation protection action plan and is not in the purview of the Low-Level Waste Advisory Committee.

Mr. Allard explained that hydraulic fracturing, or fracking, fractures the shale and releases natural gas. Hydraulic fracturing is a national issue. There are relatively high levels of TENORM, particularly radium-226 and -228, in the brine and flowback water that go to treatment facilities from the oil and gas industry. PA DEP has initiated a study to review several key issues associated with TENORM that must be managed effectively. The issues are potential worker radiation exposure, public radiation exposure, and environmental (water, etc.) contamination. The department has the lead on this and a contractor, Perma-Fix Environmental Services, Inc., is providing assistance and consultation to the department. The department is collecting the necessary data as part of this comprehensive study. Several different types of facilities have already been sampled. The first round of sampling, including wastewater treatment plants (WWTPs) and landfills, commenced on April 15, and the second round began on June 7, 2013. The sampling for underground gas storage sites started on May 14, and well pad sampling began on June 17, 2013. Sampling has been conducted 2 times at 25 WWTPs, 9 landfills, 12 well pads (drilling and fracking), and 4 underground natural gas storage sites. The types of samples collected have included natural gas samples, liquid samples (i.e., frac water, wastewater), solid samples (i.e., drill cuttings, sludges) and 'wipe' samples of loose material throughout the facilities. The samples are being analyzed for the presence of alpha, beta, and gamma radiation. The gas is being sampled for radon. PA DEP's Bureau of Laboratories and a contracted lab (Gel Labs) will be receiving and analyzing the samples collected. Mr. Allard stated that the department is also going to be tracking the waste from water treatment plants to landfills, looking at how it is being disposed of.

Mr. Allard said the study will take 12 to 14 months to complete. The final study scope and associated sampling plans are posted on the PA DEP Website. He said the department will continue to provide periodic updates on the TENORM Study to appropriate department advisory committees.



Mr. Schmidt asked if this report would include recommendations for improvements and to address any issues or concerns that may arise from the study. Mr. Allard replied that the report will include recommendations.

Mr. Boeldt inquired about funding for the study. Mr. Allard said the cost will be shared by PA DEP's Bureau of Radiation Protection and Bureau of Waste Management. Ms. Clark inquired about the expected date for the completion of the study. Mr. Allard said the study is expected to be completed by mid summer of 2014.

### **Public Comment**

A member of the public in attendance inquired about the total cost for conducting the TENORM Study. Mr. Allard stated that the study is expected to cost over a half million dollars.

### **Adjournment**

The meeting was adjourned at approximately 12:50 p.m.