



LOW-LEVEL WASTE ADVISORY COMMITTEE

MINUTES

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

September 30, 2022

Attendance

LLWAC Members and Alternates

Ernest Hanna, Pennsylvania Chamber of Business and Industry
Glendon King, PA House of Representatives
Mark Pawlowski, Constellation Nuclear
William Ponticello, Pennsylvania Council of Professional Geologists
Keith Salador, DEP Citizens Advisory Council
Jesse Sloane, Pennsylvania Society of Professional Engineers
Carole Rubley, Pennsylvania Chapter League of Women Voters
Justina Wasicek, Sierra Club, Pennsylvania Chapter
Craig Benson, Pennsylvania Farm Bureau
Brian Lorah, Penn State College of Medicine
James Wheeler, Pennsylvania State Association of Township Supervisors
Lara Renz Paciello, University of Pittsburgh Graduate School of Public Health
Nick Troutman, PA Senate
Emily Eyster, PA Senate
Jeff Ivicic, PA Senate
Evan Franzese, PA House of Representatives
Julia Loving, Legislative Staff

Department of Environmental Protection (DEP) Staff

Dwight Shearer, Bureau of Radiation Protection (BRP)
Stephanie Banning (BRP)
Wade DeHaas (BRP)
Kristina Hoffman (BRP)
Rich Janati (BRP)
Molly Adams (BRP)
Tyler Van Well (BRP)
Hena Farid (BRP)
Michelle Foster (BRP)
Richard Marcil (Bureau of Regulatory Counsel)
Valerie Shaffer (Executive Assistant, WARR)

Others Present

Frank Helin, EnergySolutions

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Hannah Pell, EnergySolutions

Kathy Shelly, Member of the Public (former chair of LLWAC)

David Allard, Member of the Public (former Director of BRP)

David Hess, Member of the Public

Public Comment

David Allard formally thanked Mr. Janati and other BRP staff who put all the effort in preparing for this meeting including all the data analysis and presentations.

Committee Business

Election of Officers

The LLWAC members voted unanimously to elect William Ponticello as Chairperson and James Wheeler as Vice-Chairperson.

Approval of the Meeting Minutes

The LLWAC members voted unanimously to approve the minutes of the October 1, 2021 annual meeting.

Next Annual Meeting

The committee decided to hold its next meeting on September 29, 2023 with an alternate date of October 6, 2023.

Status of LLRW Compacts and Update on Commercial LLRW Disposal Facilities

Mr. Janati provided an update on the status of low-level radioactive waste (LLRW) compacts and commercial LLRW disposal facilities and recent national developments involving management and disposal of LLRW.

There are currently four (4) commercial LLRW disposal facilities in the United States. These facilities are Barnwell in South Carolina; the EnergySolutions facility in Clive, Utah; Richland in Washington; and the 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. The facility also provides for disposal of bulk waste and large components such as steam generators from the nuclear power plants. This

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facility is not a regional facility and is regulated by the State of Utah. The Utah Department of Environmental Quality is currently conducting a regulatory review for disposal of large quantities of depleted uranium and Class A radioactive sealed sources at this facility. EnergySolutions is also seeking approval for license renewal of Class A waste, licensing of a federal cell and exempted waste cell.

3. The Richland facility is a regional facility and accepts all classes of LLRW but only from the Northwest and Rocky Mountain 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. Additionally, the Texas Compact Commission has established rules for the importation and exportation of LLRW into and out of the Texas region. The annual limit on radioactivity for out-of-compact waste is 275,000 Ci, but there is no annual limit on volume for out-of-compact waste. About 70% of licensed capacity is for in-compact waste and about 30% is for out-of-compact waste. Disposal of large quantities of depleted uranium and Greater-Than-Class C (GTCC) waste is being considered by WCS.

Mr. Janati stated that the Texas Compact Commission (TCC) has formed a capacity committee to gather information and develop metrics for the TCC to ensure appropriate data will be available for future decisions relative to approval of the amount of waste that would be disposed and to ensure future economic stability of the CWF.

Mr. Janati stated that if the WCS facility is no longer available to the Appalachian Compact, the generators in the compact would have to store Class B and C wastes onsite. We conducted a survey of all the generators several years ago when the South Carolina facility was closing to our generators. They indicated that they would be able to store waste onsite for at least five years. We will continue to ship waste to the EnergySolutions facility in Utah. The higher concentration of waste such as primary resin from the nuclear power plants can be blended down to Class A waste for shipment to the Clive facility in Utah. The department also issued a waste minimization guidance document. This document is published on the department's website. It provides guidance to our generators, particularly the smaller ones, for minimizing the generation of LLRW.

Mr. Janati stated most of the high-concentration waste from the compact is being disposed at the WCS facility in Texas. Primarily, waste from the nuclear power plants. Most of the low-activity waste is being disposed of at the Clive facility in Utah.

Ms. Rubley asked if we foresee that either the Clive or WCS facility would be closing to us and if so, in what timeframe. Mr. Janati stated that there is no plan to close the Clive or WCS facility to out-of-compact waste in the foreseeable future. In the past, some people have asked under what conditions we might restart the siting process for a regional LLRW disposal facility. The condition is if there is a need for a facility. For example, if we no longer have access to out-of-compact disposal facilities.

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Mr. Shearer commented that it could be a political request that, for example, WCS is no longer available to the Appalachian Compact. So, would the timeframe be within 30 days, six months? They could simply say the Appalachian Compact is frozen out or they could state you will be paying triple the rate for disposal. This would have to be taken into consideration. The restart process could ramp up quickly if something politically would happen in Texas. Mr. Janati also commented that there might be other scenarios that could result in the premature closure of a facility other than political and economic reasons such as an unplanned release of radioactive materials.

Mr. Pawlowski of Constellation Nuclear stated we spend a lot of money changing strategies when there is any uncertainty about disposal of waste. We have recognized that we play a role in keeping WCS viable financially and we are making those adjustments, but this takes time. Mr. Janati stated that under the worst-case scenario, generators of LLRW have the option of storing their waste onsite as they did in the past when the Barnwell facility closed to the Appalachian Compact. He said his assessment of the situation is that both the EnergySolutions facility in Utah and the WCS facility in Texas will continue to accept waste from the Appalachian Compact in the foreseeable future.

Review of Appalachian Compact LLRW Generation Information

Mr. Janati provided background information on the DOE's Manifest Information Management System (MIMS). MIMS contains information on LLRW disposal at the current commercial LLRW disposal facilities. Mr. Janati said DEP has significantly reduced the regulated community's administrative LLRW reporting requirements by obtaining the appropriate disposal information from the MIMS database and directly from the commercial disposal facilities.

Mr. Janati discussed the waste disposal information for calendar year 2021. The Appalachian Compact disposed of about 69,946 ft³ of LLRW. Pennsylvania disposed of about 58,078 ft³, most of which was generated by the industry and the nuclear utilities. Maryland disposed of 11,824 ft³, most of which was generated by the industry, the nuclear power plants, and the government. West Virginia disposed of 36 ft³ and Delaware disposed of 8 ft³. Most of Class A waste generated within the compact was shipped to the EnergySolutions Clive Facility in Utah. Mr. Janati also provided information on the radioactivity (curie) of waste generated in the compact. The compact generated about 1,683 Ci of LLRW. Pennsylvania generated about 1,615 Ci of waste and Maryland generated about 68 Ci of waste. Both Delaware and West Virginia generated less than 0.1 percent Ci.

Mr. Janati provided a brief discussion of waste disposal trends in the Compact for the period of 2001 to 2021. He said in 2001, several facilities were undergoing decommissioning and cleanup activities, so the amount of waste volume was very high. The Barnwell disposal facility in South Carolina stopped accepting waste from outside the Atlantic Compact in July 2008, resulting in the storage of Class B and C wastes, mainly by the nuclear utilities, for about five years. Beginning in 2014 and through 2021, the reported radioactivity also includes Class B waste that was shipped to the WCS facility in Texas. In 2016, the Safety Light facility in PA started

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cleanup efforts under the EPA's Superfund Program. The cleanup continues but currently there is not much LLRW being generated by this facility.

Mr. Janati provided a brief discussion of radioactivity of waste for the period of 2001 through 2021. From the years 2001 through 2008, the radioactivity of waste was very high due to the availability of the Barnwell facility to our compact. The nuclear power plants in the compact shipped large quantities of high activity irradiated components and reactor cleanup resins to Barnwell in 2007 and 2008, knowing that they will no longer have access to this facility.

The radioactivity of waste has been relatively low after the closure of the Barnwell facility to our compact beginning in 2009. We began shipping waste to the WCS facility in 2014 and we have been able to ship Class B and C wastes that contain higher activity to this facility. In 2018, the reported activity is very high because of a shipment of irradiated reactor components from a nuclear power plant in PA to the WCS facility in Texas.

Mr. Janati stated that many nuclear power plants are storing their irradiated reactor components onsite. Mr. Pawlowski stated that many nuclear utilities are storing these components onsite similarly to how they store spent nuclear fuel. He said we are spending a lot of money changing strategies if there is uncertainty about disposal. Now, we recognize that we play a role in keeping the WCS facility in Texas open. We are making those adjustments, but it takes time to get it started. Mr. Janati stated that we are probably going to see some changes in the future with respect to the number of shipments of higher activity waste. He said there are uncertainties associated with storing waste onsite such as an increase in disposal rates. It would make sense financially to dispose of waste when possible rather than storing it onsite.

Mr. Janati presented a pie chart showing that in 2021, about 66% of the compact's LLRW by volume was disposed at the Clive facility in Utah and about 34% by volume was disposed at the WCS facility in Texas. In comparison, about 53% of the compact's LLRW radioactivity was disposed at the Clive facility and about 47% of radioactivity was disposed at the WCS facility.

Mr. Janati stated that in the Appalachian Compact the definition of LLRW does not include TENORM (Technologically Enhanced Naturally Occurring Radioactive Material). TENORM is being tracked separately from LLRW. The TENORM reported from the compact is mainly from hydraulic fracking operations in Pennsylvania. In 2016, the volume of TENORM shipped to a commercial disposal facility was about 38,400 ft³. In 2021, the volume increased to 212,750 ft³. The radioactivity content of TENORM is very low. Both the Clive facility in Utah and the WCS facility in Texas have accepted TENORM from the Appalachian Compact. They have a separate disposal cell for TENORM. The total amount of TENORM disposed at these two facilities during 2016 through 2021 was 787,670 ft³ and the total amount of LLRW was 1,295,403ft³. We have been tracking and reporting TENORM that is being disposed at the facilities in Texas and Utah.

Mr. Ponticello praised the Bureau for the amount of work that is required to track and break down the data into charts and graphs so we can understand it. He said we want to monitor and track the information correctly and the Bureau does a great job of that.

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Peach Bottom Steam Dryer Shipment

Mr. Pawlowski, Constellation Nuclear (formerly Exelon Nuclear), provided an update on the Peach Bottom steam dryer shipment to the committee. Peach Bottom Atomic Power Station is located in southern York County. It has two units, Unit 2 and Unit 3, that are currently in operation which generate 2,750 megawatts of clean energy for PA.

In 2001, Exelon submitted their license renewal application to extend the life of both units at Peach Bottom Atomic Power Station until 2033 and 2034. In conjunction with the renewal, we were also looking to maximize the generation potential and Peach Bottom was one of the nuclear power plants that was selected to undergo an extended power upgrade. This upgrade would increase our megawatts from 2,514 to 3,915, which was a big jump in the power level.

The extent of the power upgrade is not just the reactor, it involves the entire nuclear power plant. You are looking at major changeouts involving low- and high-pressure turbines which feed the main generator to generate electricity and the transformer that transfers electric energy.

A basic overview was provided describing how a boiling water reactor operates. Steam is boiled inside the core of the reactor vessel which would then go through the steam dryer which removes moisture from the steam before it passes through the steam turbine to avoid turbine blade degradation. The dry steam is then routed to the turbine which turns an electrical generator to produce electricity.

I wanted to explain this because we had to change out our steam dryer to meet the new licensing conditions. The new design would need to generate the higher megawatts. The replaced steam dryer was fairly radioactive. We contracted with EnergySolutions to do a turnkey project including characterizing, packaging, transportation, and disposal of the old steam dryer.

The refueling outage was completed prior to the project removal. We created a plan to get as many dose rates of contamination samples to help us characterize it ahead of time so we could create the correct package requirements, validate that it's Class A waste, and be ready to package it into containers and ship it off for disposal. We worked with EnergySolutions and their subcontractors to create this model and prepare for the refueling outage. We did validate it as Class A waste, and it requires an IP-2 shipping container for transportation.

To support the shipment, the original steam dryer was segmented underwater into three main sections that would be packaged into individual IP-2 packages: (2) Upper Vain Back Sections and (1) Lower Skirt Sections and some minor components. These can be segmented into the smaller pieces and put into a smaller box for transport.

Mr. Wheeler asked about the radiation levels of the shipment. Mr. Pawlowski stated the contact radiation dose limit by regulations should not exceed 200 millirem (mrem) per hour. He said there is also a limit of 10 mrem per hour at two meters while the package is placed on the transport trailer.

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We built the inner containers to the maximum size we could and safely get through a tight clearance. The initial plan was to package and dispose of it during the outage. Prior to segmenting it, the dryer had to remain until a new one was in place and ensure that we could validate that it fit and was connected correctly. Designing these components is a long process.

This process began in April of 2021 and the subcontractors started developing plans to get these shipped to Clive, Utah. To determine the route, EnergySolutions subcontracted with Kinsley Construction. We have an excellent facility out in York with access to a rail line. They worked with a heavy hauling company (Barnhart) that specializes in these sorts of moves. The route chosen was Route 74 in York County and continued to the interchange. We started with Norfolk Southern railway and ended with Pacific Union. Anything on this side of the Mississippi uses Norfolk Southern and anything on the other side uses Pacific Union.

We started loading these containers for shipping. These trailers moved slowly, about seven miles per hour. We did contact the local news agencies to let the public know they might be experiencing delays that morning. It took about five hours to get one of the containers to Route 74 from Peach Bottom. The total duration of the activity took 10 days including getting the equipment offloaded and reshipped to Peach Bottom. Due to the size of the load, we had a police escort and a state trooper that inspected the trailers and then handled traffic control. The process was very slow due to the amount of people involved who assisted with these shipments.

We had to get approval for a reciprocity license from PA. The state had to review their plan and how the material was going to be handled and the people that were going to control it, etc. We had to make sure the plan was effective.

The shipment left Kingsley on July 30th and arrived in Clive, Utah on August 9th. There were no DOT or Clive Disposal Facility compliance issues with the shipment. There were zero safety issues with any of the work with this project from an OSHA standpoint. We did run into a lot of work stoppage due to the heat and stress and also was delayed by thunderstorms. We plan to capture a spring-time date for future shipments. There are two more containers at Peach Bottom for Unit 3 and traditionally, Unit 3 contained more radioactivity. We expect that we will ship them off in 2028 and we will go through the same motions as we did for this preparation.

We managed it very well from a communication aspect with both our regulators and our stakeholders. We were a joint team with EnergySolutions that managed the communications. If any questions or concerns were raised, we replied right away. We recognized that handling a shipment of radioactive waste is very important, especially because it is very visible to the public and it could raise concerns. We ensured our communications with the community and the stakeholders were clear and concise.

Mr. Allard praised the southcentral regional office of the PADEP which had a very good interaction with Exelon. There was a lot of work involved in the big move. Concerns were raised due to radiation levels around the containers and having the employees getting it staged for shipping. High praise was given to our southcentral region who monitored the move and the

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placement of the storage and surveying its radiation levels. There was also good interaction with our central and southcentral office and Exelon's communication with our communication team.

TMI-2 Decommissioning Overview

Frank Helin, TMI-2 Solutions, provided an update to the committee. He stated that they have been very busy on the regulatory front. A license amendment request (LAR) was submitted last year that would allow transition from post Defueling Monitored Storage (PDMS) to decommissioning. Also related to this LAR, is a proposed emergency plan revision which would cover both TMI-1 and TMI-2. The emergency plan revision needs to happen to support the approval of the license amendment request. We expect to have this submitted by the end of October.

We recently received approval for a security LAR transitioning TMI-2 to a Part 37 security plan. This allowed us to aggregate and move waste consistent with our plans to transition into decommissioning. That was completed at the end of August. We have recently had the Nuclear Regulatory Commission (NRC) inspect and review our security plan. We received favorable comments, no issues or violations were raised, and there were not any findings. They also performed a radiation protection inspection and no issues, violations, or findings raised.

As far as waste management goes, we did perform some shipments for TMI-1 using the EnergySolutions license. We are developing waste packaging plans in preparation for shipping waste in 2023. There is plenty of planning, waste packaging preparation, and ordering taking place to ensure we have a precise plan for shipping containers and the conversations with the railroad. Shipments will begin in 2023.

Mr. Janati commented to brief some of the new members that there is some damaged fuel left within the TMI-2 plant since the accident. Mr. Helin stated the material is either in the form of debris or resolidified material that attached itself to the core components. In other cases, it even completely mixed with other materials depending on its location. He said similar to what we are doing for low-level waste, we are developing packaging plans for the fuel debris and performing engineering assessments for the waste packaging. The plan is to store the fuel bearing materials in NAC canisters on a storage pad next to TMI-1 spent nuclear fuel. We have a contract to validate the process we are using to ensure all the fuel bearing materials have been removed. Since the beginning of June, we put programs and procedures into place so we could perform some work ourselves as we transitioned from PDMS to decommissioning and continue to maintain license conditions associated with the decommissioning license status. The work was previously conducted by Constellation Nuclear. We spent a lot of time putting these programs together, getting the procedures approved, and having people trained. In the beginning of July, we took over most of those programs. There are still some things Constellation does for us, but radiation protection is included in the programs that we now manage. As a result, we have been able to get into the reactor building and get additional survey data by flying drones. This gave us the ability to complete some surveys so we could validate what was collected in 1992 and to see if it was the same. We also filled in any blanks when data was either missing or if other areas needed additional data to get a good solid picture of what the radiation dose rates are.

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We are now transitioning from traditional health physics surveys to robotic surveys and this allows us to mobilize robotics in order to provide the site new technology. This technology is used to create heat maps so we could try and zero in on a component, an area, or a particular item to remove the source and ship it out. These surveys will continue until the first quarter of 2023.

In terms of our environmental program, Constellation is continuing to maintain all of the sideline programs and the necessary permits to perform our other work. Constellation has been doing outstanding work continuing our site programs, but that may change down the road.

The schedule remains the same and we continue with the planning licensing phase. We expect to transition at the end of this year when the decommissioning LARs are completed. We are making efforts to remove the damaged core material and reduce our source term. Once we remove all the source term and the damaged core materials, we will approach the final decontamination and decommissioning phase in a manner similar to what we would expect if a nuclear power plant did not experience an accident.

Ms. Wasicek asked if Mr. Helin could elaborate on the negotiations of the decommissioning agreement with Constellation. Mr. Helin stated they have two agreements with Constellation. One is the PDMS services agreement which allows Constellation to perform the services needed to maintain the PDMS license basis. Examples include such things as the groundwater monitoring program and Offsite Dose Calculation Manual (ODCM). It also included radiation protection, but this program is out of the monitoring service of the agreement since we are now implementing that program ourselves. The second one is a monitoring service agreement and it is specific to the PDMS license condition. It will be removed once we transition from the PDMS to decommissioning. We need to create another agreement to continue receiving services from Constellation. In some cases, Constellation may ask us to perform certain tasks because they are reducing staff. This can be done in the form of a decommissioning agreement. It would cover those services needed during the decommissioning license condition. We are working to reach an agreement in writing that protects both parties and includes all the required services. We hope to have this completed by December.

Mr. Janati said PADEP will continue to provide an independent oversight review of TMI-2 activities. He said we have an agreement with TMI-2 Solutions which allows us to conduct on-site surveillances, review various documents, and attend certain meetings. It is important that the members are aware of this.

Mr. Ponticello stated there is a high level of interest of the status of decommissioning and what is happening with the planning. We very much appreciate the presentation which was very informative. We intend to keep you on the agenda for future meetings and we hope you can continue to provide information to the committee on these activities.

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Public Comment

Mr. Allard commented that he enjoyed all the presentations and that the meeting was very informative.

Adjournment

The meeting was adjourned at approximately 12:47 p.m.