pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

LOW-LEVEL WASTE ADVISORY COMMITTEE

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

October 1, 2021

Attendance

LLWAC Members and Alternates

Ernest Hanna, Pennsylvania Chamber of Business and Industry
Glendon King, PA House of Representatives
Jo Ellen Litz, County Commissioners Association of PA
Mark Pawlowski, Exelon Corporation
William Ponticello, Pennsylvania Council of Professional Geologists
Keith Salador, DEP Citizens Advisory Council
Michael Sheetz, University of Pittsburgh Graduate School of Public Health
Jesse Sloane, Pennsylvania Society of Professional Engineers
Carole Rubley, Pennsylvania Chapter League of Women Voters
Yaunqing Guo, Pennsylvania State University
Justina Wasicek, Sierra Club, Pennsylvania Chapter
Emily Eyster, PA Senate
Greg Vitali, PA House of Representatives
Griffin Caurso, Legislative Staff
Julia Loving, Legislative Staff

Department of Environmental Protection (DEP) Staff

David Allard, Bureau of Radiation Protection (BRP)
Stephanie Banning (BRP)
Kate Cole (Policy Office)
Wade DeHaas (BRP)
Kristina Hoffman (BRP)
Rich Janati (BRP)
Stefanie Muzic (BRP)
Steve Acker (BRP)
Chris Minott (BRP)

Others Present

Craig Benson, Member of the Public
Frank Helin, EnergySolutions
Hannah Pell., EnergySolutions
Josephine Martin, Member of the Public

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 2, 2020 annual meeting.

Next Annual Meeting

The committee decided to hold its next meeting on September 30, 2022 with an alternate date of October 6, 2022.

Status of Commercial LLRW Disposal Facilities

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

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 in to 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. The TCEQ granted an increase in the total capacity of the Compact Waste Facility (CWF) from 2.3 million cubic feet (ft^3) to 9 million ft^3. Additionally, 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 prepared a contingency plan for the disposal and management of LLRW should there be a disruption of the normal operation of the CWF. The TCC has indicated that they can meet within 72 hours advance notice, if necessary, should the facility close. The TCC has the authority to suspend all existing import agreements; not consider any new import requests; and issue export permits to in-compact generators to ship LLRW to other disposal facilities.

Mr. Janati stated that if the CWF is no longer available to the Appalachian Compact, the generators in the compact would have to store higher concentration LLRW (Class B and C wastes) onsite. We did 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. He said 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.

The TCC's contingency plan considers several options and contains some recommendations. One option is to ask the state of Texas to operate the facility, but the state indicated they are not prepared or have the capability to operate this facility. The other option is for the TCC and other stakeholders including the generators of LLRW to seek a new operator, a new company, to operate the facility. The TCC encourages the users of the CWF to regularly dispose of their Class B and C wastes as soon as reasonably practical. They have also asked the LLRW generators to ensure they have adequate storage capacity onsite.

Mr. Janati stated that the 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 imports and to ensure future economic stability of the CWF.

Update on Commercial LLRW Disposal Facilities

Mr. Janati provided the 2020 LLRW statistics for the commercial disposal facilities in the United States. During calendar 2020, WCS accepted about 31,000 cubic feet (ft^3) of waste and the activity level was about 24,000 curies (Ci). They only disposed of 3% of total volume but the activity was about 60% because they are accepting higher concentration of LLRW or Class B, and Class C wastes. The Barnwell facility accepted about 31,000 ft^3 or 3% of the total volume

and the activity level was 640 Ci. The Clive facility in Utah accepted about 930,000 cubic feet which is about 92% of the total waste by volume. Finally, the Richland facility generated about 15,000 ft^3 which is about 1.5% in volume and the activity was 9,000 Ci. In 2020, the Commercial disposal facilities accepted just over 1,000,000 ft^3 of waste for disposal. The activity of the waste was about 40,323 Ci.

A comment was made by Mr. Pawlowski from Exelon. He stated that the nuclear utilities understand the importance of WCS. He said we are committed to getting the waste to WCS and not storing it onsite. It is best not just for the utilities but for the industry across the country. We know Barnwell closed and a lot of compacts were trying to figure out what to do. Our goal is to help WCS stay in business. Mr. Janati stated as it relates to WCS, one of the limitations they have is that the regulations are set by the state of Texas. Texas has a lot of control over their rates. Mr. Pawlowski mentioned the rates that Texas charges for out-of-compact imports into their facility has to be set at a higher rate than what they charge for in-compact waste. The biggest barrier for out-of-compact costs is the taxes that Texas poses. There are multiple taxes and fees that go into it, roughly 31%.

In response to a question by Mr. Guo, Mr. Janati said that currently only WCS facility accepts Class C waste from our Compact. In the past, the Barnwell facility in South Carolina accepted Class C waste and very rarely Greater-Than-Class C (GTCC) waste. He said he is not aware of any GTCC waste being disposed of at the WCS facility. In response to a follow up question by Ms. Litz, Mr. Janati said the industry is now allowed to blend waste, which is mixing higher concentration of waste with similar waste of lower concentration. This method would result in a waste that is of lower concentration or lower class. The blending of waste helped generators to dispose of their higher classes of waste when the Barnwell disposal facility in SC closed to out-of-compact waste in 2008.

Information on LLRW Disposal for the Appalachian Compact

Mr. Janati discussed the waste disposal information for calendar year 2020. The Appalachian Compact disposed of about 395, 889 ft^3 of waste. About 145,545 ft^3 of the total amount of waste is LLRW and about 250, 344 ft^3 of it is TENORM waste. TENORM is Technologically Enhanced Naturally Occurring Radioactive Material. It is mainly from conventional and unconventional development of oil and gas production. The oil and gas industry generates a lot of TENORM, which is lower activity and very small radioactivity but very high in volume. When you look at the total amount disposed, Pennsylvania was the largest generator. Typically, Pennsylvania generates the largest amount of waste, and it is why we are designated as the host state for the Appalachian Compact.

Pennsylvania disposed of about 129,811 ft^3, most of which was generated by the government and the industrial and the utility sectors. Maryland disposed of about 15,709 ft^3 of waste, most of which was generated by the industry sector. West Virginia disposed of about 22 ft^3 and Delaware disposed of about 3 ft^3. Mr. Janati also provided information on the activity (curie) of waste generated in the Compact. The Compact generated about 1,215 Ci of LLRW.

Pennsylvania generated about 1,212 Ci of waste, Maryland generated about 1.52 Ci of waste, West Virginia generated about .172 Ci, and Delaware generated less than .007 Ci.

The largest generator of LLRW by volume in 2020 was the industry category. They generated about 103,942 ft^3 of waste. The second largest by volume is the nuclear power plants. They generated about 28,597 ft^3. The Appalachian Compact currently has ten operating nuclear power plants, eight in Pennsylvania and two in Maryland. We also have TMI-1 and TMI-2 and both units are shut down. TMI-2 will be going through decommissioning in a few years, and they'll be generating a considerable amount of low-activity high volume waste. The third highest generator of LLRW in the Compact is the government category, which is mainly naval support activities.

Mr. Janati provided a brief discussion of waste disposal trends in the compact for the period of 2000 through 2020. From 2016 through 2020, the volumes have been increasing drastically. This is due to generation of TENORM. There are several major developments since 2000. The Barnwell disposal facility in South Carolina closed in July of 2008 to all out-of-Atlantic Compact generators. The activity level of waste has decreased significantly because prior to the closure of Barnwell to our generators, the nuclear power plants sent considerable amount of irradiated components or reactor components for disposal at Barnwell. Mr. Janati said for almost five years, our generators stored higher concentration of wastes (Class B and C wastes) onsite. We did not start sending waste to WCS in Texas until 2014. In years 2016-2020 the volume of waste increased significantly due to the significant amount of low-activity high-volume waste shipments. During 2000-2020, our Compact generated about 1,818,876 Ci of LLRW. Beginning in 2014 and through 2020, the reported activity also included Class B waste that was shipped to the WCS facility in Texas. Mr. Janati said the Appalachian Compact has made only one or two shipments of irradiated reactor components to the WCS facility so far. Additionally, due to blending of certain Class A waste with Class B waste, the volume of Class B waste that would have been disposed at the WCS facility has diminished significantly. There has been a reduction in Class C waste in storage since control blades are now being replaced less frequently and due to improved packaging efficiency.

Mr. Janati presented a pie chart showing that in 2020, about 68% of the compact's LLRW by volume was disposed at the WCS facility in Texas and about 32% by volume was disposed at the EnergySolutions Clive facility in Utah. In comparison, about 82% of the compact's LLRW by activity was disposed at the Clive facility, and about 18% by activity was disposed at the WCS facility.

Mr. Janati said we are keeping track of TENORM but we will report it separately from LLRW because in our compact TENORM is not considered LLRW by definition. The other reason to separate it is because if Pennsylvania should ever acquire a disposal facility, it would not be accepting TENORM waste for disposal. Another reason we track them separately is that for the performance assessment of the Pennsylvania facility, we should only use the LLRW data and not TENORM. Finally, there is a provision in our compact act that states the compact commission should designate another state as the host state, if it generates LLRW (not TENORM) more than 25% of Pennsylvania's waste by volume or activity over a three-year period.

Ms. Wasicek asked how TENORM waste in Pennsylvania compares to other areas of the country. Mr. Allard stated a few states generate TENORM. Ohio has the Marcellus Shale and Utica shale. Ohio's volumes come from used frack and produced water that runs through injection wells. Ohio has delegation and they approve their own permits, and it is done efficiently. They have 200 injection wells. When they produce water and use frack water, they inject it back into the strata, 9-10,000 feet down to avoid generating waste. The EPA would probably have the best handle on TENORM volumes. Ms. Wasicek then asked how PADEP is going to monitor radon in the leachate. Mr. Allard stated there are no standards for monitoring radon and leachate. Leachate must be either treated onsite with a package-sewage plant type of operation or sent to a sewage treatment plant where it is fed into the normal waste in people's houses and industries.

TMI-2 Decommissioning Overview

Mr. Helin, Project Director for TMI-2 Solutions, provided an update to the Committee. He stated that we are in the planning and licensing phase. We have a licensing request filed with the NRC where we move from safe shutdown to the actual decommissioning work and the NRC license will authorize us to do the heavy physical decommissioning. With our current license, we can prepare the site to support the physical decommissioning. We hope to transition to the decommissioning phase by mid-year 2022.

Mr. Helin stated that we are reviewing waste management packaging plans. This information will be exchanged, and a data review will be completed along with a historical data review. TMI-2 will continue to be in physical decommissioning. We have a gap between what our limiting event analysis on TMI-2 results versus what TMI-1 had proposed for emergency action levels (EALs). We realized conservative assumptions were made. We thought organic resin was used when in fact it was inorganic, metallic resin. The fire results will be different. We are in the process of updating the limited event analysis and working with Exelon to put in place an EAL for TMI-2 that is commensurate with the analysis.

We are preparing to process and recycle lead bricks and other materials that were left from the last cleanup of TMI-2. The brick will be shipped offsite and recycled into shielding in which some will return to be used for decommissioning. We are working with Exelon to identify buildings we can use to create an infrastructure with computers, phones, and offices.

We have begun site characterization work. We need to confirm radiation levels, where core debris remained, and the volume that remained is accurate. We hired a company to fly drones. We initially flew the drone at TMI-1 to find any issues from a radiological perspective. Mr. Helin then showed a video of drone flights at TMI-1 and TMI-2. The video showed the upper part of containment, the dome, and then the polar crane. He said we were not sure of the condition of the polar crane and we thought it may need to be rebuilt. After reviewing the video, we concluded that the polar crane was in good shape and an extensive upgrade was not necessary. The drone also took general area radiation dose readings. A decay analysis was performed, and we now have current information about the radiation levels contained. We

obtained information near the elevator shaft and the brick. You can see the reactor building basement, lead blankets, and lead shielding. There were concerns with the elevator shaft because the blocks can absorb the water that leaked. The drone then flew into the stairway to the reactor building basement where the valve was stuck open and the tanks were overflowed. The water made its way down into the reactor building basement. You could see on the walls areas where a water level existed and have concerns about the amount of water that was absorbed into the block.

We have built a Building Information Model (BIM) by starting with drawings of the plant and we built a 3D model. New information gets updated to the BIM. We have overlaid the 1990s radiation levels and data hotspots and information on core debris. When a team is assigned to enter and area and remove a component that has higher radiation levels, we can do it robotically with a crew. We can see where the equipment and passageways are. We can see where the radiation dose rates and hotspots are and plan accordingly. The next characterization effort is to enter basement using robotics and probe deeper into the walls, take surface surveys, take some core bores, some sludge samples, and figure out the depth any of and fission products penetrating the block. We'll then be able to segregate that waste. We hope to complete this by October.

Mr. Janati asked if they have seen any intrusion of radioactive materials into the groundwater. Mr. Helin stated the purpose of this sampling is to help locate where the hotter, more difficult material is so we can prepare plans for decommissioning. Cutting out pieces of concrete to measure depth. We have no concerns due to continued groundwater sampling and other environmental sampling results. Mr. Janati also stated it is all about the community and the findings will need to be communicated routinely to the public.

Mr. Janati asked what the largest span is as far as radiation level that the robotics would no longer be able to function. Mr. Helin said the impact of radiation level on the robots has not been assessed but it is a concern. He said they will not take the robot directly to a high-point source, they would instead use an extending device to take a smear survey. Mr. Janati then asked where the damaged fuel will be stored in the interim before the cask storage facility is available. Mr. Helin stated they will be making internal liners available as part of their cask procurement and they will take the fuel bearing material and put it in these liners. He said we may have two or three of these liners going at the same time starting with the larger pieces of debris that contain fuel bearing material going in first. These portable liners would go into the transportable storage container and will be placed on the floor of the reactor building.

The biggest challenge is the steam generator inlet because it is a once through steam generator. Due to water containing fission products from the accident pumping through the system, the inlet of the steam generator had some impingement of fuel-bearing material. It solidified and is essentially part of that inlet plan. Mr. Ponticello asked if there is a cost estimate in terms of total costs to complete this operation. Mr. Helin stated he will follow up with an estimate.

Public Comment

Ms. Hanna Pell of EnergySolutions announced that the next Citizen's Advisory Panel meeting for TMI-2 is scheduled for December 7th from 6:00 to 7:30 at the Middletown Area High School. It will be a hybrid-style setting. For additional information you can access their website at www.tmi2solutions.com.

Adjournment

The meeting was adjourned at approximately 1.01 PM.