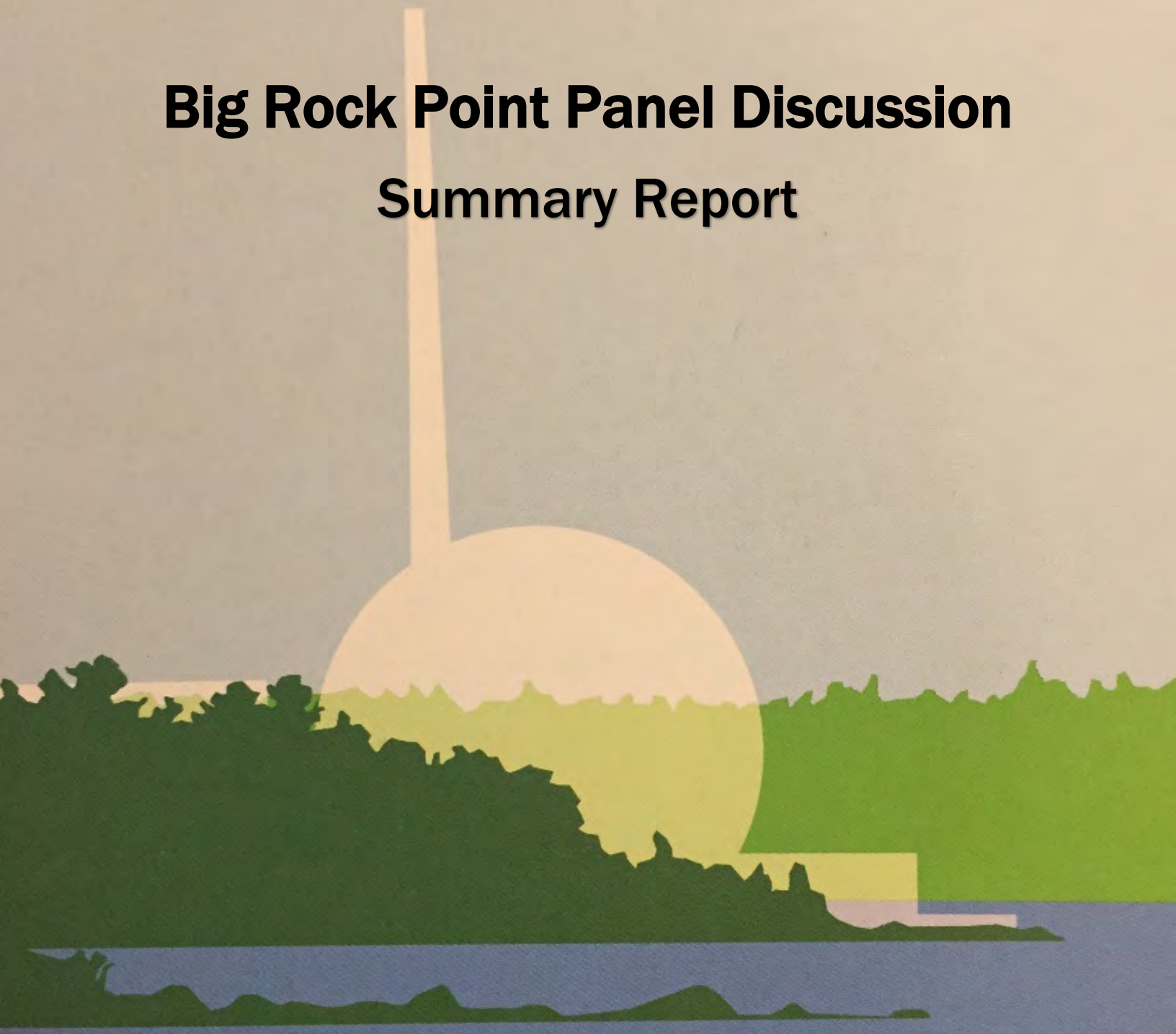
# Big Rock Point Panel Discussion

## Summary Report




Prepared by Tip of the Mitt Watershed Council
for the International Joint Commission's Great Lakes Water Quality Board.

Special thanks to Mark Burrows, Ryan Graydon and Jennifer DeMoss
for assistance with content and review of the summary report.

March 31, 2020

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# Executive Summary

Since 1963 when Big Rock Point became the first nuclear power station to begin commercial operations in the Great Lakes basin, a total of 38 nuclear reactors at 16 commercial generating stations on 14 sites were constructed and generated electricity for utilities. Today, there are 30 operating nuclear reactors at 12 commercial generating stations and numerous supporting facilities in the Great Lakes basin. Currently, eight nuclear reactors at six sites have been permanently shut down, and another seven nuclear reactors at two sites have been announced to close in the next few years. However, several nuclear operators have reversed closure decisions due to changes in energy policies, such as government subsidies via zero emmission credit programs to support continued commercial nuclear operations.

The International Joint Commission (IJC) has studied nuclear issues since the nuclear power era began in Canada and the United States in the 1950s, and its Great Lakes Water Quality Board is currently assessing the water quality impacts from closing nuclear plants in the Great Lakes basin.

As part of its assessment, the IJC's Great Lakes Water Quality Board (WQB) Legacy Issues Work Group held a Big Rock Point panel discussion because Big Rock Point is the only nuclear site in the Great Lakes basin to be dismantled and most of the site released from its license by the federal regulator, the U.S. Nuclear Regulatory Commission (NRC). Key stakeholders were invited to participate in a panel discussion to discuss the lessons learned from the experience of decommissioning the Big Rock Point nuclear plant.

On February 27, 2020, twenty individuals representing the WQB, State of Michigan agencies, local tribes, environmental non-governmental organizations, and industry gathered at the Odawa Hotel in Petoskey, Michigan, for the Big Rock Point panel discussion. Through this discussion, the Water Quality Board was looking for prime lessons from the people who were involved in the decommissioning process. The WQB asked participants to convey what worked best, how the process could have been improved, what

Big Rock Point Nuclear Power Plant. Credit: U.S. Department of Energy

happened to their community after the decommissioning process was completed, the management of spent nuclear fuel remaining onsite, and ideas for future uses of the site.

Each panelist was allotted five minutes to present on specific questions provided in advance, and a discussion followed.

During the participant comments and panel discussion, a number of recurring themes were presented:

- Panelists expressed their satisfaction with the frequent communication and public engagement from Consumers Energy throughout the decommissioning of the Big Rock Point Nuclear Power Plant.
- The public has a general fear or mistrust of the nuclear industry. Communication and community engagement, particulary a citizen's advisory board, was vital to allaying fears and addressing people's attitudes towards nuclear waste.
- Consumers Energy was successfully able to reduce the residual radioactivity onsite to only a small fraction of the Nuclear Regulatory Commission's requirements for releasing the site for unrestricted use (i.e., greenfield).
- There was agreement that the site should be conserved for future generations, given the unique ecological, scenic, and cultural value of the property. Permanent protection is the most preferred solution for the property.
- There was concern expressed about the lack of monitoring for potential contaminants both on and off the site after the license has been released by the NRC. Around the Great Lakes, there are numerous former industrial sites that are now decades later known to be releasing pollution; the parties responsible have dissolved, thus the cleanup falls on governments incurring tremendous costs to taxpayers. Without continued monitoring, we will not know quickly if any issues arise in the future and this may be a limitation of current government regulations. This concern is enhanced by the fact that there is a known tritium plume onsite, although it is acknowledged that the tritium levels are below the groundwater standards set by the U.S. Environmental Protection Agency (maximum contaminant level of 20,000 picocuries per liter) and the maximum radiation dose (25 millirems per year) requirement set by the Nuclear Regulatory Commission for termination of license.
- There is great concern among community members about third-party companies who specialize in decommissioning nuclear power plants that purchase the license to decommission the plants and become responsible for nuclear waste management. Attendees questioned these companies' business plans, including assurance of adequate funding for decommissioning, transparency of funding amount and recipients of the monies, and the effect of a profit motive on the quality of the work. Furthermore, another concern expressed was the more transfers there are of the nuclear waste among companies, the less community involvement there will be, equating to less public trust and oversight of the property.

- An important concern that was repeatedly raised was that until the spent nuclear fuel (high-level radioactive waste) is removed from the site, it will continue to remain a potential danger to the community and the waters of Lake Michigan. There needs to be a timely solution to remove the spent nuclear fuel that is currenly stored onsite.
- There were concerns about the spent nuclear fuel eventually being transported by barge on the Great Lakes. These concerns were responded to by the Entergy representatives who cited the De-Inventory Report for Big Rock Point submitted to the U.S. Department of Energy in which transportation by barge was determined to be the least preferred transportation option compared to transport by heavy-haul truck and rail.
- The U.S. Government has failed to develop a rational policy with respect to nuclear waste management. It is incumbent upon all of us to let Congress know that a permanent site for high-level radioactive waste needs to be determined to address the current unacceptable risk of spent nuclear fuel storage within the Great Lakes basin and around the country.

In conclusion, moving the spent nuclear fuel away from the Great Lakes shoreline is the next step to substantially reduce the remaining risk to the Great Lakes from decommissioned nuclear power plants. Congress needs to fulfill its obligation of accepting spent nuclear fuel by prioritizing the licensing of a repository. However, until the spent nuclear fuel can be moved offsite, we need to be diligent and monitor these sites more closely.

The Independent Spent Fuel Storage Installation (ISFSI) at Big Rock Point. Credit: U.S. Department of Energy

# 1. Great Lakes Water Quality Board

The Great Lakes Water Quality Board (WQB) is the principal advisor to the International Joint Commission (IJC) under the Great Lakes Water Quality Agreement (GLWQA). The Board assists the Commission by reviewing and assessing the progress of the governments of Canada and the United States in implementing the Agreement, identifying emerging issues and recommending strategies and approaches for preventing and resolving complex challenges facing the Great Lakes, and providing advice on the role of relevant jurisdictions to implement these strategies and approaches.

The International Joint Commission has studied nuclear issues since the nuclear power era began in the 1950s and its Great Lakes Water Quality Board is currently assessing the environmental hazards that could result from closing nuclear plants in the Great Lakes basin. Due for completion in 2020, the Board initiated this study after significant concerns about nuclear waste and proposed permanent storage solutions were raised by the public at the IJC's 2016-2017 public meetings around the Great Lakes basin.


Map of the facilities involved in the nuclear energy lifecycle in the Great Lakes region. Source: Background Report

In January 2017, the IJC approved the Board's plan to study the decommissioning of nuclear power plants in the Great Lakes basin.

For this project, the Board is assessing the environmental hazards and risks that could result during and after the decommissioning process, the regulatory regimes in Canada and the United States, and the best practices used in North America and Europe for decommissioning.

Study deliverables include a report from the University of Chicago Harris Policy Lab assessing the financial aspects of decommissioning submitted to the Board in June 2019. A background report, *Nuclear Power Facilities in the Great Lakes Basin*, describing nuclear power plants in the Great Lakes basin, radioactive waste storage and the regulatory regimes of both countries was completed for the Board and published in September 2019. Contracted consultants submitted a report to the Board in September 2019 based on interviews of experts in North America and Europe to identify potential environmental challenges, best practices, and lessons learned from the decommissioning of nuclear power plants.

The Board will use this information to make recommendations to the Commission regarding any additional actions the Canadian and US governments could take to eliminate or reduce threats to the Great Lakes from the potential release of radioactive contaminants due to decommissioning. The Board's report is expected to be submitted to the Commission by fall 2020.

Work group members contributing to this project include:

- Frank Ettawageshik
  Executive Director, United Tribes of Michigan
- George Heartwell
  Former Mayor, City of Grand Rapids, Michigan
- Glenn Miller
  Professor, University of Nevada - Department of Natural Resources and Environmental Science
- John Jackson, Project lead
- Brandon Hofmeister*
  Senior Vice President, Governmental, Regulatory & Public Affairs, CMS Energy
- Mark Mattson*
  Founder & President, Lake Ontario Waterkeeper
  President, Swim Drink Fish
- Mark Fisher*
  President & CEO, Council of the Great Lakes Region

The Water Quality Board's Legacy Issues Work Group members and IJC staff at the Big Rock Point panel discussion: (left to right) Mark Burrows, John Jackson, Glenn Miller, Frank Ettawageshik, George Heartwell, Nick Culp (Entergy), and Ryan Graydon.

*not in attendance at the Big Rock Point panel discussion

# 2. History of the Big Rock Point Nuclear Power Plant

Located on the shore of Lake Michigan in Charlevoix County, Michigan, the Big Rock Point Nuclear Plant began commercial operation on March 29, 1963, the first nuclear reactor to reach this milestone in the Great Lakes basin. Big Rock Point operated for 34 years before being permanently shut down in 1997. Credit: U.S. Nuclear Regulatory Commission.

Big Rock Point (BRP) is located on the south shore of Little Traverse Bay on Lake Michigan in Hayes Township, Charlevoix County, Michigan, approximately 12 miles (19 kilometers) west of Petoskey, MI. BRP occupies approximately 564 acres (228 hectares) and approximately 1.5 miles (2.4 kilometers) of lake frontage.

Owned by Consumers Energy Company (CE), BRP was the first commercial nuclear power plant to begin operations in the Great Lakes basin and the fifth in the United States. The General Electric Boiling Water Reactors (BWR) was rated for 240 MW thermal (67 MW electric) and was built by Bechtel Corporation. Construction of BRP began May 1, 1960, and initial criticality

was achieved September 27, 1962. BRP began supplying electricity to the grid on December 8, 1962, and officially began commercial operations on March 29, 1963. BRP permanently shut down on August 29, 1997, ending 34 years of electric power generation as the nation's oldest and longest running nuclear plant at that time. Over its lifetime, BRP supplied an average of 375 gigawatt-hours (GWh) of electricity annually for a lifetime total of 12.74 terawatt-hours (TWh), corresponding to a capacity factor of 64.1 percent.

BRP was the third reactor in the Great Lakes Basin to be decommissioned. CE decided to close BRP because its relatively small size (67 MWe) was likely to make it too expensive to operate in an increasingly competitive environment. Fuel was transferred to the spent fuel pool by September 20, 1997.

On March 26, 2003, the 441 spent fuel assemblies and Greater-Than-Class-C radioactive (GTCC) waste were transferred to dry storage in the independent spent fuel storage installation (ISFSI) located onsite. The ISFSI consists of seven concrete casks (each containing a spent fuel canister), one concrete cask containing the GTCC waste, and a 75-foot (23 m) by 99-foot (30 m) reinforced concrete pad that the eight concrete casks stand vertically on. As of August 22, 2016, the U.S. Department of Energy (DOE) inventory indicated there were 441 spent fuel assemblies in dry storage contained in seven casks.

The Independent Spent Fuel Storage Installation (ISFSI) at Big Rock Point. Credit: U.S. Department of Energy

As of March 2004, the estimated cost to decommission BRP was $439.4 million (expenditure year USD). All systems and structures not needed for the ISFSI were removed and the site remediation was completed on August 29, 2006. On January 8, 2007, the U.S. Nuclear Regulatory Commission (NRC) approved CE's request to release approximately 435 acres (176 hectares) for unrestricted use (i.e., greenfield condition). The remaining 107 acres (43 hectares) includes the ISFSI and continues to be under license by the NRC.

On April 6, 2007, the NRC approved the transfer of the operating license for the BRP ISFSI from CE to Entergy Nuclear Palisades, LLC (ENP) and Entergy Nuclear Operations, Inc. (ENO). After the fuel is removed from the site to a DOE facility, the ISFSI will be decommissioned and the ISFSI license terminated. As of December 31, 2018, the decommissioning cost estimate for the ISFSI was $2.57 million (2018 USD). As of December 31, 2018, the projected costs to manage spent fuel until DOE removal (using an assumed date of 2039) was $47.89 million (2018 USD), and ongoing costs have been paid for out of ENP operating funds. On August 1, 2018, Entergy Corp. announced their agreement to sell the BRP ISFSI site to a Holtec International subsidiary, a nuclear decommissioning specialist. The transaction is subject to approval by the NRC and is not expected to occur until 2023.[1]

Aerial view of the Big Rock Point site in Hayes Township, Charlevoix County, Michigan. Credit: Consumers Energy

[1] From Section 7.3, Nuclear Power Facilities in the Great Lakes Basin Background Report. September 2019

# 3. Introduction to the Big Rock Point Panel Discussion

The International Joint Commission's Great Lakes Water Quality Board Legacy Issues Workgroup held a Big Rock Point panel discussion on February 27, 2020 at the Odawa Hotel in Petoskey, Michigan. Key stakeholders were invited to participate in a panel discussion regarding lessons learned from their experience with the decommissioning of the Big Rock Point nuclear plant. Big Rock Point is the only nuclear site in the Great Lakes Basin to be dismantled and most of the site released from its license by the federal regulator, the U.S. Nuclear Regulatory Commission (NRC).

Recognizing that many nuclear plants around the Great Lakes basin will be shut down and decommissioned in the coming years and decades, the work group is gathering information about the process of decommissioning nuclear power plants, lessons learned, and the risks to Great Lakes water quality associated with the decommissioning process. The information gathered will be used to inform the Board's report and recommendations to the IJC.

The work group is focused specifically on the decommissioning of Big Rock Point, not the original siting or operation of the plant. The decommissioning process includes the transition from operation to shutdown, dismantling of facilities and storage of spent nuclear fuel, decontamination and remediation of the site, and license termination activities.

The work group provided participants with questions regarding topics of particular interest:

- Throughout the decommissioning of Big Rock Point, how satisfied were you with the public and Tribal engagement as well as the access to information and transparency from Consumers Energy and the U.S. Nuclear Regulatory Commission (NRC)? If satisfied, why? If unsatisfied, what do you recommend for improvement?
- How satisfied are you with the current condition of the site, and how would you like the site to be used in the future?
- Because no site has yet been approved by the U.S. Government to permanently store spent nuclear fuel, or to temporarily store it at a centralized site, Big Rock Point's spent nuclear fuel remains stored onsite aboveground, protected by armed guards. Are you satisfied with this situation? Are there ways in which the current onsite storage could be improved to make you feel more comfortable?
- Are you satisfied with the standards to which the site was cleaned up? Do you think Consumers Energy and the U.S. Nuclear Regulatory Commission adequately considered the impacts of climate change to this site? Observed climate change impacts include increasing variability and average of annual temperature, rainfall and lake levels, as well as increasing frequency of lake flooding and mass shoreline erosion events.

- Are you satisfied with how the radioactive and other hazardous wastes were transported offsite during the dismantling and remediation process? Are there any improvements to the transportation modes (semi-trailer truck, barge, railcar) or routes that you would recommend? What transportation concerns and solutions would you suggest for when the spent nuclear fuel (high-level radioactive waste) is moved to a centralized storage facility?

The purpose of this report is to summarize the comments and discussion from the Big Rock Point panel discussion.



A commemorative coin of the Big Rock Point Nuclear Plant, which was designated a Nuclear Historical Landmark by the American Nuclear Society on June 4, 1991. Consumers Energy held the memorial dedication of Big Rock Point on August 25, 2007 after the U.S. Nuclear Regulatory Commission released most of the site for unrestricted use earlier that year.

# 4. Panel Discussion Participants

***Consumers Energy***

- Tim Petrosky, Community Affairs Regional Manager
- Heather Prentice, Director of Environmental Compliance, Risk Management and Governance
- Carlin Smith, Community Affairs Regional Manager

***Entergy***

- Nick Culp, Government Affairs Manager, Palisades Nuclear Plant
- Tim Horan, Manager, Big Rock Point ISFSI

***Grand Traverse Regional Community Foundation***

- Dave Mengebier, President and CEO (former Consumers Energy Senior Vice President)

***Great Lakes Water Quality Board***

- Frank Ettawageshik
- George Heartwell
- John Jackson
- Glenn Miller

***International Joint Commission***

- Mark Burrows
- Ryan Graydon

***Little Traverse Bay Bands of Odawa Indians***

- Traven Michaels, Environmental Response Specialist

***Little Traverse Conservancy***

- Kieran Fleming, Executive Director

***Michigan Department of Environment, Great Lakes, and Energy***

- T.R. Wentworth II, Supervisor. Radioactive Materials Unit

***Tip of the Mitt Watershed Council***

- Jennifer DeMoss, Communications Director
- Jennifer McKay, Policy Director

***WATCH, Inc. - Water and Air Team Charlevoix***

- Joanne Beemon, Secretary
- Rick Beemon

Lana Pollock: Former President, Michigan Environmental Council; former State of Michigan State Senator; former Michigan Natural Resources Trust Fund Board Member, and former IJC Commissioner

# 5. Panel Discussion Format

The Big Rock Point panel discussion was opened by Frank Ettawageshik, executive director of the United Tribes of Michigan. The opening began within an acknowledgement of the tribal land upon which the meeting took place – the land of the Odawa and the Three Fires Confederacy. Frank followed with an indigenous prayer to welcome all participants.

The Little Traverse Bay Bands of Odawa Indians (LTTB) Tribal Chair was unable to attend. Frank Ettawageshik, who served as Tribal Chairman for 14 years, welcomed the participants. He acknowledged the contributions the LTBB has made to the region over the years, including infrastructure and employment of over 1,000 people, approximately half being non-tribal members. The Tribe is dedicated to working with the local community and to protecting natural and human resources.

Frank Ettawageshik introduced John Jackson, the Great Lakes Water Quality Board's project lead, to provide background information for all participants.

There are 38 current or former nuclear reactors used to generate electricity at 14 sites around the Great Lakes basin. All the Great Lakes, except Lake Superior, have nuclear generating sites on their shorelines. There are currently 30 nuclear reactors still in commercial operation. These generating stations are nearing the end of their operating licenses and will need to be decommissioned in the coming years or decades. We need to be proactive and think about the future processes and impacts of decommissioning these nuclear reactors across the Great Lakes basin.

The Great Lakes Water Quality Board is studying the decommissioning process. The Board's focus is what do we need to do to make the actual decommissioning process safe? What can we learn from past decommission projects such as Big Rock Point, what works and doesn't work, and are there ongoing threats? The Board is not assessing the original siting or operation, but rather what happens after the decision is made to close a nuclear plant. Information is being compiled on the status of nuclear plants in the Great Lakes basin, how much waste has currently accumulated from the operations, and how much waste is predicted to be present when the facilities close. The Board also hired a consultant to review decommissioning experiences elsewhere in Europe and other parts of the United States. Furthermore, students in Chicago have been working on a project on financial implications, and security funding issues.

During the Big Rock Point panel discussion, the Great Lakes Water Quality Board is looking for prime lessons from people who have gone through the experience of decommissioning. The Board is asking participants to convey what worked best, how the process could have been improved, and what happens to the community after the decommissioning of a nuclear plant is completed.

It should be noted that the International Joint Commission will not base its decision on one sector or perspective but will consider all views within the Great Lakes basin.

Each panelist was allotted five minutes to share their experience. A discussion led by work group members John Jackson and Frank Ettawageshik followed. The event's agenda is shown below.

International Joint Commission
Canada and United States

Commission mixte internationale
Canada et États-Unis

## Great Lakes Water Quality Board

### Big Rock Point Panel Discussion

### Agenda

February 27, 2020 | 6:30 - 9:00 PM | Huron Room

Odawa Hotel | 1444 US-131, Petoskey, Michigan 49770

| | |
|---|---|
| 6:30 PM | **Traditional Opening** – Frank Ettawageshik<br>**Welcome** |
| 6:40 PM | **Work Group Greeting** – John Jackson |
| 6:45 PM | **Panelist presentations** – Up to 5 minutes per panelist. Only one panelist per organization. |
| 8:15 PM | **Panel discussion** – Led by John Jackson & Frank Ettawageshik |
| 8:45 PM | **Next Steps** – John Jackson |
| 8:50 PM | **Traditional Closing** – Frank Ettawageshik |
| 9:00 PM | **Adjourn** |

On behalf of the Great Lakes Water Quality Board, we thank you for participating in our Big Rock Point panel discussion. Your knowledge and experience will greatly improve the board's report and recommendations to the IJC Commissioners on the decommissioning of nuclear power facilities in the Great Lakes basin.

For project updates and information about the Water Quality Board, please visit https://www.ijc.org/en/wqb.

# 6. Participants' Comments

This section contains an introduction of the participants and a summary of their comments as stated at the meeting.

## T.R. Wentworth II, Supervisor, Radioactive Materials Unit

### Michigan Department of Environment, Great Lakes, and Energy (EGLE)

Mr. Wentworth worked at Big Rock Point early in his career, having started working with the State of Michigan in 2001. He was heavily involved with the decommissioning process, working onsite with Consumers Energy staff, conducting site visits and surveys, and reviewing the Nuclear Regulatory Commission license termination plan.

Throughout the process, Consumers Energy staff was always transparent with the Michigan Department of Environmental Quality (DEQ) (now known as Michigan Department of Environment, Great Lakes, and Energy, EGLE) Radioactive Materials Unit, and worked hand-in-hand with the DEQ throughout the process. Consumers Energy staff worked hard, were always available, and were gracious answering questions, and even invited us to work with them more than we were able to. A citizen's advisory board was developed, and while I cannot speak from the local perspective, it seemed like membership was actively engaged.

DEQ worked with Consumers Energy on the disposal of large quantities of concrete to a local landfill. We were actively involved in the radiological assessment of the landfill. Consumers Energy provided radiation detectors at the scale to verify the cement being disposed of was free of radiation. Regarding the site condition, Consumers Energy cleaned it up to a perfect degree, the only obvious problem being the spent fuel pad. It is a shame that we don't have national policy to deal with radioactive waste. We fielded many local calls. Throughout the process, we found Consumers Energy's Big Rock Point staff to be responsive to DEQ and the local municipalities. They were professional and the decommissioning was done well.

## Traven Michaels, Environmental Response Specialist

### Little Traverse Bay Bands of Odawa Indians

Mr. Michaels has worked for three years with LTTB. He was not involved with the Big Rock Point Nuclear Plant decommissioning. However, he has had nothing but good experiences with Consumers Energy in his current role with LTTB by providing oversight of the Big Rock Point site. Consumers Energy and Mr. Petrosky have kept the Tribe up to date and have always extended invitations to any kind of emergency response drills or visits from the Nuclear Regulatory Commission. Mr. Michaels would like to thank Consumers Energy for providing education on Big Rock Point.

At least as early as the mid-nineteenth century, Odawa Indians used Big Rock, which they called *Kitcheossening*, as a gathering place each spring. The Odawa summered at *Waganaksing* (the area between Harbor Springs and Cross Village) but dispersed into smaller groups and traveled during the winter. Each spring, they returned to Big Rock, their canoes loaded with sugar, fur, deer skins, prepared venison, bear's oil, and bear meat prepared in oil, deer tallow, and sometimes lots of honey.

As for the long-term goal of the Tribe, the Tribe would like to see the nuclear waste moved to a central repository away from the lake. Big Rock Point is a sacred site for the tribe, especially because it could signal a journey's end. It was an important navigational spot. We request that the land be returned to the Tribe, returned to its original inhabitants. The past activities have left a scar and to see it returned to the Tribe would complete the healing circle.

## Joanne Bier Beemon

### WATCH, Inc. - Water and Air Team Charlevoix

After the Three Mile Island incident, Ms. Beemon served as an intervenor in the expansion of the spent fuel pool at Big Rock Point Nuclear Plant. She was on the citizen's advisory board as an opponent to nuclear energy. During her time on the citizen's advisory board, she asked that any dissent on a vote be noted; however, this did not occur.

In Ms. Beemon's opinion, she found Consumers Energy's Big Rock Point staff to be some of the nicest people saying they love nuclear power. "I don't think they lied, I think that were enthusiastic and they were religious." For example, experts on radioactivity on the site stated no radioactivity was found where none was expected. However, when questioned if radioactivity was found where it was not expected, staff admitted there was a pile of radioactive lead chips. It

became an issue of what was not said, and you had to be an expert to know what the problems were/are.

Ms. Beemon expressed that the site should not be available for unrestricted use. She stated that the NRC only required Consumers Energy to perform radiological survey 5.9 inches below the surface for site restoration. Each cask contains between 150 and 200 times the destructive power of the Hiroshima bomb. This is not sufficient for a site to be declared unrestricted use. There is still radioactivity in the groundwater and lake, including a plume of tritium onsite. Children should never be on the site until it is fully restored. We had shirts made back when the future of the site was under consideration that said, "No to plutonium state park." In addition, Consumers Energy has not looked at the role climate change can play with flooding and extreme storms and how that might impact the site.

The best use for the future would be for the site to remain a green site. Having solar or wind turbines onsite would be great and would represent healing. However, there is no plan for storing the spent nuclear fuel that is still highly radioactive. While no one wants the spent nuclear fuel onsite, the best thing is for it not to be moved until there is a permanent storage solution.

The core of my belief system is it's irresponsible to produce something that's dangerous and hand it to your children and leave. Some of these radioactive byproducts have a half-life of 750,000 years. We are giving these radioactive wastes to generations and generations and generations. The Anishinaabe teach you to think about the next seven generations. What future do we want for our children and the next seven generations?

## Dave Mengebier, President and CEO

### Grand Traverse Regional Community Foundation

### Former Consumers Energy Senior Vice President

Mr. Mengebier is a former member of the IJC's Great Lakes Water Quality Board. He is participating not on behalf of the Grand Traverse Regional Community Foundation but as a native of Petoskey. His father was a physician at Burn's Clinic and his mother was a County Commissioner. He also spent the first part of his career with Consumers Energy in Washington, D.C. working on Capitol Hill. One of the central things he worked on was the Nuclear Waste Policy Act. The Federal Government has abdicated its responsibility, and after spending $10 billion dollars to find a repository for nuclear waste in the US, we still have no permanent storage solution. As a result, we have over 100 spent nuclear fuel storage sites across the country and each near water because of nuclear power plants' need for large amounts of water for their cooling systems.

During Mr. Mengebier's last 17 years with Consumers Energy, he served in the role of Vice President of Government and Regulatory Affairs during the operation and decommissioning of Big Rock Point nuclear power plant. He is proud of his company's ability to communicate and address concerns, and their openness and transparency. The citizen's advisory board went a long

way towards influencing thinking around how to talk about nuclear power and how to decommission the plant. Utilities have an engineering culture; they think that all they need to do is explain facts. One of the biggest challenges was people's attitudes towards nuclear waste, but the company was responsible in meeting this challenge.

Mr. Mengebier worked with the Little Traverse Conservancy trying to put that land into conservation and believes that permanent protection would be the best solution for the property.

## Carlin Smith, Community Affairs Regional Manager

### Consumers Energy

In 1988, Mr. Smith first learned of Big Rock Point Nuclear Power Plant as a journalist. He spent the next 25 years working for chambers of commerce, both in Harbor Springs and Petoskey. In 2003, his predecessor at the Petoskey Chamber of Commerce had served on the citizen's advisory board. He participated in the citizen's advisory board for only the last few meetings. Mr. Smith now works as the Community Affairs Regional Manager for Consumers Energy and is available to assist anyone should they need it.

The Big Rock Point Nuclear Power Plant before and after decommissioning. Credit: U.S. Nuclear Regulatory Commission

## Tim Petrosky, Community Affairs Regional Manager

### Consumers Energy

I was Consumers Energy's public affairs director at Big Rock Point from 1992 through operations, decommissioning and the return to a greenfield in 2006.

Big Rock Point was Michigan's first and the nation's fifth commercial nuclear power plant.

It operated from 1962 to 1997 and was the longest running nuclear plant in the United States at the time of its shutdown. It was named a Nuclear Historical Landmark in 1991 for its many contributions to the nuclear and medical communities.

The decision to close Big Rock Point was made due to an increasingly deregulated electric industry in which it would be difficult for Big Rock Point to compete.

We celebrated the many accomplishments of the plant by inviting the community and industry officials to witness the final shutdown. More than 1,000 people gathered in tents in the parking lot on August 29, 1997, the 35th anniversary of the plant receiving its operating license. Those in attendance still remember operator Andy Loe saying, “Goodbye Big Rock, sorry to see you go,” as he shut down the reactor for the final time.

Plant employees, supplemented by contractors, immediately moved into decommissioning activities. They were guided by a decommissioning plan that was developed over several years prior to shut down. I have shared a document titled Decommissioning Milestones that lists many of the key activities of the decommissioning process (see appendix).

We engaged with the Little Traverse Bay Band of Odawa Indians to ensure items and areas of cultural and historical significance to the tribe were identified and protected.

In addition to U.S. Nuclear Regulatory Commission oversight, we established independent third-party review by forming a Restoration Safety Review Committee made up of nuclear industry experts. Michigan EGLE (formerly DEQ) also provided oversight of site restoration activities impacting the environment. Together, these organizations provided independent and critical reviews to ensure safety and best practices were utilized for all Big Rock Point decommissioning activities.

To support our efforts to keep the community informed, we established a Citizens Advisory Board which was comprised of community leaders from Emmet, Charlevoix, Crawford and Otsego Counties (see appendix). The group provided input and advice from a community perspective.

We also created and published a newsletter called “From the Point” to share decommissioning activities and progress with the community. The newsletter was inserted into local newspapers for distribution.

Additionally, just as during operation, we continued to host site tours for the community and industry. We hosted an open house in 2002 for the community to visit, walk on the dry fuel storage site and see the dry fuel storage casks up close.

Plant building and support systems were demolished and shipped for disposal. Low-level radioactive waste was packaged and shipped to licensed facilities in Utah and South Carolina. Debris free of radioactivity was packaged and shipped to a licensed landfill in Waters, MI. Detailed analysis and thousands of samples were taken and reviewed to verify the site met all release criteria.

In August of 2006, decommissioning activities were completed and in January 2007, after extensive review, the Nuclear Regulatory Commission issued a news release declaring Big Rock Point free for unrestricted use.

The Big Rock Point monument is made from steel that once formed the plant's containment sphere. Credit: Consumers Energy

I encourage everyone to visit the monument that resides in front of the former entrance to Big Rock Point. It shares much of the history of the site and the panels of the monument are made of the steel that once formed the plant's containment sphere.

I also encourage you to visit the Michigan historical marker that is in the park right next door to the plant. The marker provides an historical perspective of the plant and what the site means to the Little Traverse Bay Band of Odawa Indians.

I've been asked to touch on some of what went well, and what were some of the challenges we faced and to share some lessons learned.

First, what went well:

Our industrial, environmental and personal safety performance during the decommissioning process was outstanding. Then, as now at Consumers Energy, safety in all areas is our top priority. All employees and contractors received intensive safety training and were empowered to stop any job that did not appear to be safe.

I also believe our communication efforts and were well received. The Citizen Advisory Board represented a broad cross-section of the community – including an anti-nuclear activist – and was very helpful in sharing and providing information locally. Our newsletter kept the community informed, and the site tours and open houses allowed the public to witness our work and take some of the mystery out of the effort.

Challenges:

I would say a major challenge is the public's fear or mistrust of radiation. This was demonstrated by the extensive safeguards put in place for the disposal of clean debris at the landfill in Waters, MI. While the debris was surveyed three different times before leaving the site, additional measures were taken – though not required, to quell the uneasiness. In addition to large-scale radiation detectors we purchased for the landfill, we also hired a technician to provide a third-party review of the debris and report directly to the township where the landfill was located.

Lessons learned:

It was very beneficial to our mission early on to define what greenfield meant and looked like. This helped us create a common goal and vision for everyone on site and at our headquarters in Jackson, MI.

Another key to our success was taking the time upfront to collect site historical information and conduct detailed investigations to find and address potential environmental impacts in support of restoration to a greenfield.

Flag that was flown over Consumers Energy's Big Rock Point Nuclear Power Point.

Celebrate accomplishments. Rather than mourn the closing of the plant, the decision was made to celebrate its significant life, contributions, and accomplishments. After the plant closed, we held a thank you party for the community and served 1,600 meals. We established a milestone pole and listed each major accomplishment as completed and gathered around the flagpole (which now resides on a beach in Charlevoix) as a team to celebrate. Special contributors and guests were provided a flag that was flown over the site as a thank you for their work. These small touches helped keep spirits up while we focused on working ourselves out of a job.

And finally, communicate, communicate, communicate. I truly believe that the openness we demonstrated through the process with the newsletter, open houses, site tours and third-party reviews removed some of the mystery out of decommissioning and established trust and credibility with the community.

## Tim Horan, Manager, Big Rock Point Independent Spent Fuel Storage Installation

### Entergy

Mr. Horan started with Entergy in May of 2016 but has been in the nuclear industry for 39 years.

When nuclear fuel no longer supports enough fission to produce the heat required to produce power, it is removed from the reactor and becomes known as "spent nuclear fuel." The Big Rock Point Independent Spent Fuel Storage Installation (ISFSI) stores 441 spent nuclear fuel assemblies and one cask of Greater-than-Class C (GTCC) radioactive waste. In 1977, then President Jimmy Carter banned the reprocessing of spent nuclear fuel due to concerns about plutonium proliferation. The 441 spent nuclear fuel assemblies are those that fueled the Big Rock Point Nuclear Power Plant after transportation of spent nuclear fuel was halted in the US.

Spent nuclear fuel is still undergoing a lot of radioactive decay, with unstable atoms decaying to more stable atoms. This results in the release of heat that must be removed and makes the used assemblies highly radioactive. The 441 spent fuel assemblies in storage at the Big Rock ISFSI are stored in seven stainless steel canisters which are in concrete casks, known as overpacks. There is one canister and cask that contains GTCC radioactive waste. These materials cannot be transported at this time.

The canisters are 63 inches (1.6 meters) thick, and the atmosphere inside is made inert with helium gas to prevent corrosion of the contents. The overpack is designed to provide shielding from the radioactive material inside the canisters. They are 19 feet tall (5.8 meters) and 11.5 feet (3.5 meters) in diameter. The concrete is 32.5 inches (0.83 meters) thick. Officers and technicians that work in close proximity to the casks routinely receive zero millirem of radiation. Each overpack assembly weighs approximately a third of a million pounds (151 metric tons). Cooling of the canisters relies on natural convection of outside air. They require no outside power source to keep the spent fuel cooled. Each canister is monitored to ensure that natural convection is not impeded by things like snow or leaves. Temperatures are monitored daily to ensure the heat removal process is adequate to maintain the fuel within required parameters.

The ISFSI is licensed by the U.S. Nuclear Regulatory Commission for twenty years, with the current license expiring in 2021. We are currently in the process of relicensing for an additional 20 years. We have contracted with Westinghouse Electric Company to complete the relicensing activities.

Armed security guards are present 24 hours a day, 7 days a week, and 365 days a year. In addition to armed security, Entergy maintains letters of agreement with local law enforcement.

Equipment is maintained onsite to support the repair of a cask should one be damaged. That equipment is also what will be used when the transportation of spent fuel is approved by governmental agencies. To transport spent fuel canisters, they would be taken from a vertical position to horizontal. The canisters would be removed from the concrete overpacks and inserted into a transport cask. The transport cask would be loaded on a heavy-haul trailer and moved to a railroad spur in Petoskey. Once loaded on a specifically designed rail car, the cask would then be transported to a new location.

Tours of the site and spent fuel equipment are available.

## Lana Pollack

**Former President, Michigan Environmental Council**
**Former Michigan State Senator**
**Former Michigan Natural Resources Trust Fund Board Member**
**Former IJC Commissioner**

Ms. Pollock has an interest having visited the site after it was closed. The federal government has failed to have a rational policy with respect to nuclear waste management. The government

started something with no plans to finish it, and now we are stuck with waste around the Great Lakes basin. However, could there be ways to address the spent fuel rods at Big Rock Point halfway to reduce a risk?

There remains an unspoken real risk that guards cannot address: terrorism. On 9/11, why did the terrorists go after the World Trade Center? Because they were the tallest. The casks at Big Rock Point are the "tallest building" in Emmet County, and therefore, subject to a terrorist attack. The casks are vulnerable from the air and could be penetrated by a shoulder-held missile. To address this risk, the casks need to be placed below-grade in a way so they can be inspected on a regular basis. The casks need to be moved away from the water's edge to allow for time to monitor contaminants and see if they are migrating towards Lake Michigan.

Ms. Pollack posed questions to the Water Quality Board and group:

1. What is the sum of money in the decommission fund that ratepayers have funded?
2. Are those funds available to do additional work on the site, such as the recommendations made?

Everybody here wants the same thing: a safe site forever. We cannot say the site has been cleaned up and is safe, while waste remains on the site.

## Kieran Fleming, Executive Director

### Little Traverse Conservancy

Mr. Fleming is not familiar with the decommissioning of Big Rock Point, but rather is here to discuss what could happen eventually to the property. Little Traverse Conservancy (LTC) is a non-advocacy conservation organization. They are successful because of the assets within the region and they reflect what the community values. LTC owns the biggest piece of land across from the Big Rock Point site, and the Little Traverse Bay Bands of Odawa Indians (LTBB) owns land next to it. LTC has had a great relationship with Consumers Energy, and their foundation, in particular, has been a good partner.

The property represents an opportunity. With 564 acres (228 hectares) and 1.5 miles (2.4 kilometers) of Lake Michigan frontage, the site has it all: cultural value, ecological value, scenic value, water quality, etc. Ideally, the spent nuclear fuel will be removed so permanent conservation of the land can occur.

## Jennifer McKay, Policy Director

### Tip of the Mitt Watershed Council

Tip of the Mitt Watershed Council is a nonprofit organization dedicated to protecting and restoring Northern Michigan's inland lakes, streams, wetlands, groundwater, and the Great Lakes. The Watershed Council became involved with the decommissioning process approximately 15 years ago. We reviewed the license termination plan submitted to the Nuclear Regulatory Commission and the final radiation survey. The Watershed Council prides itself on

looking at everything under the lens of science. Unfortunately, I came on not knowing how nuclear plants operate, nor what the decommissioning process entailed. As a result, trying to effectively evaluate the scientific documents proved to be challenging. Thankfully, the Watershed Council had a nuclear physicist on our board of directors and I was able to use and rely upon his knowledge and skills to understand and review the decommissioning plan to determine if it was done in a manner that was protective of the water resources and public health.

Based upon our review, we were pleased with the decommissioning of Big Rock Point. The lesson learned is that the decommissioning process is complicated and nuanced and the documents are highly technical. Trying to engage the public can be difficult because there are certain entities that don't trust the company and industry. They either want to actually review the documents themselves or have an independent third party verify the science. The IJC and the Water Quality Board could assist by thinking through what tools could help organizations and the public as they participate in the decommissioning process. Could publications be developed to help explain the process and how to effectively participate? Factsheets on how to assess residual radioactivity or what the measurements mean? Could technical assistance be provided? Etc.

In 2007, the Watershed Council advocated for the public purchase and ownership of Big Rock Point by the Michigan Natural Resources Trust Fund (MNRTF). Oil, gas, and other mineral lease and royalty payments are placed into the Trust Fund and the proceeds are used to both acquire and develop public recreation lands. As provided in our letter to the MNRTF:

> "I am writing on behalf of the Tip of the Mitt Watershed Council's board, staff, and membership to support public purchase and ownership of Big Rock Point in Charlevoix County Michigan. This land which includes 1.5 miles of undeveloped shoreline and approximately 435 acres of high-quality wetlands, transitional forest, and hardwood uplands would be a remarkable addition to the public trust resources of the state of Michigan. We support this purchase despite the presence of a spent fuel storage facility on an adjacent site where the nuclear waste will remain until a national repository is developed.
>
> All around us are the footprints of history…the Great Lakes and our natural resources are a natural phenomenon formed over millions of years due to glacial advancement and retreat during the Ice Age. At the end of the last Ice Age, a large rock was left behind – a rock that would become part of Northern Michigan forever. "Big Rock" or "Kitchiossining" in the language of the Little Traverse Bay Bands of Odawa Indians is considered a sacred site, serving as a navigational guide and meeting place for generations of Native Americans. This historic marker also became the site of Big Rock Point, Michigan's first commercial nuclear power plant. After over 30 years of operation Big Rock closed and the site was restored.
>
> Increasingly intense development has compromised the integrity of the land and the quality of water along the shoreline of the Great Lakes. An undeveloped stretch on the

shores of Lake Michigan characterized by a myriad of natural resources is a rarity in this day and age. With a clean bill from the Nuclear Regulatory Commission for unrestricted public use, and such historical and ecological significance, this footprint needs to be protected for generations to come."

The Watershed Council also had individual conversations with MNRTF Board members, including Lana Pollack. Both Pollack and the MNRTF determined state funds should not be spent on acquisition of the site due to the presence of the spent nuclear fuel. So, while there is great ecological and cultural value, and ultimately it would be great to have this site in permanent conservation for the community and public, there seems to be little interest in pursuing that until the spent nuclear fuel is removed. That is the greatest lesson for you: what do you do with these sites when there is waste that remains and no one is willing to invest in the properties?

## Bruce Watson

**Chief of the Reactor Decommissioning Branch**
**Division of Decommissioning Uranium Recovery and Waste Programs**
**Office of Nuclear Materials Safety and Safeguards**
**U.S. Nuclear Regulatory Commission**[2]

As the NRC's Health Physicist (principle technical reviewer) for the Big Rock Project, I can tell you that Consumers Energy reduced the residual radioactivity on the site to only a very small fraction of the NRC requirements for releasing the site for unrestricted use. Unfortunately, the licensed spent fuel storage facility remains on the site and continues to be inspected by the NRC. Once the plant was shuttered, the liquid effluents from the plant were significantly reduced, and once the spent fuel was transferred to dry storage, the site's liquid effluent releases were eliminated. I have enclosed pictures of the plant during the decommissioning.

[2] Comments submitted via email

The reactor vessel packaged for shipment by rail for disposal at the Energy*Solutions* low-level radioactive waste disposal site in Barnwell, South Carolina.


The Big Rock Point steel containment dome being dismantled.

NRC employed our independent contractor, ORISE, to perform independent verification surveys and sampling to confirm Consumers Energy removed the residual radioactivity to meet NRC requirements. ORISE is now known as Oak Ridge Associated Universities (ORAU) and their work was supervised by either myself or our Health Physics Decommissioning Inspectors.

# 7. Discussion Summary

The Water Quality Board's Legacy Issues Work Group hosted the Big Rock Point panel discussion on February 27, 2020 in Petoskey, Michigan.

This section provides a summary of the group discussion facilitated by John Jackson and Frank Ettawageshik that followed the participants' five-minute opening remarks.

Risk Assessment of the Site

Something that is important for communities to look at is the risk, particularly what is the relative risk of storage of nuclear waste on the shores of the Great Lakes compared to Nevada where Yucca Mountain is located. The relative risk is lower for an arid state that already has contaminated both the land surface and subsurface within 100 miles of Yucca Mountain due to several hundred below- and aboveground nuclear weapons tests and historic mining. Members of Congress need to think about the long-term in the context of relative risk, taking into consideration the water table, current contamination, aridity, etc. Under this context, to have high-level radioactive waste along the Great Lakes shoreline is incongruous. It is incumbent upon all of us to let Congress know that a permanent site for high-level radioactive waste needs to be determined to address the current unacceptable risk in the Great Lakes basin.

Storage vs. Transport of Waste

What are the relative risks of onsite storage versus putting the spent fuel in casks on a train or a barge and moving them to a remote location? There is a misunderstanding that if you break open cask there would be a plume or a Chernobyl-like event. That is not the case as there is not enough force behind an operational plant like Big Rock Point. It is extremely safe in the way it is stored and monitored.

With respect to transportation, the current process would be to use a heavy-haul trailer and transport it to a rail spur in Petoskey that gets inspected prior to use. The casks will be placed on specially designed rail cars in transportation casks that are designed for impact during transport.

At this point in time, the United States government has deemed barges as not the favorable way to transport the spent nuclear fuel from the Big Rock Point site.

Safety of the Property

Do you or community members feel safe visiting Big Rock Point, knowing it was the site of a former operating nuclear plant and that there is still spent fuel onsite?

Many of the participants were on the site often, during operation and decommissioning. Many felt there was no concern being onsite after decommissioning, except for the spent nuclear fuel stored in casks. Some feel that there is no such thing as a safe dose of radiation, and no one should be on the property. One participant had a doctor advise her not to continue to visit the site if she wanted more children.

It was asked if any studies have been conducted on what would happen if the casks were breached to determine what the consequences would be. While no such studies were identified by the attendees, the assumption is that there would be a contaminated area that would need remediation.

Monitoring of Nuclear Waste

There was a discussion regarding the requirements for ongoing monitoring of the nuclear waste, including what is required by law, if anything, and who is responsible in the long-term to ensure the integrity of the casks.

The nuclear waste stored in the casks is currently owned by Entergy. The spent nuclear fuel is located within a 107-acre (43-hectare) plot that is landlocked within a 435-acre (176-hectare) plot of land owned by Consumers Energy, the site of the former Big Rock Point Nuclear Power Plant. Entergy does quarterly and yearly monitoring of radioactive materials.

The Nuclear Regulatory Commission terminated the license and released the site for unrestricted use. Therefore, Consumers Energy has no obligations for continued monitoring of nuclear radionuclides, including any monitoring of surface or groundwater. The only monitoring Consumers Energy is responsible for has to do with cultural sensitivities at the site. This monitoring is done annually per an agreement with the State Historic Preservation Office.

There was concern expressed given the lack of monitoring. Around the Great Lakes, we have seen the issue of legacy toxic pollution causing problems that need to be addressed 50 years after-the-fact. Without continued monitoring, how will we be able to quickly identify future issues, and is this a limitation of the current government regulations?

Consumers Energy noted that nuclear sites do not get worse over time, they only get better. Therefore, there is no expectation that the site will become a legacy site 50 years from now.

In addition, the issue of a tritium plume onsite was raised. Consumers Energy noted that the tritium levels onsite are below the groundwater standards set by the U.S. Environmental Protection Agency (maximum contaminant level of 20,000 picocuries per liter) and the

maximum radiation dose (25 millirems per year) requirement set by the Nuclear Regulatory Commission for license termination.

It was also expressed that the standards for nuclear decommissioning are significantly different than other contamination cleanup standards. For example, the 5.9 inches soil depth required for nuclear decommissioning is significantly less than traditional remediation efforts required for other contaminants.

Siting and Design of the ISFSI

The question was posed to Consumers Energy and Entergy, if you knew the storage facility had to remain forever (i.e., a national repository was never an option), would you have used different criteria in terms of siting, design, or location for the storage of the spent fuel?

Neither company would have made any changes to the siting or design to the ISFSI. The casks are not located on the water's edge; they are almost a mile (1.6 kilometers) away from Lake Michigan on a dry concrete pad. The casks are monitored quarterly for radiological leaks; there are yearly inspections of the casks and pads and five-year in-depth inspections occur to assess the steel and concrete to verify that the storage facility remains in excellent condition.

Lifetime of ISFSI

Independent Spent Fuel Storage Installations (ISFSI) are licensed for a period of 20 years by the U.S. Nuclear Regulatory Commission. The casks are licensed separately per the NRC's criteria.

Should there be an issue that needs to be repaired, equipment is onsite to address repairs. The equipment takes the cask from a vertical position to a horizontal position; the machinery extracts the canister and puts it in a lead-shielded cask for interim storage until a new concrete overpack can be constructed. This onsite equipment to conduct repairs is tested every two months.

Decommissioning Funding

Before a nuclear power plant begins operations, the licensee must establish or obtain a financial mechanism, such as a trust fund or a guarantee from its parent company, to ensure there will be sufficient money to pay for the ultimate decommissioning of the facility. Each nuclear power plant licensee must report to the NRC every two years the status of its decommissioning funding for each reactor or share of a reactor that it owns. The report must estimate the minimum amount needed for decommissioning by using the formulas found in 10 CFR 50.75 (c), seen below:

| | | ***Millions (1986 USD)*** [3] |
|---|---|---|
| (1)(i) | greater than or equal to 3,400 MWt | $105 |
| For a PWR: | between 1,200 MWt and 3,400 MWt<br>(For a PWR of less than 1200 MWt, use P=1,200 MWt) | $(75+0.0088P) |
| (ii) | greater than or equal to 3,400 MWt | $135 |
| For a BWR: | between 1,200 MWt and 3,400 MWt<br>(For a BWR of less than 1,200 MWt, use P=1,200 MWt) | $(104+0.009P) |

These biennial Decommissioning Funding Status Reports include the following information:

1. The minimum decommissioning fund estimate, pursuant to 10 CFR 50.75 (b) and (c)
2. The amount accumulated at the end of calendar year preceding the date of the report for items included in 10 CFR 50.75 (b) and (c)
3. The schedule of the annual amounts remaining to be collected for items in 10 CFR 50.75 (b) and (c)
4. The assumptions used regarding escalation in decommissioning cost, rates of earnings on decommissioning fund, and rates of other factors used in funding projection.
5. Any contracts upon which the licensee is relying pursuant to 10 CFR 50.75(e)(1)(v).
6. Any modifications to the current method of providing financial assurance occurring since the last submitted report.
7. Any material changes to the trust agreement. The NRC formulas in section 10 CFR 50.75(c) include only those decommissioning costs incurred by licensees to remove a facility or site safely from service and reduce residual radioactivity to levels that permit:
    (1) release of the property for unrestricted use and termination of license; or
    (2) release of the property under restricted conditions and termination of the license.

The cost of dismantling or demolishing non-radiological systems and structures is not included in the NRC decommissioning cost estimates. The costs of managing and storing spent nuclear fuel onsite until transfer to DOE are not included in the cost formulas. Although there are many factors that affect reactor decommissioning costs, generally they range from $300 million to $400 million (USD).

Approximately 70 percent of licensees are authorized to accumulate decommissioning funds over the operating life of their plants. These owners – generally traditional, rate-regulated electric utilities or indirectly regulated generation companies – are not required today to have all the funds needed for decommissioning. The remaining licensees must provide financial

[3] Table of minimum amounts (January 1986 dollars) required to demonstrate reasonable assurance of funds for decommissioning by reactor type and power level, P (in MWt); adjustment factor.[1] An adjustment factor at least equal to 0.65 L + 0.13 E + 0.22 B is to be used where L and E are escalation factors for labor and energy, respectively, and are to be taken from regional data of U.S. Department of Labor Bureau of Labor Statistics and B is an escalation factor for waste burial and is to be taken from NRC report NUREG-1307, "Report on Waste Burial Charges."

assurance through other methods, such as prepaid decommissioning funds and/or a surety method or guarantee. The staff performs an independent analysis of each of these reports to determine whether licensees are providing reasonable "decommissioning funding assurance" for radiological decommissioning of the reactor at the permanent termination of operation.

For management and interim storage of spent fuel (e.g., ISFSI) pursuant to 10 CFR 72.30(c), at the time of license renewal and at intervals not to exceed three years, the decommissioning funding plan must be resubmitted with adjustments as necessary to account for changes in costs and the extent of contamination. If the amount of financial assurance will be adjusted downward, this cannot be done until the updated decommissioning funding plan is approved. The decommissioning funding plan must update the information submitted with the original or prior approved plan and must specifically consider the effect of the following events on decommissioning costs:

1. Spills of radioactive material producing additional residual radioactivity in onsite subsurface material.
2. Facility modifications.
3. Changes in authorized possession limits.
4. Actual remediation costs that exceed the previous cost estimate.[4]

Customers of Consumers Energy that received nuclear energy paid a surcharge on their electric bill. The amount that goes into the trust fund is set by the Nuclear Regulatory Commission. The final cost of decommission of Big Rock Point was $388 million. Some of the money that customers paid into the trust fund for nuclear energy from Big Rock Point was invested in the stock market. Therefore, the customers did not pay the full $388 million, and some money was returned to customers.

Entergy Corp. has agreed to sell the subsidiaries that own the Pilgrim Nuclear Power Station in Plymouth, Massachusetts, and the Palisades Power Plant in Covert, Michigan, after their shutdowns and reactor defuelings, to a Holtec International subsidiary for accelerated decommissioning. The sales include the transfer of the licenses, spent nuclear fuel, and Nuclear Decommissioning Trusts (NDTs), as well as the Big Rock Point Nuclear Independent Spent Fuel Storage Installation (ISFSI). The transactions are subject to conditions to closing, including approvals from the U.S. Nuclear Regulatory Commission (NRC) of the license transfers.

There is great concern among community members as to why another company would agree to purchase nuclear waste and questions about Holtec's business plan. Furthermore, the more transfers of the waste among companies, the less community involvement there will be, equating to less public trust and overall oversight of the property. In addition, there is concern with Holtec's record elsewhere in the country.

[4] From Section 3.2.8 Financial Guarantees. Nuclear Power Facilities in the Great Lakes Basin Background Report. September 2019

Community Engagement

It was recommended that Entergy work with Little Traverse Bay Bands of Odawa Indians tribal police, in addition to local law enforcement agencies. Because the tribe is federally recognized, the tribe's police force has access to a variety of federal resources and could provide additional assets.

Again, it was raised that a new owner should continue to engage with the community as Consumers Energy and Entergy has done over the years. Without community involvement, as well as transparency by the company, the community loses trust and becomes more concerned about the nuclear waste stored onsite.

Future of the Site

The process of decommissioning is not deemed to be complete by almost all participants. The continued storage of high-level radioactive waste onsite makes many potential uses of the site untenable. Ultimately, the spent nuclear fuel must be removed. While the evidence demonstrates the spent nuclear fuel is being managed safely, its continued presence onsite and potential hazards are lingering thoughts for the community. There must be a place where high-level radioactive waste can be sent and monitored in a cost-effective manner. Moving the spent nuclear fuel away from the Great Lakes shoreline is the next step to substantially reduce the remaining risk to the Great Lakes from decommissioned nuclear power plants. Congress needs to fulfill its obligation of accepting spent nuclear fuel by prioritizing the licensing of a repository. However, until it's moved offsite, we need to be diligent and monitor the nuclear waste.

A couple of participants expressed proposed interim storage solutions that would minimize the risk from a terrorist attack. Suggestions included putting the casks below-grade as well as creating a hardened onsite storage facility (HOSS) to store the spent fuel casks until a permanent storage facility becomes available.

Questions were asked about the current and potential future uses of the Consumers Energy's 435-acre (176-hectare) section of the site. (The remaining 107 acres (43 hectares) are owned by Entergy and are under license by the NRC for the ISFSI.) Is anything prohibiting Consumers Energy from putting their parcel into use? According to Consumers Energy, there is nothing hindering development of the site; they simply have not made a decision. As previously noted, the Nuclear Regulatory Commission has allowed for unrestricted use of the site. Forums such as the Big Rock Point panel discussion can help senior management at Consumers Energy make future decisions about the property.

In conclusion, it was again emphasized that until the nuclear waste is removed from the site, it will continue to represent a potential hazard to the community and the waters of Lake Michigan. Transporting the spent nuclear fuel offsite is needed to eliminate this hazard and must be prioritized by Congress.

# 8. Closing

The Water Quality Board thanked all the attendees for their participation in the Big Rock Point panel discussion. The Board plans to finish this study and provide advice and recommendations to the International Joint Commission by the end of this year.

Just as he began the meeting, Frank Ettawageshik also closed the meeting. He closed the meeting with a native Anishinaabe water song:

Ne-be Gee Zah- gay- e- goo

Gee Me-gwetch -wayn ne- me – goo

Gee Zah Wayn ne- me- goo

which translates to English as:

Water, we love you

Water, we thank you

Water, we respect you

Aerial view of the Big Rock Point site along the south shore of Little Traverse Bay on Lake Michigan. Photo courtesy of the U.S. Army Corps of Engineers: Great Lakes Oblique Imagery (April 2012).

# 9. Appendices

## Acronyms, Abbreviations and Units

| | |
|---|---|
| BPR | Big Rock Point |
| BWR | Boiling Water Reactor |
| CAB | Community Advisory Board |
| CE | Consumers Energy Company |
| CFR | United States *Code of Federal Regulations* |
| DEQ | Michigan Department of Environmental Quality |
| DOE | United States Department of Energy |
| DTF | Decommissioning Trust Fund |
| EGLE | Michigan Department of Environment, Great Lakes and Energy |
| ENO | Entergy Nuclear Operations, Inc. |
| ENP | Entergy Nuclear Palisades, LLC |
| EPA | United States Environmental Protection Agency |
| GLWQA | Great Lakes Water Quality Agreement |
| GTCC | Greater-than-Class-C (waste) |
| HOSS | Hardened On-Site Storage |
| IJC | International Joint Commission |
| ISFSI | Independent Spent Fuel Storage Installation |
| LTC | Little Traverse Conservancy |
| LTTB | Little Traverse Bay Bands of Odawa Indians |
| MI | Michigan |
| MNRTF | Michigan Natural Resources Trust Fund |
| MW | Megawatt = a unit of power equal to one million ($10^6$) watts |
| MWe | Megawatts electric = one million ($10^6$) watts of electric capability |
| MWh | Megawatt hours = a unit of power equal to one million ($10^6$) watt hours |
| MWt | Megawatts thermal = one million ($10^6$) watts of thermal capability |
| NRC | United States Nuclear Regulatory Commission |
| NWPA | Nuclear Waste Policy Act |
| REM | Roentgen equivalent man: one of two standard units (Sv) to measure the dose equivalent (or effective dose). 100 rem is equivalent to 1 Sv. |
| REMP | Radiological Environmental Monitoring Program |
| SNF | Spent Nuclear Fuel |
| SI | International System of Units |
| Sv | Sievert = SI unit of absorbed radiation dose equal to 1 Joule/kilogram |
| TWh | Terawatt hours = a unit of power equal to one trillion ($10^{12}$) watt hours |
| USD | US dollars |
| WQB | Great Lakes Water Quality Board |

## Big Rock Point Panel Discussion Invitation List

| Organization / Background | Name(s) |
|---|---|
| Big Rock ISFSI (Entergy)<br>10030 U.S. 31, Charlevoix, MI | Tim Horan, Manager – thoran@entergy.com |
| Palisades Nuclear Plant (Entergy)<br>27780 Blue Star Memorial Hwy<br>Covert, MI 49043-9530 | Nick Culp, Government Affairs Manager – nculp@entergy.com |
| Consumers Energy | Tim Petrosky, Community Affairs Regional Manager – tdpetosky@gmail.com<br>Carlin Smith, Community Affairs Regional Manager – carlin.smith@cmsenergy.com<br>Heather Prentice, Director of Environmental Compliance, Risk Management and Governance – heather.prentice@cmsenergy.com |
| Michigan Natural Resources Trust Fund Board | Steven Hamp, Chair<br>Note: DNR staffs the MNRTF Board |
| Lana Pollack: Former President, Michigan Environmental Council; former MI State Senator; and former IJC Commissioner | Lana Pollack – lanapollack1@gmail.com |
| Tip of the Mitt Watershed Council<br>426 Bay St, Petoskey, MI 49770 | Gail Gruenwald<br>Jennifer McKay – jenniferm@watershedcouncil.org<br>Jen DeMoss – jenniferann@watershedcouncil.org |
| Little Traverse Conservancy<br>3264 Powell Road<br>Harbor Springs, MI 49740 | Kieran Fleming, Executive Director -<br>Caitlin Donnelly, Director of Land Protection |
| Little Traverse Bay Bands of Odawa Indians<br>7500 Odawa Circle<br>Harbor Springs, MI 49740 | Regina Gasco Bentley, Tribal Chairman<br>Stella Kay, Vice Chairman<br>Rebecca Fisher, Executive Assistant<br>Phil Harmon, Tribal Administrator<br>Doug Craven, Tribal DNR Director |
| Grand Traverse Bay Band of Ottawa and Chippewa Indians<br>2605 N West Bay Shore Dr.<br>Peshawbestown, MI 49682 | Chairman: Thurlow “Sam” McClellan,<br>Vice Chair: Kimberly Vargo<br>Brett Fessell |

| | |
|---|---|
| Friends of the Jordan River Watershed<br>101 Union Street<br>East Jordan, MI 49727 | President: Ethan Winchester<br>Secretary: Adrianne Winchester |
| Charlevoix County Administrator<br>301 State Street<br>Charlevoix, MI 49720 | Kevin Shepard, County Administrator / Human Resources Director<br>Lora Roberts, Administration Resources Coordinator<br>Denise Cunningham, Administrative Assistant |
| Emmet County Administrator<br>200 Division St., Suite G74<br>Petoskey, MI 49770-2486 | Michael Reaves – Acting County Administrator |
| Hayes Township Supervisor<br>(Charlevoix County)<br>09195 Old US 31 N<br>Charlevoix, MI 49720 | Ron Vanzee, Township Supervisor |
| City of Charlevoix<br>210 State Street, Second Floor<br>Charlevoix, MI 49720 | Mark Heydlauff, City Manager |
| City of Petoskey<br>101 E. Lake Street<br>Petoskey, MI 49770 | Rob Straebel, City Manager |
| Charlevoix County Farm Bureau<br>1201 Bridge St<br>Charlevoix, MI 49720-1605 | Lori Scheich-Givens, County Administrative Manager<br>Cole Iaquinto, Regional Rep. |
| Michigan Department of Environment, Great Lakes & Energy (EGLE)<br>Radioactive Materials Unit<br>Radiological Protection Section<br>Waste Management & Radiological Protection Division | Liesl Clark, Director<br>T.R. Wentworth II, Supervisor Radioactive Materials Unit – wentwortht@michigan.gov |
| Petoskey Regional Chamber of Commerce | Ashley Whitney, Board Chair<br>Lead staff: Nikki Devitt<br>Events/Communications Director, Lisa Hoyt |
| Charlevoix Chamber of Commerce<br>109 Mason St, Charlevoix, MI 49720 | Shay Arnold, Board Chair<br>Sarah Hagen, President |
| Sierra Club | Gail Philbin, State Director<br>Sophie Stoepker, West Michigan Clean Energy Organizer |
| Michigan Environmental Council | Conan Smith, CEO |

| | |
|---|---|
| Environmental Law and Policy Center | Howard Learner, Executive Director<br>Margrethe Kearney<br>Rachel Granneman |
| The Nature Conservancy | Helen Taylor |
| Petoskey-Harbor Springs Community Foundation<br>616 Petoskey Street, Suite 203<br>Petoskey, MI 49770 | DJ Jones, Executive Director |
| Michigan Department of Natural Resources | Dan Eichenger, Director |
| Grand Traverse Regional Community Foundation<br>Traverse City, MI | Dave Mengebier, President and CEO (former Consumers Energy Senior Vice President) – dmengebier@gtrcf.org |
| Grand Traverse Regional Land Conservancy | Jennifer Jay, Director of Communications & Engagement<br>Glen Chown, Executive Director |
| FLOW/For Love of Water<br>153 ½ East Front Street, Suite 203C<br>Traverse City, MI 49684 | Liz Kirkwood, Executive Director<br>Jim Olson, Founder & President<br>Dave Dempsey, Senior Advisor |
| Networks Northwest<br>600 East Front Street Suite 104<br>Traverse City, MI 49686 | Kathy Egan, Community Development Regional Director |
| Michigan US Senator Gary Peters | Eric Keller, northern Michigan regional director – eric_keller@peters.senate.gov |
| Michigan US Senator Debbie Stabenow<br>Northern Michigan Office, 3335 S. Airport Road West<br>Suite 6B, Traverse City, MI 49684 | Brandon Fewins, northern Michigan representative |
| WATCH, Inc. - Water and Air Team Charlevoix<br>P.O. Box 615<br>Charlevoix, MI 49720 | Joanne Beemon, Secretary – joanne_beemon@hotmail.com<br>Rick Beemon – beemons@hotmail.com<br>Bill Henne, President |
| Freshwater Future | Jill Ryan, Executive Director - jill@freshwaterfuture.org |
| U.S. Nuclear Regulatory Commission c/o Viktoria Mitlyng & Shannon King Region III, Sr. Public Affairs Officer | Bruce Watson, NRC's Health Physicist (principle technical reviewer) for the Big Rock Project – bruce.watson@nrc.gov |

## Invitation Letter

International Joint Commission
Canada and United States


Commission mixte internationale
Canada et États-Unis

# Great Lakes Water Quality Board

## Big Rock Point Panel Discussion

February 27, 2020 | 6:30 - 9:00 pm | Huron Room

Odawa Hotel | 1444 US-131, Petoskey, Michigan 49770

On behalf of the International Joint Commission's Great Lakes Water Quality Board, you are invited to participate in a panel discussion regarding lessons learned from your experience with the decommissioning of the Big Rock Point nuclear plant.

Recognizing that many nuclear plants around the Great Lakes basin will be shut down and decommissioned in the coming years and decades, the work group is gathering information about the process of decommissioning nuclear power plants, lessons learned and the risks to Great Lakes water quality associated with the decommissioning process. The information gathered will be used to inform the board's report and recommendations to the IJC.

The work group is interested in hearing your thoughts about the decommissioning of the Big Rock Point nuclear power plant and would appreciate your participation in this panel discussion. Our work is focused specifically on the decommissioning of Big Rock Point, not the original siting or operation of the plant. The decommissioning process includes the transition from operation to shutdown, dismantling of facilities and storage of spent nuclear fuel, decontamination and remediation of the site, and license termination activities.

For your consideration, some topics of particular interest to us are:

- Throughout the decommissioning of Big Rock Point, how satisfied were you with the public and Tribal engagement as well as the access to information and transparency from Consumers Energy and the U.S. Nuclear Regulatory Commission? If satisfied, why? If unsatisfied, what do you recommend for improvement?
- How satisfied are you with the current condition of the site and how would you like the site to be used in the future?
- Because no site has yet been approved by the U.S. Government to permanently store spent nuclear fuel or to temporarily store it at a centralized site, Big Rock Point's spent nuclear fuel remains stored onsite aboveground, protected by armed guards. Are you satisfied with this situation? Are there ways in which the current onsite storage could be improved to make you feel more comfortable?
- Are you satisfied with the standards to which the site was cleaned up? Do you think Consumers Energy and the U.S. Nuclear Regulatory Commission adequately considered the impacts of climate change to this site? Observed climate change impacts include increasing variability and average of annual temperature, rainfall and lake levels as well as increasing frequency of lake flooding and mass shoreline erosion events.
- Are you satisfied with how the radioactive and other hazardous wastes were transported offsite during the dismantling and remediation process? Are there any improvements to the

transportation modes (semi-trailer truck, barge, railcar) or routes that you would recommend? What transportation concerns and solutions would you suggest for when the spent nuclear fuel (high-level radioactive waste) is moved to a centralized storage facility?

Please do not hesitate to raise other concerns from the decommissioning process that are not listed above.

Due to time restrictions, only one person from each organization will be able to present as part of the panel. Each panelist will be allotted five minutes to share, which will be followed by a discussion led by work group members John Jackson and Frank Ettawageshik.

Obviously, you will not be able to share everything you want to say in that time and in the discussion that follows. We urge you to share additional thoughts by emailing us or bringing us hardcopy materials that you or your organization have put together or materials you have found particularly valuable on the topic of decommissioning nuclear power plants.

Since the IJC announced the Water Quality Board's current nuclear project last June, the Commission published the board's background report and an interactive GIS StoryMap about the nuclear power facilities in the Great Lakes basin in October 2019. These informational products describe in text and photos the 38 nuclear reactors at 14 sites on the shores of the Great Lakes, definitions and amount of nuclear waste, and the processes by which these nuclear facilities are decommissioned in the United States and Canada.

To inform our panel discussion, we recommend reading Section 7.3 of the background report, which provides pertinent information on Big Rock Point, its decommissioning and current status. For the recommendations on siting a permanent storage facility for high-level radioactive waste in the United States, please see the executive summary of the Blue Ribbon Commission for America's Nuclear Future. Additionally, a report submitted to the U.S. Department of Energy assessing the transportation options for the spent nuclear fuel from Big Rock Point to a centralized storage facility can be found here: Dropbox

For more information about the Water Quality Board, please visit https://www.ijc.org/en/wqb/.

***Please RSVP with your attendance, regrets or alternate at your earliest convenience but no later than Monday, February 24 to Mark Burrows at burrowsm@windsor.ijc.org.***

We look forward to meeting with you and gaining from your experience, knowledge and thinking. We are confident that our report to the IJC Commissioners will be greatly improved by what we learn from you.

Sincerely,

John Jackson
Project Lead

## Big Rock Point Decommissioning Milestones

Document submitted by Consumers Energy.

# BIG ROCK POINT
# DECOMMISSIONING MILESTONES

When Big Rock Point was shut down for the final time in 1997 the vision of the people who worked at the plant focused on restoring the site to what the nuclear industry calls "Green Field."

Just as during 35 years of operation, a number of significant milestones were achieved as workers returned the site to "a green field, free for unrestricted use."

| | |
|---|---|
| 08/29/06 | Big Rock Point hosts its Green Field Celebration on the 44th anniversary of receiving an operating license from the U.S. Atomic Energy Commission. |
| 04/25/06 | Containment sphere shell steel removal complete. |
| 04/12/06 | Containment interior concrete demolition complete. |
| 12/11/05 | Using explosives, controlled blasts successfully soften the concrete monolith located inside containment. |
| 12/01/05 | The final United Way campaign wraps up at Big Rock Point. Plant workers and the company contributed almost $310,000 during 16 campaigns. |
| 10/18/05 | Containment sphere cutting and removal begins. |
| 09/01/05 | Turbine building demolition complete. |
| 10/27/04 | Screen house demolition complete. |
| 10/11/04 | After servings as a beacon to boaters in Lake Michigan for more than 35 years, the plant's trademark red and white stack is removed. |
| 09/08/04 | Administration building demolition complete. |
| 08/31/04 | Discharge canal restored and backfilled. |
| 07/07/04 | Discharge canal drained. |
| 02/09/04 | Plant workers donate 23 pints of blood at their last on-site drive. Workers donated almost 3,000 pints of blood during 15 years of hosting drives. |
| 11/05/03 | The steam drum is shipped for disposal in Utah. |

10/08/03 The reactor vessel is shipped for disposal in South Carolina.

08/25/03 The reactor vessel is moved from its concrete base in containment and set in shipping container.

05/29/03 The reactor head is shipped for disposal in Utah.

03/26/03 Dry fuel storage loading campaign completed. 441 fuel bundles are successfully loaded into dry fuel storage containers.

11/18/02 The first loaded dry fuel storage cask is delivered to the dry fuel storage installation.

4/26/01 Alternate Shutdown building demolition complete.

12/31/00 Power Engineering magazine selects Big Rock Point for a "Project of the Year 2000" Award for the plant's decommissioning power system.

08/03/00 Big Rock Point employees achieve 23 years without a lost-time accident.

06/27/99 Big Rock Point welcomes more than 300 nuclear executives from around the world as host of the American Nuclear Society's Executive Conference.

02/10/99 The plant's main transformer is removed and shipped for continued use at the Thetford substation near Flint.

12/31/98 Big Rock Point is recognized by the National Safety Council for exemplary safety, as measured by recordable lost-time accident rates. The plant has worked safely for 6.4 million hours from August 4, 1977 to December 31, 1998.

11/07/98 The emergency warning system sirens fall silent. Under the defueled emergency plan, the sirens are no longer needed and are no longer sounded on the first Saturday of each month, as had been required since 1982.

10/07/98 Big Rock Point's application of a chemical process to remove radioactive contamination from the reactor and piping earns the plant an R&D 100 Award from R&D Magazine. Called "the Oscars of Invention," the award recognizes the effort as one of 1998's 100 most technologically significant products or processes.

09/20/97 The final fuel bundle is removed from the plant's reactor officially starting the decommissioning and site restoration process.

## Big Rock Point Operation Milestones

Document submitted by Consumers Energy.

# BIG ROCK POINT
# OPERATION MILESTONES

Conceived in the late 1950's as part of the Power Reactor Demonstration Program of the Atomic Energy Commission (AEC), the plant was the world's first high power-density boiling water reactor. The AEC's research program at Big Rock Point led to the development of more efficient nuclear fuels for the commercial nuclear power industry. The plant's reactor was also employed for a number of years to produce Cobalt-60 for the medical and nuclear communities.

Big Rock Point became the longest running nuclear plant in the United States in 1993 by surpassing the previous record of 30 years and 92 days set by the Yankee nuclear plant located in Rowe, Mass. It became the oldest operating nuclear plant in the United States when the Yankee plant ceased operation in 1991.

| | |
|---|---|
| 07/20/60 | Groundbreaking for construction of Big Rock Point, Michigan's first commercial nuclear power plant. |
| 09/27/62 | First sustained chain reaction achieved. |
| 11/01/65 | Consumers Power Company declares Big Rock Point commercial. The plant was made available to the Atomic Energy Commission for 4-1/2 years after initial criticality for research and development activities. |
| 1969-1977 | Big Rock Point licensed to use mixed-oxide fuel through a cooperative research and development program sponsored by the Edison Electric Institute. |
| 07/23/77 | Big Rock Point completes continuous operating run of 343 days, setting world record for boiling water reactors. |
| 08/03/82 | Plant employees complete five years without a lost-time accident. |
| 12/31/83 | Plant employees complete 1.5 million hours of work without a lost time accident and earn the National Safety Council's Award of Merit. |
| 06/09/87 | General Electric honors Big Rock Point for achieving the best availability (95.5 %) of any GE-designed plant worldwide. |
| 08/03/87 | Plant employees achieve 10 years without a lost-time accident. |
| 03/03/91 | Big Rock Point reaches production milestone of 10 million megawatts. |
| 06/04/91 | Big Rock Point named a **Nuclear Historic Landmark** by the American |

| | |
|---|---|
| | Nuclear Society – the world's first high power-density boiling water reactor and an important research site for the nuclear industry. |
| 11/15/91 | Dedication of the Big Rock Point site specific simulator – the nuclear industry's first site-specific simulator built by employees using personal computer-based technology. |
| 02/26/92 | Big Rock Point officially becomes the oldest operation nuclear power plant in the United States. |
| 08/03/92 | Plant employees achieve 15 years without a lost-time accident. |
| 09/27/92 | Big Rock Point celebrates its 30-year operating anniversary. |
| 06/29/93 | Big Rock Point becomes the longest running nuclear plant, surpassing the previous record of 30 years and 92 days held by Yankee Rowe. |
| 12/31/95 | Big Rock Point generates the most electricity in its history: 516,209 megawatts. |
| 06/11/97 | Due to economic reasons, Consumers Energy announces Big Rock Point will be shut down on Aug. 29, 1997, the 35th anniversary of the plant receiving its operating license. |
| 08/03/97 | Big Rock Point employees achieve 20 years without a lost-time accident. |
| 08/29/97 | After 35 years of operation, Nuclear Control Operator Andy Loe says, "Goodbye, Big Rock, sorry to see you go." He then pushes the reactor scram button to shut down the plant for the final time. More than 1,000 people are in attendance to witness the end of an era. |

## Consumers Energy's Presentation

Presented to the work group on Friday, February 28 at the Odawa Hotel before touring the Big Rock Point site.

# History of the Big Rock Point Nuclear Plant Site

International Joint Commission Meeting
Petoskey, MI
Feb. 28, 2020

Consumers Energy
Count on Us®

## Site Information

4 miles NE of Charlevoix and
11 miles W of Petoskey

- Approximately 500 acres (including dry fuel storage)
- 1.5 miles of Lake Michigan shoreline


*Kitchiossining (kit-hee-ahsin-ing) – the "Big Rock" – fell out of a retreating glacier at the end of the last Ice Age.*

*Generations of Native Americans regarded the "Big Rock" as a sacred site, a navigational aid and a meeting place.*

# Site History

- **July 20, 1960:** Groundbreaking for plant construction
  - Michigan's 1st commercial nuclear power plant; the nation's 5th
  - 75MW boiling water reactor designed by General Electric
- **Dec. 8, 1962:** Power operation begins
- **1991:** Named a Nuclear History Landmark
- **Aug. 29, 1997:** Operations cease
  - First commercial nuclear plant site to decommission to a Greenfield

# Operational Milestones

- **Sept. 27, 1962:** First sustained chain reaction
- **Nov. 1, 1965:** Consumers Power Company declares Big Rock Point commercial
  - The plant was made available to the Atomic Energy Commission for 4.5 years after initial criticality for research and development activities
- **July 23, 1977:** Big Rock Point completes continuous operating run of 343 days, setting world record for boiling water reactors
- **June 9, 1987:** Honored for achieving the best availability (95.5 %) of any GE-designed plant world wide
- **June 29, 1993:** Big Rock Point becomes the longest running nuclear plant in the United States, surpassing the previous record of 30 years and 92 days held by Yankee Rowe
- **Dec. 31, 1995:** The plant generates the most electricity in its history (516,209 MwH)
- **Aug. 3, 1997:** Employees achieve 20 years without a lost-time accident
- **Aug. 29, 1997:** After 35 years, Nuclear Control Operator Andy Loe says, "Goodbye, Big Rock, sorry to see you go."
  - He then pushes the reactor scram button to shut down the plant for the final time with >1,000 people in attendance

# Decommissioning Decision

- In June of 1997, Consumers Energy announces that due to economic reasons, Big Rock Point will be shut down on Aug. 29, 1997 – the 35th anniversary of the plant receiving its operating license.
- The Michigan Public Service Commission (MPSC) customer rate base decommissioning trust established to fund site restoration.
- Final decommissioning cost: $388 million

# Public Involvement & Communications

- A Citizen Advisory Board (CAB) comprised of community leaders from Charlevoix, Emmet, Otsego and Crawford counties and an anti-nuclear activist established in 1995
  - CAB members provided input and guidance on plant and community issues
  - They also communicated plant activities to surrounding communities
- "From the Point," a plant newsletter, was established and inserted in local newspapers to provide decommissioning updates to the community
- Public and industry tours and open houses

# Employee & Community Transition

- ~220 employees during operation
  - Petitioned management to lead decommissioning activities
  - Numerous meetings to emphasize "goal is to work ourselves out of a job"
  - Key talent identified for employment at other company facilities
  - New union contract established to ensure continued employment at other company facilities
- Property tax payments reduced from ~$700,000 to current $15,000 one year after shut down
  - Early and continued discussions held with local taxing authority to ensure smooth transition
  - Employment rose to ~500 during much of the decommissioning, resulting in significant local economic impact

# Decommissioning Milestones

# Restoration to Greenfield

- 9 year project completed in 2006
- Removal of all plant equipment, structures, piping, concrete & steel
  - Exceptions:
    - Break wall & below-grade shoreline water intake structure & piping into Lake Michigan
    - Septic field
- The Nuclear Regulatory Commission stated :
  - The site is below NRC requirements that allow a maximum radiation dose of 25 millirem per year from residual contamination
  - The average person in the United States receives about 300 millirem from background radiation each year
  - Release of this site for unrestricted use poses no threat to public health and safety
- Localized, low-level of Tritium identified on site – below EPA drinking water standards

# Oversight

- U.S. Nuclear Regulatory Commission
- Little Traverse Bay Band of Odawa Indians
- Michigan Department of Environmental Quality*
- Michigan State Historical Preservation Office
- Restoration Safety Review Committee
  - Independent nuclear industry experts
  - Provided critical review of all Big Rock Point decommissioning activities
- Citizens Advisory Board
  - Community leaders from Emmet, Charlevoix, Crawford and Otsego counties

*Now Department of Environment, Great Lakes, and Energy

# The Site Today

- Released for unrestricted use by U.S. Nuclear Regulatory Commission
- Michigan Historic Site
- Designated as Native American Traditional Cultural Property
- Home to threatened & endangered plant species
- Approximately 400 acres of Wetlands
- Majority of site is vacant
  - Dry Fuel Storage:
    - Approximately 100 acres owned and operated by Entergy
    - Licensed by USNRC

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# Dry Fuel Storage Location

# Dry Fuel Storage Location

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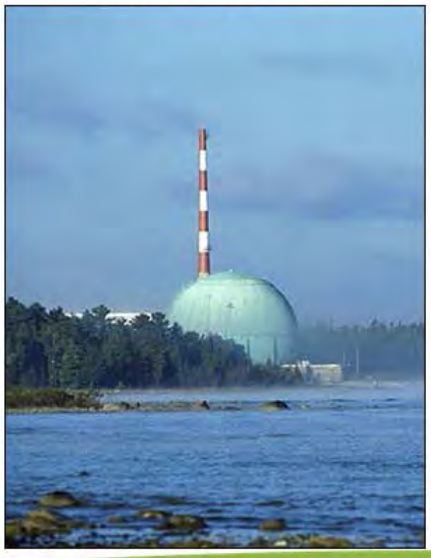
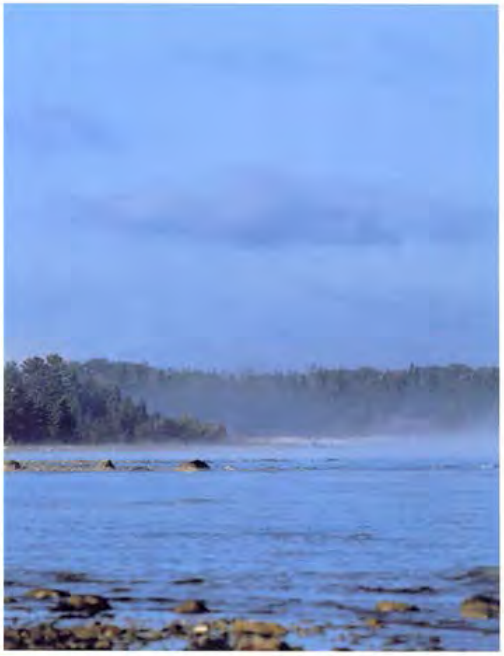
# Then & Now





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# Historic Marker

"Consumers Power Company (later Consumers Energy) opened the Big Rock Point Nuclear Power Plant just west of here in 1962. It was the world's first high-power density boiling water reactor, and the fifth commercial nuclear power plant in the U.S. The plant began as a research and development facility, with the first goal being to prove that nuclear power was economical. In addition to generating electricity, the reactor produced cobalt 60 that was used to treat an estimated 400,000 cancer patients. In 1991 the American Nuclear Society named the plant a Nuclear Historic Landmark. When it closed in 1997, Big Rock was the longest running nuclear plant in the U.S. Consumers Energy later restored the site to a natural area."


"Big Rock Point is named for a large boulder used as a landmark by Native Americans. At least as early as the mid-nineteenth century Odawa (Ottawa) Indians used Big Rock, which they called Kitcheossening, as a gathering place each spring. The Odawa summered at Waganaksing (the area between Harbor Springs and Cross Village), but dispersed into smaller groups and traveled during the winter. Each spring they returned to Big Rock, their canoes loaded with sugar, furs, deer skins, prepared venison, bear's oil, and bear meat prepared in oil, deer tallow, and sometimes a lot of honey. From there they returned to Waganaksing by crossing the bay in wiigwaas jiimaan (birch bark canoes). In 1999 elders and youth from the Little Traverse Bay Band of Odawa Indians recreated the crossing."



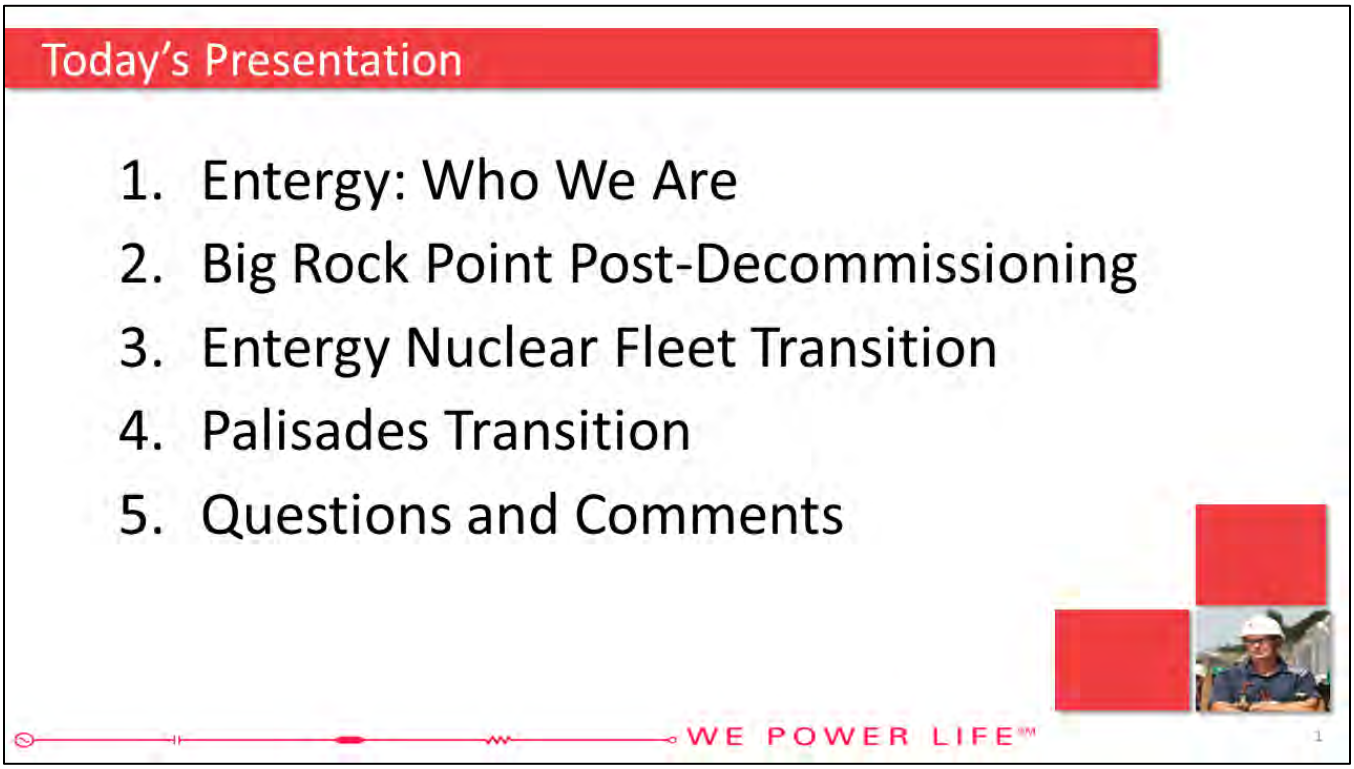
# Future Property Use

## Previous interest in the property:

- High-end residential housing
- Science Center
- Public park
- Renewable energy site
- Conservation easement
- Leave as is

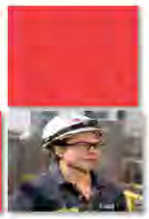
## Entergy's Presentation

Presented to the work group on Friday, February 28 at the Odawa Hotel before touring the Big Rock Point site.

## Who We Are: Entergy

- An integrated energy company with 30,000 MW of electrical generating capacity, including 9,000 MW nuclear
- Delivers electricity to 2.9 million utility customers in Arkansas, Louisiana, Mississippi, and Texas
- Two primary business segments include Utility operations (South) and Entergy Wholesale Business (North)
- Entergy is one of the largest nuclear fleets in the United States, owning, operating, or providing management services to nine reactors in six states
- Fortune 500 company with annual revenues of more than $11 billion and approximately 13,500 employees





## Big Rock Point Timeline

- **1963** – Consumers Energy's BRP becomes first nuclear plant to begin commercial operation on the Great Lakes
- **1997** – BRP permanently ceases operations (34-year run); full core offload begins
- **2003** – All spent fuel removed from pool and placed in dry fuel storage
- **2006** – Site remediation completed (3rd decommissioned plant on Great Lakes)
- **Jan. 2007** – NRC approves Consumers Energy's request to release surrounding property for unrestricted use
- **April 2007** – NRC approves Palisades and BRP ISFSI license transfer to Entergy
- **Aug. 2018** – Entergy, Holtec announce post-shutdown sale of Palisades, including BRP ISFSI, subject to regulatory approval
- **TBD** – BRP ISFSI decommissioning, license termination to be completed

## Big Rock Point

*Big Rock Point prior full remediation; ISFSI and Administrative Building in foreground*

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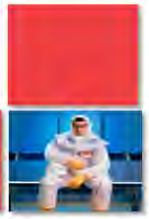
## Big Rock Point

**Snapshot of BRP Today**

- 107-acre footprint (of original 542-acre site) including the ISFSI owned by Entergy under license by the NRC
- Administrative building, warehouse, and ISFSI including:
  - Reinforced, guarded concrete pad (75' x 99')
  - Seven reinforced spent fuel canisters (441 assemblies)
  - One reinforced canister of GTCC



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## Big Rock Point

*Big Rock Point ISFSI with eight canisters*



## Entergy Nuclear Fleet Transition


**Merchant/Wholesale Nuclear North**

- Vermont Yankee – *Vermont*
- James A. Fitzpatrick – *New York*
- Pilgrim – *Massachusetts*
- Indian Point 2 & 3 – *New York*
- **Palisades – *Michigan***
- Cooper – *Nebraska* (managed)

**Utility/Rate-Based Nuclear South**

- ANO 1 & 2 – *Arkansas*
- River Bend – *Louisiana*
- Waterford 3 – *Louisiana*
- Grand Gulf – *Mississippi*

## Palisades Transition

*Palisades Power Plant today in Van Buren County, Michigan*

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## Palisades Transition

**Business Timeline**

- **1971** – Palisades begins commercial operations
  - Licensed to operate to 2031 (NRC granted renewals 2007, 2011)
- **2007** – Entergy purchase of Palisades from Consumers Energy
  - Fifteen-year purchase power agreement (PPA)
  - Big Rock Point ISFSI
- **Dec. 2016** – Entergy, Consumers propose early PPA termination
- **Sept. 2017** – Entergy announces decision to continue operations under PPA terms, close plant in Spring 2022
- **Aug. 2018** – Entergy, Holtec announce post-shutdown sale of Pilgrim and Palisades

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## Palisades Transition

### Business Timeline (cont.)

- **Summer 2020** – 1R27 final refueling and maintenance outage
- **Spring 2022** – Expiration of PPA with Consumers Energy
- **Spring 2022** – Permanent cessation of plant operations; begin full core offload
- **TBD** – Announced license transfer to Holtec, pending regulatory approval
- **TBD** – Submittal of PSDAR and DCE
- **2082** – Deadline to restore Palisades site



## Big Rock Point Citizen Advisory Board Charter

Consumers Energy provided this document for the work group in response to a request from the panel discussion.

# BIG ROCK POINT
# CITIZEN ADVISORY BOARD
# CHARTER

**I.** PURPOSE

A. The Big Rock Point Community **CITIZEN** Advisory Board (**CAB**) is established for the purpose of providing a formal channel of community feedback to Big Rock Point Plant (Plant) and Consumers Energy (Company) management on issues relevant to the Plant, including operation, decommissioning and possible re-powering at the Plant site.

B. The **CAB** shall evaluate and comment upon data and other information provided by the Plant and other reliable sources as well as upon those issues which the CAB deems relevant to the Plant.

C. The **CAB** shall function solely as an advisory board. Plant and Company management are not obligated to accept, adopt, follow or in any way conform to the advice or recommendations made by the **CAB**.

**II.** ORGANIZATION AND MEMBERSHIP

A. Membership

1. The inaugural members of the **CAB** will be appointed by the Big Rock Point Plant Manager.

2. The **CAB** shall consist of at least nine (9) and no more than thirteen (13) **FIFETEEN (15)** members as follows:

| | |
|---|---|
| Charlevoix County – one (1) | City of Charlevoix – one (1) |
| Emmet County – one (1) | City of Petoskey – one (1) |
| Hayes Township – one (1) | Industrial Business – one (1) |
| Local Residents – two (2) | Environmentalist – one (1) |
| At Large Member – one (1) | Big Rock Point Member – one (1) |

**OTSEGO COUNTY – ONE (1)**
**CRAWFORD COUNTY – ONE (1)**
Charlevoix Chamber of Commerce or other business – one (1)
Petoskey Chamber of Commerce or other business – one (1)

Members may and are encouraged to name an alternate.

3. Each member of the **CAB** shall serve for a two (2) year term, unless such term is otherwise extended or terminated in accordance with this Charter.

4. Termination of membership will automatically occur in the event that three (3) consecutive **CAB** meetings have been missed. The **CAB** may also terminate a membership upon a concurring vote of at least seven (7) members.

5. Membership may be resigned in writing sent to the Chairperson of the **CAB**. The Chairperson shall immediately forward a copy of such resignation letter to the Big Rock Point Public Affairs office.

6. Vacancies in membership will be filled by majority vote of the **CAB** after it has reviewed and approved applications for those positions. All vacancies must be filled consistent with the criteria for membership stated in 2, above. The term of that member filling a vacancy will end at the same time, as it would have for the member being replaced. Vacancies created by the expiration of a member's term will be filled as stated in this section; however, the new member will have a full term of two (2) years, subject to the term of the **CAB** as set forth in Article IV, TERM.

7. A member's term may be renewed for an additional two (2) years by concurring votes of at least seven (7) members of the **CAB**. Such renewal is subject to the term of the **CAB** as set forth in Article IV, TERM.

B. OFFICERS

1. The **CAB** shall have a Chairperson, Vice-Chairperson and Secretary. The inaugural Chairperson and Vice-Chairperson will be appointed by the Big Rock Point Plant Manager. Subsequent Chairpersons and Vice-Chairpersons will be elected by a majority vote of the **CAB**. The Secretary of the CAB will be appointed by the Chairperson.

2. The term for the Chairperson and Vice-Chairperson will be two (2) years. The Secretary will serve at the discretion of the Chairperson.

C. COMMITTEES – Committees, sub-committees or similar working groups will be designated by the Chairperson as needed to carry out the work of the **CAB**. Such committees, sub-committees or working groups will serve at the discretion of the Chairperson.

D. DUTIES

A. Chairperson shall perform the following duties:

1. Call meetings of the **CAB** after concurrence of Plant management.
2. Prepare and /or approve agenda for meetings.
3. Preside at **CAB** meetings.
4. Appoint Secretary of **CAB** and provide for the keeping of meeting minutes in the Secretary's absence.
5. Certify the accuracy of meeting minutes after approval by **CAB** membership.
6. Provide for the maintenance and retention of **CAB** records as more fully described in Section III.G.
7. Submit to Plant management all recommendations adopted by the **CAB**.
8. Forward member resignation letters to the Plant Public Affairs office.

B. Vice-Chairperson shall perform all the duties of the Chairperson in his/her absence.

C. Secretary shall perform the following duties:

1. Keep minutes of all **CAB** meetings including a record of members present and a complete and accurate description of matters discussed and conclusions reached.
2. Retain copies of all **CAB** records.
3. Provide the originals of all **CAB** records to the Plant Public Affairs office for retention and public inspection as described in Section III.G.

**III.** MEETINGS

A. Frequency – The **CAB** will meet on an as-needed basis, but no fewer than two (2) times a year. The need for such meetings will be determined by the **CAB** and Big Rock Point management. Additional meetings may be called by the Chairperson with the concurrence of Plant Management.

B. Open Meetings – All **CAB** meetings will be open to the public.

C. Reimbursement – Members of the **CAB** will not be reimbursed for travel or other expenses incurred by them in the performance of their duties as members. However, the Plant will provide a meal at every meeting.

D. Quorum – Seven (7) members will constitute a quorum for a meeting of the **CAB** at which a vote or other official action is to be taken. In the absence of a quorum, the **CAB** may convene the meeting and adjourn until such time as a quorum is present. No official action may be undertaken by the **CAB** at a meeting which lacks a quorum.

E. Majority Vote – Wherever this Charter refers to a "majority vote," it means a simple majority of those members present and voting; provided that a quorum is present at the meeting. If no quorum is present, the **CAB** cannot vote on any matter, except adjournment, or take any official action of any kind. Dissenting votes will be noted.

F. Minutes – Minutes shall be kept of all **CAB** meetings which shall include a record of members present, a complete and accurate description of matters discussed and conclusions reached, and copies of all reports received, issued or approved by the **CAB**.

G. Records – The records if the **CAB** consist of this Charter, meeting agendas, meeting minutes, reports submitted to or drafted by the **CAB**, studies made available to or prepared by the **CAB**, correspondence to or from the **CAB** and such other documents so designated by the **CAB**. All such records shall be made available to the public at the Plant Public Affairs office, unless the **CAB** decides otherwise by a confirming vote of at least seven (7) members.

H. Membership Renewal – The **CAB** shall vote to renew the terms of its existing members at the last regularly scheduled meeting of its term, unless a concurring cote of at least seven (7) members selects an earlier meeting for such renewal. Any member not receiving a concurring vote of at least seven (7) members of the **CAB** for renewal will cease being a member at the expiration of his/her term. Any vacancies created by the expiration of a member's term will be filled in accordance with the procedures set forth in Section II.A.6.

## IV. TERM

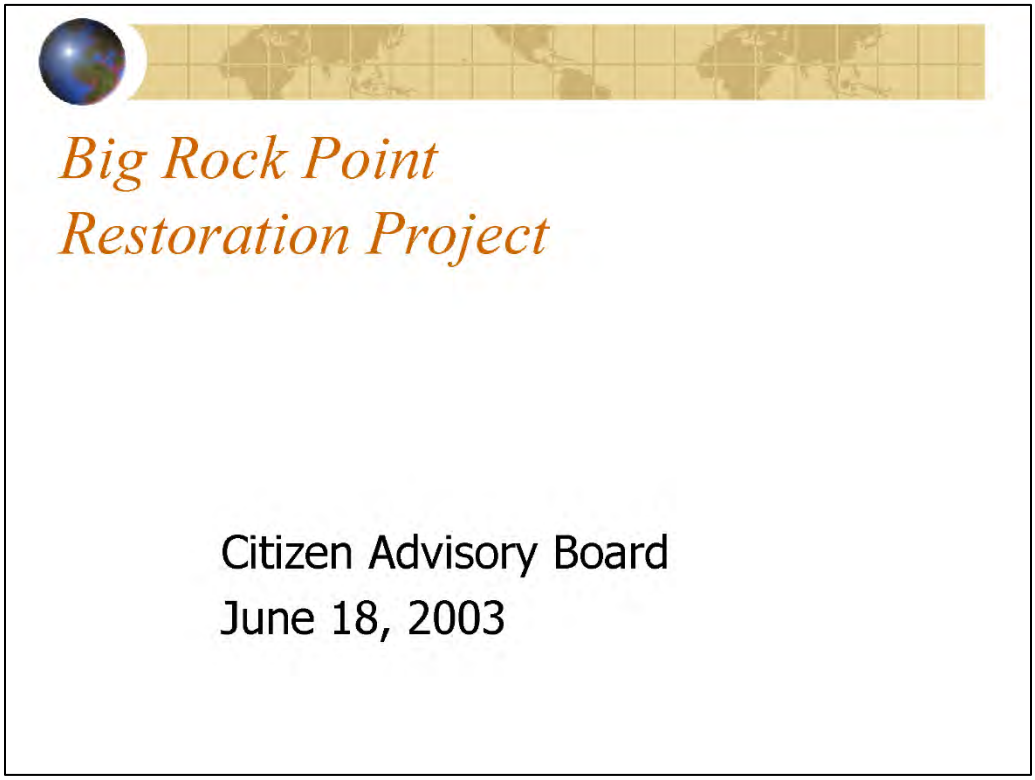
A. The **CAB** shall exist and operate for an initial term of two (2) years. The continuation of the **CAB** beyond its initial term shall be determined by the Big Rock Point Manager.

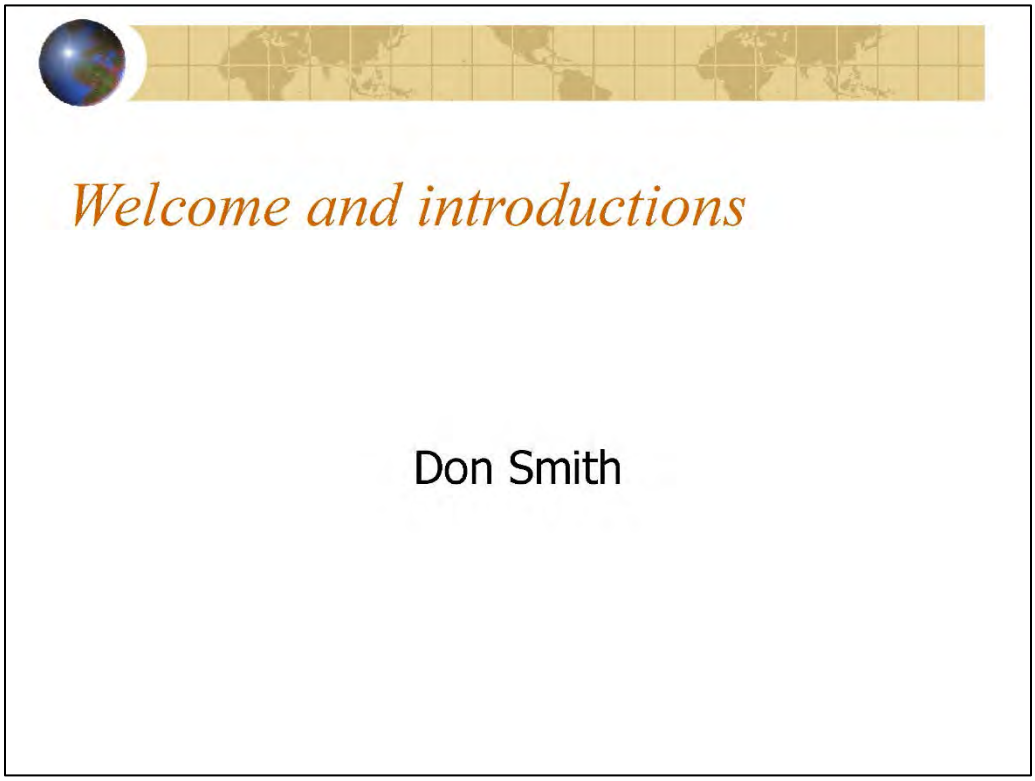
B. The **CAB** may be disbanded prior to the expiration of its initial term in the event that the Plant ceases to have approval for the finding necessary for the continued existence of the **CAB**.

**(Revised January 2002 to offer membership to representatives from Otsego and Crawford counties.)**

## Big Rock Point Restoration Project: Presentation to the Citizen Advisory Board

Consumers Energy provided this document for the work group in response to a request from the panel discussion. This presentation was given to the citizen advisory board on June 18, 2003.



# Agenda

| | |
|---|---|
| *Welcome:* | *Don Smith* |
| *Project Update:* | *Kurt Haas* |
| *Dry Fuel Storage:* | *William Trubilowicz* |
| *Gardian System Demonstration:* | *Ken Pallagi* |

# Recent Accomplishments

- Dry Fuel Storage
- Radwaste Building Removal
- Debris Disposal Program
- License Termination Plan
- Spent Fuel Pool Cleanout
- Reactor Vessel Preparation

# Dry Fuel Storage Cask Monitoring

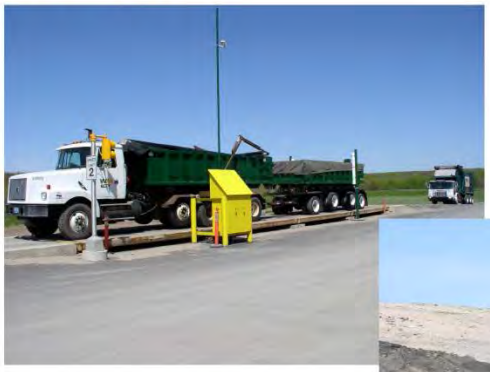
# Radwaste Building Demolition

# Debris Disposal Program

- NRC approved disposal process – February 2002
- MDEQ approved disposal plan – March 2002
- 3rd party oversight in place
- GARDIAN system operational – May 2003
- Two million pounds processed and shipped.

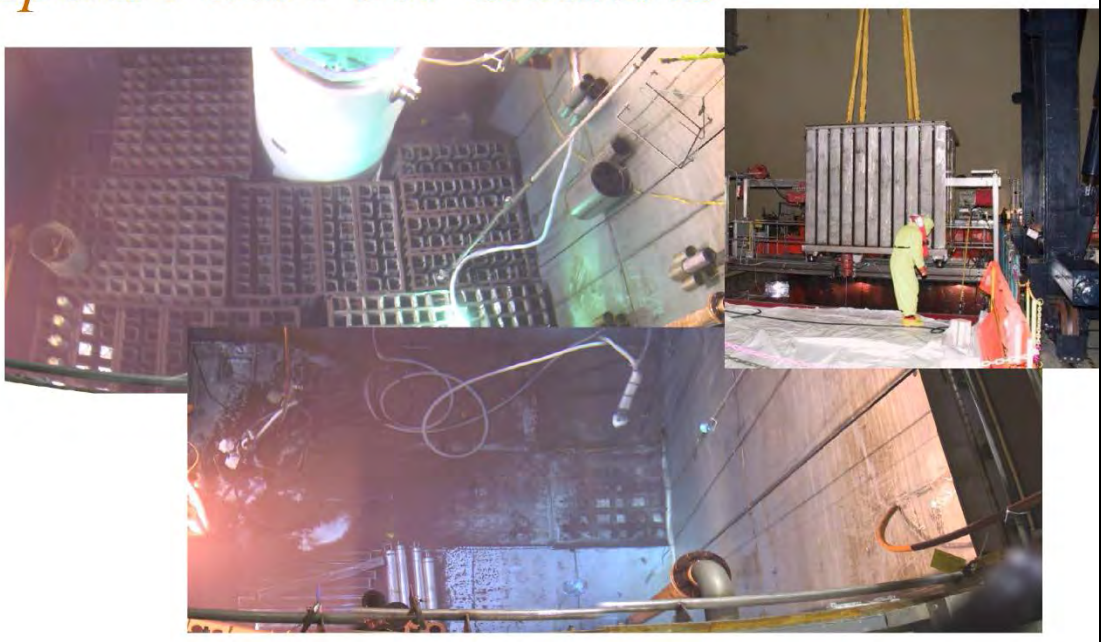
# Gardian Takes It's Post

# Debris Disposal 5-21-03



# License Termination Plan

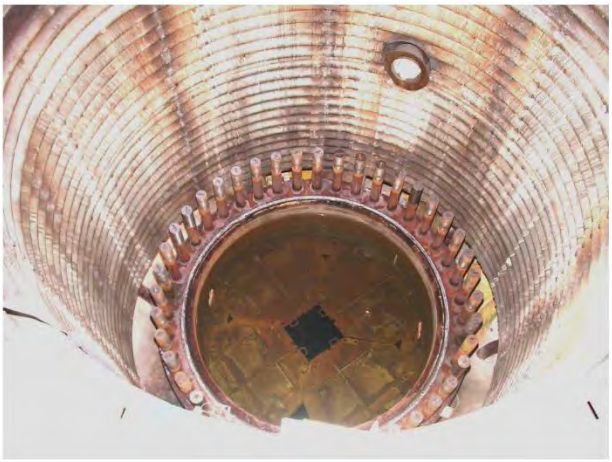
# Spent Fuel Pool Cleanout



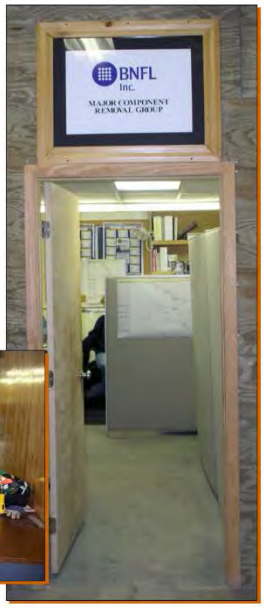
# Reactor Vessel Removal: Head Lift

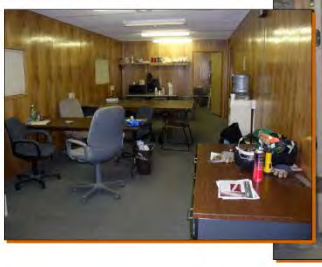
# Reactor Vessel Removal: Head Shipment


# Reactor Vessel Removal: Stud Removal



# Rearranging People



## Kilkenny, Trubilowicz win seats in Charlevoix

BY KRISTINA HUGHES
NEWS-REVIEW STAFF WRITER

CHARLEVOIX — Diane Kilkenny may provide a mom's perspective to the Charlevoix school board.

Kilkenny, the mother of three and a registered nurse, with 627 votes bested her opponent, Dennis Kusina, with 427 votes in the contested race for a one year term on the board.

"I haven't had time to digest it," Kilkenny said.

Of the 7,118 registered voters, 1,168 voters — about 16.4 percent — turned out for the election.

Kilkenny said that she will bring a fresh outlook to the board, after residing in various cities with her husband, who is a Coast Guard officer, and their three sons.

Kilkenny

"My outlook is different from someone who's lived here a majority of their life," she said.

Kilkenny will serve on a predominately male board.

"I didn't run because I'm a female, I ran because I'm a concerned parent," Kilkenny said.

Kusina, the chairman of the Charlevoix Planning Commission, said he was encouraged by his candidacy and the public's approval of the Headlee rollback and sinking fund renewal.

The ballot included a renewal of the sinking funds and a 0.30-mill Headlee Amendment tax levy increase on non-homestead properties to take the district's maximum levy to 18 mills, worth about $102,000. The millage passed 620 to 534.

Trubilowicz

The voters renewed a 0.90-mill sinking fund tax for six years for school construction, repair and other uses.

A total of 627 voters said yes, while 529 said no to the sinking fund renewal.

The sinking funds will accommodate major projects for the next six years including the replacement of the central office, repairs to the bus garage and improvements to the athletic facilities.

"Your support for both these proposals gives the schools some critical funds during uncertain time in the state," incumbent Bill Trubilowicz said. "Winning by less than 100 votes each is a tribute to the work you folks did to get the Yes voters to turn out."

Trubilowicz was elected in an uncontested race for a four-year position on the board. Trubilowicz has served on the board since he was appointed in November.

"The schools in this community have been really good to my family and I think it is an honor to give something back," Trubilowicz said. "I'm honored and humbled."

Kristina Hughes can be reached at 439-9348 or, khughes@petoskeynews.com.

# Dry Fuel Storage Project

# Fuel Loading Team

- Staging/preparing equipment for loading
- Loading the fuel canister
- Verifying the fuel load
- Vacuum drying the canister
- Transferring the canister to the overpack

# Heavy Haul Team

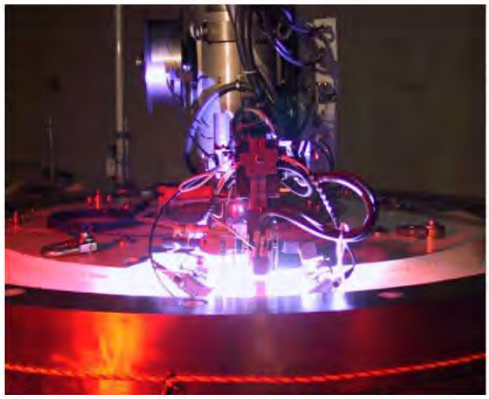
- Transfer empty overpacks to containment
- Move loaded overpacks to ISFSI
- Position the overpack in containment & on the ISFSI
- Operate the air pallets, prime mover & HHT
- Coordinate Erickson's cranes & trucks

# Three Parts to Safety

- Nuclear safety
- Industrial safety
  - Heavy loads
  - Work aloft
- Radiological safety
  - High contamination levels
  - Hot particles

# Process Improvements

- Procedure & work instruction validation
- Grout qualification
- Welding demonstrations
- Equipment fit-ups
- Dry run preparations
- Readiness Review Team



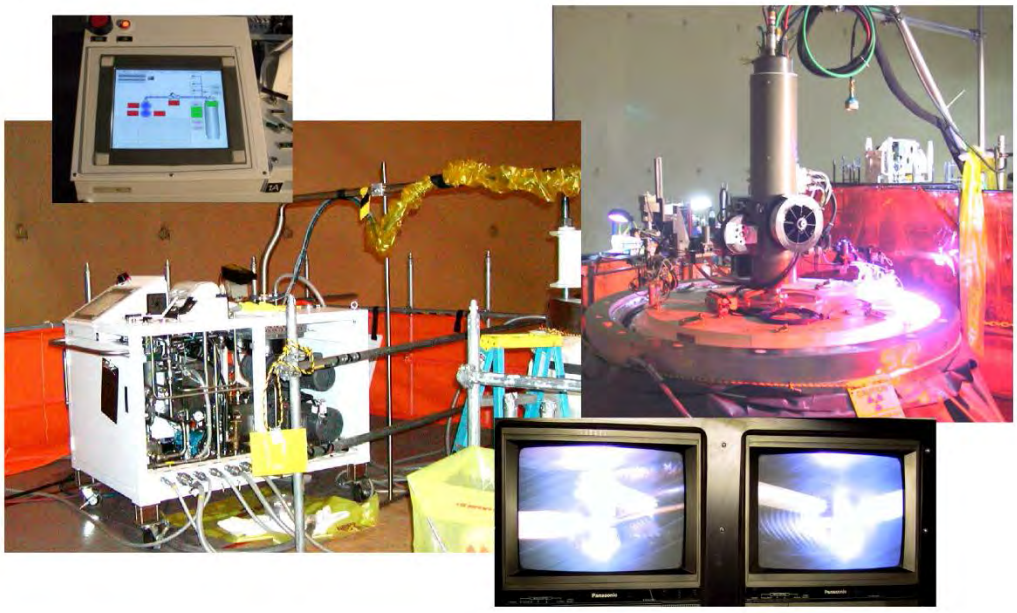
# Goal - Problem Free Loading

- Practice, practice, practice
  - Equipment fit-ups
  - Procedure validation
  - Two complete dry runs
- Contingency/off-normal planning
- Operating plant mentality
  - Absolute control of configuration
  - Procedure compliance
  - Tight administrative controls

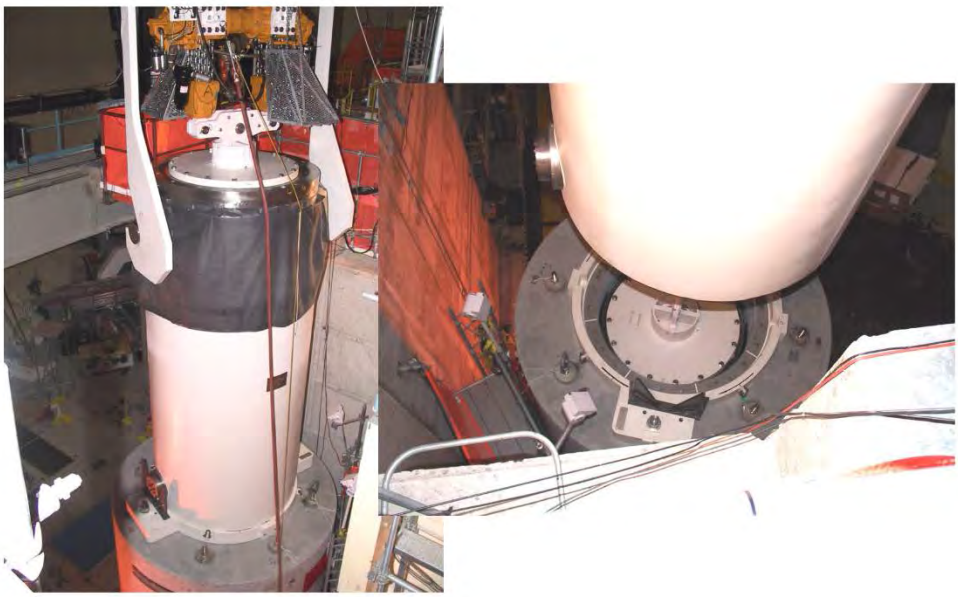
# Transfer Cask Handling

# Fuel Bundle Loading

# Canister Drying/Welding



# Canister Downloading

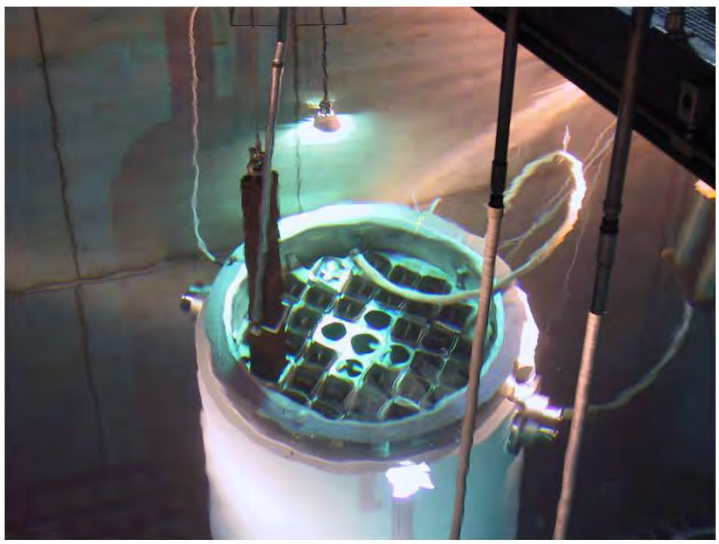


# Cask Handling


# Cask Transfer to ISFSI

# Cask Placement on Pad

# Last Fuel Bundle

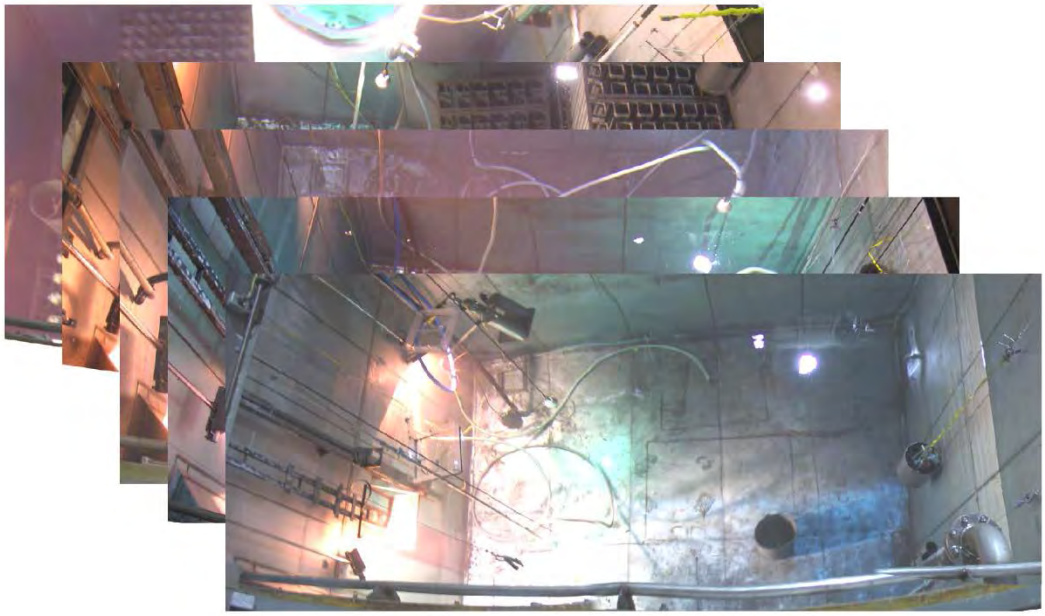


# Fuel Free Site

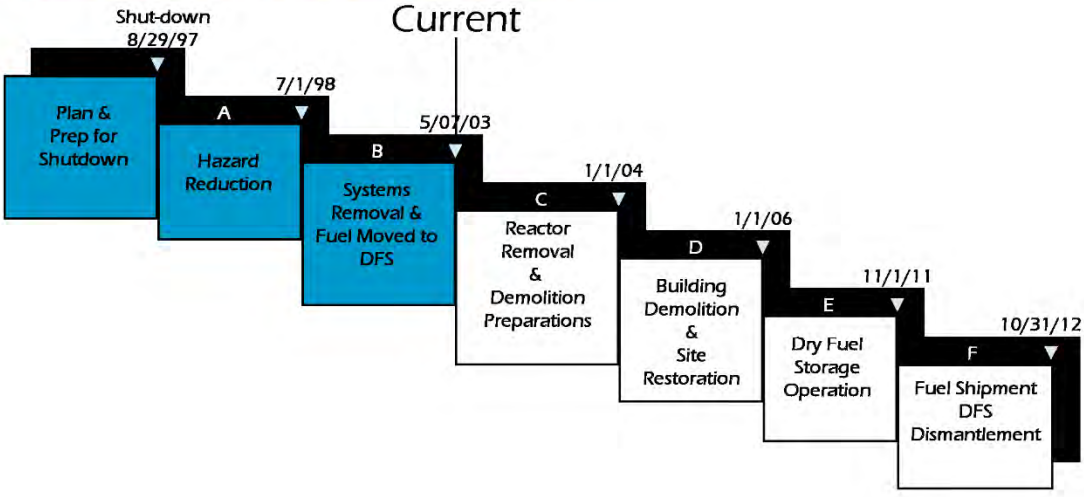
March 26, 2003

# Horizontal Transfer System

# Fuel Pool Cleanout



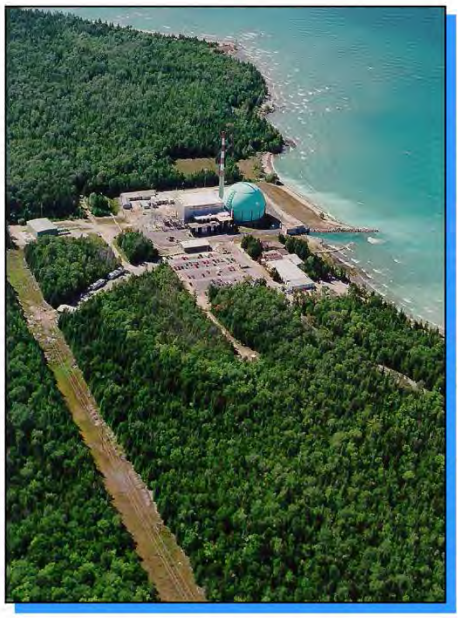
# Restoration Timeline



# Phase C

***May 2003 - Jan. 2004***

- Shipment of large components
  - Reactor Vessel
  - Steam drum
- Final systems removed



# *Big Rock Point Project Priorities*

- **Safety**
  - **Nuclear, Radiological and Industrial**
- **Efficient Restoration**
  - **Use all resources productively**
- **Future**
  - **Preparation of all people for future changes and opportunities**

**Motto:** Do it - Safe … Right … Together, but **DO IT!**

# *Cost Status*

*As of May 2003*

| | Project to Date |
|---|---|
| Budgeted | $247.4 M |
| Actual | $232.6 M |
| Variance | ($14.8 M) |

Not Including Dry Fuel Storage

# *Who we are*

- **240 currently on site**
- **Spring 1998 Peak 480 people**
- **Mid 2004**

## *Achieving the Vision*

- To conduct restoration in a manner which brings praise from all stakeholders:
  - The local community
  - The public at large
  - Our employees and their families
  - Our company
  - The nuclear community
  - Regulatory agencies
  - Our critics

*Success:*

*"There are no secrets to success. It is the result of preparation, hard work and learning from failures"*

*General Colin Powel*