Decommissioning Nuclear Power Facilities in the Great Lakes: Experts Virtual Workshop

November 2020 Workshop Report

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International Joint Commission
Great Lakes Regional Office
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Strategies to Sustainability

Our Vision

A healthy planet. A productive and engaged society. A clean, diversified and inclusive economy.

Our Mission

We work collaboratively with governments, Indigenous peoples, business and civil society to navigate complex challenges, develop integrated and practical solutions and support societal transitions that result in sustainable outcomes.

Stratos runs its business in an environmentally and socially sustainable way, one that contributes to the well-being of our stakeholders – clients, employees and the communities in which we operate. Reflecting this commitment, we have an active Corporate Social Responsibility program. For more information about our commitments and initiatives, please visit our Web page: www.stratos-sts.com/about/

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Introduction

The International Joint Commission (IJC)'s Water Quality Board (WQB) Work Group on Decommissioning Nuclear Power Plants (the Work Group) convened a two-day virtual workshop on November 12-13, 2020. The goal of the workshop was to bring together representatives from diverse sectors to provide expert advice and insights on some issues surrounding decommissioning of nuclear power facilities in the Great Lakes basin and best practices to protect the environment going forward. Through the efforts of the Work Group, the WQB will consider the input from the workshop participants in preparing its advice for the IJC regarding how to address the risks associated with decommissioning of closed nuclear power facilities in the Great Lakes basin. The goal is to minimize contamination of the Great Lakes environment during the decommissioning process and to provide long-term protections for the environment. The IJC may then choose to endorse and transmit the advice to the Governments of Canada and the United States.

Workshop participants came from a range of sectors including Indigenous peoples, industry, regulators, environmental non-governmental organizations, community representatives, and concerned citizens[1]. Additionally, a contingent of Commission staff from the Great Lakes Regional Office was present to assist in notetaking and other workshop support.

Over the course of the 2-day workshop, participants (ranging between 20 and 30 individuals per session) considered and discussed issues surrounding three decommissioning themes in breakout group and plenary formats over three sessions:

- **Session 1: On-site Storage** (November 12: 9:00 – 11:00 am EST)
- **Session 2: Transportation during Decommissioning** (November 12: 1:00 – 3:00 pm EST)
- **Session 3: Residual Waste and Long-Term Monitoring** (November 13: 9:00 – 11:00 am EST)

Throughout the workshop, breakout groups considered questions posed by the Work Group. Attendees covered diverse views and perspectives on nuclear energy and characterization of risks. Many views were expressed in regard to the themes of each session and, recognizing potentially conflicting opinions, groups were encouraged to work towards narrowing down insights and advice to the Work Group in the form of areas of convergence and divergence for each issue.

The following report provides an overview of the remarks, discussion highlights, and the areas of convergence and divergence that emerged within the topics discussed, based on notes taken by IJC staff during the workshop. A full list of participants is provided in Appendix A, and the workshop agenda is provided in Appendix B.

[1] Note: While invitations were sent to a broad range of sectors, it should be noted that attendees at the workshop were more largely representative of the ENGO community and concerned citizens (see Appendix A for full list).

Workshop Overview

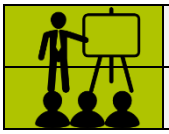
BACKGROUND

Since 2018, the WQB has been assessing the decommissioning process and plans for 38 nuclear reactors at 16 commercial generating stations on 14 sites located within both the Canadian and United States portions of the Great Lakes basin, as part of their advisory role to the IJC under the Great Lakes Water Quality Agreement. A priority issue within the Great Lakes basin, the project is aimed at identifying potential opportunities to reduce the threats to the Great Lakes environment (water, air, and land) by considering the environmental hazards and risks that could result during and after the decommissioning process. Also being considered are the current regulatory regimes in Canada and the United States in order to address the risk, and best practices used in North America and Europe.

To-date, the Work Group has completed a background report, a contracted study, supplemental research, as well as panel discussions with community representatives in the U.S. and Canada. The input received during this workshop will add to the considerable information gathered so far about the process of decommissioning nuclear power plants, lessons learned, and the risks to Great Lakes water quality associated with the process. All information gathered will form the basis of the WQB's report and recommendations to the IJC's Commissioners.

In advance of each workshop session, participants were invited to review a background paper prepared by members of the Work Group highlighting issues specific to Canada and specific to the United States for each session topic, as well as the planned discussion questions. During each session, participants received brief overviews of the context of the session's theme, participated in an interactive dialogue revolving around two issue-specific questions in breakout group and plenary discussions, and began to identify areas of potential convergence and divergence within each issue.

INTRODUCTORY REMARKS AND SESSION CONTEXT



The WQB's mandate and the objectives of the workshop

Opening Remarks

Opening remarks were delivered at the beginning of each session by either the WQB Co-Chair, Gayle Wood, or by Work Group project lead John Jackson to set the stage for the workshop and to summarize the WQB's mandate and the objectives of the workshop. Following the acknowledgement of First Nations, Tribal, and Métis traditional territories on which people live and have gathered from for this virtual workshop, members of the WQB were thanked, as were workshop organizers.

A brief overview of the IJC was provided, followed by further information on the WQB itself. As part of the opening remarks, a brief overview of this particular body of work being undertaken by the WQB project was outlined. It was noted that the WQB has undertaken this project to examine the decommissioning processes of nuclear power plants to provide recommendations to the IJC on preventing or minimizing environmental risks and challenges that may occur after the closure of nuclear facilities.

Just prior to moving into the substantive conversation of the workshop, participants were encouraged to work collaboratively, to listen for both areas of convergence as well as areas where there are

differences of opinion, acknowledging the wide range of backgrounds represented in the workshop sessions.

The Work Group's objectives and the context of each session

Session Context

Following opening remarks, John Jackson presented an overview of the Work Group's objectives and the context of each session. A map of the facilities involved in the nuclear energy lifecycle in the Great Lakes region (**Figure 1**) was presented to help set the stage. It was noted that nuclear plants and facilities are located all around the Great Lakes basin, with the exception of Lake Superior, and that in most instances these plants are close to the shores of the lakes. Mr. Jackson noted that some of these facilities are reaching their end-of-life, with decisions around whether to re-build/upgrade or decommission. It was also noted that on the U.S. side, some plants are closing due to their inability to compete with less costly forms of energy production (e.g., natural gas).

Figure 1: Map of the facilities involved in the nuclear energy lifecycle in the Great Lakes region.[2]

[2] Image courtesy of Citizens' Clearinghouse on Waste Management. Reproduced with permission.

Next, the Work Group's purpose and the scope of its report to the IJC were summarized to help workshop participants frame the workshop dialogue, including the following points:

- The WQB proposed, and the IJC approved and supported, the nuclear decommissioning project to identify recommendations to prevent or minimize environmental impacts to the Great Lakes during and after decommissioning in the long-term.
- The WQB is taking a basin-wide approach, assessing best practices and trying to determine if there are policy implications related to decommissioning of nuclear power facilities.
- The WQB will not be assessing:
  - Use of nuclear power as an energy source.
  - Siting of new nuclear power plant operations or issues with current operations of nuclear power plants.
  - Siting of long-term spent nuclear fuel storage facilities.

Workshop participants were encouraged to frame their input in a way that would assist the WQB in shaping recommendations to the IJC, which in turn could inform advice offered to governments.

Finally, remarks were presented to provide specific context for and to introduce the discussion questions in each workshop session (more fully described in the subsequent sections of this report):

- **Session 1 Theme:** Ongoing on-site storage of spent nuclear fuel after decommissioning
- **Session 2 Theme:** Off-site transportation issues during decommissioning
- **Session 3 Theme:** Residual contamination/ spent nuclear fuel and long-term monitoring

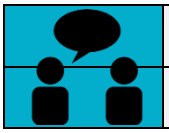
Session 1: On-site Storage

In both Canada and the United States, spent nuclear fuel is currently stored on-site in a spent fuel pool (wet storage) and later encased on-site in metal and concrete casks (dry storage) until a permanent off-site, long-term storage solution becomes available. Low- and intermediate-level radioactive waste also require a long-term management facility capable of safely isolating the waste materials from people and the environment over the time frame that those materials remain radioactive (i.e., thousands of years). Additionally, implications of expected climate change impacts on the Great Lakes (e.g., future lake levels, flooding and seiche events, shoreline erosion, increased storm intensity and frequency, and extreme temperatures) are factors to be considered with respect to both storage constraints and decommissioning methods. Lake level rise and higher storm surge events may now threaten nuclear facilities that were designed and built decades ago on coastal waterways before climate change was recognized or considered.

In this session, discussions focused on how to address the fact that it is highly likely that some radioactive wastes will have to remain on-site for a very long time, due to the lack of off-site storage or disposal sites in Canada and in the U.S., and on the implications (such as from climate change) for decisions on decommissioning.

Participants were invited to discuss:

- **Question 1:** Given the likely long-term lack of off-site repositories for radioactive wastes in Canada and the U.S., what impact will this have on decisions about **where and what methods** to use for the long-term storage of radioactive wastes on-site after other decommissioning activities have been completed? What **factors** should be used to make these decisions?
- **Question 2:** How should we take into account the possible impacts of **climate change**, both now and in the long-term future, on the on-site storage facilities (consider both type of facility and location of facility)?



Question 1: On-Site Storage Methods and Factors

Breakout Group and Plenary Discussions

Through the breakout group and plenary discussions, participants covered topics ranging from concerns over proximity of facilities to water, international storage practices, U.S. and Canadian trends in nuclear safety and regulation, cost vs. social motivators, climate change and extreme weather, nuclear materials classification systems, and community engagement, among others. Themes of trust, financial oversight/liabilities, historical environmental impacts, concerns over specific facilities, and regulatory imbalance dominated discussions.

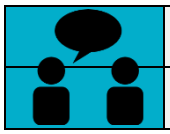
Perspectives and advice as shared in plenary by discussion groups have been synthesized into the following general areas of convergence and divergence:

Areas of Shared Understanding/Agreement (Convergence)
Participants generally agreed on the following themes:

1. On-site storage facilities need to **be made safe as possible** given proximity of facilities to drinking water sources (e.g., above ground, steel concrete structure); safety as a general principle is important.
2. Each site needs to ensure **effective and safe maintenance and management of long-term on-site storage**, recognizing that relocation of spent nuclear fuel and radioactive waste to long-term storage facilities is likely decades away; safety of storage casks/methods need to be re-evaluated.
3. There needs to be a **meaningful and effective dialogue** between nuclear industry and the public/community; recognition that there is a lot of activity/detail for the public to follow (e.g. significant amount of information and activity to track; risk of consultation fatigue; etc.). There is clearly a lot of fear, anger, and mistrust that needs to be recognized and addressed in order to foster a productive exchange.
4. Building trust with oversight and regulatory authorities is important to do early, beginning during the operation stage of the power plant and continuing throughout the decommissioning planning and execution phases.
5. **Funding** is an important consideration; capital cost estimations require expertise; economic considerations for the community as sites close (e.g., loss of jobs).
6. **Both** the U.S. and Canadian **federal governments need to work together** with nuclear agency groups and communities to resolve issues relating to decommissioning of nuclear facilities in the Great Lakes basin.
7. There should be a **consistent approach to risk assessment** on both sides of border; climate change must be a factor in that assessment (especially recognizing that impacts of climate change may require wastes to be moved to more secure locations given geological hazards, impacts of rising lake levels, etc.).

Areas Requiring further Discussion (Divergence)

1. While participants all agree that facilities need to be as safe as possible, there was a range of views on how best to do this; participants also held a wide range of views about the degree of **adequacy of current on-site storage**, given the anticipated needs in the years to come.
2. Participants also had a range of perspectives about whether current **funding efforts** and mechanisms to maintain storage facilities are adequate; questions on funding that surfaced during the discussion touched on topics including ensuring funds keep up with inflation; sources of funding (e.g., independent trusts) and the performance/security of funding over time given a trend towards using companies that specialize in decommissioning.
3. There was active discussion about the **degree of independence of nuclear decommissioning and waste management bodies**; more work will be needed to build trust with these agencies over time.
4. Some participants felt it should be a priority for both the U.S. and Canada to **act with urgency** on locating and constructing central sites that are acceptable to affected communities for storage of nuclear waste, recognizing the risk to drinking water. However, others expressed a lack of confidence in the proposed solutions (DGR) and the siting process, suggesting urgency should be placed instead on proper storage on-site while off-site solutions are explored.



Question 2: On-Site Storage and Climate Change

Breakout Group and Plenary Discussions

Through the breakout group and plenary discussions, participants exploring this question covered topics ranging from climate change hazards, risk factors, and impacts, storage container types and vulnerabilities, comparative timeframes for decommissioning vs. climate change impacts, and public access to protected information, among others.

Perspectives and advice as shared in plenary by discussion groups have been synthesized into the following general areas of convergence and divergence:

Areas of Shared Understanding/Agreement (Convergence)
Participants generally agreed on the following themes:

1. Changing climate poses **several serious threats for decommissioning**, elevating the importance of decisions around the types and locations of storage containers.
2. Participants identified a **range of risk factors** relating to the impact of climate change on nuclear facilities (including decommissioning implications) such as: high wind events, seiches, high and low water levels, warming (ambient warming and impacts on facilities), and lake warming (including implications for heat exchange).

Areas Requiring further Discussion (Divergence)

1. While participants all agreed that climate change is an important consideration for decommissioning, there was a range of views as to whether the **existing regulatory system is sufficiently prepared to address climate change factors** (e.g., in the design of facilities; etc.).
2. Participants also had a range of views as to whether **rapid decommissioning** can adequately address **climate change risks**; there was a range of views held about the potential implications of rapid decommissioning on **worker safety**.

Additional Comments
Additional discussion emerged through both breakout groups and plenary discussion:

1. Some participants commented about the **vulnerability of the lake shore** for on-site dry storage.
2. Participants generally underscored that a **greater sense of urgency is needed** to deal with on-site storage given the lack of a long-term consolidated storage site.
3. Other participants noted that the current COVID-19 pandemic has highlighted the issue of ensuring a **sustainable workforce** is in place to manage and operate the facilities, even in times of increased uncertainty and unpredictability.

Session 2: Transportation

Transportation of radioactive materials can occur by road, rail, air, or water. Depending on the mode of transportation, if there is an accident, there are concerns about potential human and wildlife exposure to radiation, contamination of water supplies, and environmental damages.

In this session, discussions focused on issues related to transportation of radioactive materials during the decommissioning process.

Participants were invited to discuss:

- **Question 1:** As **transportation routes** are considered, what factors/scenarios must be avoided? (e.g., over or close to waters (i.e., by ship, over bridges, etc.), through population centres, through heavily travelled routes, collision or spill rates along route, etc.)
- **Question 2:** Is there a preferred **transportation means** (e.g., rail, truck, ship)? Why? What could be done to make each transportation method as safe as possible?

Question 1: Transportation Routes

Breakout Group and Plenary Discussions

Through the breakout group and plenary discussions, participants covered topics ranging from current industry practices, logistics of transportation routes and intermediate facilities, the disconnect between facilities and urban transportation centres, transportation regulations, security vulnerabilities in transit, public perception of and confidence in regulatory bodies, and infrastructure needs (roads/ railways/bridges) for cask shipment. Also mentioned were packaging for shipment, emergency response capacity along routes, the current body of knowledge regarding risk assessment on transportation modes, and the need for consensus on storage repositories before advancing discussions on transportation, among others.

Perspectives and advice as shared in plenary by discussion groups have been synthesized into the following general areas of convergence and divergence:

Areas of Shared Understanding/Agreement (Convergence)
Participants generally agreed on the following themes:

1. The transportation plan for radioactive waste material must be carefully developed; although it is recognized that transportations options are needed, participants agreed that it is very important to "**not rush into a plan**".
2. There is a need for **meaningful engagement with local communities** on transportation decisions.
3. Waste should be **kept away from water** (e.g., during transportation).
4. The transportation plan / approach should have consideration of **potential security risks** (e.g., the potential risk of radioactive waste being a target for terrorism).

5. There is a need for a **harmonized/standard risk assessment** between US and Canada. Rules for transportation (e.g., by road) vary between jurisdictions and can be a challenge if radioactive materials cross jurisdictional borders.

Areas Requiring further Discussion (Divergence)

1. There was some discussion suggesting that radioactive material (including low- and intermediate level radioactive waste) should be kept as close as possible to the site (i.e., **limit movement**) until a permanent solution is identified; Additionally, some participants voiced the perspective that used nuclear fuel / radioactive waste should **not** be transported across the U.S.-Canadian border. Further discussion on the issue of "movement" of radioactive material is required.

Question 2: Transportation Means

Breakout Group and Plenary Discussions

Through the breakout group and plenary discussions, participants covered topics ranging from logistics of various means (road, rail, water) and ways to limit transfers, to historical shipment cases, shipment licensing and regulatory considerations, shipping package classification systems and associated risk profiles, comparison of safety risks between means, and transparency in transportation and safety assurance, among others. Perspectives, input, opinions, and advice synthesized to the following areas of convergence and divergence:

Areas of Shared Understanding/Agreement (Convergence)
Participants generally agreed on the following themes:

1. General agreement that there is **risk with any means of transportation**; however, there was a range of views about which method is most/least desirable (see areas of divergence below).
2. **Multiple transfers** during transportation increases the risks for an accident (e.g., by road from facility to rail, then from rail to road again to storage site).
3. Need for **transparency/right to know** by community when waste is being transported near/through a community.

Areas Requiring further Discussion (Divergence)

1. **No clear preferred means for transport**; consensus was not reached (e.g., for some rail is considered inadequate, particularly in recognition of a need for significant upgrading infrastructure investments; others noted that the least desirable transport means is by water (ship or barge) given risks to water supply, to first responders who may have to retrieve waste materials in the event of an accident while transiting water).
2. Participants held a range of views around the various **methods by which safety of packages and transport methods are certified**.

Additional Comments (Questions 1 and 2)
Additional discussion emerged through both breakout groups and plenary discussion:

1. Participants expressed the need to recognize that there is **no zero-risk transport option** and that options may vary from site to site; also need to weigh the risks of moving waste to a safer site vs. keeping waste where it is.
2. Participants emphasised the need for full **public access to transportation risk assessments**.
3. One participant shared that the U.S. American Society of Civil Engineers conducts evaluations of transportation infrastructures; it was proposed that an independent organization be used to **evaluate the state of infrastructure**, determine where updates/improvements are needed, in order to inform the best means of transportation (i.e., risk assessment).
4. Some participants noted that **further conversation is needed specifically regarding low- and intermediate-level waste** which is the majority of the waste that is in the Great Lakes region; transportation means and methods may be different for low level waste (as compared to high-level radioactive materials/spent nuclear fuel).
5. As transportation plans are developed, consideration of risk to more **vulnerable communities** should be factored in (e.g., transportation of wastes through low income, Indigenous communities/lands or other at-risk communities could be viewed as an environmental justice issue).
6. In addition to climate change considerations, some participants noted that **natural disasters** and their potential impacts (e.g., asteroid impact, meteor events; geological movement; etc.) should also be considered in selection of transportation methods.
7. Some participants noted that building a **railway directly from generation site to disposal site** (i.e., avoid transfers from road to rail to road) may help to reduce risk.
8. Some participants explored the topic of **full cost accounting** (i.e., if the nuclear energy industry was required to carry the full cost of decommissioning and not pass on to consumer/nor rely on government subsidy) and the ability of industry to do so viably.

Session 3: Residual Contamination and Long-Term Monitoring

A priority issue is ensuring during the decommissioning process that the remediation of contamination that occurred both on and off the licensed site (e.g., groundwater, lake water, lake sediments) during the operation of the nuclear generating facility is adequate. It is also important to assess whether any remaining contamination exists on site or adjacent to it. Further, after the decommissioning is complete, adequate long-term monitoring and maintenance will be required. Clarity on expectations of this long-term care and support will be required.

In this session, discussions focused on issues related to issues around residual radioactive wastes that may remain on-site after decommissioning and long-term monitoring and maintenance.

Participants were invited to discuss:

- **Question 1:** What **remaining or future concerns** might be anticipated, once a nuclear facility has been decommissioned (e.g., groundwater contamination, residual radiation, etc.)? Are existing decommissioning standards adequate and if not, what changes should be considered?
- **Question 2:** What **long-term monitoring** should be in place after decommissioning? Who should be **responsible** for the cost of long-term monitoring, for maintenance and to take action if unexpected problems arise at the site in the future?

Question 1: Remaining or Future Concerns Following Decommissioning

Breakout Group and Plenary Discussions

Through the breakout group and plenary discussions, participants covered topics ranging from regulatory review of licensing for decommissioning work and recent updates, to international decommissioning efforts, identification of the key remaining issues post decommissioning, potential to generate new residual waste through decommissioning process, public transparency issues, to financial liabilities/holding decommissioning/power companies accountable for maintaining sufficient funds, and considerations for specific plants, among others.

Perspectives and advice as shared in plenary by discussion groups have been synthesized into the following general areas of convergence and divergence:

Areas of Shared Understanding/Agreement (Convergence)
Participants generally agreed on the following themes:

1. **Decommissioning plans should be developed early**, made available for public review, and should evolve over time as decommissioning is undertaken.

2. Extensive **community engagement** as to what the community would like the site to be used for post-decommissioning is required and such engagement must take place early in the process.
3. Public access to and interpretation of **decommissioning standards** is generally difficult; there was general agreement that these standards need to be accessible, transparent, and open.

Areas Requiring further Discussion (Divergence)

1. There was divergence on what constitutes "**appropriate land use**" after decommissioning (e.g., ranging from using decommissioned land to build housing, through to conservation land – not permitting any uses for any purpose, post-decommissioning).
2. Need to know to what extent the site can be cleaned up before deciding on appropriate use.

Question 2: Long-term Monitoring and Responsibilities

Breakout Group and Plenary Discussions

Through the breakout group and plenary discussions, participants covered topics ranging from radionuclide targets for monitoring, issues of process transparency and engagement, post-decommissioning intended land uses and associated risk, monitoring methods and media, waste characterization and cleanup standards, human exposure pathways, to focus on on-site and off-site, and funding, among others.

Perspectives and advice as shared in plenary by discussion groups have been synthesized into the following general areas of convergence and divergence:

Areas of Shared Understanding/Agreement (Convergence)

1. **Long-term, ongoing site monitoring is necessary** post-decommissioning.
2. When planning decommissioning, there is a need to **determine intended land use early in the process**; this discussion needs to happen with the community (recognizing there are very divergent views on land use tolerances post-decommissioning).
3. **Standards for monitoring of radioactive materials and decommissioned sites** need to be evaluated (e.g., what long-term monitoring is needed to protect the environment and human health? how should monitoring be undertaken? etc.); different approaches to such standards should be considered.
4. Public access to and interpretation of **decommissioning standards** is generally difficult; there was general agreement that these standards need to be accessible, transparent, and open, and be easily publicly available over the long-term.

Areas Requiring further Discussion (Divergence)

1. Participants held a range of views as to whether a **single regulatory approach** is required for both Canada and U.S., or whether the current approach of two distinct processes is acceptable.

2. While there was strong agreement on the need for on-going monitoring into the long-term, participants had a range of views as to which entity(ies) should be **responsible** for this, and whether there are sufficient and sustainable **funding mechanisms** accessible to address any future needs post-decommissioning.
3. There was also a range of views as to whether monitoring programs should reflect the extent of decommissioning activities that have been undertaken (e.g., scalable monitoring programs).

Additional Comments (Questions 1 and 2)
Additional discussion emerged through both breakout groups and plenary discussion:

1. One participant suggested the creation of a **task force** to develop decommissioning plans to ensure monitoring and standards are appropriately applied.
2. It was noted by other participants that **climate change** will impact the decommissioning process/activities going forward, underscoring the need to continually review and update plans over time.
3. Given the range of views on **land uses post-decommissioning**, one participant outlined a three-step process to inform decisions/direction of permissible uses of lands/sites:
    i. Provide very good, verified information about site condition.
    ii. identify protective end-state objectives (e.g., in Canada the licensee sets these objectives with review/approval by the CNSC; currently no public review/input).
    iii. Identify acceptable land uses (Note: this step cannot be done without first completing Steps 1 and 2 above).
4. Some participants spoke to the need to be aware of **security risks** in monitoring waste/sites long-term (e.g., risk of terrorism; vulnerability of sites; etc.).
5. Other participants commented on the importance of ensuring firms contracted to conduct the decommissioning are held accountable for meeting all standards and obligations, ensuring transparency around performance (e.g., financial, standards, etc.) and so on.

Closing Remarks and Next Steps

At the close of the workshop, WQB Co-Chair Gayle Wood and Work Group member John Jackson provided closing remarks and outlined plans regarding next steps including:

- Participants were invited to submit any additional comments/materials to the Work Group via the IJC point of contact (Mark Burrows).
- A workshop report will be prepared and circulated (mid-January 2021) to workshop participants for their information.
- The WQB will prepare its report and recommendations for the IJC on this topic and the IJC will approve a follow-up and engagement plan once the report is discussed with the Commissioners, finalized, and released in 2021.

Appendix A – Workshop Participant List

Session 1: On-site Storage, November 12: 9:00 – 11:00 am EST

First Name	Last Name	Organization
Lynn	Moreau	Anishinabek Nation
Jimbob	Marsden	Anishinabek Nation
Kevin	Kamps	Beyond Nuclear and Don't Waste Michigan
Gordon	Edwards	Canadian Coalition for Nuclear Responsibility
Theresa	McClenaghan	Canadian Environmental Law Association
Raj	Garg	Canadian Nuclear Safety Commission
Malcolm	McKee	Canadian Nuclear Safety Commission
Shona	Thompson	Canadian Nuclear Safety Commission
Eric	Fortier	Canadian Nuclear Safety Commission
Nancy	Greencorn	Canadian Nuclear Safety Commission
Barbara	Warren	Citizens' Environmental Coalition
Jesse	Deer In Water	Citizens Resistance At Fermi Two
Michael	Keegan	Coalition for a Nuclear Free Great Lakes
Ole	Hendrickson	Concerned Citizens of Renfrew County and Area
Dodie	Legassick	Environment North
Ryan	Graydon	Individual
Sandy	Bihn	Lake Erie Waterkeeper
Mitchell	Maricque	None
Brennain	Lloyd	Northwatch
Dave	Kraft	Nuclear Energy Information Service
Jan	Boudart	Nuclear Energy Information Service
Rod	McCullum	Nuclear Energy Institute
Jack	Gibbons	Ontario Clean Air Alliance
Bill	Noll	Protect Our Waterways No Nuclear Waste
David	Ullrich	Retired
Carey	Pauquette	Saginaw Chippewa Indian Tribe of Michigan
Connie	Kline	Sierra Club
Pat	Marida	Sierra Club
T.R.	Wentworth	State of Michigan, Department of Environment, Great Lakes, and Energy
Bruce	Watson	US Nuclear Regulatory Commission
Antonette	Arvai	International Joint Commission
Raj	Bejankiwar	International Joint Commission
Mark	Burrows	International Joint Commission
Russell	Consor	International Joint Commission
Matthew	Child	International Joint Commission
George	Heartwell	International Joint Commission Water Quality Board
Gayle	Wood	International Joint Commission Water Quality Board

John	Jackson	International Joint Commission Water Quality Board
Frank	Ettawageshik	International Joint Commission Water Quality Board
Mark	Wales	International Joint Commission Water Quality Board
Glenn	Miller	International Joint Commission Health Professionals Advisory Board
Mike	Ben-Israel	Stratos
Barb	Sweazey	Stratos

Session 2: Transportation during Decommissioning, November 12: 1:00 – 3:00 pm EST

First Name	Last Name	Organization
Lynn	Moreau	Anishinabek Nation
Edward	Wawia	Anishinabek Nation
Jimbob	Marsden	Anishinabek Nation
Kevin	Kamps	Beyond Nuclear and Don't Waste Michigan
Gordon	Edwards	Canadian Coalition for Nuclear Responsibility
Raj	Garg	Canadian Nuclear Safety Commission
Francois	Dagenais	Canadian Nuclear Safety Commission
Eric	Lemoine	Canadian Nuclear Safety Commission
Kay	Cumbow	Citizens for Alternatives to Chemical Contamination
Jesse	Deer In Water	Citizens Resistance At Fermi Two
Michael	Keegan	Coalition for a Nuclear Free Great Lakes
Ole	Hendrickson	Concerned Citizens of Renfrew County and Area
Dodie	Legassick	Environment North
Ryan	Graydon	Individual
Mitchell	Maricque	None
Brennain	Lloyd	Northwatch
Dave	Kraft	Nuclear Energy Information Service
Jan	Boudart	Nuclear Energy Information Service
Rod	McCullum	Nuclear Energy Institute
Pat	Marida	Ohio Sierra Club
David	Ullrich	Retired
Connie	Kline	Sierra Club
Antonette	Arvai	International Joint Commission
Mark	Burrows	International Joint Commission
Raj	Bejankiwar	International Joint Commission
George	Heartwell	International Joint Commission Water Quality Board
John	Jackson	International Joint Commission Water Quality Board
Frank	Ettawageshik	International Joint Commission Water Quality Board
Mike	Ben-Israel	Stratos
Barb	Sweazey	Stratos

Session 3: Residual Waste and Long-Term Monitoring, November 13: 9:00 – 11:00 am EST

First Name	Last Name	Organization
Lynn	Moreau	Anishinabek Nation
Kevin	Kamps	Beyond Nuclear and Don't Waste Michigan
Theresa	McClenaghan	Canadian Environmental Law Association
Malcolm	McKee	Canadian Nuclear Safety Commission
Nancy	Greencorn	Canadian Nuclear Safety Commission
Shona	Thompson	Canadian Nuclear Safety Commission
Julie	Brown	Canadian Nuclear Safety Commission
Jesse	Deer In Water	Citizens Resistance At Fermi Two
Michael	Keegan	Coalition for a Nuclear Free Great Lakes
Ole	Hendrickson	Concerned Citizens of Renfrew County and Area
Ryan	Graydon	Individual
Mitchell	Maricque	None
Brennain	Lloyd	Northwatch
Jan	Boudart	Nuclear Energy Information Service
Rod	McCullum	Nuclear Energy Institute
Pat	Marida	Ohio Sierra Club
David	Ullrich	Retired
Connie	Kline	Sierra Club
Antonette	Arvai	International Joint Commission
Mark	Burrows	International Joint Commission
Matthew	Child	International Joint Commission
John	Jackson	International Joint Commission Water Quality Board
Gayle	Wood	International Joint Commission Water Quality Board
Frank	Ettawageshik	International Joint Commission Water Quality Board
Glenn	Miller	International Joint Commission Health Professionals Advisory Board
Mike	Ben-Israel	Stratos
Barb	Sweazey	Stratos

Appendix B – Workshop Agenda

IJC DECOMMISSIONING NUCLEAR POWER FACILITIES IN THE GREAT LAKES EXPERTS VIRTUAL WORKSHOP

Participant Agenda

Thursday, November 12, 2020 and Friday, November 13, 2020
Location: Zoom Meeting

Workshop Purpose: This workshop seeks to gain expert advice and insights on issues surrounding decommissioning of nuclear power facilities in the Great Lakes basin and best practices to protect the environment.

Workshop Objectives:
By attending this workshop, experts will consider a few of the issues around decommissioning and provide advice that will assist the Water Quality Board's work in formulating its recommendations to the International Joint Commission on decommissioning of nuclear power facilities in the Great Lakes basin.

Workshop Structure:
This Experts Workshop will be held using an on-line virtual meeting format via Zoom in three sessions spread over a two-day period and will focus on three topic areas, as noted below. Experts are invited to attend any or all sessions, according to their interest and expertise:

- **Session 1: On-site Storage** (November 12: 9:00 – 11:00 am EST)
- **Session 2: Transportation during Decommissioning** (November 12: 1:00 – 3:00 pm EST)
- **Session 3: Residual Waste and Long-Term Monitoring** (November 13: 9:00 – 11:00 am EST)

Session 1: On-site Storage, November 12: 9:00 – 11:00 am EST

#	Timing	Agenda Item
	8:55 – 9:00	**Logging on and Settling in**
1	9:00 – 9:30	**Welcome, Introductions and Workshop Overview** • Opening Remarks from WQB Co-Chair • Participant Introductions and Workshop Overview • Workshop Context: Nuclear Facilities Decommissioning • Theme Overview: On-site Storage
2	9:30 – 10:15	**Experts Dialogue: Breakout Groups** • **Question 1**: Given the likely long-term lack of off-site repositories for radioactive wastes in Canada and the U.S., what impact will this have on decisions about **where and what methods** to use for the long-term storage of radioactive wastes on-site after other decommissioning activities have been completed? What **factors** should be used to make these decisions? • **Question 2:** How should we take into account the possible impacts of **climate change**, both now and in the long-term future, on the on-site storage facilities (consider both type of facility and location of facility)?
3	10:15 - 10:55	**Plenary Discussion:** • Reporting back highlights, by group • Plenary discussion on emerging advice and insights
4	10:55 – 11:00	**Wrap Up and Concluding Remarks**

Session 2: Transportation during Decommissioning, November 12: 1:00 – 3:00 pm EST

#	Timing	Agenda Item
	12:55 – 1:00	**Logging on and Settling in**
1	1:00 – 1:30	**Welcome, Introductions and Workshop Overview** • Opening Remarks from WQB Co-Chair • Participant Introductions and Workshop Overview • Workshop Context: Nuclear Facilities Decommissioning • Theme Overview: Transportation during Decommissioning
2	1:30 – 2:15	**Experts Dialogue: Breakout Groups** • **Question 1**: As transportation routes are considered, what factors/scenarios must be avoided? (e.g., over or close to waters [i.e., by ship, over bridges, etc.], through population centres, through heavily travelled routes, collision or spill rates along route, etc.)? • **Question 2**: Is there a preferred transportation means (e.g., rail, truck, ship)? Why? What could be done to make each transportation method as safe as possible?
3	2:15 - 2:55	**Plenary Discussion:** • Reporting back highlights, by group • Plenary discussion on emerging advice and insights
4	2:55 – 3:00	**Wrap Up and Concluding Remarks**

Session 3: Residual Waste and Long-Term Monitoring, November 13: 9:00 – 11:00 am EST

#	Timing	Agenda Item
	8:55 – 9:00	**Logging on and Settling in**
1	9:00 – 9:30	**Welcome, Introductions and Workshop Overview** • Opening Remarks from WQB Co-Chair • Participant Introductions and Workshop Overview • Workshop Context: Nuclear Facilities Decommissioning • Theme Overview: Residual Waste and Long-Term Monitoring
2	9:30 – 10:15	**Experts Dialogue: Breakout Groups** • **Question 1**: What remaining or future concerns might be anticipated, once a nuclear facility has been decommissioned (e.g. groundwater contamination, residual radiation, etc.)? Are existing decommissioning standards adequate and if not, what changes should be considered? • **Question 2**: What long-term monitoring should be in place after decommissioning? Who should be responsible for the cost of long-term monitoring, for maintenance and to take action if unexpected problems arise at the site in the future?
3	10:15 - 10:55	**Plenary Discussion:** • Reporting back highlights, by group • Plenary discussion on emerging advice and insights
4	10:55 – 11:00	**Wrap Up and Concluding Remarks**

APPENDIX C – List of References and Supplemental Information Submitted by Workshop Participants

	Date	Format	Subject	From	Affiliation
1	12/2	.pdf/link	Groundwater contamination	G. Edwards	Anishinabek Nation
2	11/25	E-mail	Great Lakes Basin; GLWQA definition	R. Graydon	Consultant
3	11/24	E-mail	Response to Breakout Questions	E. Lemoine	CNSC/CCSN
4	11/23	E-Mail	Comments on the Nov. 12 & 13 IJD WQB Workshops	C. Kline	OH Sierra Club
5	11/19	E-mail/link	Workshop Sessions – link to Congressional Briefing	M. Greene	EESI
6	11/12	E-mail	OCAA Report and Submissions	J. Gibbons	OCAA
7	11/12	E-mail	Decom Materials for Distribution 1. Briefing Materials – Congressional Briefing Decom etc. 5-15-19.docx 2. Remarks of former NRC Chair Gregory Jaczko on CIS.docx 3. Backgrounders on HOSS 5-8-20.docx 4. Nuclear Colonialism – Indigenous opposition grows against proposal for nation's largest nuclear storage facility in NM 11-14-19.docx 5. Twelve major flaws of proposed Nuclear Waste CIS legislation 10-21-20.docx 6. What's wrong with Centralized Interim Storage (CIS).docx 7. What's Currently Wrong with Decommissioning.docx 8. What's wrong with Yucca MT. 9-2—17.pdf	D. Kraft	NEIS
8	10/28	E-mail	Japan unable to filter Tritium	W. Noll	POW NNW
9	10/19	E-mail	Anishinabek Nation/Iroquois Caucus Joint Declaration; Joint_Declaration.pdf	L. Moreau	Anishinabek Nation
10	10/13	Word Doc	Sierra Club Final Guidance	B. Warren	Sierra Club
11	10/7	E-mail	Input from NRC; NUREG CR 2907 ML 19317E480.pdf	B. Watson	NRC
12	8/7	E-mail	Additional information from the NWMO (Used in Workshop Briefing Package)	V. Dault	NWMO