

Discourse Analysis: A Study of the Social, Political Context of Radioactive Pollution  
Effects on Indigenous Communities

by

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**Abstract:**

This thesis addresses the effects of radioactive pollution on Indigenous communities, across the world and particularly in Canada. In many cases Indigenous cultural and traditional lifestyle, environment and health of the community are directly impacted due to various sectors of the nuclear industry and its radioactive contamination. My thesis highlights radioactive contamination of Indigenous traditional lands and waters, its impact on health, various instances of historical injustice and displayed experiences of affected Indigenous persons. Additional research is devoted to highlighting the radioactive contamination of Indigenous lands and waters, and in particular I reviewed the impact of tailings on Serpent River First Nation, in Ontario. Indigenous worldviews and generational wisdom play an important role when it comes to coexistence and conservation of the surrounding environment, policies and role models which act as a guiding principle when it comes to the protection of nature and the wellbeing of future generations. Therefore, this thesis aimed to analyze information and sources with a view to

- a) Highlight potential dangers when it comes to radioactive waste in Indigenous communities;
- b) To promote Indigenous knowledge and worldviews in relation to the surrounding environment and;
- c) To suggest a positive shift in terms of the renewable, waste-free hydrogen fusion process, the very same process that powers stars in the universe including our sun.

A discourse analysis, which consisted of an in-depth analysis of fifteen literature and related sources were oriented to address two key research issues: a) the dangers of radioactive pollution and b) the impact of dangerous tailings in Indigenous communities. An Indigenous methodology (Kovach 2010, Wilson 2008,) overarched the total thesis to ensure that it respected Canada's Indigenous worldviews.

Considerable attention is devoted to utilizing a discourse analysis research method for analyzing relevant texts on existing radioactive danger, experiences and the living conditions of Indigenous First Nations as a result of radioactive contamination. This work highlights the importance of implementation and careful consideration of Indigenous worldviews. Key findings call to attention instances of historical injustice addressing the devastating impact on Indigenous cultures, traditional lifestyles, community health, historical injustice, and contamination of the surrounding environment as a result of radioactive pollution.

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Miigwetch!

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## **Project Goal**

Since the post-World War II era, nuclear energy has been a popular way of producing electrical energy around the industrialized world and provides about 10% of the world's electricity from approximately 440 reactors (World Nuclear Association, 2020). In Canada, 22 nuclear reactors exist and produce up to 15% of Canadian electricity, with most of the reactors located in Ontario (Canadian Nuclear Safety Commission, 2020). While it is a good way to relatively and cheaply generate energy, considerable attention, and careful nuclear waste planning is absolutely required. Safe radioactive waste disposal is an important step to avoid dangerous radioactive exposure of people and the surrounding environment (Canadian Nuclear Safety Commission, 2020). In some cases, nuclear companies proposed the storage of nuclear waste on Indigenous lands in Ontario, which, if not stored correctly, could cause hazardous conditions for community residents. It is important to keep in mind that decisions that are made today influence the present and future, as well as have a direct effect on the generations to come.

My thesis research aims to highlight the dangers related to radioactive hazards and combine Indigenous knowledge and worldviews in relation to the surrounding environment in an attempt to find an alternative explanation for the cessation of nuclear energy generation. My research is oriented to promote the danger of radioactive waste in relation to Indigenous communities. My background as a Ukrainian-born Canadian has furnished me with a lifetime of anecdotal evidence, and ethnographic knowledge of post-Chernobyl life and culture in Ukraine.

I have drawn upon Indigenous stories and literature, using an interdisciplinary methodology in order to argue that hydrogen fusion is a safer, cleaner method for the generation of energy and a method that respects Canada's Indigenous worldviews. In Indigenous culture interconnections exist everywhere, between all entities, seeking mutual benefit in order to ensure

“ecological and cosmological balance” (Kovach, 2010, p.57). In turn, the universal connectivity of knowledge is noted for actively implementing various epistemological paradigms in Indigenous culture. The role of the sun is an important factor in Indigenous cultures and creation stories, the very same hydrogen fusion process that powers stars all throughout the universe.

The sun plays an important role in Indigenous culture and is a part of the creation story of Anishnabeg peoples. A special relationship exists in Anishnabeg culture that signifies the sun, the Earth, the moon, and the stars (Johnston, 2008). Indigenous peoples place a great level of importance when it comes to the sun in everyday life, the very same process that gives life. Cherokee people referred to the sun as the life-giver, fire represented by the spirit of Creator (Myers-El, 2008). Not only does this highlight the historical significance and cultural value of the sun in our society, but it places the project of the sun hydrogen fusion process replication on Earth as a Creator’s gift in terms of the ever-increasing energy consumption needs. Replication of which could lead to nature's best and most efficient way of limitless energy creation and process virtually free of pollution is the bridge between western science and Indigenous culture.

This research addresses the dangers of radioactive contamination that affects Indigenous communities. The primary emphasis is to highlight the potential and existing radioactive dangers when it comes to radioactive waste in Indigenous communities. In this thesis, I promote Indigenous knowledge and worldviews in relation to the surrounding environment as well as suggest a positive shift towards a renewable, waste-free hydrogen fusion process, the very same process that powers all stars in the universe. My approach is based on a discourse analysis research method, using an in-depth literature review and related sources oriented to address the above listed key research issues. The primary aim of this research is to



promote community benefit and wellbeing, as well as to integrate Indigenous research methodology with a combination of the western model of research practices.

My research findings intend to highlight the interrelationship of Indigenous cultures with the surrounding environment. Indigenous peoples highly value deep interconnections with nature and the surrounding environment by relying on intergenerational wisdom. Throughout the research process, I highlight numerous cases of basic human rights violations that had been recorded by Indigenous elders and leaders. Many of these stories tell of the radioactive contamination of the traditional lands and waters, impact on traditional lifestyle, various instances of historical injustice and displayed experiences of affected persons. An additional aspect of this research focuses on highlighting mistakes of the past to envision the potential danger of careless actions. Indigenous worldviews and intergenerational wisdom play an important role when it comes to coexistence and conservation of the surrounding environment, policies and role models which should be a guiding principle when it comes to the protection of mother nature and the wellbeing of future generations.

### **Situating Self**

I was born and raised in Kiev, modern-day Ukraine, shortly after the Chernobyl nuclear disaster. Some of my close relatives are originally from Pripyat and Chernobyl. Both settlements are in very close proximity to the nuclear power plant number 4, at the distance of 3km and 15km respectively and collectively was a home of approximately 62,000 people. The Chernobyl nuclear disaster was equivalent to 500 nuclear Hiroshima bombs detonated and continuously emitting dangerous radiation in the atmosphere (Plokhy, 2018). The major radioactive accident took place 100 kilometers away from the capital of Ukraine, Kiev, home of my parents and other relatives. The radiation outbreak affected an entire generation of Ukrainians, Byelorussians,

Russians, and other European countries. Lives of the first responders and emergency liquidation crews were once and for all impacted, the majority of whom have been critically affected, and many passed away. Those who survived had developed cancer and other related illnesses while many generations of children were born with birth abnormalities. More than 800,000 people were officially registered as being affected by radiation in Belorussia alone (Grey, 2019).

**Figure 31. Radiation Hotspots Resulting From the Chernobyl' Nuclear Power Plant Accident**



Image 1: 'Radiation Hotspots Resulting from the Chernobyl Nuclear Power Plant Accident' (downloaded October 20, 22, p.1) University of Texas at Austin. [https://maps.lib.utexas.edu/maps/commonwealth/chornobyl\\_radiation96.jpg](https://maps.lib.utexas.edu/maps/commonwealth/chornobyl_radiation96.jpg)

According to the Russian Academy of Sciences, up to 830,000 people were involved in the Chernobyl clean up teams, and up to 125,000 (15%) had died by 2005 (Grey, 2019). Many of those who survived had developed cancer and other related illnesses. In turn, this tragedy has impacted the wellbeing of an entire nation, especially families of those who received radioactive exposure were greatly affected as well. A critical illness developed as a result of radioactive exposure that affected families' wellbeing, the loved ones or simply someone somebody had known. As a result of that, an entire nation faced fear and uncertainty when it came to everyone's future. I remembered hearing about radioactive danger almost everywhere during my childhood. The significance of the situation created an outcome where unofficial statistics were much greater, with many affected on the different levels of exposure including those who cared for them.

As a child, I remembered growing up with stories on how to prepare for a radiation outbreak. For example, proper usage of the Geiger counters, radiation decontamination procedures, and how to detect and avoid radioactively dangerous objects. Regardless of all the protection procedures, a safety design flaw, which at that time was thought to be one of the most innovative designs, or it was first perceived to be, caused the nuclear disaster. It is believed that detonation at the Chernobyl block 4 could not possibly occur due to advanced, military-grade technology.

However, as a result of the nuclear catastrophe, irreversible damage was done to environment and people who resided in the radioactive contamination radius. The lives of ordinary people were altered once and for all. The disaster forced everyone affected to leave their homes, with only a set of identity verification documents. Home pets, livestock animals and personal belongings were left behind due to the strict quarantine regulations. Later on, even

personal cloth was replaced due to the contamination preventative measures. As a result, many have lost their homes and were forced to seek refuge elsewhere. Some of the evacuees were our relatives who lived there all their lives. Running away from radioactive exposure did not always help, much of the radiation also affected the capital of Ukraine Kiev. However, due to the size and significance of the city, it was not selected for evacuation.

The people of Kiev were requested to thoroughly clean their houses from the dust and wash the floors a couple of times per day. It was strongly suggested not to keep the windows open, and do not go outside if not necessary. Many were given radiation preventative medicine to reduce radioactive exposure. Growing up, I recall real stories of those who participated or volunteered in Chernobyl during the emergency, and who later had trouble giving birth to healthy children from radiation exposure. Consequently, many generations have and will yet experience the devastating effects of radioactive pollution.

Devastating consequences of the Chernobyl tragedy changed the lives of the Ukrainians, affecting many on different levels including me personally. An additional effect of the above-described disaster has led to the surrounding lands becoming uninhabitable by humans for many generations to come as a result of the radioactive contamination. In order to protect our planet, as well as current and future generations, historical lessons of Chernobyl and other nuclear disasters should be taken into most careful consideration to avoid mistakes of the past. Our actions today impact the wellbeing of our society, the very future of our children for many generations to come.

### **Description of Research Project**

The Discourse Analysis Schneider (2013) research method aims to analyze texts, and for this thesis highlight and examine the dangers of radioactive pollution effects and in particular on

Indigenous communities. For this research, 15 relevant texts were examined in detail. The research project points out instances of historical injustice when it comes to communities affected by the radioactive contamination, as well as incorporates Indigenous knowledge and worldviews in relation to conservation of the surrounding environment and protection of human life. Research promotes awareness when it comes to the dangerous nuclear waste and Indigenous communities. As a Ukrainian who was born shortly after the Chernobyl nuclear explosion, I would like to emphasize the dangerous consequences of radioactive contamination for people and the surrounding environment. Further, a considerable part of the thesis is oriented to address Indigenous communities whose lands and waters have been contaminated due to various instances of radioactive outbreaks. An important aspect of this research is to spread awareness regarding the historical injustice Indigenous communities faced around the world, in Canada and more specifically in Ontario.

Some of the Indigenous communities affected around the world are peoples of Pacific islands, whose lands and waters have been contaminated as a result of the nuclear explosion testing sites (Atomic Heritage Foundation, 2017). In Canada, North West Territories, the Délı̄ne First Nation community has been historically affected as a result of uranium mining (Isacsson, 1990). In Canada, Ontario, Serpent River First Nation has been “significantly affected due to uranium mining, and uranium tailings that negatively impact community well-being” (L. Rekmans in Hankard, 2003, pp.16). In all of the above-addressed cases, radioactive contamination affected the health of the community members, traditional lifestyle, and well-being of the future generations to come. Decisions and policies implemented today will have a long-lasting effect.

The potential of this work is to be viewed as a reference guide when it comes to decisions and careful planning of the projects associated with nuclear energy, and most importantly nuclear waste. I hope that future decisions are based on the consideration of past events, and historical lessons, and aim for collective well-being. Indigenous worldview is an important factor when it comes to the respect and coexistence with the surrounding environment, and consequently the well-being of the future generations. I wish no other nation in the world would experience the tragedy of the Chernobyl nuclear incident.

### **Literature review**

Many people around the world have experienced the dangerous effects of radiation, including the Indigenous peoples of the Pacific Oceanic region. Certain Marshall Islands such as Bikini and Enewetok atolls were used as nuclear weapons testing sites resulting in radiation contamination, in some cases ten times higher than the Chernobyl exclusion zone today (Geggel, 2019).



*Image 2: A 'tomb' (downloaded October 20, 2022, p.1) <https://www.businessinsider.com/marshall-islands-nuclear-dome-radioactive-waste-11>*

As a result of the nuclear weapons testing, unjust actions took place in the distortion of traditional waters and territories resulting in environmental destruction of the surrounding regions. Additionally, certain nuclear testing sites on some of the islands in the Pacific region, were turned into nuclear waste storage sites.

UN Secretary-General Antonio Guterres warned that “dome” location is running a real risk of leaking radioactive material into the Pacific Ocean, consequently potentially causing environmental hazards (Columbia Broadcasting System News, 2019; Swenson, 2019; Russell, 2019; PHYS.ORG, 2019). Part of the issue, aside from the formation of the storage site in the first place, is a weak rigidity that leads to cracking and a subject of the weather effect, and vulnerable to the ocean tides. Additionally, the Pacific nuclear waste storage site could lead to a nuclear tsunami because of the compromised rigidity of the site (Chillymanjaro, 2012). As a result of global warming, sea levels continue to rise, potentially affecting radioactive burial sites, additionally increasing the risk of hazardous contamination.

During the Cold War era, on March 1, 1954, the United States tested the most massive thermonuclear detonation, “Castle Bravo,” at the Bikini Atoll in the Marshall Islands; equivalent to 15 megatons of trinitrotoluene (TNT), resulting in radioactive contamination of an area of approximately 7,000 square miles and resulted in the contamination of nearby atolls (Atomic Heritage Foundation, 2017). Radioactive ash contamination landed over people’s homes, resulting in radiation poisoning effects such as vomiting, eye irritation, burns, and days later hair falling out, years later developing into cancer (Rust, 2019). Nuclear testing also made a devastating impact on the wildlife, conflicting with the coexistence of the traditional way of life in Indigenous cultures. Islands and atolls are the traditional historical and cultural heritage of

Pacific Nations, lands, and waters of Indigenous peoples who reside there long before colonization arrived.

Nuclear energy is a popular way of producing energy all around the world and provides about 10% of the world's electricity from approximately 440 reactors (World Nuclear Association, 2020). There are 22 nuclear reactors in Canada, most of which are in Ontario, and they produce up to 15% of the country's electricity (Canadian Nuclear Safety Commission, 2020). Although it is a great way to generate energy for a low cost, careful planning for nuclear waste is absolutely necessary. In some situations, nuclear companies proposed to store nuclear waste on Indigenous lands in Ontario, process of which could result in hazardous and dangerous conditions for community residents. It is essential to keep in mind that decisions made today have an impact not only on the upcoming generations but also on the past, present, and future.

Our actions today, affect the future wellbeing of society. Our lives and who we are lead us to be here as a result of the decisions made by previous generations. The Seven Generations and Grand Father Teachings are part of the generational wisdom and guiding principles for many Indigenous peoples with respect to all living things (Uniting Three Fires Against Violence, 2020). Therefore, one of the primary factors that should be envisioned is the minimization of risks and the maximization of the benefits for the present and future generations. Part of Indigenous culture in Canada, is collective wellbeing, respect for the surrounding environment, dependency on nature, a shared society where material possessions do not play an active role, a society where sharing is actively promoted as more fair in terms of the redistribution to the benefit of all (Belanger, 2018). As a result of deep spiritual and physical connection with the surrounding nature and environment, the Indigenous worldview is crucially important when it comes to protecting mother nature and preserving it for future generations.



A deep sense of connectivity exists in Indigenous culture when it comes to knowledge and universal connectedness that is present on all levels, a series of relationships that are integrated with everything else (Kovach, 2010). A major part of the Indigenous worldview links to nature in terms of survival thereby actively placing humans as a part of this incredible world, and by not any means on top of it. Universal value and respect for nature are present all throughout the Indigenous cultures. As a result, in this interconnection, is a universal balance; harmony exists in relation to the nature, ecological and cosmological balance (Kovach, 2010). This approach is absolutely crucial when it comes to preservation and maintenance of the delicate balance.

The sun plays a vital role in Indigenous culture and is a part of the creation story of Anishnabeg peoples, thus a special relationship exists that signifies the importance of the sun, the earth, the moon, and the stars (Johnston, 2008). Indigenous peoples place a great level of importance when it comes to the sun in everyday life, the very same process that gives life. Cherokee people referred to the sun as the life-giver, and this fire is represented by the spirit of Creator (Myers, 2008). Not only does this highlight the historical significance and cultural value of the sun in our society, but it places the project of the sun's hydrogen fusion process replication on Earth as a Creator's gift in terms of the ever-increasing energy consumption needs. The sun is a natural replication that could lead to nature's best and most efficient way of limitless energy creation and process virtually free of pollution is the bridge between western science and Indigenous culture.

I believe it is important to take into account traditions, worldviews, beliefs, and wisdom of the previous generations to avoid mistakes of the past and strive towards collective wellbeing founded on the principles beneficial for the future generations; generations that will experience

outcomes of our actions today. While living in Ukraine, I remember stories based on the real experience of those who participated in Chernobyl during the emergency, stories of how participants of the tragedy had troubles conceiving healthy children due to the birth abnormalities. An outcome of the Chernobyl radiation outbreak tragedy has resulted in consequences that many generations have yet to experience.

As an example of a problematic historical past, the Chernobyl explosion affected approximately five million peoples from the former USSR republics. The National Research Centre for Radiation Medicine (NRCRM), which is based in Kiev, Ukraine, highlight that 800,000 people were officially listed as having been affected by the radiation in Belarus alone. (Grey, 2019). As highlighted in my abstract and my introduction, the Chernobyl nuclear disaster was equivalent to 500 nuclear Hiroshima detonated bombs continuously emitting dangerous radiation into the atmosphere. The radiation outbreak affected entire generations of Ukrainians and many surrounding European countries. The lives of the first responders, emergency liquidation crews, were once and for all affected, many of whom have critically suffered and passed away (Lanese, 2019). Up to 830,000 people were involved in Chernobyl cleanup teams, according to the Russian Academy of Sciences; Of those, up to 125,000 (15 percent) had died by 2005 (Grey, 2019). Cancer and other related diseases affected many of those who survived. Many generations of children were born with birth abnormalities. The tragedy occurred as a result of a safety design flaw, which at that time was thought to be one of the most innovative designs. It is believed that detonation at the Chernobyl block 4 could not have possibly occurred due to advanced, military-grade technology. I repeat the Chernobyl disaster here, to remind the reader of the intergenerational impact on peoples' wellbeing, traditions and worldview.

Sadly, many people around the world have also experienced the dangerous effects of radiation, including Indigenous peoples of the Pacific region. Some of the unjust actions took place in the distortion of the traditional environment and territories, some of which became nuclear weaponry testing grounds. Additionally, a number of Pacific Island nuclear waste storage facilities were converted into nuclear waste storage facilities, posing a real threat of radioactive contamination of the Pacific Ocean and other potential environmental dangers. (PHYS.ORG, 2019; Russell, 2019; Swenson, 2019).

Apart from the fact that the storage site was created in the first place, a weak rigidity that causes cracking and could be affected by the weather and ocean tides is a part of the problem. Potentially, due to the site's compromised rigidity, the Pacific nuclear waste storage facilities may result in a nuclear tsunami (Chillymanjaro, 2012). On the traditional lands and waters of the Indigenous peoples of the Pacific Region, the sea level continues to rise as a result of global warming, affecting radioactive burial sites and increasing the risk of hazardous contamination.

Here in Canada, uranium pollution affected an Indigenous community in Ontario called Serpent River First Nation which is located approximately 20 kilometers south of Elliot Lake. This particular community has experienced and still does, a history of nuclear genocide. An important piece relevant to an Indigenous methodology, is to work alongside an elder from the community that one is studying. Therefore, I was fortunate to utilize the lived stories and experiences of Dr. Mike Hankard, an Indigenous Knowledge Keeper who is also one of my committee members. Through his lived experience and guidance, I was also able to identify key sources that became vital for my thesis. Dr. Hankard shared an important book *Unearthing Justice*, written by Kuyek, J. (2019). This book highlighted the dangerous effects of the mining industry in relation to the community's well-being. This book plays an important role when it

comes to community decision-making and consideration of the risk factors associated with the mining industry in general. On pages 49-50 Kuyek provided important insight when it came to uranium tailings, the dangers associated with it and radon odorless gas that causes lung cancer. This work provides great significance when it comes to the research associated with uranium mining and the devastating consequences of uranium mining at Serpent River First Nation, Ontario which continues to face on a daily basis as a result of the uranium tailings located in close proximity to this community.

Additionally, Dr. Hankard shared an important book *This is my homeland stories of the effects of nuclear industries by people of the Serpent River First Nation and the north shore of Lake Huron* written collectively by Serpent River First Nation in 2003, edited by Anabel Dwyer, Keith Lewis, Lorraine Rekmans. This book in detail highlighted the experiences of Serpent River First Nation community members in relation to uranium mining and uranium tailings that caused dangerous effects as a result of radioactive pollution. This book holds significant value in terms of the real-life stories of community members and experiences associated with uranium mining.

During our telephone conversations, Dr. Hankard, Indigenous Knowledge Keeper shared his insights into the devastating effects on the Serpent River First Nation as a result of the mining industry, particularly in the form of the high cancer rates. Additionally, Dr. Hankard shared some of the experiences and stories of the community Elders regarding the effects of uranium mining on the community in keeping with the oral traditional aspects of Indigenous knowledge. Throughout these telephone conversations, Dr. Hankard noted that many if not the majority of people died because of cancer. This, of course, impacts the number of Elders the community has, and affects the availability of the knowledge passed down from generation to generation.

Further, Dr. Hankard addressed how uranium mining companies openly ignored community needs in terms of reducing pollution effects. The community has no access to the uranium tailings storage sites and there is a great level of fear when it comes to the rigidity of the structure. Additionally, there is a great level of fear related to heavy rain over flooding, seepage of radioactive material into the groundwater, and generation of radon gas. As a result of the radioactive contamination, traditional community activities became dangerous such as hunting and berries picking. The moose that drink contaminated water or go near radioactively contaminated areas could not be hunted. As a result, the community has shifted towards a more wage-dependent economy heavily reliant on external food and income sources. Additionally, as a result of the economic uncertainty this community has experienced a series of hardships including social problems. Why learning from an Indigenous Knowledge keeper is valuable in my thesis, is because oral communication not only validates the community's stories, but is just as important as books and articles. Therefore, this oral information was absolutely vital to strengthen my literature review.

In the book written by L. Rekmans shares (in Hankard, 2003, pp.1, 10), stories from community members whose traditional, self-sustained way of living off the land and waters were forever changed with the discovery of uranium. Earl Commanda, then Chief of Serpent River, discussed how the process of how self-sustainable, independent community was affected by the mining;

*“They took our fish out of the lakes and river. The territory was relied up for the trapping that went on there. In the summertime everybody did things like blueberries, cranberries, strawberries and used them to supplement their incomes or to make preserves to carry them through the winter. Many men had their own fishing nets and trapping areas.”*

(Rekmans, L., in Hankard, 2003, pp.1).



Image 3; 'Uranium Conflicts Map' (downloaded October 20, 2022, p.1) <https://intercontinentalcry.org/another-uranium-conflict-breeds-in-ontario/>

Upon the discovery of uranium, the community had no choice but to shift away from living off the land, towards the wage economy as a primary mode of wage dependent existence. As a result of this imposed change, the community became affected on many different social and cultural levels including the development of social problems L. Rekmans in Hankard (2003, pp.1-2). An additional issue of the uranium extraction industry was the sulfuric acid plant; leftovers of the acid were left laying in the piles, “causing shoelaces to fall apart, often used by parents to tell if the kids were playing around the abandoned sites” (L. Rekmans in Hankard (2003, pp.3-4). It is evident that upon completion of the mining project, the company did not place significant effort into cleaning up the process of the mining extraction, leaving the community to face the dangerous consequences of hazardous contamination.

Considerable efforts were put in place to clean up devastating impacts of the sulfuric mines, in the attempt to provide community residents with housing developments. As a part of the prescribed effort, community housing was burned down, which in turn led to the scattering of the sulphate particles. Further effort included refilling an area with “soil equivalent to three football stadiums” (9,000 truckloads of material), all to contain prior damage caused by the mining company L. Rekmans in Hankard (pp. 5, 2003). Community residences were left to face difficult consequences of environmental destruction, efforts that are placed to refill the area with new soil is direct evidence of devastating environmental distraction clean up.

One of the former mines in close proximity to the Serpent River First Nation community was the uranium Pronto mine operated by Rio Algom Ltd from 1955 to 1970. During this time the total production contributed to 2.3 million of ore extraction (Mindat.org, 2020; Ontario Geological Survey - Ontario Ministry of Energy, N., 2020). Pronto mine was one of the 12 uranium mines, where the members of Serpent River First Nation participated in “uranium handling and extraction without proper personal protection” (L. Rekmans in Hankard (2003, pp.31). The close proximity of the uranium exposure has led to land and water contamination, making it a health concern when it comes to traditional trapping, hunting or fishing in the surrounding Elliot Lake area. A mining incentive driven by increased demand for uranium exploration triggered by the United States accelerated the nuclear incentives development (Mellor, 2016). While the development process propelled and improved economic growth, it created a negative legacy of the environmental distraction, evidence of which is prominent up to this day. The process of refining uranium created millions of tons of waste; waste which was left to pollute the surrounding environment as a result of the weak or absence of environmental standards at the time. As Mellor (2016) explains, this waste led to an increase in water acidity

and the release of harmful radioactivity. Additionally, it is important to note that the land and surrounding environment is sacred for Indigenous people's coexistence which directly impacts the wellbeing of an entire community.

Contamination of the surrounding environment has impacted the people of Elliot Lake area, and members of the Serpent River First Nation who have lived there for many generations (Mellor, 2016). Many community members have moved, possibly as a result of the environmental circumstances. As mentioned previously, a part of the problem was a lack of the nature conservation and environmental protection plans at the time. Nowadays, prior to the operation of a mine site, any company is obligated to provide an environmental protection plan and mine reclamation as per plan sections 139.1 and 139.2 (Mining Act, R.S.O., 1990).

Currently, many mining companies in Canada have eagerly provided the public with nature conservation mission statements, where a global corporation would specify its noble intent in terms of the nature conservation and land reclamation incentives, policies generally oriented to return nature as close as possible to the original state of being.

Many companies implement safety and nature protection procedures that act as accident preventative mechanisms, in theory aiming to eliminate mistakes of the past. However, even such procedures do not always guarantee the pollution and negative side effects of the mining procedures when it comes to the general public living in close proximity, and the environment itself. Additionally, mining industries are obligated to work within the consideration of Aboriginal or Treaty Rights Section 35, of the Constitution Act 1982, Section 86.1 (Mining Act, R.S.O., 1990). Currently, mines could not start operating until the proclamation/reclamation plan is available. It is an important preventative mechanism oriented to protect the environment, community residents and our legacy as a humanity. In some cases, mining companies while



following legislations neglect to protect cultural, ancient Aboriginal sacred sites. For example, as a result of the blasting in the Pilbara region of Western Australia, mining companies have destroyed those Aboriginal sacred sites that showed 46,000 years of continuous occupation and provided a 4,000-year-old genetic link to the present “traditional owners”, the Puutu Kunti Kurrama and Pinikura peoples (Business and Human Rights Resource Centre, 2020). When it comes to the Serpent River First Nation here in Ontario, community residents also lost traditional lands and waters, that are an important part of their traditional way of living and ancestral sacred grounds. Close proximity uranium mining affects traditional ways of living.

In the effort of decommissioning uranium mines, 12 mines across Canada were given a potential contract that “was comprised of 6 billion dollars with 655 million dollars set aside as a close-out compensation package” L. Rekmans in Hankard (2003, pp.14). Sadly, the Serpent River First Nation community were not compensated for the loss of the oil bulk storage plant which was created on their lands for the uranium mines. However, the community was “offered half a million dollars as a compensation proposal along with the hydro farm project, in order to offset the heating cost” L. Rekmans in Hankard (2003, pp.14). Upon the closure of the uranium mines, the community faced challenges on how to rebuild and implement new economic incentives. Important to note as further described by L. Rekmans in Hankard (2003, pp.15), the community was not opposed to the new economy driven environmentally considerate projects. The most important point to highlight though, is that the community were never truly compensated for the inevitable consequences of the need for recovery from the economic exploitation of nature.

In terms of nuclear waste dangers, Serpent River First Nation also faced the dangers of uranium tailings. L. Rekmans in Hankard (2003, pp.16) shared that “About 200 million tons of

uranium tailings are stored behind seven huge earthen dams in the Serpent River watershed". L. Rekmans in Hankard (2003, pp.16) assessment continues: "oxygen continues to affect the pH of the tailings because of the milling process which uses sulfuric acid, and if exposed to the oxygen, it'll continue to perpetually produce acid". A primary concern exists in relation to the heavy rain that potentially could damage the dams. One of the solutions was to bury the uranium tailings under the water, to prevent oxygen from increased pH levels, but that in turn could potentially increase the production of acid that could contaminate/poison soil or get into the water stream. One example is the Rio Algom Corporation that proposed to mine tailings in order to extract zinc, copper and uranium in Mole Lake Reservation, located in Wisconsin, L. Rekmans in Hankard (2003, pp.16). Because this community was downstream and in close proximity to the proposed mining site it did not go ahead. Uranium tailings mining in close proximity to the community could have created dangerous conditions for the community and residents.

The Serpent River First Nation community were also concerned about the possibility of the structural integrity of the tailings which could be compromised as a result of the heavy rain or flooding in the area. As described above, exposed uranium tailings could lead to increased pH levels that would in turn lead to the development of sulfuric acid as a result of the oxygen bond. The sulfuric acid compound could poison the soil, ground waters and surrounding environment evidently causing considerable damage to the fragile eco-system balance.

An additional concern is the uranium itself, in that it is possible that stored uranium is dangerous when it encounters humans or wildlife. When it comes to the radioactive exposure, intensity and severity could vary depending on the type of radiation and its frequency. The most common uranium isotope found in nature is Uranium-238, an isotope that emits Alpha particles. Importantly, Alpha particles are not seriously hazardous when it remains outside of the body

aside from weak gamma rays; however, when inhaled or ingested possesses a serious health threat to the body in the form of cancer development. Depending on the severity of exposure due to its radioactive properties and high chemical toxicity it could cause considerable damage to internal organs and the reproductive system (Institute for Energy and Environmental Research, 2011). Another example of Alpha particle exposure could be derived from consuming an animal or a fish that came into contact with radioactive particles. Other examples are simply breathing the contaminated air or drinking contaminated water.

An estimate of worldwide uranium deposits suggests that 70 percent of the resource is located on the lands of Indigenous peoples, while in Canada and Australia concentration is higher (Graetz, 2015). One of the Indigenous communities affected by uranium mining is D  l  ne First Nation, home to approximately 900 people who reside in that community. The former Port Radium mine is located on the northeast shore of Great Bear Lake in the North West Territories (NWT), 440 kilometers north of Yellowknife (Government of Canada, 2017). The Port Radium mine operated from 1931-1960 and contributed towards radium and uranium extraction, some of which were used in the creation of atomic weapons used at Hiroshima and Nagasaki (Bird, 2020). Aside from the radioactive danger which many community members were exposed to, the community had no idea as regards to the purpose of the uranium extraction. Members of D  l  ne First Nation had no access to personal protection when it came to toxically radioactive materials handling. According to Danny Gaudet from the film *A Moral Awakening, The Legacy of Atomic Bomb* (2020) one of the D  l  ne Representatives involved in the 2005 Canada-D  l  ne Uranium Table:

*In the documentary film a moral awakening “Our people have never been told the dangers exposed to uranium, even though the opening uranium mine was a huge health risk to anyone who worked there...workers did not work with proper personal protection, without knowing the danger associated with it.”*

In the documentary film “A Moral Awakening, The Legacy of Atomic Bomb” it describes the stories of the people affected by radiation, people who lived in close proximity to the uranium storage sites. Some lived on the top of poisoned soil without knowing the health-related risks (Bird, 2020). The primary concern is the lack of critical information and knowledge, in regards to conditions that possess health-related risks. According to the Canada-Déjñę Uranium Table – Final Report (Concerning Health and Environmental Issues Related to the Port Radium Mine, operation years 1931-1960) as a result of the lower radiation protection standards that existed then, that community are not assessed under the new standards that are enforced today (Canada-Déjñę Uranium Table – Final Report, 2005). The overall report actively highlights missing links between radioactive exposure and peoples of Déjñę First Nation, suggesting no evidence or direct correlation, as a result of the absence of standards and different transportation routes. However, testimonies of Elders and Déjñę community representatives vary from official report statements and place emphasis on historically elevated cancer rates and other health related concerns. Overall, the cancer rates for the Déjñę community are not significantly different than the rest of the NorthWest Territories. However, researchers highlight that cancer statistics should be interpreted cautiously because of the gaps in the NorthWest Territories cancer registry prior to 1990 and the small populations in the Déjñę and NWT (Bird, 2020). Despite these findings, community-based health studies determined that cancer is a predominant health concern in Déjñę (Bird, 2020). Further as stated by Danny Gaudet, one of the Déjñę representatives during the Canada-Déjñę Uranium Table – Final Report, who lived in the community all his life:

*“There are letters on file that the Federal government knew back then that opening Port Radium was a huge health risk to anybody who operated or worked there”. Additionally, Déjñę First Nation was impacted by the residential school system (Bird, 2020).*

Consequently, the community has faced difficult times due to the Elders leaving sooner than expected as a result of cancer development and youth that were taken away from the community as Danny Gaudet further stated in the film “A Moral Awakening movie” (Bird, 2020).

Similarly, a nearby nation to the Délı̨nę community have similar effects too. As highlighted in the film “Uranium” directed by Isacson (1990) one of the Dene Nation leaders at the time George Blondin described events that were happening at the Port Radium, Great Bear Lake, near Délı̨nę First Nation:

*“In the beginning we did not know what kind of ore is being taken out of here, we thought it was gold or silver, but then we learned that ore was dangerous. As soon as you take it out of the ground it shuts rays that could damage people and animals...when the mine operated, they did not care what they did with the waste, they just threw it into the lake. We had set up our camp on the other side of the bay, we took our drinking water and eat the fish from out there, from the bay where they were throwing their waste into the water.”*

*“We Native People see the Earth as our mother, and we do not like it when this kind of damage is done.”*

-George Blondin

In the film, Isacson further emphasizes the devastating consequences of Canada’s first uranium mine in the community. Real life stories of people who regret working in the uranium mine cast the light on negative effects for community, nature and traditional way of living of First Nation People.

Jimmy Lacorde:

*“We did not know anything about the rock that was taken out of the ground or what it was for. But now we find out, we really do not like it. All work should be to make things better for people, if it is for war, that is not the case, it is not right for us to work on something that we do not know what it is.”*

Elizabeth Lacorde:

*“Some people are saying that if the animal goes near the mining area it would be dangerous to eat that animal. We used to fish and catch muskrat there, but since the mining have started, we have been afraid of it, so we do not go near there anymore.”*

Jimmy Lacorde:

*“With this ore, people in the south make bombs and prepare for war. We do not know much about that kind of war, we just live off the land, but they seemed it is important to keep making those bombs...Everything is in the power of Creator, we hope there would be not too much damage done, and we pray for peace.”*

Throughout the film, the director highlighted the dangerous tendencies and negative side effects of uranium mining. The primary concern focused in this film is the radioactive waste, the abundance of which in the form of uranium tailings fundamentally affect communities, nature and Indigenous ways of living. For every barrel extracted of useful material, tons of solid waste are dumped on site, the sand-like tailings contain more radioactivity than extracted uranium (Bui, 2022; Isacsson, 1990). Many companies often proclaim existing technologies as “state of the art”, that are designed to contain radioactive waste for a considerable period of the time (Isacsson, 1990). According to Dr. Robert Woollard, even though technology could be safe at the current moment, consequences of the safe storage procedures should be noted in the foreseeable future. To highlight an example of a regulatory regulation, is from Saskatchewan where they allowed the development of highly radioactive tailings, in a manner which will not last beyond 50 years. Dr. Robert Woollard further describes; “So that when we are talking the state of the art, we are talking state of the art to protect us, but not the state of the art to protect future generations” (Isacsson, 1990). Consequently, it is important to pay particular attention to the details of tailing regulations, in order to avoid the countless mistakes companies, users and regulators have made in the past.

When it comes to effective uranium waste disposal, containment of radioactive substances does not yet exist. Containment practices and technology need to account for at least 200,000 years (Isacsson, 1990). In some cases, radioactive substances were stored in the concrete containers designed to last 100 years, but hundreds started leaking after 6 years (ibid). Examples of this and similar cases cast a shadow on the arguments related to safe technological advances

designed to eliminate any risks, especially when considering accidents of the past. Our actions today should reflect the future, especially considering the safety of humans, wildlife and conservation of the environment.

Some Canadian towns were able to resist development of the uranium mining in their surrounding region as a result of public protests and community outrage. However, many Indigenous communities do not have such luxury and are stuck with consequences of uranium tailings and mining pollution next to their door, left to pollute for hundreds and thousands of years (ibid). Important to note that in many cases Indigenous communities are also protesting against environmentally harmful projects in order to protect identity and traditional way of living.

Chemical processing of common uranium, developed by UO<sub>2</sub> is used in nuclear weapons, nuclear power plants and many other applications (Uranium: Its Uses and Hazards, 2011). During the process of uranium mining, large amounts of lime and pyrites are produced. Through the process of mining uranium ore (uraninite) certain commercially valuable elements are extracted. On the website Ontario Ministry of Energy stated:

*“According to the Mineral Deposit Inventory for Ontario Pronto Mine economically extracted ores are; brannerite, uraninite, monazite, thucholite, uranophane. Associated with produced ore is Pyrite mineralization (FeS<sub>2</sub>) and low-grade uranium residue”*  
(Mineral Deposit Inventory, 2020)

Important to note that two major concerns exist regarding the uranium mining leftover in the form of uranium which is not only toxic at certain levels by inhaling dust or contaminated food and water. Associated Pyrite FeS<sub>2</sub> has a high concentration of sulfur which can potentially mean an increase of sulfur content in the ground and further environmental contamination (Mineral Deposit Inventory, 2020).

When it comes to the rigidity of the dam a delicate balance must be carefully supervised and sustained in order to maintain the chemical equilibrium of the uranium tailings. The primary danger that should be considered when it comes to uranium tailing is in the form of water surface contamination, groundwater contamination; a process that could also produce and contain radium. The decay of radium leads to the production of radon, an odorless radioactive gas that causes lung cancer according to the US National Toxicity Program (National Library of Medicine, 2017). Fallout from radioactive gas given off by the tailings will accumulate in vegetation for thousands of years to come (Bui, 2022; Isacson, 1990). Further from the extracted uranium, 85% of the radioactivity is left behind and stored in uranium tailings; maintenance of which is required (Bui, 2022; Göcke, 2014). Considerable concerns exist about the monitoring process of uranium tailings and its potential effect on the surrounding ecosystems and human beings.

In addition, an estimate suggests that 996 pounds of radioactive waste are produced as mine tailings for every 4 pounds of uranium extracted (Tsosie, 2015). The mining process disturbs a natural ecosystem balance, leading to release of harmful substances. As described in the documentary “Uranium” unless tailings could be perfectly contained, contaminants from Elliot Lake mine continue to migrate down the Serpent River and into the Great Lakes (Isacson, 1990). This process affects not only Serpent River First Nation, but communities as a result of the interconnectivity of the environmental forces. Isacson’s film highlights the danger when it comes to human caused environmental catastrophes. People from the Serpent River First Nation have been getting sick, and many have been asking the question: why are we getting sick? People of the First Nation Serpent River First Nation protested against environmental contamination, contamination that is harmful for all living beings (Isacson, 1990).



Additional health effects related to uranium mining and uranium tailings consist of weak gamma rays and Alpha particles radiation that have been addressed above. In total, ten uranium tailings exist around Elliot Lake (CNSC, 2019). Moreover, due to currently existing ecological concerns in the area, further meticulous observation and maintenance of uranium tailings is a crucial process in order to maintain and restore an outcome of economical development at the cost of nature and people who reside there. A survey for International Concern for Public Health cited a serious health concern in the community (Isacsson, 1990). One of the arguments related to uranium mining often states that industry creates local jobs and provides economic prosperity for everyone constantly striving to push for economic growth.

Even though uranium mining has the potential for creating economic growth and creating employment opportunities for Indigenous peoples, the negative consequences often outweigh the benefit. One of the Indigenous workers who considered himself lucky in 1970 was Martin Assinewi, 15 years later illness forced him to quit his work. Martin is working with his wife in the sugar bush, doing his original work:

*In the documentary film Uranium: "That is where I worked and that is where I got this cancer. I inhaled this poisoned air, that is what the doctor has told me, this is where you got your sickness from the doctor said... Where I worked, there were many people, and many white people, most of us will be dying on the short time. I am afraid all of us will eventually die from this." (Isacsson, 1990)*

There is indisputable evidence to prove that many uranium mine workers have high rates of lung cancer as the film "Uranium" further highlights (Isacsson, 1990). As a result of the reduced health and safety standards many workers suffer from the effects of radioactive contamination, many have experienced devastating consequences in the form of health problems.

Some Canadian towns were able to resist development of the uranium mining in their region as a result of public protests and community outrage. However, many Indigenous

communities did not and do not have such luxury and are stuck with the consequences of uranium tailings and mining pollution right on their doorstep, which has been left to pollute their lands for hundreds and thousands of years (Isacsson, 1990). For me it is important to note that in many cases Indigenous communities are actively protesting against environmentally harmful projects in order to protect their communities, lands and traditional way of living.

In summary, the literature that I have reviewed demonstrates that further attention must be devoted towards the ways the treatment of uranium tailings and compounds are stored. It is therefore imperative, to reduce and neutralize risks associated with dangers relating to radioactive waste storage in close proximity to all communities and its residents. Careful management of radioactive waste disposal is a crucial step when it comes to long-term community wellbeing. One of the primary concerns of the uranium tailings compound treatment is the limited availability of solutions due to the private, intellectual property ownership. Many companies compete with each other, often omitting technological advances to the general public or other companies. Part of the issue is a competitive advantage, once developed a company is better off in relation to the less successful competitive rivals. As a result of this tendency, ways and solutions to resolve certain environmental issues often are diminished due to the ever-increasing desire for enrichment and profit-maximization.

In my literature review, I argue that there must be a safer, cleaner method for the generation of energy and a method that also respects Indigenous worldviews. In Indigenous culture interconnections exist everywhere, between all entities, seeking mutual benefit in order to ensure “ecological and cosmological balance” (Kovach, 2010, pp.57). Hence this thesis draws upon the universal connectivity of Indigenous knowledge. The literature I have reviewed highlights that Indigenous culture values collective well-being, respect for the surrounding

environment, dependency on nature, a shared society where material possessions do not play an active role, a society where sharing is actively promoted as more fair in terms of the redistribution to the benefit of all (Belanger, 2018). As a result of the deep spiritual and physical connection with the surrounding nature and environment, the Indigenous worldview is crucially important when it comes to protecting mother nature and preserving it for future generations. Elder Albert Marshall as cited in Martin (2012, pp.21) provides a complimentary quote about Two-Eyed Seeing, that I believe is relevant to this literature review:

*“Two-Eyed Seeing adamantly, respectfully, and passionately asks that we bring together our different ways of knowing to motivate people, Aboriginal and non-Aboriginal alike, to use all our understandings so that we can leave the world a better place and not compromise the opportunities for our youth (in the sense of Seven Generations) through our own inaction.”*

The importance of above-listed approach is fundamentally important when it comes to building a better future for many generations to come. Two-Eyed Seeing refers to using both eyes simultaneously and learning to see with one eye using the strengths of Western knowledge and the other using the strengths of Indigenous knowledge. Intentionally and respectfully, Two-Eyed Seeing brings our various ways of knowing together to encourage people to use all of their talents so that we can leave the world a better place and preserve youth opportunities (Hatcher et al., 2009). The future founded on respect and consideration towards nature as well as the usage of technological development for the better good is an important step towards the collective wellbeing of future generations.

Development of the better future fundamentally important with the integration of the Seven Generations Worldview:

*“The responsibility of the living is to care for and honor the suffering, memory, and spiritual well-being of those who have passed away, as well as to pray for the lives of (and to act as caretakers of the earth) for seven generations to come.”*

(Sinclair, 2004, pp.54)

Seven Generations Worldview directly highlights that the actions and decisions of the previous generations have led to where we are right now. The Two-Eyed Seeing approach actively applies principles of; mutual research interest, identification of required tools, research co-development, co-evaluation and community validation, shared recognition and co-benefits, and long-term relationship (Reid et al., 2020). Decisions of the current generations will affect the present and future generations to come; the Seven Generations Worldview act as a guiding principle to ensure the well-being of the next generations. The environment is an important part of Indigenous culture, based on the intergenerational wisdom, traditions, and beliefs of Indigenous peoples. A crucial aspect is the connection between conservation and preservation which impacts the future generations, hence Indigenous value their only home, which is mother nature. I concur with this stance.

A major part of the Indigenous worldview in terms of survival, is actively placing humans as a part of this incredible world, and by not any means on top of it. Universal value and respect for nature should be present throughout all cultures. The Seven Grandfather Teachings addresses major viewpoints and thought lessons of Love, Respect, Bravery, Truth, Honesty, Humility, and Wisdom (Jorgenson, 2018; Nottawaseppi Huron Band of the Potawatomi, 2022; Verbos, 2013). The Seven Grandfather Teachings play an important role when it comes to addressing generational knowledge, promoting generational wisdom and applying traditional teachings. This approach is crucial when it comes to preservation and maintenance of the Earth's delicate balance, which often falls victim to the profit-extracting strategies of capitalistic systems.

In the next chapter, I will discuss my research methodology, methods and links to my research goals and aims.

### **Chapter 3: Research Methodology**

My thesis research aims to highlight the risks related to radioactive danger and combine Indigenous knowledge and worldviews in relation to the surrounding environment in an attempt to find an alternative explanation for the cessation of nuclear energy generation. My research is oriented to promote the danger of radioactive waste in relation to Indigenous communities.

Therefore, this thesis aims to analyze information and sources with a view to

- a) Highlight potential dangers when it comes to radioactive waste in Indigenous communities;
- b) To promote Indigenous knowledge and worldviews in relation to the surrounding environment and;
- c) To suggest a positive shift in terms of the renewable, waste-free hydrogen fusion process, the very same process that powers stars in the universe including our sun.

My research design involves a discourse analysis (a useful tool for studying social-political contexts) which will consist of an in-depth analysis of literature and related sources oriented to address two key research issues: a) the dangers of radioactive pollution and b) the impact of dangerous tailings in Indigenous communities.

I used a “discourse analysis toolbox” originally designed by Siegfried Jäger and further developed by Florian Schneider (2013). The toolbox consists of ten steps, these being:

1. Establish the context
2. Explore the production process
3. Prepare material for analysis
4. Code material
5. Examine the structure of the text

6. Collect and examine discursive statements
7. Identify cultural references
8. Identify linguistic and rhetorical mechanisms
9. Interpret the data
10. Present findings

Because my overall research is about the dangers of radioactive pollution and its impacts on the environment, a discourse analysis would assist with framing the social political contexts of those Indigenous communities directly impacted by nuclear waste on their territories. Therefore, it was important to include an Indigenous approach in my research, namely an Indigenous worldview to use as an overarching framework to complement the discourse toolbox analysis. Since an important aspect of this research is direct consideration towards Indigenous worldviews and community benefit, the aim will be focused to integrate Indigenous research methodology as well as combining with the western model of research practices. Indigenous research integration became more prominent with the development of human rights in North America (Wilson, 2008). Even with the rapid development of the human rights movement, many Indigenous people's voices were hardly addressed, in turn generating a great level of importance when it comes to the restoration of missing balance. So it is important to me that I use an Indigenous worldview as a balance and guide for my thesis, to make sure I promote and center Indigenous voices in my study.

In terms of searching for relevant resources, as a first step, I completed a bibliography of 15 key resources (see Appendix A). These resources gave me a baseline to understand both the impact of radioactive pollution and Indigenous worldviews. This situated my analytic framework for understanding the material. Once I completed this bibliography, I then was able to

identify and locate 15 literature sources that were directly related to my research aims. I found these resources primarily from the online archives and database, as well, Dr. Mike Hankard, Indigenous Knowledge Keeper also provided me with relevant First Nation information and sources. Unfortunately, due to limitations of the COVID 19 pandemic and occurring lockdowns, I was unable nor was it ethical at that time to interview anyone, hence my thesis only explored literature sources. I explain this piece in more detail under the analysis chapter.

To start, I will outline why Indigenous worldviews are important to my research study and to my overall research goals. An Indigenous methodology (Kovach 2010, Wilson 2008,) overarch my total thesis including the discourse analysis to ensure that it respects Canada's Indigenous worldviews. This will be particularly useful when I am using steps 6-9 in the discourse analysis toolbox.

To ensure I am inclusive and respectful of an Indigenous worldview, the following Indigenous research concepts used as a guide. Indigenous Seven Generations' worldview is an important aspect of community wellbeing. Additionally, "two-eyed-seeing" emphasizes the importance of analysis when it comes to looking at seven generations in the past, and analyzing actions of today, for the best possible future of many generations to come (Elder Albert Marshall, 2004). The actions and decisions of the previous generations lead us to where we are today. Consequently, it is crucial to take into consideration any careful planning decisions of today to positively affect the future in terms of nature conservation and community wellbeing in general. The emphasis of the discourse-analytical framework is to visualize and dissect various approaches within the consideration of community wellbeing. More specifically, attention will be devoted to the hazards of radiation in the context of Indigenous communities. Additional attention will be devoted to hazardous nuclear waste or byproducts in relation to community

benefit and wellbeing incentives. The land is important to the identity of Indigenous peoples; their relationships with the land, their ancestors who returned to the land, as well as consideration of the future generations who will reside there (Wilson, 2008).

Throughout Indigenous discourse aspects of Indigenous epistemologies constantly emerge connected by a framework directly integrated with everything else, outer and inner space, merging metaphysical and physical knowledge within universal understanding (Kovach, 2010). In turn, the collective connectivity approach promotes the wellbeing of everyone without concern of social status, with primary emphasis to benefit everyone in the community and preserve the surrounding environment for future generations.

In some cases, researchers have a difficult time when it comes to highlighting ways of Indigenous knowledge and research in relation to the western science perspective. This is especially relevant when it comes to attempting to incorporate holistic theories into one's research. (Kovach, 2010). In turn, this creates a considerable challenge to researchers implementing traditional research methodologies as a result of the self-prescribed western dominance or authority to determine what is right or wrong when it comes to the research approaches. At times, research approaches are misunderstood by researchers when it comes to the specific community due to the generalized understanding of the customs. One of the examples is a fairly well-known tobacco offering, which at times could be misconceived as a result of the different customs and traditions of the community.

In keeping with the intentions of Kovach (2010) and Wilson (2008), the primary guiding principles of positive research should be directed with an emphasis on community wellbeing. In many cases strong trust with the consideration of community wellbeing is to be established, trust that is fundamentally based on the desire to provide benefit to the community. An important



aspect of Indigenous research is giving back to the community established on the development of a positive motive behind one's actions, (Kovach, 2010). One of the ways my research might benefit a community is to spread awareness in regards to the radioactive danger, consequences for current and future generations based on historical examples in addition to conservation of environment and preservation of it for future generations. Indigenous peoples place a great level of importance when it comes to coexistence and preservation of nature and the surrounding environment through the series of interconnected relationships (Wilson, 2008). Therefore, the role of the researcher has its own responsibility when it comes to using guiding principles of Indigenous methodologies, worldviews and beneficial interests of the community and its members.

My chosen research methodology is determined by incorporating both western and Indigenous worldviews with the aim of the most optimal benefit to the community. Additionally, a consideration of Indigenous generational wisdom is an important step when it comes to the conservation of the environment. What the literature has proven, is that when it comes to mining impacts, the maintenance and preservation of a delicate ecosystem balance and fragile equilibrium is often distorted by western profit-seeking motives. A preservation strategy could be of benefit for future generations to be a part of the world as we experience it in terms of nature conservation. Consequently, the combined research approach is optimal in terms of the knowledge utilization derived from the two worlds, a strategy designed to address the danger of radiation when it comes to community and considerations for nature conservation.

As a non-Indigenous researcher, this is good advice so I want to make sure that my methodology is inclusive of Indigenous worldviews. Considerable attention will be devoted to highlighting radiation exposure in the Indigenous community in terms of social wellbeing when

it comes to current and future generations. As a part of the research, I will ensure that the resources I analyze investigate health and safety standards when it comes to the storage of radioactive waste on Indigenous lands. Important attention will also be addressing the capitalistic greed of overproduction, fueled by the western civilization that artificially proclaimed itself on top of this world.

Drawing on the laws of balance, I also examined literature on waste-free energy production. As an alternative, a green form of hydrogen fusion provides limitless and waste-free energy that could fulfill ever-increasing energy consumption needs. The hydrogen fusion process draws from the sun. The sun's power starts the earth, a natural source that is limitless. Historically Indigenous peoples placed great importance on when it comes to the sun, addressing it as a life-giver.

Human's way of replicating the perfect design of nature more than often appears to be the most sophisticated design with very little flaws. ITER (International Thermonuclear Experimental Reactor) is a collaboration of 35 countries with a direct aim to create sustainable hydrogen fusion, the key to clean and unlimited energy, the very same process that powers stars (ITER, 2020). The fundamental objective of ITER, an international collaboration project is to replicate the hydrogen fusion, a process that powers our sun at 15 million degrees, but ten times hotter at 150 million degrees in order to maximize energy output efficiency. It is also important to recognize that hydrogen fusion, unlike traditional deuterium fusion that is present at all nuclear stations, does not produce harmful nuclear waste and, in turn, provides limitless energy output. Abundant energy is

“Fusing atoms together in a controlled way releases nearly four million times more energy than a chemical reaction such as the burning of coal, oil or gas, and four times as much as nuclear fission reactions (at equal mass). Fusion has the potential to provide the

kind of base load energy needed to provide electricity to our cities and our industries (ITER: Advantages of Fusion, 2020).”

Likewise, sustainable energy is maintained by fusion fuels that are “widely available and nearly inexhaustible. Deuterium can be distilled from all forms of water, while tritium will be produced during the fusion reaction as fusion neutrons interact with lithium. Terrestrial reserves of lithium would permit the operation of fusion power plants for more than 1,000 years, while sea-based reserves of lithium would fulfill needs for millions of years” (ITER: Sustainability, 2020).

As mentioned previously, the sun plays an important role in Indigenous culture and is a part of the creation story of Anishnabeg peoples. A special relationship exists in Anishnabeg culture that signifies the sun, the Earth, the moon, and the stars (Johnston, 2008). Indigenous peoples place a great level of importance when it comes to the sun in everyday life, the very same process that gives life. Cherokee people referred to the sun as the life-giver, fire represented by the spirit of Creator (Myers-El, 2008). Not only does this highlight the historical significance and cultural value of the sun in our society, but it places the project of the sun hydrogen fusion process replication on Earth as a Creator’s gift in terms of the ever-increasing energy consumption needs. Combining the worldviews of the ITER project with Indigenous worldviews could lead to nature's best and most efficient way of limitless energy creation, a process virtually free of pollution which could be the bridge between western science and Indigenous culture.

In summary, a discourse analysis of relevant literature and sources would assist to inform those most impacted by nuclear waste, as well as those intending to work with Indigenous communities to mitigate the dangerous effects of radioactive contamination and provide communities with available information references when it comes to decisions. An additional

benefit is to protect and preserve uncontaminated lands for current and future generations to come.

### **Research Questions that helped me to identify key issues in the discourse analysis**

#### 1) The dangers of radioactive pollution in Indigenous communities

Radioactive waste exists. Why do some communities come forward with a proposal to store nuclear waste on Indigenous lands? Do economic circumstances play a part in their decision to store nuclear waste? What is the danger of radioactive waste? What is the potential for safe storage procedures? How do nuclear companies exploit those communities who depend on their funding to sustain their communities? What is the evidence of this, if any? What sorts of information do nuclear companies use to convince Indigenous communities? i.e. scientific data actively reassuring the safety of the nuclear storage projects on Indigenous lands. What are the ways and dangers when it comes to prolonged uranium tailing treatment? How long is the complete restoration and land healing?

#### 2) Why hydrogen fusion is a safer, cleaner method for the generation of energy.

What are the safety and cost-effective control mechanisms primarily designed to integrate the lowest cost-efficiency system (nuclear waste management) with the balance safety sheet approach, possibly avoiding implementation of the costly health and safety-related standards as a result of the various communities' self-governance abilities?

In the next chapter, I talk more about the discourse analysis method and then provide the results of what I found.

## **Chapter 4 Results of the Discourse Analysis**

During the process of this thesis, I reviewed 15 literature sources. More specifically the discussion process is based on the discourse data analysis of the various radioactively contaminated communities around the world; Serpent River First Nation, Délı̄nę First Nation, Indigenous peoples of Marshall Islands, and my Chernobyl nuclear power plant. I was born shortly after the Chernobyl nuclear accident occurred and found it important to address this tragedy and the serious problems it has caused as a result of the safety design flaw. The COVID-19 pandemic outbreak made a significant impact when it came to the availability of interviewing key Indigenous persons that had a lived experience with nuclear contamination. As my thesis was written during lockdown, it was decided between myself and my committee that as this work is absolutely important, rather than stop it from going ahead, the next best research approach was to utilize a discourse analysis method.

Data was limited to online to achieve most of the sources I had gathered. Also, I was fortunate enough to utilize the lived stories and experiences of Dr. Mike Hankard, Indigenous Knowledge Keeper who is also one of my committee members. Through his lived experience and guidance, I was also able to identify key sources that became vital for my thesis. From video sources, it became possible to learn from real-life stories, rich source-based statements that told of the devastating impacts Indigenous communities had experienced as a result of the radioactive contamination. As a result, I was able to find 15 key resources primarily from the online archives and data basis materials, as well as books. Each of the key sources, are organized in the table below:

	Reviwed Sources			
Number	Authors and Year of Publication	Articles	Coding Criteria	Coding Points
1	Kuyek, J. (2019).	Unearthing Justice. Between the Lines.	(r), (e), (i), (h), (c)	24
2	Kovach, M. (2010).	Indigenous Methodologies: Characteristics, Conversations and Contexts.	(h), (w)	15
3	Wilson, S. (2008).	Research is Ceremony: Indigenous Research Methods.	(h), (w)	10
4	Nabigon, H., & Yerxa, L. (2006).	The Hollow Tree: Fighting Addiction with Native Healing.	(h), (w), (i)	27
5	L. Rekmans in Hankard. (2003).	This is My Homeland Stories of the Effects of Nuclear Industries by People of the Serpent River First Nation and the North Shore of Lake Huron.	(r), (e), (i), (h), (c), (w)	18
6	Gray, R. (2019).	The True Toll of the Chernobyl Disaster.	(r), (e), (c)	17
7	NHBP (2022).	Seven Grandfather Teachings.	(w)	8
8	Rust, S. (2019).	How the U.S. Betrayed the Marshall Islands, Kindling the Next Nuclear Disaster.	(i), (e), (h), (r)	28
9	Raj, A. (2019).	In Marshall Islands, Radiation Threatens Tradition of Handing Down Stories by Song.	(i), (h), (r), (e), (c)	23
10	Marshall, A. (2004).	Two-Eyed Seeing.	(w)	6
11	Smith, L. T. (2008).	Decolonizing Methodologies: Research and Indigenous Peoples.	(w)	5
12	Graetz, G. (2015).	Energy for Whom? Uranium Mining, Indigenous People, and Navigating Risk and Rights in Australia.	(r), (h)	3
13	Fouse, S. (2020).	An Ongoing Battle: Fighting the Impacts of Uranium Mining in Southwestern Indigenous Communities.	(r), (e), (i), (h), (c)	17
14	Heath, J. (2020).	The Violence of Nuclear Energy Against Indigenous Peoples, Land, Water and Air.	(r), (e), (i), (h), (c)	12
15	PSR. (2022).	The Unequal Impacts of Nuclear Weapons. Physicians for Social Responsibility.	(r), (h), (c)	9

The table above consists of the author's column and year of publication, title of source, coding criteria and coding points derived from the discourse analysis toolbox (Schenider, 2013).

I then carried out an in depth analysis of each of the sources using the discourse analysis toolbox (see Appendix B). For every source, I followed each of the steps developed by Florian Schneider (2013) below and elicited relevant material that went with each of the stages. This process took me many months to complete.

1. Establish the context
2. Explore the production process
3. Prepare material for analysis
4. Code material

5. Examine the structure of the text
6. Collect and examine discursive statements
7. Identify cultural references
8. Identify linguistic and rhetorical mechanisms

Once I had completed the above tool box analysis for each source, I analyzed the above listed sources which I then categorized based on the coding research criteria marked as (w), (r), (e), (h), (c), (i). The following graph incorporates coding criteria and coding points used to analyze categorized material derived from the text sources materials and associated with a specific coding theme; Indigenous Worldview and Environment, Radioactive Danger, Community Health, Social Impacts and Experience of Affected Populations (info retrieved from the text), Historical Injustice, Contamination of the Surrounding Environment and, Impact on Traditional Lifestyle. Further, coding criteria are ranked based on the number of points and coding theme.

<b>Number</b>	<b>Coding Criteria</b>	<b>Coding Points</b>
1	Indigenous Worldview and Environment (w)	66
2	Radioactive Danger (r)	37
3	Community Health, Social Impacts and Experience of Affected Populations (info retrieved from the text) (e)	29
4	Historical Injustice (h)	38
5	Contamination of the Surrounding Environment (c)	36
6	Impact on Traditional Lifestyle (i)	16

From the sources, I was able to ascertain key patterns or themes that were mentioned. I then used a coding points system, i.e. how many times these themes were mentioned in the sources and the above six themes were the most pertinent that I found.

In summary, key results are the tasks that are completed to achieve the larger research aims. In this chapter I provided a table of the 15 sources, and from the discourse analysis

toolbox, I produced a table showing key themes and coding points. In the next chapter, the findings section, I will explain each of the six themes, and link these to my research aims.

## **Chapter 5 Findings and Conclusion**

The findings section represents the core findings derived from my discourse analysis method. My thesis research aim was to; a) highlight the risks related to radioactive danger and b) combine Indigenous knowledge and worldviews in relation to the surrounding environment in an attempt to c) find an alternative explanation for the cessation of nuclear energy generation. My research was also oriented to promote the danger of radioactive waste in relation to Indigenous communities. As mentioned in the results chapter, I found six key themes derived from the 15 sources I analyzed. These were: Indigenous Worldview and Environment, Radioactive Danger, Community Health, Social Impacts and Experience of Affected Populations (info retrieved from the text), Historical Injustice, Contamination of the Surrounding Environment and Impact on Traditional Lifestyle. Below, I present an explanation of these key findings.

### **Findings: Indigenous Worldviews and Environment (w)**

The discourse analysis showed that Indigenous worldviews and environments were an important consideration when understanding the impact of radioactive dangers. One of the important aspects of this research is to highlight the deep sense of universal connection when it comes to the surrounding environment. Indigenous worldviews are intertwined with the surrounding environment and share the value of harmony. In Kovach's (2010) book, one of the key sources I analyzed, she shared that in Indigenous culture, an interconnection exists everywhere, between all entities, seeking mutual benefit in order to ensure "ecological and cosmological balance" (Kovach, 2010, p. 57). Further, throughout the history of time, Indigenous peoples developed a



strong connection with nature and the surrounding environment. Kovach (2010) further points out that Indigenous research and worldviews are intertwined with the relationship to land, culture and origin.

*“Within Indigenous research, self-location means cultural identification, and it manifests itself in various ways. Indigenous researchers identify themselves as being of an Indigenous group, be it tribal, urban or otherwise. They share their experience with culture, and/ or they will identify the Indigenous epistemology.”* (Kovach, 2010, p. 110)

Self-situation therefore, is an important aspect of Indigenous worldviews and environment in terms of self-location, identification of one's own cultural inheritance in relation to others' cultural background and identification.

Another key source I analyzed was from Wilson (2008), who described that Indigenous peoples value the traditional approach towards nature, based on the deep sense of respect, and interconnection of the surrounding environment. People of Indigenous Nations place great importance on the meaning of universal interconnection, respect and conservation towards the surrounding environment.

*“Identity for Indigenous peoples is grounded in their relationships with the land, with their ancestors who have returned to the land and future generations who will come into being on the land.”* (Wilson 2008, p. 80)

From the sources analyzed, I learned that an Indigenous worldview and philosophy often highlight the duty to preserve the surrounding environment for future generations. The environment plays an important role when it comes to understanding various Indigenous worldviews, the importance of the conservation of nature as well as becoming familiar with the culture itself. Consequently, core values of respect and conservation towards nature are embedded in existing principles of Indigenous worldviews and balance, as highlighted by Nabigon and Yerxa's (2006).

*“The Hub...The outer circle represents the negative side of life. The middle circle represents the positive side, and the centre circle one’s inner spiritual fire. The balance of these three parts is the ideal medium that one strives for in life. The circles are divided into four directions: North, South, East, and West, resembling the points of compass...The Hub can be used as a means to guide a person towards the balance of both negative and positive circumstances that occur within every life.”* (Nabigon & Yerxa, 2006, p46.).

Nabigon addresses the Indigenous vision of balance represented in traditional teachings. By observing nature, humans can learn and coexist with the surrounding environment. Nabigon provides us with a meaningful analogy:

*“The strongest example I can find in Nature comes from sister Water, the cradle of Mother Earth’s womb.”* (Nabigon & Yerxa, 2006, p53.)

Nabigon & Yerxa highlights the complex relationship of Indigenous cultures represented in an intergenerational worldview oriented to protect and nurture the surrounding environment.

Considerable attention is devoted towards the surrounding environment for the future generations to come. The Seven Generations Worldview is the cornerstone, a guiding principle of the First Nations when it comes to the protection of mother nature.

*“If we continue to abuse our interdependence with food chain our lives will be made very difficult. We are responsible for the quality sustenance for the next seven generations.”* (Nabigon & Yerxa, 2006, p61.)

Indigenous cultures preserve the pure ability to recognize and envision the environment and conservation of it for many generations to come. The primary aspect of this ability is related to the possibility of envisioning the future without short-term, nature exploitation, and harmful profit-oriented tendencies. As a result of the traditional teachings, ceremonies and guidance of the Elders, First Nations peoples place themselves as a part of this wonderful world, coexistence with which is a true path of meaningful existence.

Certain technological advances have made human life easier, however, it is often that technological progress actively contributes towards the exploitation of nature. Not surprisingly

human, peaceful coexistence with nature should be prioritized at the cost of monetary enrichment.

*“We should always remember that without Nature, human beings are nothing. Our dependency on the Nature should never be forgotten.”*

Rekmans, L., in Hankard. (2003).

Indigenous peoples possess knowledge of the dangerous effects of uranium, and this knowledge was passed on through storytelling, from generation to generation. Some of the stories of Anishnawbe communities about people helping locate the mineral during the exploration process. Stories further address the potential danger of the uranium, addressing that the mineral smelled bad and would not live on the ground above veins' location (Rekmans, L., in Hankard, 2003). Certain Indigenous people envision the importance of working together, moving forward in the collective benefit of combining traditional Indigenous core principles and values with western knowledge.

*“We often explain Etuaptmunk - Two-Eyed Seeing by saying it refers to learning to see from one eye with the strengths of Indigenous knowledge's and ways of knowing, and from the other eye with the strengths of Western knowledge's and ways of knowing ... and learning to use both these eyes together, for the benefit of all.”* (Elder Albert Marshal, 2004)

Collective wellbeing is an important factor when it comes to Indigenous worldviews. Two-Eyed Seeing envisions the society free of current differences. The world is based on universal harmony, conservation of the surrounding environment for the generations to come and the wellbeing of everyone.

### **Findings: Radioactive Danger (r)**

The sources analyzed revealed that knowledge of radioactive danger and its impacts are critical for all communities. For Indigenous communities, as well as lower-income communities and people of color, they are often targeted when it comes to the impact of nuclear weaponry, uranium mining sites, nuclear weapons production facilities, nuclear weapons testing sites, and

nuclear waste storage predominantly located on Indigenous lands or territories positioned in the proximity to above-noted communities, a process referred as a “nuclear colonization” (Physicians For Social Responsibility, 2022). Graetz (2015) noted that our collective histories accounts for numerous unjust examples related to radioactive contamination and especially so of Indigenous lands and waters. The current estimation suggests that 70% of the world's uranium deposits are located on, or next to the lands of the First Nation peoples as cited in Graetz (2015). Consequently, highlighting and understating the dangerous effects of the radioactive components is an important step towards community wellbeing. Historically various communities, including my country of origin, have been affected by the dangerous effects of radioactive elements.

It is important to highlight that decay of radioactive elements possess serious health risks when coming into contact with a living being. Uranium tailings contain radioactive elements radium and radon, when radium undergoes natural decay, one of the products released is radon gas (Kuyek, 2019). Kuyek’s article, highlighted that radon is a radioactive odorless gas released in the air, which causes significant environmental and health concerns thus when inhaled causes lung cancer. Uranium tailings pose a constant health risk to the surrounding area and the community residents. Tailings have a tendency to seep and can fail due to weak structure or overtopping and rainfall; water floating on the top of the dam, with many examples of tailing dams failing in Canada or abroad (Kuyek, 2019). For many years Residents of the Serpent River First Nation have experienced devastating effects of Uranium mining.

L. Rekman holds invaluable knowledge of the Serpent River First Nation. The primary concern of the Serpent River First Nation is 12 uranium mines located north of the community. Particularly troubling is the “water from operating mines continued to flow past the community on the Serpent River watershed” (Rekmans et al., 2003, pp.10, 33). Throughout the year,

community members lived in contaminated water, including children swimming without any protection from contamination. L. Rekmans in Hankard (2003, pp.16) highlights the cataclysmic quantity of approximately 200 million tons of uranium tailings stored behind seven huge earthen dams in the Serpent River watershed. Alarming is the process of oxygen that continues to affect the pH of the tailings due to the milling process using sulfuric acid.

The proposed and the implemented solution is the usage of the water to contain uranium tailings, which in turn raises concerns regarding the rigidity of the structure, especially in the case of the unpredicted weather conditions. The Serpent River community members constantly worry if dams could break or if the weather conditions such as heavy rain or flooding contribute towards spillage. The outcome of the uranium tailings storage is the loss of wildlife and contamination of the ten lakes where radioactive waste was dumped.

History, unfortunately, is filled with examples of radioactive contamination all around the world. One of the tragedies that should be taken into account is the Chernobyl incident. On April 26, 1986, reactor number four exploded at the Chernobyl nuclear power plant. As a result of the explosion, hundreds of thousands were sent to deal with the consequences of the Chernobyl nuclear explosion. People involved in the radiation clean-up received a liquidator status due to the considerably high dosage of radioactive exposure. Official registration includes 600,000 liquidators, around 15% of whom have died by 2005 (Gray, 2019). Many also received a disability status as a result of radioactive exposure. The following summer after the Chernobyl tragedy occurred at least 40,000 people were hospitalized with acute symptoms, many of whom were women and children. As a result of the accident, 200,000 people lost their homes and were forced to relocate to safer areas.

*“The National Research Center for Radiation Medicine estimate around five million citizens of the former USSR, including three million in Ukraine, have suffered as a result of Chernobyl.”*

-Gray, 2019

One of the largest radioactive spills caused in US history occurred as a result of uranium development. Three-Mile-Island radiation events arise due to dam breakage resulting from radioactive contamination of the Navajo Nation reservation (Fouse, 2020). Due to contamination, many residents developed sicknesses related to radioactive exposure including childbirth defects as Fouse further highlights. For some communities' radioactive contamination has been an outstanding problem including improper uranium mine closure; environmental degradation, community health effects lasting up to the current time, improperly sealed mines resulting in waterways contamination, children swimming in contaminated water, and homes built from the rock and mine material (Fouse, 2020). Violation of basic health and safety standards is unacceptable practice; it is a violation of basic human rights for safe living standards.

Another historical injustice occurred as a result of the United States nuclear weaponry testing in the Marshall Islands between 1946-1958. Entire islands were vaporized as a result of the detonation of the nuclear weapon, and hundreds of people were exiled from their traditional homes (Rust, 2019). Also, a dozen biological tests were conducted resulting in the dumping of 130 tons of soil from an irradiated Nevada testing site. An attempt was made to clean up radioactive debris into the dome, commonly referred to as "the Tomb" by the local population. However, the structure is running a risk of collapsing due to rising seas and subject to the climate change effects.

Many Indigenous Peoples of Pacific regions were greatly affected by nuclear weaponry testing. The Castle Bravo nuclear detonation resulted in devastating results for the local population who resided 100 miles. Hours after the explosion resulted in contamination of the surrounding area, wind and radioactive ash resulted in acute radiation poisoning (Rust, 2019).

Effects were similar to Chernobyl resulting in burned skin and vomiting. Between 1948 and 1958 the United States detonated 43 nuclear bombs, after 1958 islands and atolls were used as biological weaponry testing grounds. Radioactively contaminated soil, including 130 tons from the Nevada Testing site was transported into the existing nuclear detonation crater and covered with concrete. Today, the structure is covered by cracks in concrete and susceptible to the various weather effects. Structure itself potentially leaks radioactive material into the ocean and causes serious environmental and health concerns to the surrounding area.

Although nuclear biological testing has stopped, consequences of the nuclear contamination are prominent up to this day. The cumulative radioactive yield of more than 7,000 Hiroshima bombs has caused elevated incidents of thyroid disorders and affected at least 1,500 Marshallese who were alive during testing. The largest 15-megaton hydrogen bomb ever detonated by the United States at Bikini Atoll. The explosion created a fire mushroom cloud 13 times as high as Mt. Baldy (Raj, 2019). The explosion resulted in ash falling from the sky, causing vomiting and skin burns as a result of radiation poisoning. Due to nuclear weaponry testing many developed various forms of cancer. What these authors highlight is not only the extent of radioactive impacts but that safety information is critical for those communities who live nearby.

### **Community Health, Social Impacts and Experience of Affected Populations (info retrieved from the text) (e)**

One of the very important aspects of this research is community health and the social impacts of radiation on affected populations. Even though mining is commonly associated with greater income earning, it often causes income disparity and involves the development of various forms of social inequality. Mining wages are high to the majority of the population, combined with limited job availability, industry, aside from environmental distraction, contributes towards

inequality. More specifically Kueyk (2019) noticed the inequality among the most vulnerable groups of the population; women, youth, First Nations and immigrants. As a whole, mining development projects drastically alter infrastructure around the settlement or community that is held hostage at the mercy of the mining worldwide supply and demand.

One of the uranium mining-affected communities is the Dene First Nation, the community that was a subject of uranium mining interests for over 60 years. Important to note that the Dene community is considered to be a village of widows as a result of international uranium mining development interests that once and for all affected the lives of community residents (Kuyek, 2019).

*“We now have a village of widows...Dene in the village no longer have grandfathers to pass down the spiritual practices, no uncles to slap their wrists when they do something wrong.”*

Kuyek, J. (2019)

Uranium mining resulted in contamination of the surrounding environment, land and water, and caused a higher than normal cancer development rate. L. Rekmans (2003) shared that for many years’ community residents of the Serpent River First Nation experienced devastating effects of uranium mining. More specifically twelve operational uranium mines north of the reserve, operation of which also contaminated lands and waters, including drinking water, hunting and trapping grounds once and forever altering traditional lifestyle. Community members were “deprived of the basic means of protection including water treatment” (Rekmans, L., in Hankard, 2003 pp. 31, 41). Uranium mining and mining, in general, have created a negative impact on the traditional lifestyle of community members; culture, identity, self-esteem, nearly every aspect of community lifestyle has been negatively affected. No compensation could quantify the above-listed alteration, and most importantly human health.



*“We drank most of that water because...actually, before the mines, came you could look right down that water, the sand looked like jewels down there. But now, a couple years later, that sand grain is scum.”* (Rekmans, L., in Hankard, pp.41, 2003)

Contamination of land and water resulted in the inability to hunt, fish, trapping, berry picking and drinking water itself.

While nuclear power plants provide great benefits in terms of efficient energy generation, the process itself could cause serious danger. Various historical examples as posited by Gray (2019) should be taken into account to learn, prevent and protect various communities from similar instances of radioactive exposure. As an example of the devastating radioactive exposure-outcome, the Chernobyl nuclear accident is taken into account. I was born shortly after the initial radioactive outbreak, only 90 kilometers away from the city with a population of 2,4 million people. As a result of the radioactive outbreak the death rate of liquidators increased from 3.5 to 17.5 deaths per 1,000 people between 1988 and 2012. In 1988 68% of people were considered healthy, while 26 years later only 5.5% remained healthy (Gray, 2019). Many have developed various forms of disability, and radiation exposure-related illnesses. The outcome of the tragedy forced public authorities to relocate the entire Chernobyl population. The mortality rate in the radioactively contaminated area is higher than the national Ukrainian average.

Peoples of the Marshall Islands have experienced devastating effects of the nuclear radioactive contamination of traditional lands and waters as a result of the nuclear weaponry testing. The Castle Bravo project resulted in radioactive contamination of people's homes, water and skin was affected (Rust, 2019). Some islanders experienced acute radioactive poisoning and were forced to evacuate days later from their homes. Various weaponry testing including nuclear and bioweapons affected the lives of the people who resided there before colonization arrived. In 1972, after 26 years, leaders of Enewetak were invited to see the atoll since 1946. A Department

of Energy report highlighted that leaders “were deeply gratified to be able to visit their ancestral homeland, but they were mortified by what they saw.” (Rust, 2019). Their ancestral home, islands were completely deforested, apocalyptic scenes combined with crumbling buildings and military structures. Nuclear tests conducted have impacted human health, resulting in the development of thyroid cancer, often with damage to vocal cords (Raj, 2019). Many Marshallese traditional musicians and singers could not continue their legacy as a result of developing thyroid cancer.

*“Sometimes I wonder why all the people in the U.S. are not aware of what their government has done to these tiny islands.”*

— Justina Langidrik, 67, musician

Sadly, the intergenerational social, health, cultural and economic impact on communities from radioactive pollution is devastating and hopefully this thesis serves as a reminder about such dangers.

### **Historical Injustice (h)**

Throughout the research, I found that communities often find themselves at a disadvantage when it comes to the interest of large corporations. It is often that during the operation phase of the mine, communities experience major power imbalance. Communities are often unable to resist mine expansion, resist company water taking, reduce pollution and improve safety (Kueyek, 2019). An additional concern is the availability of the information, information that is often not included in the public records due to corporate interests. When the company completes its operation, work and salaries disappear, evidently crippling existing infrastructure primarily designed to support demand. Further, communities are left with an increased tax burden and oversized infrastructure. In many cases, First Nation peoples have been excluded from the conversation about energy creation and utilization and consequently suffered from both a lack of

access to energy and from the impacts of energy developments on their traditional lands (Graetz, 2015). This in turn placed certain communities in economically unfair circumstances and affected control of the traditional lands.

Additionally, communities often experience denial of traditional culture and knowledge, which in turn affect community wellbeing. Partially this could be addressed by the tendency to keep a distance between scientific research methods and traditional beliefs. As a result, clear division could be noted in terms of the visualization of collective benefit when it comes to the combined action of traditional Indigenous worldviews and western science. In Two-Eyed Seeing, Elder Albert Marshall perfectly addresses the collective benefits of bringing together different ways of thinking for the collective benefit, striving for the wellbeing of everyone.

*“Two-Eyed Seeing is hard to convey to academics as it does not fit into any particular subject area or discipline. Rather, it is about life: what you do, what kind of responsibilities you have, how you should live while on Earth”* (Marshall, 2004)

The guiding principle of this approach is oriented to protect mother nature, a way of living in relation to mother nature. Two-Eyed Seeing is an important principle founded on a co-learning Integrative Science journey.

In contrast, the considerable exclusion could be noted when it comes to the western scientific approaches; approaches that are often oriented to exclude other forms of scientific knowledge and research methods. It is simply set by the specific industry prescribed standard often neglecting alternative ways of thinking. Kovach further describes the set in the standard model of thinking, progressively describing the western research approach:

*“The holistic nature of Indigenous science often creates a chasm between it and the beliefs held by Western science...Sacred knowledge is not really accepted in Western research, often than in a peripheral, anthropological, exotic kind of way.”* (Kovach, 2010, p.39).

Wilson (2008) found that considerable obstacles exist to the so-called mainstream, dominant culture. Dominant European descendant, Eurocentric, Christian, heterosexist, male-dominated

culture often designed to exclude those who do not “fit it” in the stereotypes of powerful majority (Wilson, 2008, p.35). As a result of the above-described tendencies, an entire culture, traditions, identities and affected groups of the population are being affected due to oppressing tendencies of exclusion.

One example of this type of injustice affecting an entire nation was the Canadian Residential school system, oriented to deprive Indigenous people of their identity, culture, traditions and much more. These schools were established by the federal government to assimilate Native peoples into the Western culture by the implementation of the Indian Act designed to remove traditional beliefs and values (Nabigon & Yerxa, 2006). The policy was designed to remove Indigenous identity creating a devastating impact on communities and continues through intergenerational trauma noticed up to the current day. Children were not permitted to speak their Native language, practice traditions and even their names were replaced with numbers to completely erase Indigenous identity (Nabigon & Yerxa, 2006).

Historically, peoples of the Serpent River First Nation suffered through the effects of uranium mining, consequences of which had led to loss of community sustainability. Traditional lifestyle was altered due to the effects of the above-described industry. The community “lost their mineral rights as a result of the unilateral government decision” (Rekmans, L., in Hankard, 2003, pp. 10). Also, throughout the year’s this community was very concerned about the twelve uranium mines operating north of the reserve. Continuous mining operations have resulted in waterways pollution flowing past the reserve water shore.

It is important to visualize the importance of clean drinking water to community wellbeing. Fresh, uncontaminated water supply is crucial not only for the people, but for the wild habitat. Hunting, fishing, trapping and much more become unsafe as a result of the contaminated

waterways. Conclusively, the community becomes deprived of the traditional way of living and becomes suspected of the dangerous radioactive effects because of the radioactive contamination.

*“Good clear drinking water and fish habitat, wildlife, and plants have been destroyed for the benefit of few people.”* Rekmans, L., in Hankard. (2003, p.10).

The historical results have created a devastating outcome of contamination of the surrounding environment, affecting the traditional way of living established for many generations before colonization arrived. Historically Indigenous people were aware of the dangers associated with uranium, including locations.

*“The stories are that when the mine prospectors came looking for uranium, they would hire Indian guides. The stories were that Indians could smell the uranium and they would never hang out where it was.”* Rekmans, L., in Hankard. (2003, p.67)

When it comes to uranium development, certain communities have not been aware of the risks associated with uranium mining. In many cases, the nuclear industry unequally affects Indigenous peoples, nations, lands and waters (Health, 2020). In the cases where communities agreed to host mine development, scientific and government officials knew about health-associated hazards. Often community members participated in the hazardous project's development, companies willingly put miners at risk without the use of the proper protective equipment, some miners were unethically treated as test subjects, with radiation exposure affecting their families and leading to health damage and the development of various forms of cancer (Fouse, 2020). Uranium mining affected entire generations of community members, miners and their family members experiencing unjust actions the consequences of which are relevant even today.

Peoples of the Pacific Islands experienced devastating effects of nuclear weaponry testing with many losing their homes as a result of the radioactive contamination. Upon cleaning up procedure a giant nuclear dome was left behind that was filled with radioactively contaminated soil, some of which was reportedly brought from the Nevada testing site (Rust, 2019). It is important to note that officials of the Marshall Islands lobbied the United States government for help to clean up the structure, but received the answer that the dome is the responsibility of the Marshall Islands because it is located on their land. As a result of this unfair tendency, peoples of the Pacific Regions are subject to constant health risks due to the structure's aging, rigidity and weather effects. Historically, peoples of the Pacific Islands experienced various forms of historical injustice in turn placing the entire population in a precarious and vulnerable position. Many have suffered greatly as a result of the radioactive contamination, such leading to the development of various forms of cancer and thyroid disorders (Raj, 2019). Loss of cultural inheritance, traditional ways of living and radioactive contamination is an unfair historical circumstance that peoples of Pacific Regions constantly face.

A literature text analysis points out the devastating tendency associated with radioactive contamination of Indigenous lands and waterways throughout fairly recent history. Unjust actions have impacted communities on many levels, burdening Indigenous Nations with health-threatening circumstances and affecting traditional harmony established by the wisdom of the past generations.

### **Contamination of the Surrounding Environment (c)**

The impacts of contamination are discussed in this piece. Indigenous communities have been greatly impacted by the contamination of the surrounding environment, with many affected on different levels. Communities continue to face the consequences of unjust actions. Indigenous

lands frequently chosen for the waste storage sites often breaking treaties, at times willingly allowed by the consent of community as a result of the “systemic inequalities”; in the US alone twice as many Native families live below the poverty line with limited options for generating income (Physicians For Social Responsibility, 2022). Some economic incentives offered by the nuclear companies proposed to store nuclear waste on Indigenous lands, commonly described as “economic incentives”. Indigenous peoples have a strong, historical relationship with the surrounding environment, in turn making them more vulnerable when it comes to contamination of the surrounding environment as a result of uranium mining (Fouse, 2020). Many communities directly rely on the surrounding ecosystem for their drinking water, hunting and more as a part of their traditional way of living. Despite various laws oriented towards nature conservation, mining and its supporting infrastructure created a significant impact on mother nature.

Tailings cause serious concern when it comes to contamination of the land, air, waterways, birds and animals. Despite reclamation and re-greening mines and mining waste rapidly expanding (Kuyek, 2019). Mining creates a large amount of waste, after the process of ore extraction low grade processed waste rock is deposited with various chemicals being deposited into the tailings. Commonly found minerals found in tailings include arsenic, barite, fluorite, radioactive materials, mercury, pyrites/sulphate compounds, cadmium, and hydrocarbons. Tailings tend to generate acid and require a large amount of water to cover the surface. Tailing structure could seep and fail, resulting in catastrophic consequences (Kuyek, 2019). Therefore, Kuyek (2019) and Health (2020) caution that careful maintenance is crucial when it comes to existing structures. Heavy rain could cause a dam to fail, severe weather effects have been a constant concern of the communities residing close to the uranium tailings.

Further, Health (2020) asserts that water contamination is a dangerous, negative externality when it comes to uranium mining, some of the combinations include uranium, arsenic, copper, lead, molybdenum, selenium, sulphate, thorium, vanadium and radium. As an outcome, communities are stuck dealing with the consequences of uranium mining and contamination, in many cases even after companies relocated resource extraction elsewhere. Even the process of exploration could cause contamination of the surrounding environment and drinking water. Developing infrastructure and drilling thousands of exploration holes, especially if not sealed could lead to contamination of the water (Health, 2020). Aside from irreversible environmental damage, the process of uranium mining creates health-threatening circumstances for current and future generations to come.

Many Indigenous communities experience devastating consequences of uranium mining. One of the communities affected by the uranium mining industry is the Dene first nation, members of which were unknowingly exposed to radioactivity. Studies conducted show that mining had an effect on the water quality, and elevated metal levels in the soil of the site (Kuyek, 2019). Another community affected by uranium mining is Serpent River First Nation, located near seven huge earthen dams, “containing 200 million tons of uranium tailings” (Rekmans, L., in Hankard, 2003, pp.16). Waterways and the surrounding environment were contaminated because of industrial development. Next, approximately 520 abandoned uranium mines exist at Navajo Territory, while only in 2019 they have been funded for remediation (Fouse, 2020). Important to note, open access uranium mining sites contain hidden dangers in terms of radioactive contamination of the surrounding environment as well as may cause serious risks for human health, including children accessing unsupervised radioactive zones and waterways pollution. Radioactive poisoning of the surrounding environment is a subject of serious concern



by many of the authors I reviewed, when it comes to the danger to the surrounding environment, health concerns, and loss of the natural habitat.

History is filled with examples of a similar matter, some as a result of the different causes, incidents at the power plant, nuclear weaponry testing, uranium mining and more. Unfortunately, the outcome is radioactive contamination, often irreversible damage consequences of which require more than one lifetime to resolve. One of the famous historical examples is the Chernobyl nuclear incident, a catastrophe that resulted in the relocation of entire urban centers due to the dangerous conditions to human health as a result of radiation. Nearly 4,000sq kilometers became uninhabited, turned into an exclusion zone due to the Chernobyl incident; 150,000sq kilometers was considered to be contaminated (Gray, 2019). While the Chernobyl accident was unintentional, contamination of Pacific Islands and waters was a direct result of the nuclear weaponry testing.

Nuclear weaponry testing resulted in contamination and vaporization of certain Pacific Islands, creating numerous craters and forcing the local population to leave their home (Rust, 2019). The devastating consequences of the human-made radioactive fallout are relevant even today. Up to the current time, some lands remain unlivable due to radioactive contamination, with some areas doubling the safe radioactively allowable health and safety standard (Physicians For Social Responsibility, 2022). Additionally, numerous tests of nuclear and biological weaponry were conducted, erasing landscape from the earth, depriving peoples of Pacific Islands and waters of a traditional way of living. Despite these authors raising awareness of hazardous living conditions, the fact still remains. Unsafe radioactive pollution has created impossible circumstances for many generations who live nearby.

### **Impact on Traditional Lifestyle (i)**

This particular finding highlights how through historical injustice, communities experienced a series of negative events that impacted their traditional lifestyle. One of the commonly binding outcomes of radioactive contamination has resulted in an outcome that has altered the traditional lifestyle of Indigenous peoples. In the case of Délı̨ne First Nation community members was a part of the national interest of uranium mining. For more than 60 years Dene people experienced injustice as a result of the mining industry, an industry that impacted community health, lands, waters and lives of its residents (Kuyek, 2019).

*“Domestic life, the very intimacy of our home...was also retroactively contaminated”*

Residents of the Serpent River First nation throughout the years experienced “destruction and degradation of hunting, fishing, and gathering areas”. This disrupted their traditional lifestyle. The community witnessed the destruction of the surrounding environment used as traditional hunting and fishing grounds. Surrounding lakes were used as dumping grounds of radioactive waste (Rekmans, L., in Hankard, 2003). Uranium mining industry damages destroyed sacred sites, petroglyphs and ancestors' unmarked burial sites, and contaminated their drinking water (Health, 2020). Through data analysis, I found that because of the uranium mining industry, living in traditional homelands has a direct consequence on health due to various health-threatening mining externalities, as well as the impact on the traditional lifestyle.

Nuclear weaponry testing at Pacific Islands made a devastating impact on the traditional lifestyle of Indigenous peoples. Many were forced to relocate from their ancestral homes and waters, all as a result of the radioactive contamination, many experienced radiation poisoning and various forms of cancer (Rust, 2019). Once the nuclear and biological testing was over, entire islands were erased from the face of the earth, some with little to no vegetation, there was

no home to return to. In addition to all injustice that peoples of the Pacific Islands and waters experienced, nuclear testing made an impact on the storytelling passed from generation to generation (Raj, 2019). The following quote by Raj (2019) is an apt way to highlight the disruption on traditions and lifestyles by radioactive waste and pollution.

*“For centuries, the people of the Marshall Islands have told their history through song. They sang of unrequited love, sea voyages, marine life, faith, family legends... Abon, a stout man of 40 with a bristly beard and toothless smile, is one of at least a dozen prominent Marshallese musicians with voices damaged by thyroid disorders — a type of illness that increased in the Marshall Islands after residents were exposed to fallout from U.S. nuclear weapons testing.”*  
Raj, 2019

Nabigon and Yerxa (2006) remind us that Indigenous teachings provide guidance when it comes to coexistence with nature and other human beings peacefully and respectfully. The guidance and worldviews of the Indigenous Nations must be a source of inspiration and knowledge to help guide humanity to a better future.

In summary, each of the findings keep pointing to a central theme, that is the systematic injustice experienced by Indigenous communities all around the world because of the nuclear industry. Further, utilizing a discourse analysis research method for analyzing relevant texts of existing radioactive danger, helped me to identify key findings to describe the experiences and the living conditions of Indigenous First Nations as a result of radioactive contamination. The key findings call to attention instances of historical injustice addressing the devastating impact on Indigenous cultures, traditional lifestyles, community health, historical injustice, and contamination of the surrounding environment as a result of radioactive contamination.

## **Conclusion**

Throughout the research process, I was shocked to find out the devastating impact of the nuclear industry on Indigenous peoples. In many cases culture, traditional lifestyle, environment, and the health of the community were directly impacted due to various sectors of the nuclear industry

and it is radioactive contamination. I also found that careful consideration and implementation of Indigenous worldviews, traditions and practices is an important cornerstone when it comes to empowering communities and examination of current ways of approaching the nuclear industry. Understanding instances of historical injustice are critical when it comes to the consideration and careful planning of the present and future.

Taking into account my own background, I have concluded that despite the Chernobyl tragedy having devastating consequences on the population, surrounding countries and regions of Ukraine, Chernobyl was different. Different because, despite delayed government response, everyone was able to relocate from the contaminated land and in some way or form received recognition for what has been done. Many of the Indigenous peoples who live near the radioactively contaminated lands and waters could not leave their ancestral homes. Many instances of radioactive contamination or unjust actions are not recognized by the officials despite past and present attempts “of making things right”.

I found that careful planning and consideration of the past injustice is an important step towards building a better present future. Our actions today will impact many generations in the future. Future generations will judge our history, our actions, justices and injustices. The wisdom of the Indigenous cultures is directly intertwined with the surrounding environment as part of identity based on the teaching of the past, intended for a better future and wellbeing of the present. Indigenous research contributes towards a better, just future founded with the contemplation of generational wisdom, as part of the universal interconnection, obeisance, and protection.

## Research Limitations

When it comes to research, certain limitations exist for the non-Indigenous researcher when carrying out research that has a focus on Indigenous issues. To my understanding, challenges exist in terms of understanding as well as visualizing obstacles that Indigenous people face on a daily basis. So comprehending various levels of complexities when it comes to racism and the impacts of colonization was a crucial part of my learning, hence I chose this particular program the Master of Indigenous Relations to do my studies. Depending on the geographical location, Indigenous peoples experience different levels of institutionalized racism, cultural, racial discrimination, and prejudice. Although I did not conduct interviews, I was always mindful to use Indigenous guidelines to assist me with my research approach and the discourse analysis. In my master's program, I came to learn about why it was important to ensure that I sought the guidance and mentorship of an Indigenous expert. Although most of my research centers around literature and relevant sources, I was able to learn from Dr. Mike Hankard, Traditional Knowledge Keeper, who also became my committee member. I am grateful for his wisdom, networks and mentorship. An additional concern in terms of being an outsider, is helping others know who I am, and what I value in terms of my research thoughts, practices and values. I believe that situating-self is a key perspective that assists with researcher accountability.

Another considerable obstacle that existed was due to the COVID 19 pandemic which in the past and up to the current time has affected the availability of certain sources. I had originally intended to interview key sources, but in the first few months of the pandemic, lockdown and the importance of not spreading the virus to vulnerable communities, led me to the decision to use a discourse analysis route instead. Also during lockdown, major complications took place as a result of the inability to physically access archives, databases and library resources. Even though

in some cases online databases exist as an alternative, access to certain journals and publications was strictly limited in my university network. For example, the inability to access the “racer” library inter-loan borrowing system, that in turn further limited the availability of certain sources. In general, the Covid pandemic in my opinion slowed down and complicated my academic processes.

When it comes to my lifetime journey, my family immigrated to Canada from Ukraine in 2005. Since my arrival in Canada, I have had a challenging time adapting to this country’s diverse array of cultures and customs. As an immigrant, my primary struggle consisted of understanding the language, and integration into a postsecondary institution system that had a considerable number of hidden and visible barriers, barriers that purposely at times excluded certain groups of people including me. Based on my personal experiences, I believe that visualization and understanding of the multilayered inequalities is one of the key objectives when it comes to positive research.

The war in Ukraine also made a considerable impact on the progress of this work. More specifically, it was and still is, difficult to comprehend everything that happened. I was very worried for my relatives and their safety because of the war. I am very grateful for everyone's support in this matter and hope that this conflict will be resolved as soon as possible.

## References:

- Atomic Heritage Foundation. (2017). Atomic Heritage Foundation, Castle Bravo. <https://www.atomicheritage.org/history/castle-bravo>
- Atomic Heritage Foundation. (n.d.). *Marshall Islands*. Atomic Heritage Foundation. <https://www.atomicheritage.org/location/marshall-islands>
- Anderson, S. W., Christensen, K., & Lamanna, J. (2018). The development of natural resources in outer space. *Journal of Energy & Natural Resources Law*, 37(2), 227–258. doi: 10.1080/02646811.2018.1507343
- Belanger, Y. D. (2018). *Ways of Knowing: An Introduction to Native Studies in Canada*. Toronto, Ontario: Nelson Education.
- Bui, V. (2022). *Radioactive Waste and indigenous consent*. The Council of Canadians. <https://canadians.org/analysis/radioactive-waste-and-indigenous-consent/>
- Belfer, E., Ford, J. D., & Maillet, M. (2017). *Representation of Indigenous peoples in climate change reporting*. *Climatic Change*, 145(1-2), 57–70. doi: 10.1007/s10584-017-2076-z
- Bird, G. (2020). Film Premiere: *A Moral Awakening*. from <https://moralawakening.ca/>
- Bendix, A. (2019). *A 'tomb' in the Marshall Islands contains enough radioactive waste to fill 35 Olympic-sized pools. it's starting to crack*. Business Insider. Retrieved from <https://www.businessinsider.com/marshall-islands-nuclear-dome-radioactive-waste-11>
- BHRRC. (2020). Australia: Rio Tinto mining blast destroys ancient Aboriginal sacred site. <https://www.business-humanrights.org/en/australia-rio-tinto-mining-blast-destroys-ancient-aboriginal-sacred-site>
- CNSC. (2019). Nuclear power plants. <https://www.cnsccsn.gc.ca/eng/reactors/power-plants/index.cfm>
- Canada-Déline Uranium Table – Final Report. (2005). <https://assembly.nu.ca/library/Edocs/2005/001195-e.pdf>
- CNSC. (2019). Uranium mines and mills waste. <http://nuclearsafety.gc.ca/eng/waste/uranium-mines-and-millswaste/index.cfm>
- Corntassel, J. (2012). Re-envisioning resurgence: Indigenous pathways to decolonization and sustainable self-determination. *Decolonization: Indigeneity, Education & Society*. 1.

- CBS News. (2019). Nuclear "coffin" may be leaking radioactive material into Pacific Ocean, U.N. chief says. <https://www.cbsnews.com/news/enwetak-atoll-dome-un-antonio-guterres-concerns-marshall-islands-structure-leaking-radioactive-material-pacific/>
- Chillymanjaro. (2012). Leaked report raised fears of radioactive tsunami if Mururoa Atoll in French Polynesia collapses. <https://watchers.news/2012/08/19/leaked-report-raised-fears-of-radioactive-tsunami-if-mururoa-atoll-in-french-polynesia-collapses/>
- Fouse, S. (2020). *An Ongoing Battle: Fighting the Impacts of Uranium Mining in Southwestern Indigenous Communities*. An Ongoing Battle: Fighting the Impacts of Uranium Mining in Southwestern Indigenous Communities | Environmental Law Institute. <https://www.eli.org/vibrant-environment-blog/ongoing-battle-fighting-impacts-uranium-mining-southwestern-indigenous-communities>.
- Foster, J. B. (1999). *The vulnerable planet: a short economic history of the environment*. New York: Monthly Review Press.
- Uniting Three Fires Against Violence. (2020). The Seven Grandfathers Teachings <https://unitingthreefiresagainstviolence.org/the-7-grandfathers-teachin/>
- University of Texas at Austin. (2021). *Figure 31. Radiation Hotspots Resulting from the Chernobyl Nuclear Power Plant Accident*. Belarus maps - Perry-Castañeda Map Collection - UT Library Online. Retrieved from [https://maps.lib.utexas.edu/maps/commonwealth/chornobyl\\_radiation96.jpg](https://maps.lib.utexas.edu/maps/commonwealth/chornobyl_radiation96.jpg)
- Kovach, M. (2010). *Indigenous Methodologies: Characteristics, Conversations and Contexts*. Toronto: University of Toronto Press.
- Kuyek, J. (2019). *Unearthing Justice*. Between the Lines.
- Heath, J. (2020). *The Violence of Nuclear Energy Against Indigenous Peoples, Land, Water and Air*. Atlantic Chapter. <https://atlantic2.sierraclub.org/content/violence-nuclear-energy-against-indigenous-peoples-land-water-and-air>.
- Henderson, J. Y. (2008). *Indigenous Diplomacy and the Rights of Peoples: Achieving Un Recognition*. Saskatoon: Purich Pub.
- Nabigon, H., & Yerxa, L. (2006). *The Hollow Tree: Fighting Addiction with Native Healing*. Montreal, Quebec: McGill-Queen's University Press.
- NLM. (2017). Uranium Tailing: Your Environment, Your Health | National Library of Medicine. <https://toxtown.nlm.nih.gov/sources-of-exposure/uranium-tailings>
- Nuclear Safety Commission. (2018). *Health Effects of the Chernobyl Accident*. <https://nuclearsafety.gc.ca/eng/resources/health/health-effects-chernobyl-accident.cfm>



- Nottawaseppi Huron Band of the Potawatomi, (NHBP). (2022). *Seven Grandfather Teachings*. <https://www.nhbpi.org/seven-grandfather-teachings/>
- Perkel, C. (2020). Indigenous community votes down proposed nuclear waste bunker near Lake Huron. <https://www.ctvnews.ca/canada/indigenous-community-votes-down-proposed-nuclear-waste-bunker-near-lake-huron-1.4793412>
- Tsosie, R. (2015). Indigenous peoples and the ethics of remediation: redressing the legacy of radioactive contamination for native peoples and native lands. *Santa Clara Journal of International Law*, 13(1), 203-272.
- Martin, D. H. (2012). Two-eyed seeing: a framework for understanding Indigenous and non-Indigenous approaches to Indigenous health research. *The Canadian Journal of Nursing Research = Revue Canadienne De Recherche En Sciences Infirmières*, 44(2), 20–42. [https://www.researchgate.net/publication/230677133\\_Two-eyed\\_seeing\\_a\\_framework\\_for\\_understanding\\_Indigenous\\_and\\_non-Indigenous\\_approaches\\_to\\_Indigenous\\_health\\_research](https://www.researchgate.net/publication/230677133_Two-eyed_seeing_a_framework_for_understanding_Indigenous_and_non-Indigenous_approaches_to_Indigenous_health_research).
- Mindat (2020). *Mindat.org and the Hudson Institute of Mineralogy* <https://www.mindat.org/loc-171349.html>
- Mellor, R. (2016). Wildly Nuclear: Elliot Lake and Canada's Nuclear Legacy. <https://niche-canada.org/2016/06/15/wildly-nuclear-elliott-lake-and-canadas-nuclear-legacy/>
- Mining Act, R.S.O. 1990, c. M.14. (2020). <https://www.ontario.ca/laws/statute/90m14>
- Ontario Geological Survey - Ontario Ministry of Energy, N. (2020). Mineral Deposit Inventory for Ontario. <http://www.geologyontario.mndmf.gov.on.ca/mndmfiles/mdi/data/records/MDI41J02NE00003.html>
- Government of Canada; Crown-Indigenous Relations and Northern Affairs Canada. (2017). *Port Radium*. Government of Canada; Crown-Indigenous Relations and Northern Affairs Canada. <https://www.rcaanc-cirnac.gc.ca/eng/1445630103716/1618401563211>
- Gray, R. (2019). The true toll of the Chernobyl disaster. <https://www.bbc.com/future/article/20190725-will-we-ever-know-chernobyls-true-death-toll>
- Graetz, G. (2015). Energy for whom? Uranium mining, Indigenous people, and navigating risk and rights in Australia. *Energy Research & Social Science*, 8, 113–126. <https://doi.org/10.1016/j.erss.2015.05.006>
- Göcke, K. (2014). Indigenous peoples in the nuclear age: Uranium Mining on Indigenous' Lands. *Nuclear Non-Proliferation in International Law - Volume I*, 199–223. [https://doi.org/10.1007/978-94-6265-020-6\\_8](https://doi.org/10.1007/978-94-6265-020-6_8)

- Geggel, L. (2019). The Marshall Islands Are 10 Times More 'Radioactive' Than Chernobyl. <https://www.livescience.com/65949-marshall-islands-more-radioactivity-chernobyl.html>
- Government of Canada; Aboriginal Affairs and Northern Development Canada. (2017). Port Radium. <https://www.aadnc-aandc.gc.ca/eng/1445630103716/1445630134250>
- Myers-El, N. T. (2008). *The Unknown Lore of Amexem's Indigenous People: An Aboriginal treatise*. Bloomington, IN: AuthorHouse.
- Marshall, A. (2004). Two-Eyed Seeing. <http://www.integrativescience.ca/Principles/TwoEyedSeeing/>
- Smith, L. T. (2008). *Decolonizing methodologies: research and indigenous peoples*. Zed Books
- Swenson, K. (2019). Dome covering nuclear waste in Marshall Islands is beginning to crack, UN warns. <https://www.independent.co.uk/news/world/australasia/us-nuclear-waste-marshall-islands-dome-climate-change-antonio-guterres-a8923186.html>
- Simonds, V. W., & Christopher, S. (2013). Adapting Western research methods to Indigenous ways of knowing. *American journal of public health*, 103(12), 2185–2192. <https://doi.org/10.2105/AJPH.2012.301157>
- Sinclair, R. (2004). Aboriginal Social Work Education in Canada: Decolonizing Pedagogy for the Seventh Generation. *First Peoples Child & Family Review*, 1(1), 49-62. <https://fpcfr.com/index.php/FPCFR/article/view/10>
- Schneider, F. (2013). *How to Do a Discourse Analysis*. *PoliticsEastAsia.com*. <http://www.politicseastasia.com/studying/how-to-do-a-discourse-analysis/>.
- Russell, A. (2019). UN chief warns nuclear 'coffin' may be leaking radioactive material into Pacific Ocean. <https://globalnews.ca/news/5297512/un-chief-warns-nuclear-coffin-may-be-leaking-radioactive-material-pacific-ocean/>
- Raj, A. (2019). In Marshall Islands, radiation threatens tradition of handing down stories by song. <https://www.latimes.com/projects/marshall-islands-radiation-effects-cancer/>
- Rust, S. (2019). How the U.S. betrayed the Marshall Islands, kindling the next nuclear disaster. <https://www.latimes.com/projects/marshall-islands-nuclear-testing-sea-level-rise/>
- Reid, A. J., Eckert, L. E., Lane, J. F., Young, N., Hinch, S. G., Darimont, C. T., Cooke, S. J., Ban, N. C., & Marshall, A. (2020). “Two-eyed seeing”: An indigenous framework to transform Fisheries Research and Management. *Fish and Fisheries*, 22(2), 243–261. <https://doi.org/10.1111/faf.12516>

- Hankard, M. (2019). *The clean place: Honoring Indigenous spiritual roots of Turtle Island*. Vernon, British Columbia: JCharlton Publishing.
- Hatcher, A., Bartlett, C., Marshall, A., & Marshall, M. (2009). Two-eyed seeing in the classroom environment: Concepts, approaches, and challenges. *Canadian Journal of Science, Mathematics and Technology Education*, 9(3), 141–153.  
<https://doi.org/10.1080/14926150903118342>
- Lanese, N. (2019). The Real Chernobyl: Q&A with a Radiation Exposure Expert.  
<https://www.ucsf.edu/news/2019/07/414976/real-chernobyl-qa-radiation-exposure-expert>
- Rekmans, L., in Hankard (2003). *This is my homeland stories of the effects of nuclear industries by people of the Serpent River First Nation and the north shore of Lake Huron*. Cutler, Ont: Serpent River First Nation.
- PHYS.ORG. (2019). UN chief concerned nuclear 'coffin' leaking in Pacific.  
<https://phys.org/news/2019-05-chief-nuclear-coffin-leaking-pacific.html>
- PSR. (2022). *The Unequal Impacts of Nuclear Weapons*. Physicians for Social Responsibility | PSR. <http://www.oregonpsr.org>.
- Johnston, B. (2008). *Ojibway Heritage*. Toronto: Emblem, McClelland & Stewart.
- Jorgenson, A. (2018). Grandfathers' Teachings. *Consensus*, 39(1), 15.
- Plochy, S. (2018). The Chernobyl Cover-Up: How Officials Botched Evacuating an Irradiated City. <https://www.history.com/news/chernobyl-disaster-coverup>
- ITER. (2020). The Way to New Energy. <https://www.iter.org/>
- Intercontinental Cry. (2008). *Another uranium conflict brews in Ontario*.  
<https://intercontinentalcry.org/another-uranium-conflict-brews-in-ontario/>
- Isacson, M. (Director). (1990). *Uranium* [Motion picture on <https://www.nfb.ca/film/uranium/>]. Montreal: NFB.
- IEER. (2011). Uranium: Its Uses and Hazards. <https://ieer.org/resource/factsheets/uranium-its-uses-and-hazards/>
- Verbos, A. K., & Humphries, M. (2013). A Native American relational ethic: An indigenous perspective on teaching human responsibility. *Journal of Business Ethics*, 123(1), 1–9.  
<https://doi.org/10.1007/s10551-013-1790-3>
- White Face, C., Wobaga, Z. (2013). *Indigenous Nations Rights in the Balance: An Analysis of the Declaration on the Rights of Indigenous Peoples*. Canada: Living Justice Press.

Wilson, S. (2008). *Research is Ceremony: Indigenous Research Methods*. Black Point, N.S.: Fernwood Pub.

WNA. (2020). *World Nuclear Association*. Nuclear Power in the World Today. <https://www.world-nuclear.org/information-library/current-and-future-generation/nuclear-power-in-the-world-today.aspx>

WNA. (2020). *World Nuclear Association*. Storage and Disposal of Radioactive Waste. <https://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-waste/storage-and-disposal-of-radioactive-waste.aspx>

## Appendices

### Appendix A: Bibliography of Supporting Resources

Belfer, E., Ford, J. D., & Maillet, M. (2017). *Representation of Indigenous peoples in climate change reporting*. *Climatic Change*, 145(1-2), 57–70. doi: 10.1007/s10584-017-2076-z

Article on Representation of Indigenous peoples in climate change focuses on highlighting the issues of climate change that otherwise, generally not addressed in relation to Indigenous world views. A complex connection exists between Indigenous people and nature that often is not being taken into account when it comes to the climate change discussion. The article examines eight newspapers in Canada, the United States, Australia, and New Zealand. Time frame stretches from 1995 to 2015, taking into consideration content analysis and framing. As further discussed in the article, generally, there is a lack of substantive discussion of colonialism, marginalization when it comes to the review of the stories, historical marginalization of Indigenous peoples. Cultural impact is often omitted when it comes to the climate change discussion, consequently omitting certain needs of the Indigenous peoples who reside in the affected lands. As further discussed in the article, traditionally, Indigenous people were forced to take less desired lands, many of which under the direct influence of climate change.

As discussed further, traditional knowledge is widely discussed and acknowledged by the western world; however, as the means of conformation of scientific knowledge is rarely taken into account. Further discussion highlights the idea of the significance of climate change in indigenous people's context and active denial or involvement of the subject from the mainstream media. I believe that this article is an important piece in terms of my personal belief towards Indigenous climate views, the relevance of the climate change and diminished effects of the devastating citation occurred as a result of the human-caused activity.

Anderson, S. W., Christensen, K., & Lamanna, J. (2018). The development of natural resources in outer space. *Journal of Energy & Natural Resources Law*, 37(2), 227–258. doi: 10.1080/02646811.2018.1507343

The reason I choose to discuss the asteroid mining subject is that, from my point of view, it is a green alternative to the ever-growing need for energy and natural resources consumption. With the further development of western civilization, the demand for resource consumption is only increasing day by day. Unfortunately, very few tend to project their thoughts in the direction of nature conservation and coexistence with this great world. Many in western society tend to view themselves as the owners of the planet and treat it as natural resources as part of their entitlement. In order to battle distraction of the earth, and aim towards nature preservation, those who refuse to reduce their consumption needs should look for an alternative elsewhere.

Part of the solution is the relocation of production and resource extraction into space, where asteroids could be mined as the article describes. The economic value of the asteroids is incredibly high, with an abundance of an entire periodic table present in the open space. Recourse extraction in the open space would cause a minimum of negative externalities and pollution effects on the earth. Any production waste could be ejected in any direction of the open space or directly into the sun where it would burn before even reaching the star. As the article

further addresses, the economic value of the nearby asteroids could be measured in billions and trillions of dollars. The article suggests economic incentives and ways to set up the manufacturing process in outer space.

In my opinion, this is truly a green alternative oriented towards preservation of the earth and ever-increasing consumption needs of the capitalistic overproducing society. As research suggests, required technology already exists and could be perfected in the near future. However, there is a little economic incentive for those who already establish production on earth rather than the preservation of the earth, which tends to be never taken into account.

Belanger, Y. D. (2018). *Ways of Knowing: An Introduction to Native Studies in Canada*. Toronto, Ontario: Nelson Education.

The book, written by Belanger, an assistant professor of Native American Studies, addressed a wide variety of challenges Indigenous peoples face in terms of socioeconomic, socio-political issues. Fields of study include philosophy and Indigenous world view, history, political economy, and contemporary issues. Indigenous world view, combined with economics and philosophy, addresses a critical point of view when it comes to the thesis research topic in terms of traditions and spirituality. Additional attention is devoted to Indigenous leaders and community self-governance. A significant emphasis is placed on the relationship with land and Indigenous world view. Cultural representation of Native Philosophy, ancestral memory that incorporates the earth, fire, air water, and spirit address unity and harmony when it comes to nature. Creation unites all forms of energy, highlights natural law in relation to a worldview.

Additional emphasis is placed on the four seasons, and the role of the sun, the relation of the birds and animals, migratory patterns. Indigenous people's relation to nature and animals, as well as dependence on the migratory patterns of animals and seasons of nature. An additional important factor in the Indigenous world view is the time itself, non-linear patterns of time, space-time continuum with no distinct differences between past- present and future. Role of the time is important when it comes to honoring previous generations, traditions, guidance for the present, and future. Change and transformation, complex relationship with nature and universe, and a series of interrelationships are important when it comes to Indigenous knowledge and heritage as the book describes.

Kuyek, J. (2019). *Unearthing Justice*. Between the Lines.

This book highlights the danger of the mining industry in relation to community and surrounding settings. The primary emphasis of the book written by Joan Kuyek is the protection of the community, and guidance when it comes to decision making. This book provides the reader with ways of coping and responding to global, multinational corporations. The book provides a series of the law and policy regulations oriented to protect communities when it comes to making a decision that once and for all could alter lives of the residents, leaving beings and environment in general. Kuyek highlights an important message: what we do will have an effect on future generations. Therefore, it is the current generation's responsibility to protect and preserve precious homes that we have.

Author Joan Kuyek is an important advocate of the mining-affected communities. In her book *Unearthing Justice*, Kuyek provides an important analysis of the myth surrounding mining industries and enrichment prospects commonly promised by the mining companies. Book takes

into account Indigenous worldviews and provides communities with ways to cope and recover from the damage caused by the mining companies. Also, the entire chapter is focused on uranium mining, providing important information regarding the dangerous consequences of the uranium mining. In many cases, the author highlights stories of people affected by the industry in many different ways and complexities.

Kovach, M. (2010). *Indigenous Methodologies: Characteristics, Conversations and Contexts*. Toronto: University of Toronto Press.

The book was written by Kovach to address methodologies within Indigenous discourse, and highlight aspects of Indigenous epistemologies that constantly emerge. All aspects are relational but not identified as a specific theme, rather because it is entirely with everything else. An interconnection exists on all levels to ensure the relationship between all entities, evidently ensuring ecological and cosmological balance. The holistic nature of Indigenous science creates a distinct variance between it and western science. A holistic component is fundamental when it comes to the orientation of Indigenous research, especially prioritizing tribal epistemology in academic research. Emphasis placed on the specific set of challenges when it comes to delivering a holistic epistemologies approach in order to be understood by western academia. One of the examples described by Kovach is a traditional offering of tobacco gift, the daily offering of tobacco to the Creator to honor spiritual knowledge.

Therefore, when it comes to Indigenous methodology delivery, it is important to consider the difference when it comes to western academic research in relation to Indigenous communities, traditions, and worldviews. The application of conceptual frameworks and methodology is an essential aspect of research in order to visualize Indigenous worldviews.

White Face, C., Wobaga, Z. (2013). *Indigenous Nations Rights in the Balance: An Analysis of the Declaration on the Rights of Indigenous Peoples*. Canada: Living Justice Press.

UN declaration on the Rights of Indigenous Peoples oriented to protect, spread awareness, and address rights Indigenous peoples. Primary emphasis is placed on a critical set of factors that are issues of human rights when it comes to recognition, history, and struggles against various forms of assaults in relation to Indigenous people's existence. History of struggle in relation to military, political, and legislative attempts to eliminate the existence of Indigenous peoples described by an analysis. The primary emphasis of the book is to address human rights as a protective mechanism when it comes to the fundamental ability to practice culture and way of life while facing historical and current instances of annihilation.

White Face addresses and highlights certain uncertainties when it comes to the clarification of the documents written and originated to protect human rights. Considerable attention devoted towards a comparison of original and readjusted articles, highlighting uncertainty and in some cases tendency of shifting the responsibility away from the declaration changes primarily originated to protect the rights and freedoms of Indigenous peoples. In certain cases, this document is the primary source of protection when it comes to the rights and freedoms of Indigenous peoples, their fundamental human rights for existence and self-determination. Additional emphasis is placed on the right of self-governance as well as control of their personal lives.

Henderson, J. Y. (2008). *Indigenous Diplomacy and the Rights of Peoples: Achieving Un Recognition*. Saskatoon: Purich Pub.

The book written by Henderson *Indigenous Diplomacy and the rights of Peoples; achieving UN recognition*, addresses the working progress to ending the history of oppression towards Indigenous nations. Reaffirmation of fundamental human rights and freedoms of Indigenous peoples is a crucial perspective. As described by Henderson, the UN declaration of rights and freedoms of Indigenous peoples is the standard for human rights based on partnership and mutual respect. Book reveals colonization, and its effects on Indigenous peoples, as well as allies who want to help oppressed nations.

UN recognition is the fundamental stepping stone when it comes to the advancement of Indigenous human rights, learning new ways of reconciliation and unlearning unjust actions of the past and present. The UN voted to extend the rights of Indigenous peoples after years suffering and humiliation, achieved through the difficult twenty years' journey. Further factors of urgent decolonization and human rights advocacy exist when it comes to the implementation of declaration from paper to action. Consequently, the importance of the above-listed document is crucially relevant when it comes to fundamental guiding principles of society based on egalitarian principles of democratic civilization.

AHF. (2017). Atomic Heritage Foundation, Castle Bravo.  
<https://www.atomicheritage.org/history/castle-bravo>

The Atomic Heritage Foundation is a valuable source when it comes to nuclear testing history as well as dangerous consequences when it comes to radioactive pollution. More specifically, "Castle Bravo" nuclear detonation at Bikini Atoll in the Marshall Islands. As described in the source, nuclear testing was more than two and a half times greater than expected to cause higher levels of radioactive fallout than previously expected. As described in the source, a miscalculation by the scientists when it comes to the power of explosion has caused effects on many generations including Indigenous communities as well as contamination of traditional lands, waters, and territories. A certain level of justification exists when the article mentions "unfavorable weather conditions and weather patterns," evidently shifting the blame on to nature and human error.

Unfortunately, human history is filled with commonly referred unintentional errors that have caused a negative change in traditional lives and result in health hazards that are present up to this day. Following the nuclear testing resulted in the study of radiation effects on island inhabitants, and provided medical care to those who were exposed initially classifying research data to the public. Additionally, the study project has been widely criticized due to not seeking permission from the Marshallese, stating that they have been treated for "various illnesses," in most cases without a translator to explain what tests are being conducted as further described in the article. Therefore, historical instances of such and similar matters should be taken into account, as well as unjustified actions committed towards surrounding island inhabitants.

CNSC. (2019). Nuclear power plants. <https://www.cnsccsn.gc.ca/eng/reactors/power-plants/index.cfm>



The Canadian Nuclear Safety Commission (CNSC) designed to regulate nuclear power plants in Canada. Article by Canada describes a number of operating nuclear power plants, with the majority located in Ontario. Additional emphasis placed upon energy generation and the importance of such families when it comes to economy and power consumption needs. Regulatory assessment oriented to analyze the nuclear industry through all stages of the life cycle starting from design assessment required and finishing decommissioning nuclear power plants due to various reasons. CNSC statement oriented to protect the public and environment with the implementation of various technical experts and safety guidance procedures.

Additional responsibilities of CNSC to supervise decommissioning activities and safe storage of the radioactive waste materials. Certain decommissioning programs exist under the supervision of CNSC Canada's Nuclear Liabilities Program. Description of the program mentions safety and cost-efficiency program design control-oriented to reduce risks and liabilities at AECL sites. Highlighting an inherent flaw of the safety and cost-efficiency balance approach often implemented in cost-effective economic settings. Historical examples highlight uncertainty when it comes to the implementation of safety and cost-related balance approaches, often creating unnecessary risks as a result of economic incentives related to the cost of production.

Simonds, V. W., & Christopher, S. (2013). Adapting Western research methods to Indigenous ways of knowing. *American journal of public health*, 103(12), 2185–2192.  
<https://doi.org/10.2105/AJPH.2012.301157>

When it comes to community-based research, some researchers historically exploited participation incentives in Indigenous communities without giving back to the community. In some cases, community members rarely see the benefits of the conducted research, and have limited to no access when it comes to findings or the study. As a result, the community does not benefit from the conducted study, often resulting in the researcher's or an institution's gain instead. The primary aim of the community-based research should be oriented towards community wellbeing and welfare of everyone.

When it comes to the research methodologies, a considerable difference exists when it comes to the implementation of Indigenous methodologies and western research approaches. Aim of the study conducted by Simonds & Christopher to provide implications of the Indigenous methodologies in relation to the western deductive qualitative analysis. An important step in relation to decolonization and attempt of reconciliation. Implementation of Indigenous methodologies in conjunction with appropriate western research methods is an important step towards appropriate community-based research. At the current time, Indigenous research methods are not widely available in the academic works, and often not recognized.

Corntassel, J. (2012). Re-envisioning resurgence: Indigenous pathways to decolonization and sustainable self-determination. *Decolonization: Indigeneity, Education & Society*. 1.

The article was written by Jeff Corntassel to address the effects of colonization in relation to Indigenous freedom. Emphasis placed on the issues related to the past and ongoing colonization in relation to decolonization strategies in relation to Indigenous communities. Research addresses danger when it comes to communities as a result of the harmful to Indigenous worldviews and practices process of colonization, and its effects. Additional attention

is devoted to harmful aspects of the rights of discourse, reconciliation, resource extraction in relation to Indigenous approaches in accountability of relationships renewal.

The study provides comparative examples of restoration from Lekwungen, the Nishnaabekwewag “Water Walkers”, Kanaka Maoli, in the process of decolonization movements. In addition, the article aims to challenge the ongoing “destructive forces of colonization”. Examples of colonization, the direct process of which is causing cultural harm, and affects worldviews, the spirituality of Indigenous peoples. The above-described system deprives Indigenous peoples of confidence and directly affects the lives of entire generations. The considerable emphasis of the article highlights Indigenous worldviews in relation to the land, surrounding environment, and spirituality, often labeling and proclaiming government initiatives as “economic development” strategies. An example provided by the author highlights how the process of colonization affects traditional relationships with the surrounding environment, worldviews, tradition and spirituality.

Marshall, A. (2004). Two-Eyed Seeing.

<http://www.integrativescience.ca/Principles/TwoEyedSeeing/>

Two-Eyed Seeing is an important Guiding Principle introduced into Integrative Science in a co-learning journey by Elder Albert Marshall. The Guiding Principle addresses a way of living in relation to mother nature, worldviews, and spirituality. It is an approach to view the world from the combined approach benefiting society. Primary emphasis focuses on combining Indigenous people’s knowledge and western science, in order to work together, deriving from the strength of both. The collective approach oriented to protect nature, conserve the environment actively relying on Indigenous wisdom and western science.

Additional attention is devoted towards reliance on the Seven Generations Teachings, actions of our ancestors that have to lead us here to who we are, our actions affect the present, and will influence the future of unborn generations. In order to preserve nature and work for the benefit of all, it is important to bring different ways of knowing together, in order to build a better world for the future generations and preserve mother nature. Elder Albert emphasizes the need for the mindset and attitude change in order to overcome the challenges. An important step to co-exist with the surrounding environment, ecological, and spiritual harmony is part of Indigenous worldviews. Relationship building, according to Elder Albert Marshall, is the foundational basis of any relationship in an exchange of stories.

Foster, J. B. (1999). *The vulnerable planet: a short economic history of the environment*. New York: Monthly Review Press.

In the book written by John Bellamy Foster, the author describes the devastating consequences of imperialistic expansion, global environmental crisis as a result of the capitalistic system. The human-caused destruction of nature is closely related to the exploitation of the earth and environmental distraction that leads to the extinction of multiple species in the ever-increasing need for economic expansion of the world. With the global capitalist expansion reliance and need, resource extraction dramatically increased, causing the spiral effect of the distraction of nature. The book examines the ecological balance approach in relation to sustainable economic production.

In addition, Foster focuses on imperialistic expansion, ecological balance, and the effects of colonialism in relation to ecology. Various historical examples highlighted when it comes to

capitalistic stages of development following the effects of the ecological balance destabilization. In account taken imperialistic powers that historically affected Indigenous peoples all around the globe, expanding economic interest and its influence. Power imbalance further addressed in terms of the colonies' exploitation, favoring the development of the home bases of imperial powers. Great territorial division of the world highlighted predetermine colonial influence in order to extract resources in the personal favor of the economic benefit. An additional aspect of the Fosters focuses is oriented to address instances of ecological imperialism, and its effects on nature.

Nuclear Safety Commission. (2018). Health Effects of the Chernobyl Accident.

<https://nuclearsafety.gc.ca/eng/resources/health/health-effects-chernobyl-accident.cfm>

An important historical lesson is described by the Canadian Nuclear Safety Commission in relation to the health effects of the Chernobyl nuclear disaster. The report highlights the largest uncontrolled radioactive event in history that affected hundreds of thousands of people worldwide. Primarily affected as a result of the radioactive catastrophe were Ukrainians, Belarusians, and Russians. The report highlights the dangerous health effects of the radioactive outbreak in relation to cancer development as a result of iodine-131 exposure. Adults and their children were affected as a result of the radioactive contamination of the surrounding regions. Additionally, the report highlights how as a result of the safety design flaw, which at the time thought to be safe, have led to a radioactive fire that has lasted for 10 days; spreading radioactive iodine into the atmosphere, consequently carrying out radiation around Europe.

Report addresses in significant detail effects of the radiation, workers, and liquidators involved in the radioactive outbreak, families, and regular people who were not involved in the radioactive outbreak resolution. The nuclear disaster resulted in the contamination of the surrounding environment, land, forests, and waters, making the surrounding area harmful for human and animal existence. The explosion occurred near Ukraine capital Kiev, putting in the danger zone millions of people. Up to this day, concerns exist of the psychological and mental problems, fertility, and congenital disabilities that affected entire generations. In Ontario, 19 reactors exist, generating approximately 15% of Canadian power. In addition, a byproduct of nuclear fusion is radioactive waste that requires to be stored in accordance with the existing safety protocols and standards.

Wilson, S. (2008). *Research is Ceremony: Indigenous Research Methods*. Black Point, N.S.: Fernwood Pub.

Indigenous research is an important part of Indigenous peoples around the world. Relationships that are present within Indigenous society shape reality and is a direct extension of Indigenous people's reality. Indigenous peoples place a great level of importance on coexistence with nature and the surrounding environment. The major part of conducting research for Indigenous peoples is through the process of ceremony, developing, and using existing relationships. Methods and research criteria's selection is crucial when it comes to the community relationship establishment. An important part is showing respect to the community, its members, and complex relationships with nature and spiritual world coexistence with which is very much relevant to the majority of Indigenous peoples.

One conducting the research using Indigenous methodologies must ask itself how one can benefit the community, by placing community needs above personal gain. Aboriginal peoples approve methods of research. The role of the researcher is non-intrusive observation, with a primary aim to benefit the community. One of the critical criteria is listening and observing in a non-judgmental way, learning from the generational wisdom and knowledge. Importance of this book is directly related to the research using Indigenous methodologies, respect of the community traditions and customs, and the aim to protect mother nature and the surrounding environment, as well as peoples who reside in Indigenous communities.

Myers-El, N. T. (2008). *The Unknown Lore of Amexem's Indigenous People: An Aboriginal treatise*. Bloomington, IN: AuthorHouse.

In the book written by Myers-El the author describes an incredible connection Indigenous peoples have when it comes to nature. One of the traditional beliefs is described by the Cherokee peoples, more specifically the role of the sun in daily life. The sun is represented as the spirit of the Creator (the life-giver), the secret fire that has been burning for centuries. The significance of the sun in Cherokee people's culture signifies the sacred fire, the symbol, and the requirement for life.

In addition, Myers-El describes the Keetoowah Nighthawk Society of Cherokee peoples oriented to reclaim old ways of traditional Indigenous life. Traditional Indigenous ways highlight a deep sense of the connection to nature and the importance it has played in the everyday life of first nation people. Significance of the above-listed source directly related to the role of the sun in everyday life of Indigenous peoples. Important to note that the sun is a crucial component of human existence, the replication process of which is directly related to the resolution of human energy needs.

ITER. (2020). The Way to New Energy. <https://www.iter.org/>

ITER is an important project when it comes to the hydrogen fusion process, replication of the sun's generation/creation energy process. Fusion is the nuclear reactor cycle that powers all star throughout the universe. The process itself produces no carbon emission and generates energy in much greater capacities than conventional nuclear reactors. Nuclear energy is a great way to generate energy relatively cheaply; however, one of the byproducts of the nuclear reaction is radioactive waste. An important aspect of hydrogen fusion is the process virtually free of pollution and a much more efficient way in terms of the comparative energy output.

The primary challenge exists in replicating the process that occurs in the center of the stars, including our own. Generally, stars have a lot of pressure, which creates a possibility to sustain 15 million fusion reactions in the case of our sun. However, the primary challenge exists in replicating this process on the earth. More specifically, ITER is aiming to figure out how to contain 150 million degrees' hydrogen fusion reaction using a controlled magnetic field, in order to generate greater energy output than initial input.

ITER is the international collaboration of the 35 countries with the aim to replicate the process that powers the stars, to fulfill the constantly increasing energy needs of our civilization. Stars in our universe have been burning hydrogen atoms in their cores, generating the energy all throughout the endless galaxies in the universe, generating energy, providing light. This process is especially relevant in our solar system, where our sun has provided a possibility for life to

exist. The ITER is an international collaboration program oriented for everyone to collaborate collectively, in order to prove an alternative, limitless, clean energy source, powering a better future for humans with care and respect towards nature.

## Appendices

### Appendix B - Data Analysis

Discourse analysis toolbox originally designed by Siegfried Jäger and further developed by Florian Schneider (2013)

1. Establish the context
2. Explore the production process
3. Prepare material for analysis
4. Code material
5. Examine the structure of the text
6. Collect and examine discursive statements
7. Identify cultural references
8. Identify linguistic and rhetorical mechanisms

Kuyek, J. (2019). *Unearthing Justice*. Between the Lines.

#### 1. Establish the Context

The book was written by Joan Kuyek *Unearthing Justice*. Between the Lines (2019) highlights the danger when it comes to the mining industry in relation to Indigenous communities and environment. Chapter 14 specifically addresses Canada's one of the leading roles of historical uranium production. Primary emphasis is placed on uranium mining and impact for community and traditional way of life. Context lens applied from the community standpoint, traditional way of life, protection and conservation of environment, health of the community residents. *Unearthing Justice* is an important tool guide oriented to protect communities from mining companies by exposing the ways of industry intentions.

#### 2. Explore the Production Process

Author Joan Kuyek is an important community organizer and advocate of the mining-affected communities. Considerable research done by Kuyek has helped uncover negative externalities of mining in Canada. Joan Kuyek is a co-founder of the MiningWatch Canada from 1999-2009 and an important community organizer. Some of the publications that Joan Kuyek published are Fighting for Hope; The Phone Book: Working at Bell Canada; Community Organizing: A Holistic Approach; *Unearthing Justice: How to Protect Your Community from the Mining Industry*. The work of *Unearthing Justice* unveils considerable hardships and mining related challenges the community face on a daily basis.

#### 3. Prepare Material for Analysis

Primary analysis of the book *Unearthing Justice* will be used Chapter 1 "The Physical Footprint of the Mine", Chapter 2 "The Mining Sequence", Chapter 3 "Key Environmental impacts", Chapter 5 "Social Impacts", and Chapter 14 "Notes on Uranium".

#### 4. Code Material

Radioactive danger (r)

Community Health, Social Impacts and Experience of Affected Populations (info retrieved from the text) (e)

Impact on traditional lifestyle (i)

Historical injustice (h)

Contamination of the surrounding environment (c)

#### 5. Examine the Structure of the Text

Primary argument of *Unearthing Justice* aims to highlight the danger when it comes to Indigenous communities, contamination of the surrounding environment and the effect it has on the traditional way of living of Indigenous Nations. More specifically Chapter 1 “The Physical Footprint of the Mine” addresses the devastating impact of nature as a result of the mining development. Aim of the chapter scatter common myth regarding the mine reconsolidation, commonly regarded as “temporary use of land”. The chapter additionally describes an inefficient process of mining that produces high amounts of waste.

Chapter 2 “The Mining Sequence” provides important information regards to the structure of the tailings and mine operation process. An important insight when it comes to visualization and understanding of the tailings hazards, nature distraction and dangerous conditions for humans.

Chapter 3 “Key Environmental Impacts” provides essential information related to unfolding knowledge, in relation to environmental impacts to water, air, and soil. Considerable attention devoted towards understanding and visualization of tailings hazards including dams collapse.

Chapter 5 “Social Impacts” address the social changes caused by the mining industry. Author addresses personal history, living almost for 30 years in Sudbury, the largest mining community in Canada. Entire communities could become displaced as a result of the mining, evidently creating refugees whose social fabric has been affected on many different levels. Some of the well documented reasons include development of social problems and substance abuse, and income disparity. Additional concern that leads to increased social problems as a result of the boom and bust mining economy, a system that greatly impacts small communities.

Chapter 14 “Notes on Uranium” highlights Canadian world role in terms of Uranium production, and industry managing as a federal responsibility. One of the communities affected by mining is Délı̄nę First Nation. This chapter provides a crucial insight of the community wellbeing and consequences of uranium mining for the lives of ordinary community members. Some of the stories describe real life stories of those who were primarily been affected by the uranium mining. Additional emphasis placed on the Canadian uranium mining regulation, mine proposal development and exploration for the new mine sites in Canada.

#### 6. Collect and Examine Discursive Statements

##### Chapter 1

“I am flying over Sudbury on a clear afternoon day. I can see the city and the surrounding towns, the roads and railways, power lines, rivers, lakes, and hills. But I can also see three huge turquoise and rusty-orange tailings lakes (one thirty-five square kilometers in size)

...Everywhere there are blackened slag heaps and waste rock piles. A number of open-pit mines

dot the surface, as do the head frames of underground mines. Smoke streams from the super stack. From this height, I am aware of how much the footprint of these mines has grown since my last flight just a few years ago. Despite reclamation and re-greening programs, the mines and their wastes are quickly devouring the landscape.” (c)

“Mining is a waste management industry. The process creates an extremely high volume of waste: the overburden, the waste rock that is removed to get the ore, and the ore body that has been crushed into powder at the mill and rejected, called tailings. Some mines dispose of almost 100 percent of the rock they smash up, along with various chemicals that are added in the course of extracting the minerals.” (c)

## **Chapter 2**

“Tailings are everything that is left over after primary ore separation. Tailings are a mixture of water, finely ground rock from which the valued minerals have largely been removed, and residues of all the chemicals that have been used in the process of the ore... It is generally not possible to return all tailings underground, even if a company were to make that kind of commitment. There are three key environmental concerns associated with the mine tailings: loss of habitat due to the huge areas required for tailings management, impacts on water quality and aquatic ecosystems, and impacts on air quality, primarily from dust.” (c)

“Common minerals and elements found in tailings include arsenic, barite, fluorite, radioactive materials, mercury, pyrites/sulfate compounds, cadmium, and hydrocarbons introduced by mining and processing equipment (such as oils and greases). Common additives found in tailings include cyanide and sulfuric acid used in leaching, floating agents and cleaning/descaling agents, and calcium components, which have been introduced as a lime to aid in acid control.” (c)

Tailings are acid generating, they will require a water cover to prevent acid mine and drainage and metal leaching.” (c)

## **Chapter 3**

“Uranium elements are always associated with radioactive elements such as radium and radon... Uranium tailings contain all the radium that was present in the original ore. When radium undergoes natural radioactive decay, one of the products is radon gas. Because radon and its decay products (daughters) are radioactive, and because the tailings are now on the surface, radon gas is a major release to air and a significant environmental concern. When radon-222 gas is released from a uranium mine, it deposits solid radioactive dust on the ground for hundreds of miles downwind from the mine site. The radon-222 and all of its radioactive decay chain products release twelve times as much radiation as is in the uranium-238 itself. The radioactivity will be measurable in the area for more than one hundred years after the mine is closed.” (r)

“Radon progeny is another name for radon decay products or radon daughters. It’s the radon progeny, rather than radon gas itself, that delivers actual radiation dose to lung tissues. The solid airborne radon progeny – particularly polonium 218 and polonium 214 – are of particular health importance because they can be breathed into and retained in the lungs. Radon releases are a major hazard that will continue long after uranium mines are shut down.” (r)

“Tailings dams always seep and can fail catastrophically due to weaknesses in construction or from overtopping (water flowing over the top of the dam). In addition to extraordinary rainfall events, overtopping can occur because the spillway is inadequate or the dam is not high enough. Beavers frequently dam spillways, causing the tailings pond to overflow or increasing the water pressure on the dam, resulting in its collapse.” (r)(c)

There are numerous examples of catastrophic tailings dam failures, both in Canada and abroad. There are increasingly serious tailings dam failures because open-pit mining of low grade ore



creates such huge impoundments, and because weather has become more unpredictable with climate change. (r)

### **Chapter 5**

“Mining can displace whole communities from their land and homes, traumatizing them and affecting cultural identity, security, and subsistence. Residents may end up in urban slums or even become homeless.” (e)

“Social effects from mine activity, including increased alcohol consumption and drug use, have been well documented...Because mining wages are so high, and jobs are few, mining projects inevitably create greater income disparity. Some populations will be much more vulnerable than others: women, youth, First Nations, immigrants.” (e)

“In older mining and smelting communities, with their constantly growing mine footprint, any resource-based economic activities such as farming, fishing, and logging have been damaged by pollution from the mine and smelters, and communities became dependent on power grids, chain stores, and imported goods and services to supply their needs.” (e)

“During operations, major power imbalances exist between communities and the mining companies they depend on. When communities try to organize to resist mine expansion, to fight company requests for water-taking, or to reduce pollution or to improve safety, they often cannot get information and analysis they need.” (h)

“At the closure, when jobs and contracts are lost, workers leave the community. Those left behind shoulder a greatly increased tax burden as a result of the community carrying the costs of oversized and aging infrastructure...Family employment after a closure tends to shift to the women, and to lower wages.” (h)

### **Chapter 14**

“We now have a village of widows...Dene in the village no longer have grandfathers to pass down the spiritual practices, no uncles to slap their wrists when they do something wrong.” (e)

“We the Dene have been subjected to over 60 years of horrible injustice because of apparent national interests. Our people have paid for this with our lives and the health of our community, lands and waters” (e) (i)

“Domestic life, the very intimacy of our home...was also retroactively contaminated” (e) (i)

“Federal health study concluded that ‘it is not possible to know for certain if the illness or death of any individual ore carrier was directly caused by radiation exposure, due to the small number of predicted excess cancers and the presence of other health risk factors’” (h)

“By the end of February 2003, sixty years after the Dene had been unknowingly exposed to the radioactivity, the community of Délı̨ne signed a three-year, 6.7 million agreements for the Remediation Action Plan, which included the clean up, monitoring requirements, and future community needs...The studies showed that the mine had an effect on water quality at the site and in the immediate vicinity of Great Bear Lake. Elevated metal levels were found in soil at the site” (c)

“No apology was ever made” (h)

“To 2014, more uranium had been mined in Canada than any other country, about one-fifth of the world's total. Over 85 percent of production is exported” (c)

Kovach, M. (2010). *Indigenous Methodologies: Characteristics, Conversations and Contexts*. Toronto: University of Toronto Press.

## **1. Establish the Context**

The book written by Margaret Kovach highlights multilayered complexities within Indigenous methodologies. The book emphasizes the universal Indigenous approach when it comes to connectivity of knowledge, respect to nature. Chapter 3 specifically addresses Epistemology, research within Indigenous discourse. A strong series of relationships in Indigenous cultures lead to universal interconnectivity. An important emphasis is placed on the major differences between Western and Indigenous worldview approaches, consequent understanding and world vision when it comes to Indigenous research discourse. The book *Indigenous Methodologies: Characteristics, Conversations and Contexts* is an important tool guide when it comes to Indigenous worldviews, knowledge and research.

## **2. Explore the Production Process**

Author, Margaret Kovach is an assistant professor in the College of Education at the University of Saskatchewan. At the current moment she is Acting Director of the Aboriginal Education Research Centre at the University of Saskatchewan. Some of the publications (2014) *Thinking through theory: Contemplating Indigenous situated research and policy*, (2012) *Treaties, Truths, and Transgressive Pedagogies*. Margaret Kovach interests include Indigenous Research Methodologies, Indigenous adult and higher education, and anti-oppressive teacher education. The book *Indigenous Methodologies: Characteristics, Conversations and Contexts* written by Kovach helps readers to visualize and understand the complex world of Indigenous research, worldviews and visions.

## **3. Prepare Material for Analysis**

Primarily analysis of the book *Indigenous Methodologies: Characteristics, Conversations and Contexts* will be used Chapter 3 “Epistemology and Research: Centering Tribal Knowledge”, and Chapter 6 “Situating Self, Culture, and Purpose in Indigenous Inquiry”.

## **4. Code Material**

Historical injustice (h)  
Indigenous worldviews (w)

## **5. Examine the Structure of the Text**

The Primary aim of Chapter 3 “Epistemology and Research: Centering Tribal Knowledge” is to highlight universal connectivity of knowledge, interconnection between all entities, in relation to universal ecological and cosmological balance. Indigenous research and worldviews play an important role in Indigenous cultures, and complex cultural practices when it comes to ordinary and extraordinary. A series of relationships that interconnected with everything else, Indigenous discourse in relation to consistent epistemological themes. The Primary aim of Chapter 5 “Situating Self, Culture, and Purpose in Indigenous Inquiry” is to emphasize the importance of self-situating in relation to cultural respect and Indigenous inquiry. One of the important messages from Chapter 5 directly highlights the meaning of purposeful research in relation to giving back to the community and making sure that research is relevant. Additional attention is

placed on maintaining good relationships by identifying one's purpose and motivation as a researcher. Relationship culture plays an important role when it comes Indigenous research and cultural grounding.

## 6. Collect and Examine Discursive Statements

### Chapter 3

“Every little thing. I mean, I can see a dead frog on the road, and it relates to epistemology”

“Epistemology and research methodology are tightly bound, complex partnerships...it is frogs everywhere.” (w)

“Indigenous cultures have sophisticated and complex cultural practices to access that which comes from both the ordinary and the extraordinary.” (w)

“Within Indigenous discourse aspects of Indigenous epistemologies constantly emerge. They are all bound by the relational. Relationship is not identified as a specific theme because it is wholly integrated with everything else.” (w)

“The outer space is the physical world and inner space is where metaphysical knowledge resides.” (w)

“Because of the interconnection between all entities, seeking this information ought not to be extractive but reciprocal, to ensure an ecological and cosmological balance.” (w)

“Energy reveals itself as knowing's stored deep within a collective unconscious and surfaces through dreams, prayer, ceremonial ritual, and happenings.” (w)

“A holistic orientation is integral, but how do Indigenous researchers apply it to their research? First, they make choices about the knowledge that they will privilege” (w)

“Privileging tribal epistemology in academic research efforts is easier said than done, but Indigenous researchers are making this choice. Acknowledging these choices and challenges, they are encompassing holism within their research frameworks” (w)

“The holistic nature of Indigenous science often creates a chasm between it and the beliefs held by Western science...Sacred knowledge is not really accepted in Western research, often than in a peripheral, anthropological, exotic kind of way.” (h)

“Ancient knowledge is still alive in Cree communities. The most sacred form comes through dreams, fasts, sweats, vision quests, and during sacred ceremonies.” (w)

“Plains Cree ways of knowing cannot be an objectified philosophy for this knowing is a process of being. This epistemology emphasizes the importance of respect, reciprocity, relation, protocol, holistic knowing, relevancy, story, interpretive meaning, and the experiential nested in place and kinship systems – all of which ought to be in a research process that encompasses this way of knowing. My ancestors were highly strategic peoples in both practical and aspects of life as well as within ceremonies and rituals contextualized in place and manifested in ways of knowing.” (w)

### Chapter 6

“Within Indigenous research, self-location means cultural identification, and it manifests itself in various ways. Indigenous researchers will situate themselves as being of an Indigenous group, be it tribal, urban, or otherwise. They will share their experiences with culture, and/or they will identify the Indigenous epistemology of their research...Often they will culturally locate in all three ways” (w)

“Within Indigenous methodologies, crafting research questions remains a necessity, though it may surface more organically.” (w)

“What is the purpose of this research? How is your motivation found in your story? Why and how this research contributes back to the community...One maintains good research relationships by identifying one’s purpose and motivations behind the actions. It is about being honest...Purposeful research was inseparable from the value in giving back.” (w)

“For Indigenous research, cultural grounding is best defined within the context of a person’s life and relationship with culture. As with non-Indigenous researchers, its significance may depend upon their life context and how they engage with culture.” (w)

Wilson, S. (2008). *Research is Ceremony: Indigenous Research Methods*. Black Point, N.S.: Fernwood Pub.

### **1. Establish the Context**

The book written by Shawn Wilson *Research is Ceremony: Indigenous Research Methods*. (2008) signifies Indigenous worldviews when it comes to research. Indigenous research is an important part of Indigenous peoples. Relationships that are present within Indigenous society shape reality and is a direct identity extension of Indigenous peoples. Strong emphasis placed on Indigenous research paradigm. Indigenous research paradigm plays an important role in relation to understanding “uniqueness and glory of Indigenous cultures”. The major part of conducting research for Indigenous peoples is through the process of ceremony, developing and using existing relationships. Indigenous societies founded on the basis of mutual self-respect, collective coexistence, major part of which is intertwined with nature and spiritual worldviews. *Research is Ceremony: Indigenous Research Methods* is an important tool guide for Indigenous and non-Indigenous researchers when it comes to visualization and value of Indigenous research practices.

### **2. Explore the Production Process**

Shawn Wilson is Opaskwayak Cree from northern Manitoba, and is a director of Research at Gnibi College of Indigenous Australian peoples at Southern Cross university. Dr. Shawn Wilson is known for his international work with Indigenous peoples. Some of the publications include: *Ceremony at a Boundary fire: A story of Indigenist Knowledge*, and *Research is Ceremony: Indigenous Research Methods*. Important to note, that *Research is Ceremony* has been cited numerous times and used as a course book. Additionally, Shawn Wilson is part of the Advisory Committee for the Indigenous Inquires Circle of the International Congress of Qualitative Inquiry and Advisory Group for Aboriginal Affairs Research, NSW Dept. Aboriginal Affairs. Shawn Wilson made an important contribution when it comes to description of Indigenous paradigm shared by Indigenous scholars in Canada and Australia.

### **3. Prepare Material for Analysis**

Primarily analysis developed through the visualization of the research is ceremonial practice of the fundamental understanding when it comes to Indigenous research paradigm and development

of Indigenous theory and methods of practice. Chapter 1 addresses the primary emphasis of the book, with the aim to highlight crucial aspects to Indigenous research practice and worldview.

#### **4. Code Material**

Historical injustice (h)

Indigenous worldviews (w)

#### **5. Examine the Structure of the Text**

Chapter 1 provides an introduction to the importance of further Indigenous theory development as a key research method that incorporates Indigenous worldviews. Book written by Shawn Wilson aims to highlight similarities between research paradigms for Indigenous people. Primarily the aim of the text is to distinguish Indigenous way of research and by not any means compare it with dominant western research methods. Author analyzes shared aspects of ontology, epidemiology, axiology, methodology as research methods that connect Indigenous peoples of Canada and Australia. As described in the text various aspects of Indigenous research paradigms are analyzed in order to support other Indigenous peoples in their own research. Wilson situated himself by describing parts of his journey providing a reader with an important message and visualization regarding his path.

#### **6. Collect and Examine Discursive Statements**

“The development of an Indigenous research paradigm is of great importance to Indigenous people because it allows the development of Indigenous theory and methods of practice.” (w)

“A strong Indigenous research paradigm can provide ways to celebrate the uniqueness and glory of Indigenous cultures, while allowing for the critical examination of shortcomings” (w)

“It will encourage a greater appreciation of Indigenous history and worldviews, thus allowing Indigenous peoples to look forward towards the future while neither demonizing nor romanticizing the past. This study is also important for non-Indigenous people, as it will assist with understanding of Indigenous issues, cultures and values.” (w)

“Research paradigms are labels that are used to identify sets of underlying beliefs or assumptions upon which research is based. These sets of beliefs go together to guide researchers’ actions. Any research represents the paradigm used by the researcher, whether the researcher is conscious of their choice of paradigm or not.” (w)

“Ontology is the theory of the nature of existence, or the nature of reality. Is there one ‘real’ world that each of us observes differently through our own senses. Or do various worlds exist, depending upon the point of view of the observer.” (w)

“Epistemology is the study of the nature of thinking or knowing. It involves the theory of how we come to have knowledge, or how we know that we know something...Epistemology is tied in to ontology, in that what I believe to be ‘real’ is going to impact on the way that I think about ‘reality’.” (w)

“Indigenous is used throughout this book to refer to the people and peoples who identify their ancestry with the original inhabitants of Australia, Canada and other countries worldwide” (w)

“Dominant” is used as an adjective to describe the culture of European descent and Eurocentric, Christian, heterosexist, male-dominated Canada or Australia. The term dominant, like the culture

that it describes and the society created by this culture, is not meant to include those who fall ‘outside’ the powerful majority.” (h)

“Identity for Indigenous peoples is grounded in their relationships with the land, with their ancestors who have returned to the land and future generations who will come into being on the land.” (w)

“Within Indigenous research epistemology and ontology is the recognition that their research and thinking need to be (and are) culturally based.” (w)

“Positivism espouses the view that there is one true reality that can be broken down into overriding laws. The epistemology that goes along with this belief is that through objective thought, it should be possible to discover this one reality. Methodology from this paradigm thus uses experiments to dissect and manipulate the smallest controllable bits of nature...in an attempt to discover the truth, with the ultimate goal of predicting and controlling reality.”

“Post-positivism has its main difference in that while believing in one ultimate reality, it sees research and researchers as imperfect tools that will never allow this one reality to be clearly seen. Therefore, the ideal is to be perfectly objective, as in the positivist epistemology, but with realization that this can never be achieved. Many of the methodologies of post-positivism share the same goal with positivism of discovering the one truth, while attempting to account for natural settings and situational differences that will influence our view of it.”

“Constructivism takes the ontology of a fluid reality one step further in the belief that there is not merely one fluid reality, but many realities specific to the people and locations that hold them. Reality then is what you make it to be. The interaction between investigator and the subjects is the key to this epistemology, with reality made up of socially constructed concepts that are shared. The goal is coming together between researcher and subjects to create a mutual reality and to find a common meaning in the natural world...The aim of the research is to come to a consensus among researchers and subjects on a construction that is better informed than it was before.”

Nabigon, H., & Yerxa, L. (2006). *The Hollow Tree: Fighting Addiction with Native Healing*. Montreal, Quebec: McGill-Queen's University Press.

## 1. Establish the Context

*“I am just one flash in the pan, resembling the finite breath of the moose in wintertime”*

-Herb Nabigon

The book written by Herb Nabigon provides the reader with a personal journey of recovery from an addiction by implementing traditional Indigenous practices and ceremonies. Guidance of the Elders and practice of ceremonies have led to visualization of creator’s gift, understanding the meaning of life, role of the one in society. Book written by Nabigon teaches us to care for each other and for Mother Earth. Relationships described in the book highlight deep spiritual connection of Indigenous cultures, universal interconnection found in the respect and appreciation for everything that surrounds us. Herb Nabigon shares a story of the personal path and valuable lessons one could derive from reading *The Hollow Tree* book. Some of the history includes influences on the traditional lifestyle of Indigenous peoples by western society.

An important aspect of the book teaches us humility, the specific role and importance of everyone. Throughout the early years and adulthood Herb Nabigon experienced personal conflict, the origin of struggle is deeply rooted in the colonialism that forever changed traditional life of First Nation peoples. The personal story addresses the power of change, hope for the future when it comes to everyone. Strong message depicted of one's role to care and protect the environment, Creators gift for all living beings. The book teaches us to care and love for each other, a view that is based on unconditional goodwill and honesty.

## **2. Explore the Production Process**

Author Herb Nabigon is an Elder from Pic River First Nation. He was also a professor in Native Human Services Social Work program at Laurentian University. During adulthood Herb Nabigon struggled with alcohol addiction, which he successfully overcame by allowing traditional teachings and practices into his life. A book *The Hollow Tree: Fighting Addiction with Native Healing* written by Herb Nabigon is an excellent tool guide for those who are looking for the meaning of life, striving to overcome struggles of life or seeking spiritual guidance. Based on the personal, real life story, *The Hollow Tree* is a great book that incorporates Indigenous worldviews.

## **3. Prepare Material for Analysis**

*The Hollow Tree: Fighting Addiction with Native Healing* describes a personal healing journey based on traditional Indigenous wisdom, knowledge and ceremonial practices. The book highlight The Early Years, The Long Road Home, The Natural Cycle of Life.

## **4. Code Material**

Indigenous worldviews (w)  
Impact on traditional lifestyle (i)  
Historical injustice (h)

## **5. Examine the Structure of the Text**

In the section “The early Years” describe his early years of adulthood through self situating. Author addresses personal journeys through the struggle of alcohol addiction that lead to problems of various complexities. “The Long Road Home” is addressed by incorporation of ancient ceremonial practices and developing relationships with Elders. “The Natural Cycle of Life” based on Indigenous worldviews and teachings that guided the author through his spiritual journey of recovery.

## **6. Collect and Examine Discursive Statements**

“When I turned nine years old, like many other Native children, I was taken from my parents and sent to Residential School in Spanish, Ontario. These schools were established by the federal government as part of a plan to assimilate Native peoples into the Western culture. In the 1850s an act made it mandatory that Native children be removed from their families was implemented.

This act, called the Indian Act, was established to remove the traditional values and beliefs from our culture, forcing Western values upon our people. The policy of outlawing our spiritual beliefs and language leads to devastating effects on our identities as Native people.” (h)

“No longer would parents have any control over their children’s lives. Children as young as six years old would be taken from their homes and placed in a school, often far from their homes, where their names would be replaced with numbers. They were completely stripped from their identity and punished for speaking their Native tongue. This was the setting for many triggers in my life that led me on a downward spiral of despair.” (h)

“The world around us was changing and the traditional lifestyle of the Native people was rapidly dissipating.” (i)

“Fasting and ancient teaching from the Elders helped me set aside the alcohol and pick up and carry my sacred pipe” (i)

“I brought the Elders into the department to teach human relations through Native cultural beliefs. They came and used Native philosophy and Native psychology to improve human relations within our workplace.” (i)

“The Hub...The outer circle represents the negative side of life. The middle circle represents the positive side, and the centre circle one’s inner spiritual fire. The balance of these three parts is the ideal medium that one strives for in life. The circles are divided into four directions: North, South, East, and West, resembling the points of compass...The Hub can be used as a means to guide a person towards the balance of both negative and positive circumstances that occur within every life.” (w)

“The eagle feather represents balance. The eagle uses its feathers to balance itself in flight.” (w)

“When a person feels inferior, he or she begins to envy other people. Envy is simply defined as wanting what other people have, but not willing to do the work necessary to achieve it. I envied other people’s happiness, success, status, and material wealth. However, I was not willing to work for these things.” (w)

“The positive side of the Hub is the middle circle. Starting in the East again, a number of positive aspects are represented such as good feelings, food, and vision.” (w)

“Relationships, time, and patience are represented in the South. It takes a long time to understand your feelings, especially after years of suppressing them. I believe that time and patience go together. These two elements are needed to have a rewarding relationship with itself” (w)

“The strongest example I can find in Nature comes from sister Water, the cradle of Mother Earth’s womb.” (w)

“Before I point my finger and blame, accuse, or gossip about another, I should point my finger towards myself and look at my own behavior. My mind, eyes, ears, and mouth can teach me how to be a good person by using this Hub.” (w)

“The Hub of my being is now the light of my fire. I call it fire because when I think of fire, I think of sweetgrass ceremony and feeling of warmth and feeling of beauty engulf my senses. Only through the help of Elders was I able to build my fire. I use my fire to protect myself from fear. The fire acts as a shield...I need to ask the Great Spirit for help and I need to be honest and try to change my fear.” (w)

“In our Native culture, we relate to and learn much by observing Nature. Two paths are available to us. One is a dark and anxious way. Those who exclusively or persistently follow it to see Earth only as a resource to be exploited. Their guide is gold, or the hope of receiving monetary rewards. On this path their nurturing Mother will become the dark Mother and destroy them. The other option is the Medicine Wheel path. The spiritual interpretation of the Native world view is



divided into Four Sacred Directions. These directions are used to search for harmony and peace from within. All those who embark upon this path hold the land in trust. Their every act is of leadership and their every service is directed towards Mother Earth, Sky Nation, or Spirit World and all living creatures that sustain our lives.” (w)

“The seven natural healing methods are crying, yelling, sweating, yawning, talking, laughing, and shaking. The eagle feather represents balance between positive and negative, reflecting the way the eagle uses its feathers to balance and direct its flight.” (w)

“Four aspects of the self-spiritual, emotional, physical, and mental. Each of the four cardinal directions of the Wheel has specific powers and gifts which are taught by a spiritual teacher.” (w)

“If we continue to abuse our interdependence with the food chain our lives will be made very difficult. We are responsible for quality sustenance for the next seven generations.” (w)

“Food is the lifegiver and we still don’t understand how physical food transforms into the essence of the life force that gives us energy.” (w)

“An Eagle’s feather is held in great respect because it represents the highest virtues of our truth. The holder of an Eagle feather values balanced life.” (w)

“Do not abuse the precious commodity of water. If you had to lug it from a dwindling well you would think twice about how and when we use her precious life force” (w)

“White symbolizes Caucasian race, which has led the world into technological achievements, but which in many cases continues to damage the environment, for example ozone layer. We need collectivity to heal the earth. I am a human being, therefore I use common sense.” (w)

“The white race has improved technology for harvesting food from Nature, which makes life easier for us. But we should always remember that without Nature, human beings are nothing. Our dependency on Nature should never be forgotten.” (w)

“The sun is the hub of the universe. All our planets in the solar system revolve around the sun. Without the sun the Earth would die.” (w)

“When the sun gets hot in August, I feel the presence and the power of the Great Spirit. When the cold north wind blows in the winter, I can feel the presence and the power of the Great Spirit.” (w)

“It is all connected to give us direction and maintain balance, which we access through sweatlodge. That is the essence of the sweatlodge. First Nations people say the sweatlodge represents the womb of our birth mother, Mother Earth, and the universe.” (w)

“You will never be purer than at the moment you are born or humbler than when you are within your last breath of life. We are connected to our Earth Mother through the blood and water of her womb.” (w)

“Dependence on all of our life supports: air, food, sun, water, earth, and fire... Water is the First Nation’s definition of unconditional love. Water gives without the beginning or end... It is our responsibility to secure the health of the elements that feed us goodness and life for future generations.” (w)

Rekmans, L., in Hankard. (2003). *This is my homeland stories of the effects of nuclear industries by people of the Serpent River First Nation and the north shore of Lake Huron*. Cutler, Ont: Serpent River First Nation.

### **1. Establish the Context**

The book *This is my homeland stories of the effects of nuclear industries by people of the Serpent River First Nation and the north shore of Lake Huron* written collectively by Serpent River First Nation in 2003, edited by Anabel Dwyer, Keith Lewis, Lorraine Rekmans, is a collective voice of story and common struggle of the community as a result of the various forms of mining, including uranium mining. Collection of the community voice is a result of the common problems faced by the community for many years. Entire community was affected by the uranium mining, corporate greed, industrial and government negligence when it comes to outstanding issues. Many of the community members have no choice but to face hazardous conditions implemented by the uranium industry right the community borders. Traditional lifestyle, availability of clean drinking water, air and healthy environment was once and forever changed with development of uranium mining in the surrounding Elliot Lake area. Book *This is My Homeland*, provides readers with real life stories and common problems faced by community members.

### **2. Explore the Production Process**

*This is my homeland stories of the effects of nuclear industries by people of the Serpent River First Nation and the north shore of Lake Huron* is written collectively by the Serpent River community members, and community Chiefs and Elders. Book provides an example of the ongoing, lifelong process of collective struggle in relation to profit seeking corporations. Stories are based on the small Anishnawbe community in Northern Ontario, located right next to the world's largest uranium deposits. Community members play an important role when it comes to collective awareness when it comes to dangerous consequences of uranium mining. Many community members were employed directly in the dangerous industrial setting of uranium mining, consequences of which have been noticed in the overall health of the community.

### **3. Prepare Material for Analysis**

*This is my homeland stories of the effects of nuclear industries by people of the Serpent River First Nation and the north shore of Lake Huron* is an important reference when it comes to devastating consequences of uranium mining in relation to community, traditional lifestyle, traditions, and environment in general. Collective struggle against, voices, and stories oriented to spread awareness when it comes to world nuclear energy production, and negative consequences of unsafe uranium extraction/production process.

### **4. Code Material**

Radioactive danger (r)

Community Health, Social Impacts and Experience of Affected Populations (info retrieved from the text) (e)

Impact on traditional lifestyle (i)  
 Historical injustice (h)  
 Contamination of the surrounding environment (c)  
 Indigenous worldview (w)

## 5. Examine the Structure of the Text

*“What are you loosing is Forever”*

The section of the book “The Voices” designed to address the voices of the community members, real life stories. Many community members address numerous instances of social injustice, cases of the destruction of nature that forever altered traditional lifestyle.

## 6. Collect and Examine Discursive Statements

“There are stories of Anishnawbe communities about how people in the beginning were used to help locate the mineral. It was said that Anishnawbe people could actually smell the veins of uranium under the ground. They said it stunk, smelled bad and would not live on the ground above the veins.” (w)

“I am Earl Commanda, Chief of the Serpent River First Nation...This Ojibwe community was self-sustaining prior to discovery of uranium... We are the people who lived off the land. We hunted, we fished, we trapped. And every family had their own family garden. They took fish out of the river, out of the lake. The territory was relied upon for trapping that went on there. In the summertime everybody did things like pick blueberries and used them to supplement their incomes or to make preserves to carry them through the winter. Many of the men had their own fishing nets and trapping areas all throughout this area, on reserve and north of the reserve.”

“Soon after they discovered uranium we lost our mineral rights. It was a unilateral government decision to take those away. We were never able to get them back”. (h)

“The thing we were concerned about was with everything north of the reserve, what they did was – all these twelve uranium mines that were operating – they made sure that all the water continued from the effluents to flow past our community on the Serpent River watershed. Although we have kids who swim in there, there was no real protection from the contaminants that were coming through there.” (r), (e), (h), (c)

“There were different standards. There were provincial standards and national standards, and for some reason the federal government had lowered standards than the provincial government. So it was quite alright for us to drink the water, but our neighboring municipality was told, ‘You’ve got to have water treated’ (e)

“About 200 million tons of uranium tailings are stored behind seven huge earthen dams in the Serpent River watershed. The oxygen continues to affect the pH of the tailings because the milling process uses sulfuric acid. The solution is to bury the tailings under water in tailings ponds or lakes. What we’re worried about is what happens if those dams break or there’s more rain in a given year than those dams were meant to sustain.” (r), (c)

*“Keith Lewis:* There is difficulty...when you try to quantify what it means to society to lose their culture, their identity, their self-esteem, their language, and all the things to do with it. You can’t. My view is that any approach in terms of compensation has to be first based on a concept of perpetuity. It’s got to be forever, because, basically, what you are losing is forever.” (e)

“The resultant contamination, destruction and degradation of hunting, fishing and gathering areas is grossly offensive and inevitably an assault on the entire way of life shared by Original people for generations. There are ten lakes lost for eternity at Elliot Lake. These lakes were used as dumping grounds for radioactive waste. There is no sanitary way to describe the incident.” (i), (h), (c), (r)

“We drank most of that water because...actually, before the mines came you could look right down that water, the sand looked like jewels down there. But now, a couple years later, that sand grain is scum.” (e)

“Remember the beaver, where they build their homes. They’re chewing on the trees, they’re swimming in the water, and then, in order to go out there and get the beaver, you have to go through the territory. You might be getting into the water; you might be getting into a pool where sediment was accumulated. So, all those relations are what you’re talking about.” (e)

“Good clear drinking water and fish habitat, wildlife, and plants have been destroyed for the benefit of few people.” (h)

“The devastating effects of nuclear industries on this remote Anishnabe community undeniably and unmistakably involve international corporations, governments and institutions.” (h)

Gray, R. (2019). *The true toll of the Chernobyl disaster*. <https://www.bbc.com/future/article/20190725-will-we-ever-know-chernobyls-true-death-toll>

## 1. Establish the Context

The article *The true toll of the Chernobyl disaster* written by Richard Gray addresses the devastating effects of the Chernobyl nuclear accident. It is difficult to estimate the true number of people affected by this national tragedy. Article written by Richard Gray aims to reveal the truth associated with the true toll of the casualties and affected population. Part of the problem when it comes to finding the truth is the classification of data by the government, in an attempt to diminish the real consequences of the tragedy. Initial effects of the tragedy were little known, with many receiving a lethal dose of radiation. A strong emphasis of the article is placed on empathy with those whose lives were once and forever changed as a result of the safety design flaw. The explosion occurred during the process of safety testing, resulting in the spread of highly radioactive material. From the article, the reader could derive an inevitable truth related to learning from one’s mistakes of the past and avoiding similar mistakes from reoccurring in the future. The Chernobyl national tragedy changed the lives of ordinary people once and for all, people who have been left to deal with consequences from one of the major radioactive exposures based on what is thought to be indestructible safety design. Generations of children are born with birth defects and various related illnesses as a result of human actions.

## 2. Explore the Production Process

Richard Gray is a Freelance journalist and senior journalist at BBC Future. Additionally, Richard Gray is a science journalist and biochemist. A considerable part of the publications is directly related to the subject of science. Some of the recent article publications include covid-19 awareness and guidance procedures. Some of the important works published related to safety and hazards awareness, one example included is would face shields protect you from coronavirus.

### 3. Prepare Material for Analysis

*The true toll of the Chernobyl disaster provides an important insight when it comes to the consequences of human actions. Article addresses real life scenarios of an entire nation affected by a radioactive outbreak. The lives of the first respondents, their families, ordinary citizens and generations of newborn children were once and for all altered as a result of this devastating accident. The article written by Richard Gray is an important reminder of our past, and a chance to influence the future.*

### 4. Code Material

Radioactive danger (r)

Community Health, Social Impacts and Experience of Affected Populations (info retrieved from the text) (e)

Contamination of the surrounding environment (c)

### 5. Examine the Structure of the Text

*The article *The true toll of the Chernobyl disaster oriented to spared awareness when it comes to mistakes of the past and potential radioactive danger. An entire town was relocated as a result of this tragedy, with many affected on different levels of exposure, the aftermath of which is relevant up to this day.**

### 6. Collect and Examine Discursive Statements

*“The Chernobyl disaster is the largest anthropogenic disaster in the history of humankind”*

“Springtime was always the busiest time of year for the women working at the wool processing plant in Chernihiv, northern Ukraine. More than 21,000 tons of wool passed through the factory from farms all across the country during the annual sheep shearing period. The April and May of 1986 were no exception. The workers pulled 12-hour shifts as they sorted the piles of raw fleece by hand before they were washed and baled. But then the women started getting sick. Some suffered nosebleeds, others complained of dizziness and nausea. When the authorities were called to investigate, they found radiation levels in the factory of up to 180mSv/hr. Anyone exposed at these levels would exceed the total annual dose considered to be safe in many parts of the world today in less than a minute.” (r), (e)

“Fifty miles away was the Chernobyl nuclear power plant. On 26 April 1986 reactor number four at the power plant suffered a catastrophic explosion that exposed the core and threw clouds of radioactive material over the surrounding area as a fire burned uncontrollably... here were 298 women in this factory who were given liquidator status, which was normally reserved for those who had documented exposures during the early days of the clean-up after the accident.” (r), (c), (e)

“In 2005 the UN predicted a further 4,000 people might eventually die as a result of radiation exposure from Chernobyl.” (e)

“Thousands of animals were slaughtered in the area around Chernobyl as it was being evacuated.” (r), (c)

“In the weeks and months that followed the Chernobyl disaster, hundreds of thousands of firefighters, engineers, military troops, police, miners, cleaners and medical personnel were sent into the area immediately around the destroyed power plant in an effort to control the fire and core meltdown, and prevent radioactive material from spreading further into the environment. These people – who became known as “liquidators” due to the official Soviet definition of “participant in liquidation of the Chernobyl nuclear power plant accident consequences” – were given a special status that meant they would receive benefits such as extra healthcare and payments. Official registries indicate that 600,000 people were granted liquidator status... They estimated that between 112,000 and 125,000 of these – around 15% – had died by 2005.” (r)

“In Ukraine, death rates among these brave individuals have soared, rising from 3.5 to 17.5 deaths per 1,000 people between 1988 and 2012. Disability among the liquidators has also soared. In 1988 68% of them were regarded as healthy, while 26 years later just 5.5% were still healthy. Most – 63% – were reported to be suffering from cardiovascular and circulatory diseases while 13% had problems with their nervous systems. In Belarus, 40,049 liquidators were registered to have cancers by 2008 along with a further 2,833 from Russia.” (r), (e)

“It took a day and a half before the evacuation began and led to 49,614 people being evacuated. Later a further 41,986 people were evacuated from another 80 settlements in a 30km (18.7 mile) zone around the power plant, but ultimately some 200,000 people are thought to have been relocated as a result of the accident.” (r)

“In hospitals throughout the region and as far away as Moscow, people were flooding in with acute symptoms... The accounts indicate at least 40,000 people were hospitalized in the summer after the accident, many of them women and children.” (r)

“The National Research Center for Radiation Medicine estimates around five million citizens of the former USSR, including three million in Ukraine, have suffered as a result of Chernobyl.” (r)

“Mortality rates in radiation contaminated areas have been growing progressively higher than the rest of the Ukraine. They peaked in 2007 when more than 26 people out of every 1,000 died compared to the national average of 16 for every 1,000.” (r), (e)

“In total some 150,000sq km (57,915 sq. miles) of Belarus, Russia and Ukraine are considered to be contaminated and the 4,000sq km (1,544 sq. miles) exclusion zone – an area more than twice the size of London – remains virtually uninhabited.” (c)

NHBP. (2022). *Seven Grandfather Teachings*. <https://www.nhbpi.org/seven-grandfather-teachings/>

## 1. Establish the Context

The article *The Seven Grandfather Teachings* written by Nottawaseppi Huron Band of the Potawatomi, a Federally Recognized Tribal Government highlight Indigenous world views since the beginning of time. The article emphasizes core values associated with Indigenous society, teaching that evolves everything around us to live a good life. An important principle is set as guidance towards action with one another based on the fundamental principles; Love, Respect, Bravery, Truth, Honesty, Humility, Wisdom. Part of the guidance is generational storytelling based on the child chosen to be taught by The Seven Grandfather Teachings to live an honest and righteous life. An important emphasis is placed on the principle of using all teaching equally, in combination and in balance. One example is you can not be Honest if you are not using other

teachings. The Seven Grandfather Teachings is an important tool guide when it comes to Indigenous worldviews, knowledge and Indigenous research.

## **2. Explore the Production Process**

*The Seven Grandfather Teaching* is based on the mutual respect and coexistence of Indigenous nations, universal harmony with nature, the spirit world and everything that surround us. Part of the teaching emphasizes harmony and respect for one another. The Seven Grandfather teachings highlight generational knowledge of Indigenous peoples shared and valued as fundamental principles of a good life. Generational wisdom highlights that Neshnabék used to live in a negative way, which impacted their actions, thoughts and choices. “Others revealed pride or were full of shame.” Teaching addresses how a child was chosen by the messenger to be taught by the Seven Grandfathers, how to live life with dignity. Those teachings play a fundamental role when it comes to guidance and the way of life of Indigenous peoples. After teaching, the child was left with a choice to implement or not such teachings. Each and every one of us represents the child and it is up to us to use these teachings or not. Our actions have universal consequences, positively or negatively affecting everything around us.

## **3. Prepare Material for Analysis**

*The Seven Grandfather Teaching provides an important message when it comes to the appropriate way of living, based on the condition of allowing generational wisdom into one’s heart. Teachings are found on the universal principles of respect, love, bravery, truth, honesty, humility, and wisdom. Those are the cornering stones when it comes to self-protection and a good way of life. The article describes in detail the above listed fundamental principles and leaves the reader with a decision when it comes to the implementation of teachings shared through generational wisdom.*

## **4. Code Material**

Indigenous worldview (w)

## **5. Examine the Structure of the Text**

*The Seven Grandfather Teachings* designed to spread awareness when it comes to Indigenous worldviews, address generational knowledge consequently affecting the wellbeing of those who choose to allow teachings into their hearts. Text addresses major viewpoints and thought lessons of Love, Respect, Bravery, Truth, Honesty, Humility, and Wisdom.

## **6. Collect and Examine Discursive Statements**

“Each one of us represents the child. We must faithfully apply the teachings of our Seven Grandfathers to our own lives. We must place our trust in the Creator. We must also never forget to be sincere in our actions, character, and words.” (w)

“**Love** Knowing love is to know peace. Our love must be unconditional. When people are weak, that is when they need love the most. Love is a strong affection for another. This can form

between friends and family. Love is an attachment based upon devotion, admiration, tenderness, and kindness for all things around you. For one to love and accept themselves is to live at peace with the Creator and in harmony with all of creation. Love knows no bounds. We must accept it sincerely and give it freely.” (w)

“**Respect** A way to honor creation is by showing respect. There should be no part of creation that should be excluded from the honor that we are to give. We demonstrate respect by realizing the value of all people and things, and by showing courteous consideration and appreciation. We must give respect if we wish to be respected. We honor the traditional roles that we fill and the teaching we have been given. We honor our families and others, as well as ourselves. We are not to bring harm to anyone or anything. Respect is not just an action, but a heart-grown feeling.” (w)

“**Bravery** Facing a problem with integrity is a true demonstration of bravery. We do what is right even when the consequences may be unpleasant. We face life with the courage to use our personal strengths to face difficulties, stand tall through adversity, and make positive choices. We must stand up for our convictions and have courage in our thinking and speaking. All of these actions together will lead to ceaseless bravery.” (w)

“**Truth** is having the knowledge of our cultural teachings. It gives us the ability to act without regret. We must understand, speak, and feel the truth, while also honoring its power. Truth should not lead us to deceptions. We know who we are in our heart. By knowing that, we also know the truth. Our emotional, physical, mental, and spiritual gifts will guide each one of us in our journey.” (w)

“**Honesty** Facing a situation is to be brave, but having the courage to not only do the right thing, but also saying it, is honesty. We must allow truth to be our guide. We must first be honest with ourselves. This will allow us to be honest with others. We must give full value to both the efforts of our own and others. When we walk through life with integrity, it is then that we know honesty. Be truthful and trustworthy. We must also remember to accept and act on truths through straightforward and appropriate communication.” (w)

“**Humility** is to know that we are a part of creation. We must always consider ourselves equal to one another. We should never think of ourselves as being better or worse than anyone else. Humility comes in many forms. This includes compassion, calmness, meekness, gentleness, and patience. We must reflect on how we want to present ourselves to those around us. We must be aware of the balance and equality with all of life, including humans, plants, and animals.” (w)

“**Wisdom** The mixture of these teachings, combined with the experiences of life, is what we refer to as wisdom. It is given to us by the Creator to be used for good. Wisdom carries other meanings, which also include intelligence or knowledge. When we cherish our knowledge or intelligence, we are also cherishing our wisdom. We must use sound judgement along with the ability to separate inner qualities and relationships. We must use a good sense and course of action to form a positive attitude. We must remember to listen and use the wisdom that has been provided by our Elders, Tribal leadership, and our Spiritual leaders. We must also always remember that Wisdom comes in all shapes, sizes, forms, and ages.” (w)



Rust, S. (2019). How the U.S. betrayed the Marshall Islands, kindling the next nuclear disaster. <https://www.latimes.com/projects/marshall-islands-nuclear-testing-sea-level-rise/>

### **1. Establish the Context**

The article written by the Los Angeles Times signifies the legacy of nuclear testing and unjust actions towards Indigenous peoples of Pacific Nations. The article describes how during the cold war, the United States detonated 67 nuclear bombs in and above the Marshall Islands. Part of the nuclear waste exposure was a production of the nuclear dome that holds more than 3.1 million cubic feet of volume equivalent to 35 Olympic size pools containing radioactive soil and debris including lethal amounts of plutonium. Part of the problem aside from the creation of the nuclear storage site in the first place is the rigidity of the side as well as direct exposure to ocean tides. During 1946-1958 the United States conducted nuclear weapon testing “vaporizing entire islands, carving craters into its shallow lagoons and exiling hundreds of people from their homes.” The strong emphasis of the article is focused on the destruction of the traditional lands and waters of Pacific Nations, as well as environmental distraction resulting in irreversible damage to the environment that takes millions of years to form. *How the U.S. betrayed the Marshall Islands, kindling the next nuclear disaster* is a crucial reminder of how human actions could cause irreversible damage to the delicate ecosystem and lives of Indigenous peoples who resided there a long time before colonization arrived.

### **2. Explore the Production Process**

Susanne Rust is an investigative reporter who specializes in environmental issues. Susanne Rust is employed by Los Angeles Times, and previously was an editor at Columbia University Energy and Environmental Reporting. Susanne Rust is an important member of the nature conservation movement and recipient of numerous journalist awards. One of the major awards includes the George Polk and John S. Oakes award for environmental reporting. Some of the contributions include “Tensions rise in Ecuador and Peru as Chinese fishing fleet moves south from Galapagos”, “How climate change is fueling record-breaking California wildfires, heat and smog”, “The U.S. says leaking nuclear waste dome is safe; Marshall Islands leaders don’t believe it.” Besides, Susanne Rust shared the National Headliner Award in the 2010 “series on conflicts of interest involving doctors and researchers at the University of Wisconsin”.

### **3. Prepare Material for Analysis**

The primary analysis of the article *How the U.S. betrayed the Marshall Islands, kindling the next nuclear disaster* involves the relocation of hundredths of people from their homes and environmental distraction as a result of the years of nuclear testing. As a result, certain atolls have similar levels of radiation compared to Chernobyl.

### **4. Code Material**

Impact on traditional lifestyle (i)

Community Health, Social Impacts and Experience of Affected Populations (info retrieved from the text) (e)

Historical injustice (h)  
Radioactive danger (r)

## 5. Examine the Structure of the Text

Article *How the U.S. betrayed the Marshall Islands, kindling the next nuclear disaster* written by Suzanne Rust helps readers visualize devastating consequences of nuclear weapons testing and other related activities. The text timeline describes chronological weapons testing including geographical data.

## 6. Collect and Examine Discursive Statements

“Between 1946 and 1958, the United States detonated 67 nuclear bombs on, in and above the Marshall Islands — vaporizing whole islands, carving craters into its shallow lagoons and exiling hundreds of people from their homes...U.S. authorities later cleaned up contaminated soil on Enewetak Atoll, where the United States not only detonated the bulk of its weapons tests but, as *The Times* has learned, also conducted a dozen biological weapons tests and dumped 130 tons of soil from an irradiated Nevada testing site. It then deposited the atoll’s most lethal debris and soil into the dome...Now the concrete coffin, which locals call “the Tomb,” is at risk of collapsing from rising seas and other effects of climate change. Tides are creeping up its sides, advancing higher every year as distant glaciers melt and ocean waters rise.” (r), (h), (c)

“Officials in the Marshall Islands have lobbied the U.S. government for help, but American officials have declined, saying the dome is on Marshallese land and therefore the responsibility of the Marshallese government.” (r), (e), (h), (c)

“Nerje Joseph, 72, was a witness to the largest thermonuclear bomb tested by the United States: The Castle Bravo detonation. She was 7 years old at the time, living with her family in Rongelap Atoll, 100 miles east of Bikini Atoll — a tropical lagoon commandeered for nuclear testing. On March 1, 1954, Joseph recalls waking up and seeing two suns rising over Rongelap. First there was the usual sun, topping the horizon in the east and bringing light and warmth to the tropical lagoon near her home. Then there was another sun, rising from the western sky. It lit up the horizon, shining orange at first, then turning pink, then disappearing as if it had never been there at all. Joseph and the 63 others on Rongelap had no idea what they had just witnessed. Hours later, the fallout from Castle Bravo rained down like snow on their homes, contaminating their skin, water and food. According to Joseph and government documents, U.S. authorities came to evacuate the Rongelapese two days later. By that time, some islanders were beginning to suffer from acute radiation poisoning — their hair fell out in clumps, their skin was burned, and they were vomiting.” (r), (e), (i), (h), (c)

“U.S. government documents from the time show that officials weighed the potential hazards of radiation exposure against “the current low morale of the natives” and a “risk of an onset of indolence.” Ultimately they decided to go forward with the resettlement so researchers could study the effects of lingering radiation on human beings.” (r), (h), (e), (c)

“Between 1948 and 1958, the U.S. military detonated 43 atomic bombs here. After agreeing to a 1958 temporary moratorium on nuclear testing with the United Kingdom and the Soviet Union, the U.S. began using the atoll as a conventional and bioweapons testing ground. For the next 18 years, the U.S. shot ballistic missiles at it from California, tested virulent forms of bacteria on its islands and detonated a series of other large, conventional bombs in the lagoon. In 1972, after the

U.S had nearly exhausted its military interest in the region, it invited the leaders of Enewetak back to see the atoll for the first time since 1946. According to a Department of Energy report of the event, the Enewetak leaders “were deeply gratified to be able to visit their ancestral homeland, but they were mortified by what they saw.” ... The islands were completely denuded. Photos show an apocalyptic scene of windswept, deforested islands, with only the occasional coconut tree jutting up from the ground. Elsewhere, crumbling concrete structures, warped tarmac roads and abandoned construction and military equipment dotted the barren landscape. (e), (r), (i), (h), (c)

“One test shot, Quince, misfired Aug. 6, 1958, and sprayed plutonium fuel across Runit Island. The Department of Defense and the Lawrence Livermore National Laboratory, which was sponsoring the test, ordered soldiers into the contaminated ground zero to prepare the site for the next bomb, 12 days later. Soldiers swarmed in with bulldozers and earthmoving equipment, pushing the radioactive soil into big debris piles that they shoved into the lagoon, the ocean or possibly left alone; government reports differ on these details. What is clear, and which has never been reported before, is that 130 tons of soil transported 5,300 miles from an atomic test site in Nevada was dumped into a 30-foot-wide, 8-foot-deep ‘conical plug’.” (r), (i), (h), (c)

“Today, 40 years after it was constructed, the Tomb resembles an aged, neglected and slightly diminutive cousin of the Houston Astrodome. Spiderweb cracks whipsaw across its cap and chunks of missing concrete pock its facade. Pools of brown, brackish water surround its base, and vines and foliage snake up its sides. The Tomb, which was built atop an unlined crater created by a U.S. nuclear bomb, was designed to encapsulate the most radioactive and toxic land-based waste of the U.S. testing programs in Enewetak Atoll. This included irradiated military and construction equipment, contaminated soil and plutonium-laced chunks of metal pulverized by the 43 bombs detonated in this 2.26-square-mile lagoon, according to U.S. government documents.” (r), (h), (c)

Raj, A. (2019). In Marshall Islands, radiation threatens tradition of handing down stories by song. <https://www.latimes.com/projects/marshall-islands-radiation-effects-cancer/>

### 1. Establish the Context

In the article written by Ali Raj, *In Marshall Islands, radiation threatens the tradition of handing down stories by song* authors describing devastating effects of radiation and how people of Marshall Islands cope with generational trauma as a result of the radioactive exposure. Article address how through generations people of the Marshall Islands have told their history through song; “*They sang of unrequited love, sea voyages, marine life, faith, family legends.*” The article highlights the story of Carlton Abon, one of the famous islander’s balladeers who had promising career prospects. The story further describes Carlton’s personal history of developing thyroid disorder, commonly developed among islanders as a result of the US nuclear weapons testing during the cold war era. Many residents have been exposed to toxic and radioactive elements throughout the years of nuclear weapons testing, collectively accounting for more than 7,000 Hiroshima bombs. In total 67 nuclear devices were detonated by the United States government between 1946-1958. In the case of Carlton Abon, doctors surgically removed thyroid gland cancerous development as a result of the radioactive iodine exposure. Many people of the Marshall Islands have developed various illnesses as a result of radioactive exposure. Article

written by Ali Raj aims to highlight how through generational storytelling, people of Marshall Islands cope with radioactive danger and generational trauma.

## 2. Explore the Production Process

Author, Ali Raj is a postgraduate Ph.D. student at Columbia School of Journalism. Some of the major publications include; “*Deadly heat is killing Americans: climate death toll rises after a decade of federal inaction*”, “*A flesh-eating bacteria lurking in waterways is killing people in the Carolinas*”, “*How a decade of neglect and politics undermined the CDC’s fight against climate change.*” Some publications are written by Ali Raj seen in Medium, The Guardian, Los Angeles Times and much more. Ali Raj conducted important research when it comes to populations affected by the radioactive outbreak, triggered by nuclear weapons testing.

## 3. Prepare Material for Analysis

The primary analysis of the article *in the Marshall Islands, radiation threatens the tradition of handing down stories by song* involves radiation affected population, coping with radioactive outbreak through the process of generational stories and songs. Implementation of traditional worldviews helps peoples of Marshall Islands to cope with the existing problem as well as help spread awareness, provide a fighting chance when it comes to revealing the truth about nuclear weapons testing. The power of music provides strength for the people of the Marshall Islands.

## 4. Code Material

Impact on traditional lifestyle (i)

Historical injustice (h)

Radioactive danger (r)

Community Health, Social Impacts and Experience of Affected Populations (info retrieved from the text) (e)

Contamination of the surrounding environment (c)

## 5. Examine the Structure of the Text

Article *in Marshall Islands, radiation threatens the tradition of handing down stories by song*, help readers visualize hardships people of Marshall Islands face daily, and derive strength through the power of music. The author well describes the experiences of radiation affected populations, as well as help highlight instances of injustices when it comes to impact on traditional lifestyle, the health of the community, environmental impact and overall well being of the radiation affected nation.

## 6. Collect and Examine Discursive Statements

“*Our history is passed down through music and chants.*”

— Daniel Kramer, Marshallese music producer

“For centuries, the people of the Marshall Islands have told their history through song. They sang of unrequited love, sea voyages, marine life, faith, family legends... Abon, a stout man of 40 with

a bristly beard and toothless smile, is one of at least a dozen prominent Marshallese musicians with voices damaged by thyroid disorders — a type of illness that increased in the Marshall Islands after residents were exposed to fallout from U.S. nuclear weapons testing.” (r), (i), (h), (c)

“Between 1946 and 1958, nearly 20 years before Abon was born, the U.S. detonated 67 nuclear devices in the Marshall Islands that had a cumulative radioactive yield of more than 7,000 Hiroshima bombs. Radioactive fallout from the tests devastated people’s health and was later documented to have caused an elevated incidence of thyroid disorders. First reported in the country in 1961, these disorders have afflicted at least 1,500 Marshallese who were alive during the testing period.” (e), (r), (h), (c)

“Yet the nuclear tests helped unravel the cultural fabric of the Marshallese, which had already been frayed by centuries of Spanish and German colonial rule, Japanese annexation in 1914 and then the era of U.S. domination. The traditional songwriting “has not only changed, but it is dying,” said Abacca Anjain-Maddison, a former senator of the Marshall Islands. “We don’t see composers anymore.” Kramer, the music producer, said: “You have an older generation that was unable to pass down what it could if it was at its full potential. If even one or two of its talented artists are affected, it has a big impact on a small community.” (e), (r), (h)

*“Sometimes I wonder why all the people in the U.S. are not aware of what their government has done to these tiny islands.”*

— Justina Langidrik, 67, musician

“Tarines Abon, 75, who continues to write songs and train choirs despite past treatments for stomach cancer and a thyroid tumor his doctors are now watching. When a Times photographer visited him at his Majuro home in May, Abon, no relation to Carlton Abon, struggled to reach some of the higher notes he was singing.” (e), (i)

“Justina Langidrik, 67, who sang as a soprano with the United Church of Christ choir in Majuro until doctors diagnosed her with thyroid cancer in 1984. The physicians removed Langidrik’s thyroid, taking away her singing voice, which she only partially regained a few years later. Today, when her health permits, she tries to teach her songs to young choristers.” (e), (i)

“Neisen Laukon, 66, grew up in Rongelap when exposures to radioactivity were at their peak. Her father, Rongelap’s paramount chief, helped his people evacuate the atoll in 1985. She has had recurring health issues all her life, including problems with her thyroid. It’s also possible she passed on her condition to her offspring. Her daughter Faith Laukon, 43, was born and raised in Missouri and never lived on the affected atolls. Yet she has hypothyroidism.” (e), (i)

“On the morning of March 1, 1954, the U.S. tested a 15-megaton hydrogen bomb at Bikini Atoll in the north of the Marshall Islands. Called the Castle Bravo test, it was the largest detonation the United States has ever carried out. The explosion kicked up a mushroom cloud of fire more than 13 times as high as Mt. Baldy. Winds carried the fallout to neighboring atolls, including Rongelap, where people thought the ash falling from the sky was snow. As they came in contact with the debris, many started vomiting and experienced skin burns and other symptoms of radiation sickness. They were evacuated two days later. Within a week, U.S. officials initiated a top-secret program called Project 4.1, designed to study radiation exposure among the Marshallese.” (r), (h), (c)

“Starting 61 years ago, hundreds of Marshallese were exposed to radioactive fallout from U.S. nuclear weapons testing. Many developed cancers. The majority were diagnosed with thyroid cancer, often resulting in damage to their vocal cords and other medical problems.” (r), (e), (h)

Marshall, A. (2004). *Two-Eyed Seeing*.

<http://www.integrativescience.ca/Principles/TwoEyedSeeing/>

### **1. Establish the Context**

In the article *Two-Eyed Seeing* Elder Albert Marshall describe collective worldview and important guiding principle introduced into the Integrative Science in a co-learning journey. The Guiding Principle addresses a way of living in relation to mother nature, worldviews, and spirituality. It is an approach to view the world from the combined approach benefiting society. Primary emphasis focuses on combining Indigenous people’s knowledge and western science, to work together, deriving from the strength of both. The collective approach is oriented to protect nature, conserve the environment actively relying on Indigenous wisdom and western science. The article addresses importance when it comes to reliance on the Seven Generations Teachings, where actions of our ancestors lead us to who we are, our actions affect the present, future and influence the future, unborn generations. Article place emphasizes protecting nature and working collectively to benefit everyone. It is important to bring different ways of knowing together, to build a better world, founded on the principles of mutual respect and preservation of mother nature. Elder Albert Marshall emphasizes the need for mindset and attitude change to collectively overcome these challenges. Considerable attention devoted to co-existence with the surrounding environment, ecological, and spiritual harmony is part of Indigenous worldviews. Relationship building, according to Elder Albert Marshall our foundational basis of any relationship in an exchange of stories.

### **2. Explore the Production Process**

Author, Albert Marshall is an Elder of the Mi’kmaw Nation. He lives in Eskasoni First Nation in Unama’ki (Cape Breton), an advocate of cross-cultural understanding, collective works when it comes to caring for Mother Earth. Elder Albert Marshall is an important advocate when it comes to environmental issues, and part of the various committee membership positions when it comes to natural resources management that serves First Nations governance issues. In February 2009, Albert Marshal was awarded the Marshal Award for Aboriginal Leadership as part of the Eco-Hero Awards. Elder Albert Marshall is an important advocate of implementing the Two-Eyed Seeing, the approach that involves inter relatedness, coexistence, interconnectedness, and community spirit. An idea founded on collective benefits deriving from collective knowledge and strength.

### **3. Prepare Material for Analysis**

The primary aim of the article *Two-Eyed Seeing* to describe the fundamental principle of working together, using both Indigenous and western worldviews for the collective good. One of the fundamental principles to be taken into account is respect for Mother Nature's coexistence with the surrounding environment. The seven Generation guidance principle is an important

worldview addressing the need to protect nature for future generations. Two Eye Seeing brings together different ways of thinking when it comes to collective wellbeing; protecting nature, conserving the environment using Indigenous wisdom and western science.

#### **4. Code Material**

Indigenous worldview (w)

#### **5. Examine the Structure of the Text**

The Two-Eyed Seeing article provides important information regarding conservation of the environment, coexistence with the surrounding environment, and protecting Mother Earth for future generations. Article based on universal connection, ecological, and spiritual harmony is part of Indigenous worldviews. The author well describes sharing principles and combining both knowledge of Indigenous and western knowledge, to achieve collective wellbeing. The visualization aspect helps the reader understand the idea, and Seven Generation responsibility emphasizes the importance of a collective approach when it comes to our future and the future of unborn generations.

#### **6. Collect and Examine Discursive Statements**

“We often explain Etuaptmunk - Two-Eyed Seeing by saying it refers to learning to see from one eye with the strengths of Indigenous knowledge’s and ways of knowing, and from the other eye with the strengths of Western knowledge’s and ways of knowing ... and learning to use both these eyes together, for the benefit of all.” (w)

“Etuaptmunk - Two-Eyed Seeing adamantly, respectfully, and passionately asks that we bring together our different ways of knowing to motivate people, Aboriginal and non-Aboriginal alike, to use all our understandings so we can leave the world a better place and not comprise the opportunities for our youth (in the sense of Seven Generations) through our own inactions.” (w)

“Netukulimk is a Mi'kmaw understanding that, in Albert's words, "takes you into a place where you are very conscious of how the human two-leggeds are interdependent and interconnected with the natural world ... this philosophy / ideology is so ingrained in your subconscious that you are constantly aware of not creating an imbalance." Key concepts within this understanding are: co-existence, interrelatedness, interconnectedness, and community spirit. Albert emphasizes that these four apply to our relationships with each other and with Mother Earth.” (w)

“Two-Eyed Seeing is hard to convey to academics as it does not fit into any particular subject area or discipline. Rather, it is about life: what you do, what kind of responsibilities you have, how you should live while on Earth ... i.e., a guiding principle that covers all aspects of our lives: social, economic, environmental, etc. The advantage of Two-Eyed Seeing is that you are always fine tuning your mind into different places at once, you are always looking for another perspective and better way of doing things.” (w)

“The guiding principle of Two-Eyed Seeing further helps us to acknowledge the distinct and whole nature of Indigenous knowledge and ways of knowing (i.e., such are represented as a whole eye). Similarly, it helps us recognize the distinct nature of Western knowledge and ways of knowing (i.e., such are also represented as a whole eye). At the same time, Two-Eyed Seeing asks that these two eyes work together (i.e., as they do in binocular vision).” (w)

“It may be that in a particular set of circumstances we will choose to call upon the strengths within Indigenous sciences, whereas in another set of circumstances we might choose to call upon those within the Western sciences. Two-Eyed Seeing can require a "weaving back and forth" between knowledge's, and this will draw upon abilities to meaningfully and respectfully engage in an informed manner in collaborative settings. To help us do this, we have developed the four big pattern knowledge understandings (with visuals) as tools...Two-Eyed Seeing, in that it speaks directly to the setting of collaborative, cross-cultural work, intentionally seeks to avoid the situation becoming a clash between knowledge's, domination by one worldview, or assimilation by one worldview of the knowledge of another.” (w)

Smith, L. T. (2008). *Decolonizing Methodologies: Research and Indigenous peoples*. Zed Books.

### **1. Establish the Context**

The book written by Linda Tuhiwai Smith *Decolonizing methodologies: research and indigenous peoples* (2008) addresses decolonizing methodologies and addresses some of the important criteria relevant to this research, one of which is community based research. Author actively questions western centered institutional research, as well as point out negative effects it has caused for Indigenous research. One of the sections focuses on defining Indigenous research in relation to the collective community wellbeing, and community focused research. One of the aims of this work is to decolonize western institutional research and provide guidance to non-Indigenous researchers. *Decolonizing methodologies* is an important tool guide when it comes to decolonization of Indigenous research.

### **2. Explore the Production Process**

Linda Tuhiwai Smith is a professor of Indigenous Education at the University of Waikato, Hamilton New Zealand. Linda Tuhiwai Smith holds Honorary Doctorate in Canada and received the Prime Ministers Award for Lifetime Achievement in Education. In addition, Smith is a world known researcher and contributor towards Indigenous research, community wellbeing. The work *Decolonizing methodologies: research and Indigenous peoples* (2008) unveils various research challenges Indigenous researchers experience as a result of colonization. Smith also made considerable contributions in terms of Indigenous education recognition by various academic institutions across the world.

### **3. Prepare Material for Analysis**

The primary analysis of the book *Decolonizing methodologies: research and Indigenous peoples* focused on Chapter 7 “Articling an Indigenous Research Agenda”, focusing on defining Indigenous community research, and the role of non-Indigenous researchers when it comes to community wellbeing.

### **4. Code Material**

Indigenous worldviews (w)



## 5. Examine the Structure of the Text

Primary aim of the chapter *Articling an Indigenous Research Agenda* is to highlight research conducted by Indigenous peoples. Aim of the book *Decolonizing methodologies: research and Indigenous peoples focused* written by the Smith addresses highly institutionalized research. In addition, research plays an important role in political and government structures, as well as private corporations and organizations. Smith emphasizes that disregarding how rich or poor the nation, corporation or industry is, the considerable amount of funds being spent on the research. In turn, the author highlights the importance of strong Indigenous research. Article promotes the significance of further development of Indigenous research as an important step towards self-determination and world vision according to Indigenous views.

## 6. Collect and Examine Discursive Statements

“It is striking that for indigenous peoples there are distinctly different ways of thinking about and naming research. Often projects are not referred to as research despite having research as a central core of the project activity.” (w)

“Research is also regarded as being the domain of experts who have advanced educational qualifications and have access to highly specialized language and skills... Communities carrying out what they may regard as a very humble little project are reluctant to name it as research in case it provokes the scorn and outrage of 'real' researchers. Furthermore, Indigenous communities as part of the self-determination agenda do engage quite deliberately in naming the world according to an Indigenous world view. What researchers may call methodology, for example, Maori researchers in New Zealand call Kaupapa Mao research or Maori-centred research. This form of naming is about bringing to the centre and privileging in Indigenous values, attitudes and practices rather than disguising them with Westernized labels such as 'collaborative research'.” (w)

“There are two distinct pathways through which an Indigenous research agenda is being advanced. The first one is through community action projects, local initiatives and nation or tribal research based around claims. The second pathway is through the spaces gained within institutions by Indigenous research centres and studies programmes.” (w)

“Defining community research is as complex as defining community. For example, ‘the community’ is regarded as being a rather different space, in the research sense, to ‘field’. ‘Community’ conveys a much more intimate, human self-defined space, whereas ‘field’ assumes a space ‘out there’ where people may not be present. What community research relies upon and validates is that the community itself makes its own definitions... Social research at community level is often referred to as community action research or emancipatory research. (w)

“In all community approaches, the process – that is, methodology and method – is highly important. In many projects the process is far more important than the outcome. Processes are expected to be respectful, to enable people, to heal and to educate. They are expected to lead one small step further towards self-determination.” (w)

Graetz, G. (2015). Energy for whom? Uranium mining, Indigenous people, and navigating risk and rights in Australia. *Energy Research & Social Science*, 8, 113–126.  
<https://doi.org/10.1016/j.erss.2015.05.006>

### **1. Establish the Context**

The article *Energy for whom? Uranium mining, Indigenous people, and navigating risk and rights in Australia* written by Geordan Graetz highlights the radioactive contamination danger when it comes to the uranium mining industry. The author further addresses historical challenges between Indigenous peoples and mining companies. Certain communities decide to participate in mining industry projects as a result of the large uranium deposits. The primary emphasis of the article addressed improving relationships between companies and Owners of the lands. With an increasing demand for uranium deposits more companies are approaching Indigenous for permission to develop uranium. The author further highlights that approximately 70 percent of uranium is located on, or near the lands of Indigenous peoples. Work was written by Geordan Graetz based with the aim for collective benefit and understanding when it comes to uranium mining on Indigenous lands.

### **2. Explore the Production Process**

Author Graetz Geordan is a researcher from the University of Queensland in Australia. Some of the works are associated with uranium mining and Indigenous peoples. Some of the contributed topics include Strategic Environmental Assessment; Social Impact Assessment; Environmental Impact Statements. Other uranium mining and radiation-related work would include Ranger Uranium Mine and the Mirarr; Nuclear Policy and Regulation in Japan after Fukushima: Navigating the Crisis; The politics of uranium mining in Australia. Graetz made an important contribution when it comes to the analysis of risks and impacts related to the uranium industry. The work “*Energy for whom? Uranium mining, Indigenous people, and navigating risk and rights in Australia*” is an important step towards relationship establishment between uranium mining companies and Indigenous peoples.

### **3. Prepare Material for Analysis**

Primary analysis conducted of the research paper “*Energy for whom? Uranium mining, Indigenous people, and navigating risk and rights in Australia*”, retrieved from *Energy Research and Social Science* peer-reviewed journal 2015, 8, pp. 113–126.

### **4. Code Material**

Radioactive danger (r)  
 Historical injustice (h)

### **5. Examine the Structure of the Text**

The primary argument of the article “*Energy for whom? Uranium mining, Indigenous people, and navigating risk and rights in Australia*” written by Graetz, Geordan oriented towards

engagement between resource developing companies and Indigenous peoples who are owners of the land. The article further highlights mutual benefits when it comes to improved relationships between Aboriginal peoples and uranium mining companies. Graetz further highlights resource-rich uranium deposits that account for 70% of the world's uranium deposits located on Indigenous lands, with Canada and Australia containing even higher estimates. Strong emphasis is placed on mutually beneficial outcomes when it comes to devoted attention to the rights of Indigenous peoples. The article further takes into consideration the increasing interest of Indigenous communities when it comes to participation in resource-developing projects. Graetz highlights reduced risk analysis and impacts through the positive approach when it comes to Indigenous rights. The author further focuses on the benefit for the mining companies, from the standpoint of mutual benefit derived from collective understanding and respect towards Indigenous culture, and rights of Indigenous peoples. Graetz points out that Indigenous people have been historically excluded from the discussion regarding energy production. One of the research directions aims to answer is there a way for the uranium mining companies and Indigenous peoples to achieve a mutually beneficial outcome?

## 6. Collect and Examine Discursive Statements

It is estimated that 70 per cent of the world's uranium is located on, or adjacent to, the lands of First Peoples...Radiation contamination of lands and waterways poses both objective and subjective risks to human and environmental health, particularly if corporate and regulatory risk, impact assessment, and management systems are lax. Accordingly, concerns about social and environmental impacts and their management, notably, the carriage and deposition of radioactive particulates; groundwater contamination; recognition of, and respect for, rights; cultural heritage protection; future land access and use; the occupational health and safety of mine workers; and the use of uranium in nuclear technologies, figure prominently in the minds of host First Peoples when evaluating the desirability and/or acceptability of a proposed uranium development. (r) The Australian uranium industry's past acknowledgement and management of these risks and impacts, and engagement with First Peoples' concerns and aspirations for social and economic development, arguably has been inadequate. (h)

"First Peoples traditionally have been excluded from discussions about energy production and consumption, and have suffered from both a lack of access to energy and from the impacts of (often unwanted) energy developments on their traditional lands." (h)

"However, in the last 20 years or so, industry participants have sought to improve perceptions of the sector, and to demonstrate that the sector presents few threats to human and environmental health. Industry participants also have begun to pay greater attention to the rights of First Peoples, and to engage in a manner that is respectful of their host community's aspirations, knowledge and interests."

"Some Australian First Peoples have become more receptive to uranium developments on their lands...Progress in the relationships between uranium companies and First Peoples in Australia comes several decades after similar developments in Canada. In that country, improved relationships between Aboriginal peoples and uranium companies has allowed for the establishment of Indigenous mine services businesses across the supply chain, profit sharing and joint ownership of operations, employment opportunities, and community investment programs.

Among uranium companies and some First Peoples, there is a growing understanding that uranium developments present opportunities to create ‘shared value’.”

Fouse, S. (2020). *An Ongoing Battle: Fighting the Impacts of Uranium Mining in Southwestern Indigenous Communities*. An Ongoing Battle: Fighting the Impacts of Uranium Mining in Southwestern Indigenous Communities | Environmental Law Institute. <https://www.eli.org/vibrant-environment-blog/ongoing-battle-fighting-impacts-uranium-mining-southwestern-indigenous-communities>.

## 1. Establish the Context

The article “*An Ongoing Battle: Fighting the Impacts of Uranium Mining in Southwestern Indigenous Communities*” written by Siena Fouse addresses historical injustices experienced by Indigenous communities in, the Southwestern United States as a result of uranium mining. Author highlights the dangerous impact of uranium mining since the early 1940s. Development of uranium was urgently demanded during the cold war era, extraction of which was conducted at the uranium-rich Colorado Plateau. As a result of the uranium mining, contamination of the environment and entire generations of Indigenous peoples have been affected up to the current day. The article aims to highlight instances of historical injustice and emphasize misguidance when it comes to effects and health danger concerning radioactive pollution. Fouse further points out violations of various health and safety measures during the mining process and improper mine closure procedures resulting in dangerous conditions for human health. The author conducted an important contribution by highlighting issues of uranium mining, and its effects on Indigenous peoples.

## 2. Explore the Production Process

Author, Siena Fouse currently is a Legal Assistant at The Law Office. Fouse conducted Research and Publication at Environmental Law Institute, where the article “*An Ongoing Battle: Fighting the Impacts of Uranium Mining in Southwestern Indigenous Communities*” was retrieved from. The research publication is based on one of the fundamental rights of Indigenous peoples, the right to live in a clean environment free of radioactive pollution. Further, Fouse is an important advocate for environmental sustainability and environmental justice. The author's contribution is an important step towards a better and safer future.

## 3. Prepare Material for Analysis

The primary analysis focused on the article “*An Ongoing Battle: Fighting the Impacts of Uranium Mining in Southwestern Indigenous Communities*”. Article retrieved from the Environmental Law Institute.

## 4. Code Material

Radioactive danger (r)  
Community Health, Social Impacts and Experience of Affected Populations (info retrieved from the text) (e)

Impact on traditional lifestyle (i)  
 Historical injustice (h)  
 Contamination of the surrounding environment (c)

## 5. Examine the Structure of the Text

The primary aim of the article is to highlight the ongoing struggle of Indigenous communities and the uranium mining industry. Historically, as a result of the uranium extraction, consequent pollution resulted in devastating effects on the health and wellbeing of Indigenous peoples. Community members who participated in the process of uranium mining were not advised regarding health hazards, and were not equipped with proper personal protection equipment. An additional concern is radioactive waste that was safely stored during and upon mine closures. The article, “*An Ongoing Battle: Fighting the Impacts of Uranium Mining in Southwestern Indigenous Communities*”, written by Siena Fouse aims to advocate on behalf of Indigenous communities by highlighting multiple instances of environmental injustice. The author further focuses on the outstanding issue of the not properly closed mines through the remediation process, with many continuing to pollute groundwater and the environment as a whole.

## 6. Collect and Examine Discursive Statements

“Indigenous communities were not told about the health risks uranium and radiation posed even though scientists and government officials knew of its hazards at the time. Tribes agreed to host mine sites and were hired as miners. Indigenous miners were underpaid, unethically treated as test subjects, and forced to do dangerous work without protective equipment. Miners and their families were exposed to uranium and radiation, causing health issues like bone cancer, kidney damage, and lung cancer.” (h), (c), (e), (r)

“While the 1979 Three-Mile-Island radiation event is well known, just three months later, the Puerco River saw the largest spill of radioactive material in U.S. history with little fanfare. A dam broke at a uranium mill site on the Navajo Nation reservation and caused widespread contamination. Mass death of livestock threatened their way of life. Navajo neuropathy, a disorder linked to uranium mining, caused muscle weakness, birth defects, and liver problems that often had fatal consequences. Adding further injury, the state denied the Navajo Nation disaster assistance for cleaning up the spill.” (h), (r), (e), (c)

“At the end of the Cold War in the 1980s, as U.S. government demand for building nuclear weapons ended, uranium mining operations ceased. However, the Uranium mine environmental degradation from mining activities continued and still continues today, extending an eight-decades-long public health crisis. Lasting health consequences have followed the miners and community members exposed to uranium and radiation. Mines were improperly sealed, resulting in water and soil contamination. Children swam in water collected in abandoned mine holes. Rock and material from the mines were used to build homes.” (h), (r), (i), (c)

“The close relationship indigenous communities have with the environment increased their vulnerability to the negative environmental health impacts associated with uranium mining. River water may be applied topically or ingested for ceremonial purposes and plants are used medicinally across indigenous land.” (w), (c)

“Indigenous miners’ applications for RECA are often denied, in part due to a language barrier and lack of documentation. Compensation for families of the miners who were exposed to radiation brought home on the miner’s clothes and materials was not included in the bill.” (h)  
 “Roughly 520 abandoned uranium mines in Navajo territory, only around 219 of these sites have been funded for remediation.” (c)

“In southwestern states like Arizona and New Mexico, Indigenous populations suffer higher mortality rates than other residents. Recent studies have found that people with cancer are more vulnerable to worse outcomes of COVID-19. Given that the effects of radiation exposure include lung cancer and bone cancer, there is reason to believe that the contamination from uranium mines and mills contributed directly to this increased COVID-19 vulnerability. One way to protect indigenous communities from future environmental contamination would be to pass congressional legislation giving tribal governments the authority to regulate uranium mining in areas that would impact them. With their health and traditional way of life at stake, southwestern indigenous communities have a vested interest in cleaning up the mine sites and ensuring that any future uranium mining operations proceed in the safest way possible. While working to meaningfully address this environmental justice issue, it’s important to keep in mind the painful history and lasting social and cultural impacts of uranium mining in Indigenous communities.” (h)

Heath, J. (2020). *The Violence of Nuclear Energy Against Indigenous Peoples, Land, Water and Air*. Atlantic Chapter. <https://atlantic2.sierraclub.org/content/violence-nuclear-energy-against-indigenous-peoples-land-water-and-air>.

## 1. Establish the Context

The article “*The Violence of Nuclear Energy Against Indigenous Peoples, Land, Water and Air*” written by Joe Health addresses the issues Indigenous peoples face as a result of the uranium mining industry. There are ageing nuclear reactors within traditional Onondaga Nation’s territory currently past their intended lifespan, the existence of which possesses potential concern concerning all living beings in the surrounding Lake Ontario area. Primary emphasis is placed on the uranium mining impacts for Indigenous Nations and Peoples. Article address some health concerning outcomes resulting in water and air pollution, contamination of surrounding environments, impact on the traditional lifestyle of Indigenous peoples and more. The primary orientation of the article described from the community standpoint about past, present and future risks associated with the uranium mining industry. “*The Violence of Nuclear Energy Against Indigenous Peoples, Land, Water and Air*” is an important work when it comes to highlighting challenges Indigenous peoples face on a daily basis.

## 2. Explore the Production Process

Author Joe Health is the general counsellor of the Onondaga Nation. His work is primarily oriented towards community wellbeing with environmental protection under Clean Water Act., with a primary focus on Onondaga Lake, Onondaga Creek. Joe Health played an important role representing Onondaga people in the archeological sites, unmarked burial sites and litigation of “Native American Graves Protection and Repatriation Act.”, “Indian Child Welfare Act.”, hunting and fishing rights, treaty rights, excessive tax issues, and land rights as described in Suny

Cortland. Joe Health plays an important role as a community advocate and Indigenous people's rights activist. “*The Violence of Nuclear Energy Against Indigenous Peoples, Land, Water and Air*” is an outstanding example of community wellbeing dedication, as well as Indigenous fundamental rights protection advocacy.

### 3. Prepare Material for Analysis

The primary analysis of the article “The Violence of Nuclear Energy Against Indigenous Peoples, Land, Water and Air”, written by Joe Health. Focuses oriented towards the danger of uranium mining and community wellbeing.

### 4. Code Material

Radioactive danger (r)

Community Health, Social Impacts and Experience of Affected Populations (info retrieved from the text) (e)

Impact on traditional lifestyle (i)

Historical injustice (h)

Contamination of the surrounding environment (c)

### 5. Examine the Structure of the Text

The Primary argument of “*The Violence of Nuclear Energy Against Indigenous Peoples, Land, Water and Air*”, written by Joe Health, aims to highlight various radioactive hazards caused by radioactive pollution and nuclear industry in general. Author addresses the hidden radioactive dangers such as contamination of air and waters, impossible to remove by air or water filters. The author further highlights the dangers of the aging nuclear reactors, accumulation of spent fuel rods, decay of radioactive isotopes, and the impact of the mining on Indigenous peoples and commonalities.

### 6. Collect and Examine Discursive Statements

“The nuclear industry negatively and disproportionately impacts on Indigenous peoples, nations, land and waters. Three aging Oswego nuclear reactors within the Onondaga Nation’s original territory are well past their designed life spans and are a danger to all beings living in relation to Lake Ontario.” (h)

“The entire life cycle of the nuclear power industry has huge negative impacts on Indigenous nations and peoples, from the mining of uranium in Indian country and the vast amounts of nuclear waste associated with the mining and milling of uranium, to the transportation of uranium and the proposed long-term storage of nuclear wastes on Indian country. Negative impacts continue and will worsen due to the current administration’s plan to resume uranium mining.”

“Uranium mining, milling and related industries destroy sacred sites, petroglyphs and ancestors’ unmarked burial sites, and contaminate drinking water. Traditional lifeways are made difficult or impossible because of contamination of water and land; sacred sites have been made inaccessible

or dangerous to access; and Indigenous peoples are forced to leave homelands they have occupied for centuries.” (h), (e), (i)

“Water contamination from uranium mining and tailings is widespread and especially damaging in southwestern states where water is scarce. Surface waters and aquifers are polluted by all phases of uranium mining and production. Water contamination includes various combinations of uranium, arsenic, copper, lead, molybdenum, selenium, sulfate, thorium, vanadium and radium.

Prior to any uranium mining, extensive explorations are conducted on Indian country, such as drilling thousands of holes and cores, and construction of extensive roads and truck pads on undisturbed, pristine lands. Most of these exploratory holes are not sealed or capped and create pathways between groundwater aquifers, allowing contaminated water to pollute clean drinking water supplies.” (c), (i)

“The Nuclear Regulatory Commission relies on self-reporting and computer modeling from reactor operators to track radioactive releases and projected dispersion of radioactivity. This means that a significant portion of the environmental monitoring data is extrapolated and virtual, but not real. Low-level radiation damages tissues, cells, DNA and other vital molecules in humans and all life forms; there is no safe dose.

One of the main radioactive isotopes of concern for both water and air releases from nuclear reactors is tritium (a radioactive isotope of hydrogen), which combines with oxygen to produce tritiated water and is readily absorbed through skin, lungs and the GI tract. Tritium is impossible to remove from air or water by filters and is absorbed by trees and plants, including food crops; when consumed it can be incorporated into tissue cells, becoming a dangerous human health risk.” (r)

“Some radioactive fission gasses from the reactor cooling water are contained in decay tanks for days before being released into the atmosphere, and some gasses leak into the reactor buildings’ interiors. The gasses, in addition to tritium, include noble gasses which rapidly decay to dangerous daughter isotopes, such as cesium-135 and strontium-90. Additionally, some contaminated water is intentionally removed from the reactor vessel to reduce the amount of the radioactive and corrosive chemicals; the water is filtered and then either recycled back into the cooling system or released into the environment.” (r), (c)

“A nuclear reactor produces hundreds of radioisotopes such as plutonium-239 (a component of spent fuel), which decays into various radioactive substances, such as thorium and radium, and must be isolated from the environment for at least 100,000 years to decay to a safe level. Radioisotopes produced in a reactor remain extremely hazardous from a few days to hundreds of thousands of years; these radioisotopes remain in fuel assemblies and as components of the resulting spent fuel.” (r), (c)

“When spent fuel rods are removed from a reactor, they are thermally hot and intensely radioactive; they must be immersed in deep pools of water. Once placed in a holding pool, spent fuel rods continue to decay and generate enormous amounts of heat. Cooling water must be circulated in the pools, requiring an uninterrupted source of power. Due to cost issues, operators keep rods in pools until full capacity, meaning that only about 25% of domestic spent fuel is stored in dry casks—stainless steel or concrete containers. Spent fuel rods are being stored at an average density of four times higher than originally intended. The higher density of fuel rod storage causes degradation in the neutron-absorbing materials that are required to prevent a self-sustaining chain reaction from starting; and it creates an added stress on the cooling and cleaning systems. Spent fuel rod storage pools have at least two potential hazards. If a leak develops it



could drain enough water to expose the fuel, or the water circulation system used for cooling could fail, which would cause the hot fuel rods to boil off the water in which they are stored and catch fire at 800 degrees Celsius.” (r)

PSR. (2022). *The Unequal Impacts of Nuclear Weapons*. Physicians for Social Responsibility | PSR. <http://www.oregonpsr.org>.

### **1. Establish the Context**

The article *The Unequal Impacts of Nuclear Weapons* written by PSR (Physicians for Social Responsibility) highlights the danger when it comes to the nuclear industry, primarily uranium weaponry testing and uranium mining. The article aims to address the unequal effects of radioactive contamination when it comes to certain groups of the population. Most specifically those who are disproportionately affected by the radioactive danger are women, children, Indigenous peoples and people of color. The article further highlights North American and Pacific Islands history concerning the radioactive contamination of the surrounding environment. The article also further challenges industry standards when it comes to radiation dosage standards, standards primarily designed for an able-bodied Caucasian male, regarding the “normal” height and weight. Further, the article takes into account uranium mining, weaponry production, and nuclear weapons testing. *The Unequal Impacts of Nuclear Weapons* is an important reference guide when it comes to the real, history-based effects of radioactive contamination.

### **2. Explore the Production Process**

PSR (Physicians for Social Responsibility) highlight the issues many communities face around the world. The organization focuses on preventing climate change, nuclear war, and contamination of the surrounding environment by various toxic elements. By employing medical and public health experience, the aim of the organization is to protect the environment, people and prevent nuclear war. PSR is a physician lead organization advocating for climate solutions and a nuclear weapons-free world. In 1985 PSR shared a Nobel Peace Prize with International Physicians for the Prevention of Nuclear War.

### **3. Prepare Material for Analysis**

Primarily analysis of the article *The Unequal Impacts of Nuclear Weapons*. Information retrieved from the Physicians for Social Responsibility | PSR website. Focuses of the article are oriented towards the impact of the nuclear industry.

### **4. Code Material**

Radioactive danger (r)

Historical injustice (h)

Contamination of the surrounding environment (c)

## 5. Examine the Structure of the Text

The primary argument of “*The Unequal Impacts of Nuclear Weapons*” is oriented to address the dangers of the nuclear industry and the unnecessary harm it causes to certain groups of the population. Important to note that groups of women, children, Indigenous peoples and people of colour are at greater risk due to various social factors. The article further addresses that Indigenous people tend to suffer greatly as a result of nuclear weaponry testing and uranium extraction through the mining process. As an outcome, certain groups of people are in greater danger compared to the majority of the population. Aim of the article to address inequalities that are affecting certain groups of the population due to the uranium industry.

## 6. Collect and Examine Discursive Statements

“Ionizing radiation—radioactivity powerful enough to strip electrons from atoms, break chemical bonds of molecules, and even break chromosomes—can be extremely harmful to humans. Even at low levels, ionizing radiation has the potential to cause DNA damage resulting in an uncontrolled division of abnormal cells, or what is commonly known as cancer”

“Although everyone is vulnerable to the health impacts of nuclear weapons, some experience more severe impacts than do others. Women, children, indigenous peoples, and communities of color are disproportionately impacted throughout the toxic life cycle of nuclear weapons.”

“For every two men who develop cancer through exposure to ionizing radiation, three women will get the disease”. While there is no definitive explanation, it has been speculated that women are more susceptible because they have more reproductive tissue than men; reproductive organs and tissue are more sensitive to radiation.”

“While children as a whole are more harmed by radiation than adults, infant and young girls, when exposed, run the highest risk of cancer across their lifetime, and teenage girls will suffer almost double rates of cancer compared to boys in the same juvenile group and the same level of exposure.”

“Systemic inequities, and often direct targeting, cause Indigenous peoples and communities of color to be more severely impacted by nuclear weapons. In the context of the US, the locations used for uranium mines, nuclear weapons production facilities, nuclear weapons test sites, and nuclear waste storage sites are largely on Native American lands, or otherwise sited near predominantly lower income communities and communities of color. Nuclear weapons were also tested on islands throughout the Pacific Ocean, including the Marshall Islands and others, with devastating health impacts. These are examples of “nuclear colonialism,” and this same pattern holds true for all nuclear powers globally, from the colonialism inflicted on aboriginal Australia and North and South America to central Africa and beyond.” (r)

“Indigenous Peoples and Communities of Color... Their sacred religious locations, food and water sources, livelihoods, and tracts of their ancestral lands have been appropriated and poisoned without consent.” (h)

“Uranium mining... At least 90% of all mining done in the US occurred on or just outside of Native American reservations. Heavily recruited to work in the mines, indigenous communities

were generally unaware of the health impacts of radiation. Not only is uranium mining extremely harmful to human and environmental health in itself, but accidental spills have been common and devastating. The Church Rock spill on Navajo Nation land, for example, released more radiation than the Three Mile Island accident.” (c)

“Weapons testing... Marshall Islands: 67 weapons were tested nearby, including the largest-ever US nuclear weapons test. In that case, with a sudden shift of winds and a much larger explosion than anticipated, deadly radioactive fallout landed on the Islands. Some land remains unlivable; “radiation levels in parts of that country are still almost double what has been deemed safe for human habitation”. (h), (c)

“Native American lands: Most testing happens on stolen Native American lands. “The Western Shoshone are the most bombed nation on the earth: 814 nuclear tests have been done on their land”. In the Nevada Test Site (on traditional Shoshone land), “approximately 1,350 square miles of their...territory have been destroyed by hundreds of craters and tunnels that are no more than unsupervised nuclear waste dumps”. (h), (c)

“Waste Storage... Indigenous land is usually selected for waste storage, often breaking treaties in the process. On other occasions, consent is given by tribes because—due to systemic inequities- “twice as many Native families live below the poverty line than other sectors of U.S. society and often have few if any options for generating income”. (h), (c)