



Oral Presentation

Exposé oral

**Written submission from
Women in Nuclear**

**Mémoire de
Women in Nuclear**

In the Matter of the

À l'égard de

BWXT Medical Ltd.

BWXT Medical Ltd.

Application for a Class IB nuclear substance
processing facility operating licence

Demande pour un permis d'exploitation d'une
installation de traitement de substances
nucléaires de catégorie IB

Commission Public Hearing

Audience publique de la Commission

June 9, 2021

9 juin 2021

**Summary Report of BWXT Medical Inc. Class 1B Nuclear Licence
Submission**



Version 2.6

May 2, 2021

Prepared for: Women in Nuclear Canada

Prepared by: Phil Larabie

Summary Report of BWXT Medical Inc. Class 1B Nuclear Licence Submission

Disclosure:

This summary report was prepared by Phil Larabie, a former Nordion and BWXT Medical Inc. (“BWXT”) business leader, under the terms of a consulting agreement with the “Women in Nuclear Canada” (“WiN”) industry association. The engagement scope is to:

- Review BWXT’s licence request application and related documentation, including BWXT and CNSC Commission Member Documents with a focus on the safety of female employees and the surrounding community
- Submit a written report to the CNSC summarizing comments from the review of the proposed licence request application and survey and participate at the Commission hearing.
- Assist in crafting and reviewing a draft membership survey

Introduction:

Medical isotopes are critical elements in the diagnosis and treatment of disease, including but not limited to cancer, heart ailments and the like. Medical isotopes have been in wide use for well over 50 years, with Nordion historically as a global leader in the manufacture and distribution of these short-lived products. The most important medical isotope is molybdenum-99 (Mo99) and its decay product, technetium-99m (Tc99m). Tc99m has ideal gamma ray emission characteristics for nuclear imaging and its versatile chemistry allows it to be tagged onto a variety of carrier molecules that then make the imaging agent site specific. Given Tc99m’s short half-life of 6 hours it is inefficient to produce and distribute from a central location so it is provided to local radiopharmacies and hospitals as part of a chemical generator system. In this, the parent isotope Mo99 is bonded to a substrate and its decay product, Tc99m, is eluted from the system periodically, compounded into the final form radiopharmaceutical ready for administration to a patient. This unit is termed a “Tc99m generator”.

In 2016 Atomic Energy of Canada permanently shut down the NRU reactor at Chalk River, Ontario. The NRU was Nordion’s irradiation source for many medical isotopes, including Mo99, which was then processed in Nordion’s Ottawa facility. BWXT acquired the medical isotope business unit from Nordion in 2018 and is

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nearing completion of new manufacturing processes and infrastructure for both Mo99 and the Tc99m generator system. The new infrastructure required is being built inside the same Nordion plant that historically produced these products in Ottawa.

To support this initiative, BWXT has applied to the Canadian Nuclear Safety Commission (“CNSC”) for a stand-alone Class IB Nuclear Substance Processing Facility Operating Licence. This report, developed in consultation with WiN, summarizes the author’s views on the licence application, with a focus on matters from the perspective of women, which was supported through collaboration with WiN Canada directly.

Information Sources Reviewed and Cited:

1. BWXT Medical Commission Member Document for a Class IB nuclear substance processing facility operating licence, submitted by BWXT to the CNSC on March 9, 2021.
2. CNSC’s Commission Member Document regarding the application dated March 10, 2021.
3. Results of an industry survey conducted by WiN issued to the author on April 26, 2021.
4. The author’s professional experience in the manufacture and distribution of medical isotopes.

The overall conclusion is that BWXT has satisfied the requirements for the licence. BWXT has an established and demonstrated capability to produce medical isotopes in quantity without posing undue risk to any person’s personal safety or to the environment. The three areas of concern identified in the WiN survey are adequately addressed by a number of the BWXT safety system elements and BWXT’s commitment to prioritize safety and environmental protection goals over other competing goals. WiN Canada fully endorses the application and urges the CNSC to proceed with the licence issuing process post-haste.

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Regarding BWXT's application:

It is important to note that Nordion had been safely manufacturing sizable quantities of medical isotope in the Ottawa facility for over 40 years. Throughout that time all activities were conducted under the auspices of a CNSC-issued Class IB nuclear licence with compliance being verified through periodic audits and site visits. Nordion's management team has a demonstrated history of meeting or exceeding the regulatory requirements as defined in the licence.

As part of BWXT's acquisition of that business in July 2018, approximately 150 employees were transferred from Nordion. These were the same employees who routinely engaged in operating the manufacturing processes and the management systems governing personal safety (for both employees and the community), environmental protection and regulatory compliance. Section 3.2 of BWXT's licence application includes a description of each element that, taken in total, reflect a well-established management construct to ensure due care and attention is paid to matters. Section 3.3 details the substantial investment BWXT makes in ensuring staff are adequately prepared to fulfill their roles in a safe and compliant manner. In essence, largely the same people and management systems that were responsible for Nordion's past track record of compliance are now working for or within BWXT. This instills a level of confidence that the management processes are well-established and well-utilized by knowledgeable, competent staff.

Of interest to WiN, the organizational structure shown in Section 3.2.2 delineates the key roles involved in the medical isotope business and although not shown, at least 6 of these key positions are held by women (as at the time of this writing). BWXT is truly an equal opportunity employer.

Section 3.6 discusses the facility from a Physical Design perspective. Safely producing and shipping medical isotopes requires highly specialized facilities to provide adequate shielding, ventilation and remote handling capabilities. These facilities are also used to process radioactive waste generated by the manufacturing activities. Areas specific to BWXT's Mo99 and Tc99m generator production are being repurposed within the existing licensed facility. Section 3.7 covers Fitness for Service and highlights the need to ongoing maintenance of both physical and virtual systems. BWXT is investing considerable sums of capital in establishing the medical isotope business and seeks a pay-back on that over the long term, emphasizing the commitment to properly maintain and enhance facilities and systems.

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In Section 3.8 BWXT explains the multiple aspects of their radiation protection program for both employees and the public. The point of note is that radiation exposure to individuals has been and continues to be managed to a fraction of the regulatory requirement as shown in Table 1, Section 3.8.8 for the public and Table 2, Section 3.8.13 for the BWXT workers.

Section 3.10 discusses Environmental Protection systems and data thereof. Consistent with the aforementioned approach to radiation dose to individuals, the results as shown in Tables 4, 5, 6 and 7 demonstrate that the Nordion and BWXT management systems and facilities result in radioactive releases which are a small fraction of the licenced limits.

Section 3.12 spells out BWXT's overall approach to waste management. It is important to note that the BWXT process for Mo99 differs from the previous Nordion process significantly in that it does not involve the use of high-enriched uranium targets, rather it uses a non-radioactive target material. As such the make-up of the waste stream from BWXT's Mo99 process will be less of a concern than Nordion's previous stream, albeit at a higher physical volume. The radioactive waste stemming from Tc99m generator manufacturing will be largely comprised of Tc99m itself. Given Tc99m's short half-life of only 6 hours, it precludes any long-term storage or disposal issues.

Overall, the submission appears to be complete and compelling in support of BWXT's medical isotope program.

Regarding the CNSC Commission Member Document:

The first paragraph of the Executive Summary states that all of the activities proposed by BWXT in the facility are currently authorized (addition by the author: under Nordion's existing Class IB licence). By way of background, quantities of Mo99 sufficient to meet the majority of the entire global demand were produced each week in Nordion's Ottawa facilities. In addition, Tc99m generators were also produced there each week, largely for distribution in Canada. In 2016 Mo99 processing in Ottawa was halted owing to the permanent shut down of AECL's NRU reactor, which irradiated the high-enriched uranium targets for Nordion's Mo99 process. The Tc99m generator production was halted in the mid 1990's owing to commercial issues. However, the experience, competence and knowledge required to conduct these activities and the management systems

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around them remains in BWXT today due to the remarkable number of long-term employees remaining there.

One of the most significant observations in reviewing the report revolves around the sub-sections labelled “Past Performance” which are all comprised of positive, affirming statements. Out of the fourteen Safety and Control Areas (“SCAs”) listed, seven state that BWXT’s past performance has been verified “Through ongoing compliance oversight...” with no major findings cited. The remaining seven speak to the adoption of the Nordion management systems by BWXT. These are well known to the CNSC and the statement that the CNSC “...expect this to continue under BWXT” reflects the CNSC’s level of satisfaction that the current systems are adequate. Combined, these two types of assessment provide a high degree of confidence that appropriate systems and safeguards are in, in fact, in place and operating well.

Overall, WiN fully supports the Staff recommendation to approve the licence application for the stated 10-year period. No comment is provided on the sufficiency of the decommissioning bond guarantee as that is outside the author’s current expertise.

Regarding the WiN Survey:

In April 2021 WiN Canada drafted and conducted a survey of their members to which 279 persons responded in whole or in part. The survey was designed to assess the extent to which the polled community has:

- an understanding of medical isotopes, their uses and importance
- an understanding of BWXT’s plans for medical isotope production in Ottawa
- identified any concerns over the BWXT licence application and intentions
- identified any other concerns over women’s issues in nuclear

Given that the survey was developed and administered by WiN Canada it is of little surprise to note that 78% of the respondents were women. Also, the polled group are highly educated with 89% having a college diploma or university degree. Respondents were not obligated to answer every question so the response rate varied by question, likely driven by the respondent’s familiarity with the subject area. Only 5% of respondents are employees or directly involved in BWXT’s

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medical isotope initiative, so the specific questions about key BWXT safety control systems and measures tended to have a very low response rate precluding any quantitative insight. However, they did foster a number of ad lib comments which assisted in understanding their viewpoints qualitatively.

Thematically, the top concerns identified from survey respondents' perspective in the nuclear field are:

- radiation dose management during child-bearing years: including both the woman and the man during the conception phase and the woman during pregnancy. It was stated there is no different radiation exposure limit for women as compared to men. (comments from question 10, 12, 17 & 23)
- ergonomics: it was noted that, generally speaking, ergonomic concerns are somewhat different for women than men, for example when it comes to lifting heavy loads and this should be a consideration. (comments from question 14 & 17)
- safety of their family / children: whether the risk stems from radioactive releases to the environment, non-radioactive chemical releases or other factors, several respondents stated that to be of concern. (comments from question 19)

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The BWXT licence application describes a multi-faceted approach to ensuring the safety of their employees and the general public. Several of the elements contained therein address the concerns cited above, in whole or in part, as follows:

Concern	BWXT Management Element	Comments
Radiation dose during pregnancy	3.3.4 Radiation Protection Training 3.8 Radiation Protection	BWXT has a practice of modifying work duties for pregnant employees to minimize risk.
Ergonomics	3.5.2 Facility Safety Analysis 3.6 Physical Design 3.9 Conventional Health and Safety	Detailed assessments of ergonomic risks are a part of the safety analysis template.
Safety of family / children (the public)	3.3.4 Radiation Protection Training 3.5.2 Facility Safety Analysis 3.6 Physical Design 3.7 Fitness for Service 3.8 Radiation Protection 3.10 Environmental Protection 3.12 Waste Management	Table 1 of the licence application shows that estimated dose to the public is well less than 1% of the regulatory limit, year over year. Sections 3.10.8 and 3.10.8.1 show that the radioactive releases to the environment are consistently a very small fraction of the DRL's.

The umbrella over top of all these elements is contained in Section 3.2.5 of the licence application titled Safety Culture. In it, BWXT speaks to their commitment to "...emphasize safety, quality, ethics and security over competing goals to ensure the protection of people and the environment."

Fully 100% of the respondents believe that medical isotopes are important (Q3), with 84% expressing a concern about a shortage of medical isotopes (Q29). Since Nordion's NRU Mo99 production route ceased in 2016 there have been many instances of supply disruptions for Mo99 and Tc99m generators, heightening awareness of their value on a global basis. The new BWXT Mo99 and Tc99m

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generator infrastructure under construction will significantly stabilize supply for the benefit of radiopharmacies, hospitals and ultimately the patients, women and men.

Almost half of the respondents, 48%, have had a close, personal experience with medical isotopes, defined as either the respondents themselves or a member of their family (Q26). The dominant area for diagnosis and / or treatment is cancer (n=49), followed by non-specific “imaging” or “diagnosis” (n=11) and cardiac imaging (n=4) (Q27).

These two points manifest themselves in that 92% of respondents “...support BWXT’s Class IB licence application because I think their medical isotope processing facility is beneficial to Canadians.”. From a woman’s viewpoint, 80% of respondents “...support BWXT’s Class IB licence application because I think their medical isotope processing facility is beneficial to women.”. (both Q5) It can therefore be seen that there is tremendous support for BWXT’s medical isotope initiative in the nuclear community.

With regards to the specific SCA questions:

Question No.	Statement	% Disagree	Sample size
9	BWXT adequately addresses Management System requirements	0%	n=8
11	BWXT adequately addresses Radiation Protection requirements	0%	n=8
13	BWXT adequately addresses Conventional Health & Safety requirements	0%	n=8
16	BWXT adequately addresses Safety Analysis requirements	0.6%	n=177
18	BWXT adequately addresses Environmental Protection requirements	0%	n=178
20	BWXT adequately addresses Emergency Management and Fire Protection requirements	0.6%	n=176

It is apparent that the response rate to these questions is variable which is believed to reflect the lack of familiarity with some specific BWXT systems. Questions 16, 18 and 20 yielded higher response rates however the “Don’t know” responses amounted to approximately 50%.

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Respondents were also polled on how important the following areas are to them (Q24):

Element	% Important & Very Important	Sample size
Socio economic concerns	95%	n=175
Continuing dialog with the Public and Employees	97%	n=174
Long Term Waste Management	98%	n=175

The overwhelmingly strong responses to this question highlight the importance of transparency and limiting nuclear risk. BWXT management systems for these elements have been reviewed and recommended for approval by CNSC staff in their Commission Member Document.

Conclusion:

On review of the cited inputs, WiN Canada's conclusion is that BWXT has satisfied the requirements for their requested 10-year Class IB nuclear substance processing facility operating licence. BWXT has an established and demonstrated capability to produce medical isotopes in quantity without posing undue risk to any person's safety or to the environment. The three areas of concern identified in the WiN survey are adequately addressed by a number of the BWXT safety system elements and BWXT's commitment to prioritize safety and environmental protection goals over other competing goals. WiN Canada fully endorses the application and urges the CNSC to proceed with the licence issuing process post-haste.

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About the author:

Phil Larabie began his career in medical isotope production with Atomic Energy of Canada in 1983. In 1991, AECL's medical isotope business unit was divested into the private sector and became Nordion, then in turn that was divested by Nordion to BWXT in 2018. In his 37-year career, he worked as a front-line production technician and then through a series of career enhancement opportunities moved into the role of Vice President and General Manager of the Medical Isotope business unit, a position held until the BWXT acquisition. Subsequently he acted as Vice President of Strategic Projects until his retirement in July 2019.

BWXT Medical Operating Licence Renewal Survey

Background

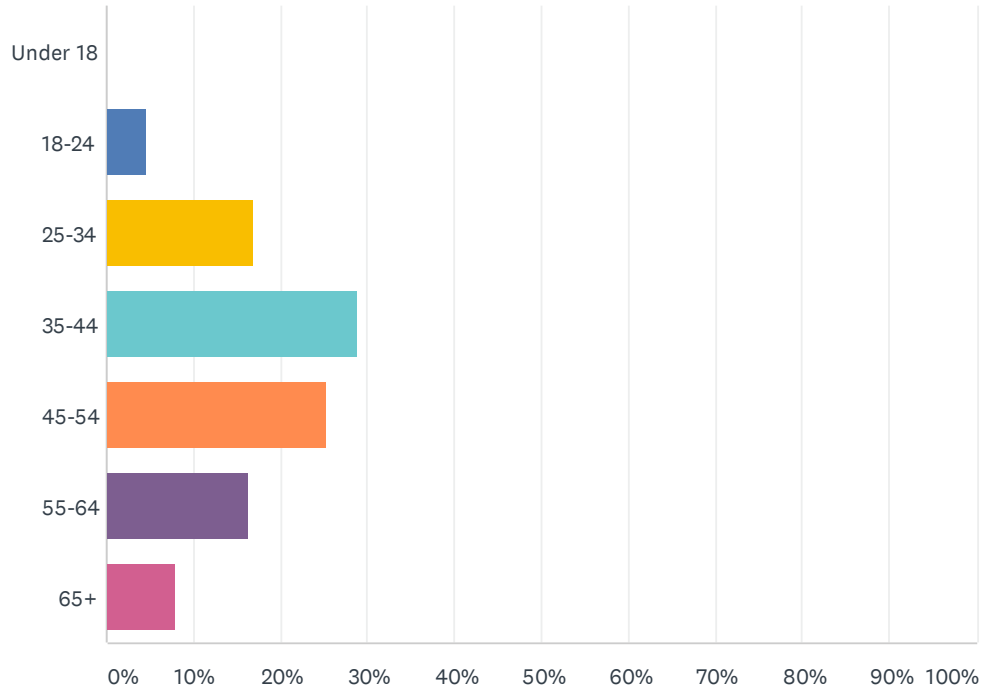
On Friday April 16, 2021 WiN Canada sent a survey regarding the BWXTM licence renewal to their 3,300+ membership base. Their membership includes nuclear industry and STEM professionals from across the country. The intent of the survey was to gain insights into any concerns over the BWXTM licence application and in particular how it relates to women and their safety. The survey was available for nine days and closed on Sunday April 25, 2021. 279 persons (9%) responded to the survey.

In the following pages you will find the unaltered survey results. **Please note:** question 22 regarding “safeguards and non-proliferation” was discovered to be added in error after the survey’s deployment. In the preceding report this question was disregarded, please do the same when examining these results.



Q1 What is your age group?

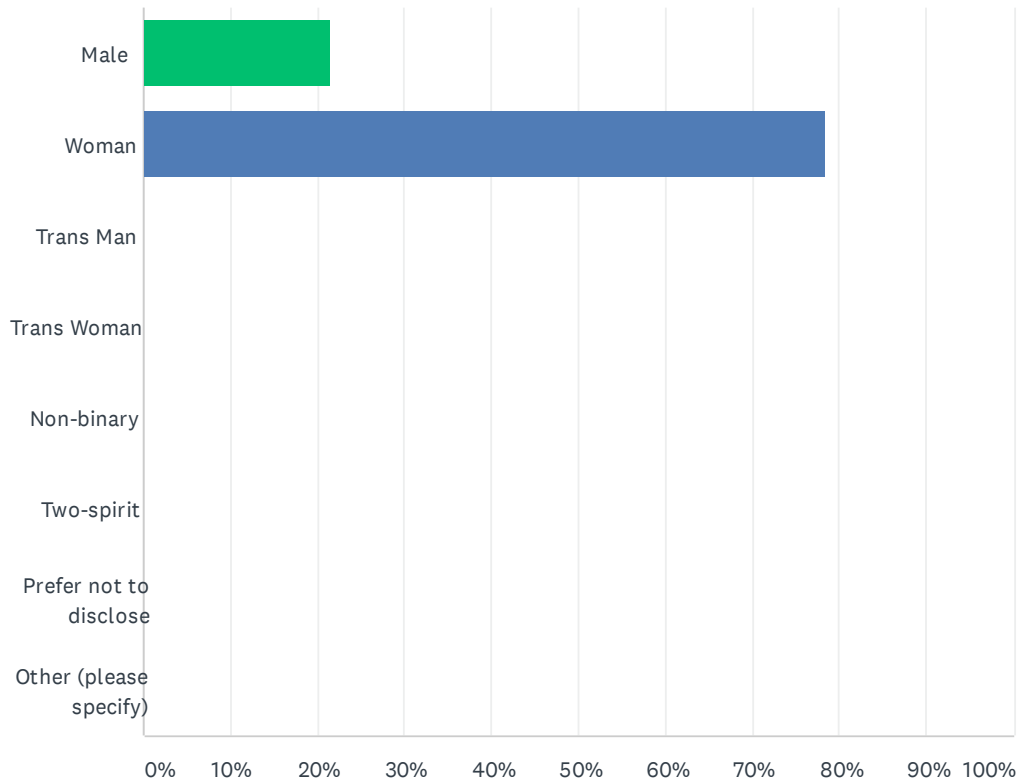
Answered: 277 Skipped: 2



ANSWER CHOICES	RESPONSES	
Under 18	0.00%	0
18-24	4.69%	13
25-34	16.97%	47
35-44	28.88%	80
45-54	25.27%	70
55-64	16.25%	45
65+	7.94%	22
TOTAL		277

Q2 What is your gender?

Answered: 279 Skipped: 0

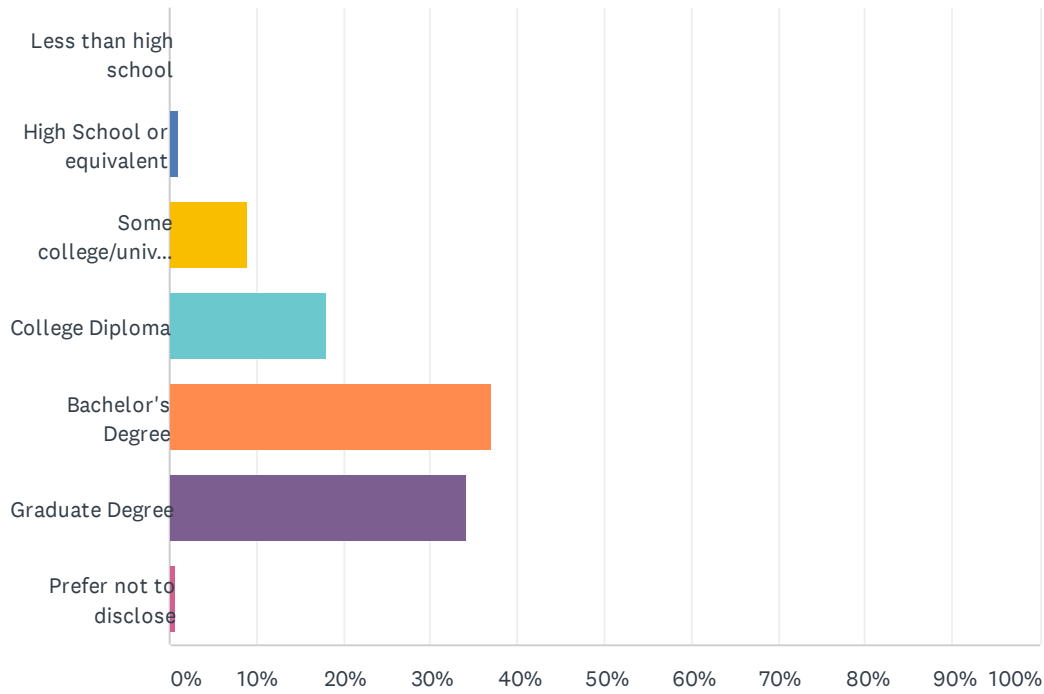


ANSWER CHOICES	RESPONSES	
Male	21.51%	60
Woman	78.49%	219
Trans Man	0.00%	0
Trans Woman	0.00%	0
Non-binary	0.00%	0
Two-spirit	0.00%	0
Prefer not to disclose	0.00%	0
Other (please specify)	0.00%	0
TOTAL		279

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

Q3 What is your highest level of education?

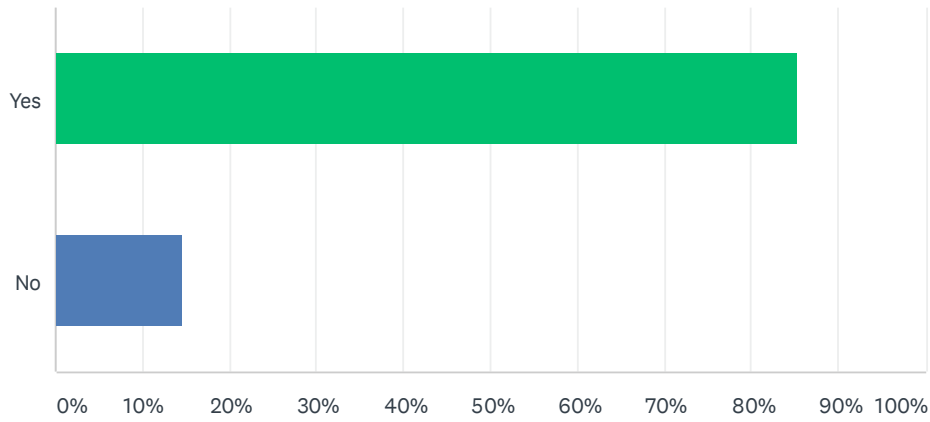
Answered: 278 Skipped: 1



ANSWER CHOICES	RESPONSES	
Less than high school	0.00%	0
High School or equivalent	1.08%	3
Some college/university	8.99%	25
College Diploma	17.99%	50
Bachelor's Degree	37.05%	103
Graduate Degree	34.17%	95
Prefer not to disclose	0.72%	2
TOTAL		278

Q4 Are you a member of Women in Nuclear Canada?

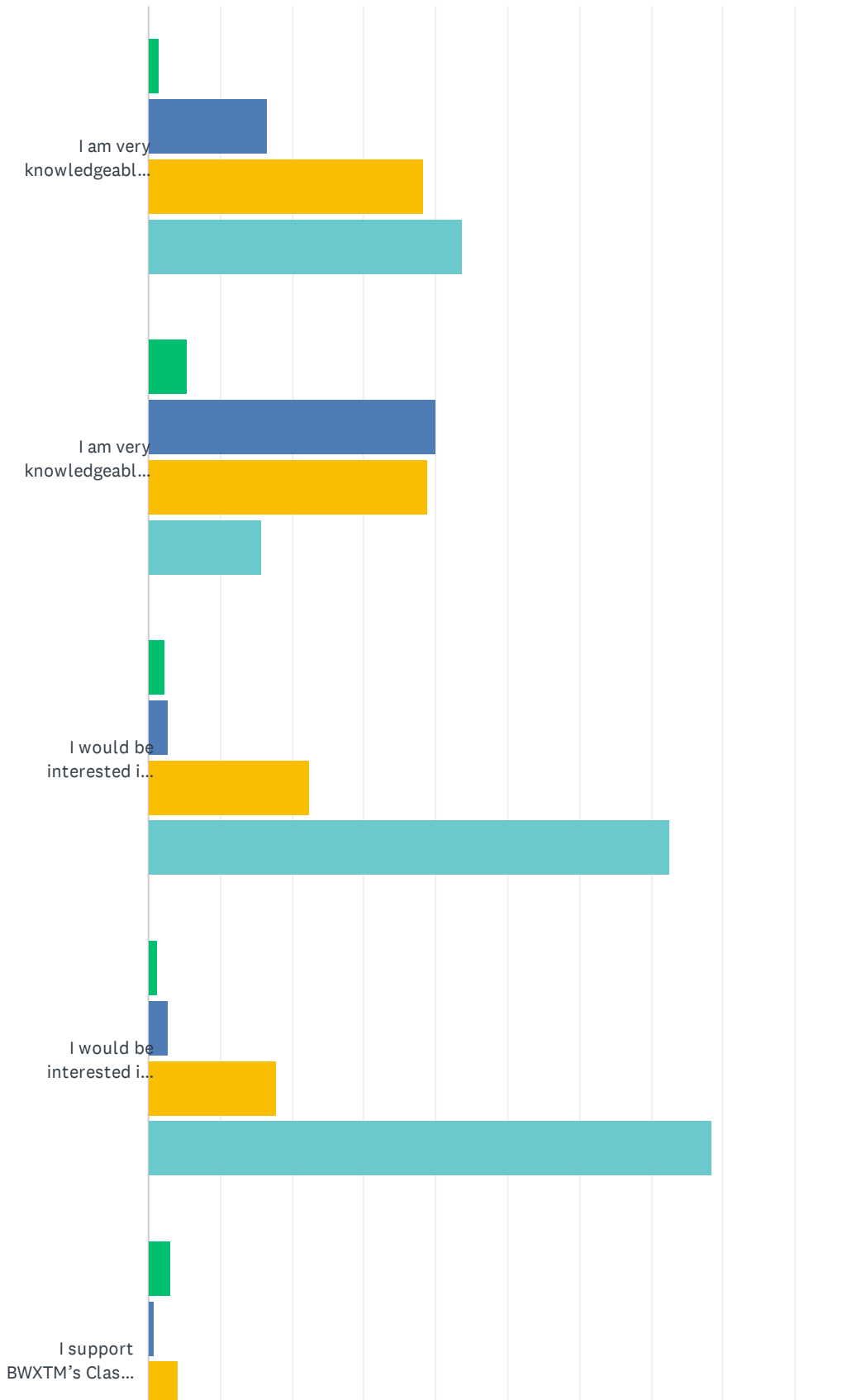
Answered: 279 Skipped: 0

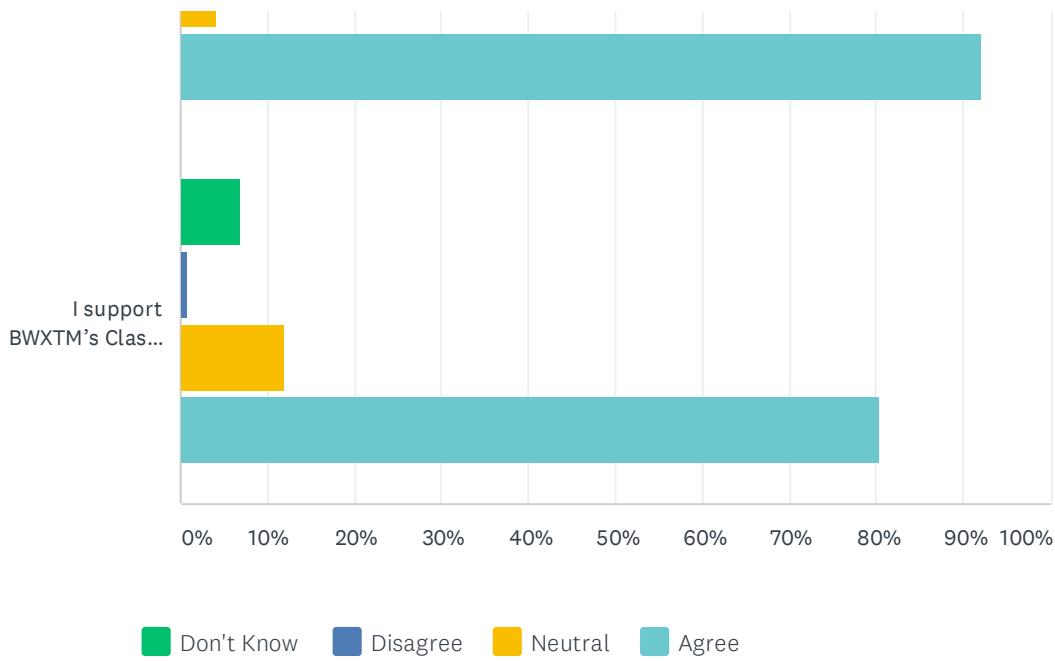


ANSWER CHOICES	RESPONSES	
Yes	85.30%	238
No	14.70%	41
TOTAL		279

Q5 How would you rate your knowledge on the below.

Answered: 261 Skipped: 18

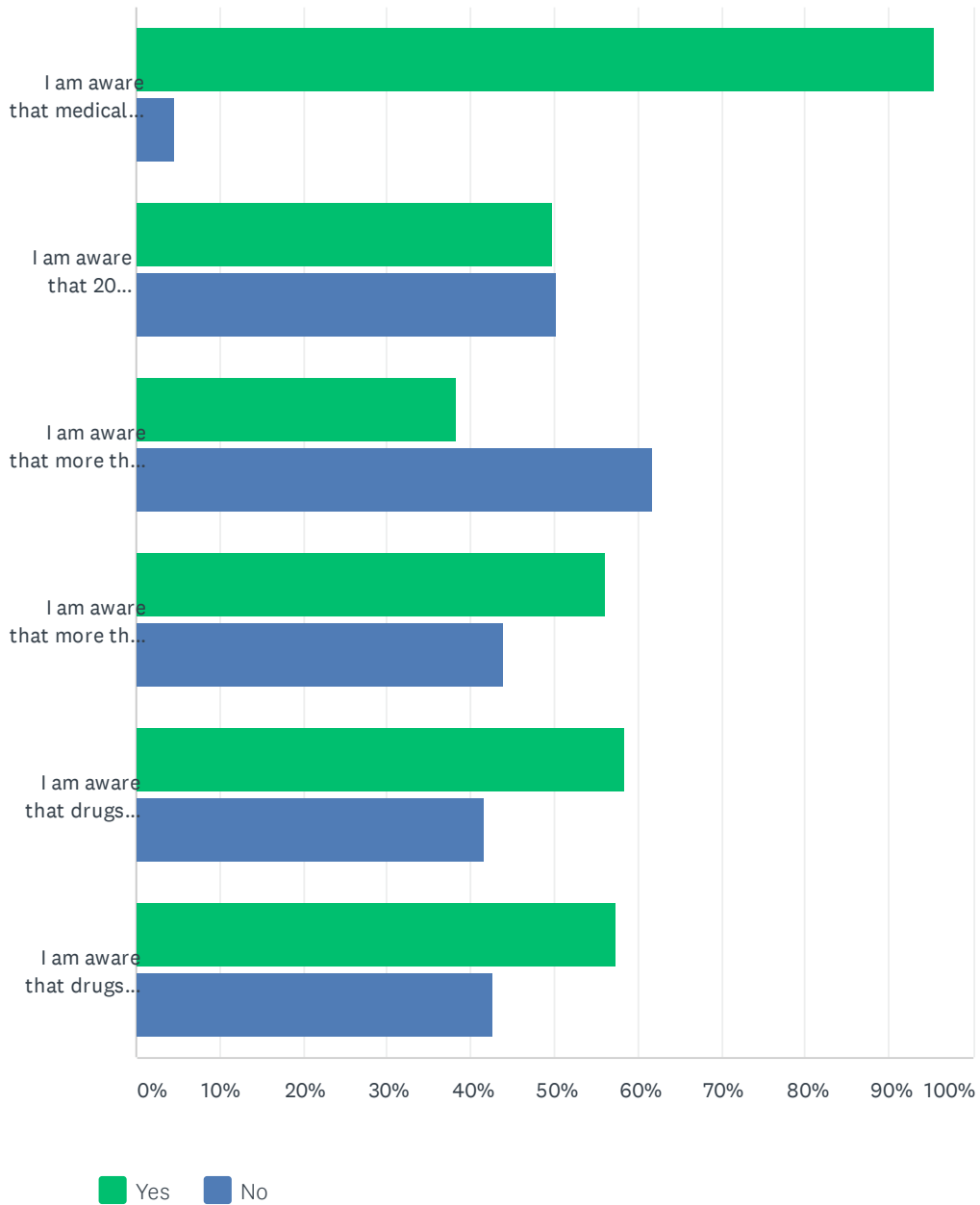




	DON'T KNOW	DISAGREE	NEUTRAL	AGREE	TOTAL
I am very knowledgeable about the uses of medical isotopes in general.	1.53% 4	16.48% 43	38.31% 100	43.68% 114	261
I am very knowledgeable about BWXTM's medical isotope processing facility.	5.38% 14	40.00% 104	38.85% 101	15.77% 41	260
I would be interested in learning more about BWXTM's Class IB nuclear substance processing facility.	2.32% 6	2.70% 7	22.39% 58	72.59% 188	259
I would be interested in learning more about the uses of radioisotopes in medicine.	1.15% 3	2.69% 7	17.69% 46	78.46% 204	260
I support BWXTM's Class IB licence application because I think their medical isotope processing facility is beneficial to Canadians.	3.07% 8	0.77% 2	4.21% 11	91.95% 240	261
I support BWXTM's Class IB licence application because I think their medical isotope processing facility is beneficial to women.	6.92% 18	0.77% 2	11.92% 31	80.38% 209	260

Q6 Please answer yes or no to the following statements.

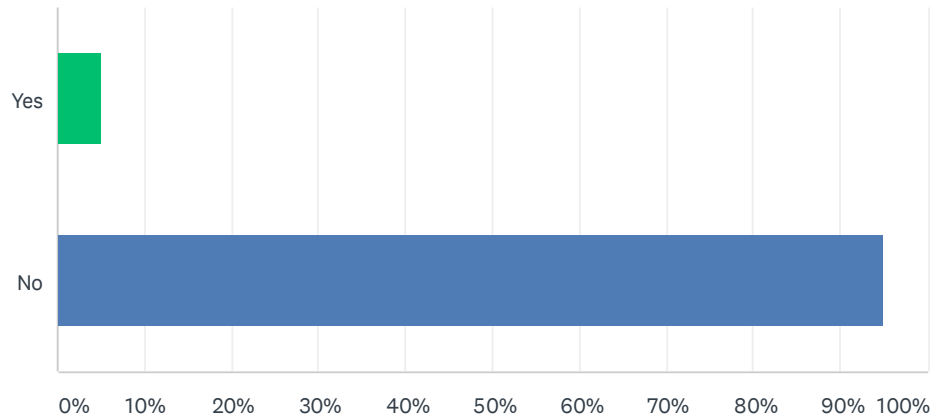
Answered: 261 Skipped: 18



	YES	NO	TOTAL	WEIGHTED AVERAGE
I am aware that medical isotopes can be used both to diagnose and to treat disease.	95.37% 247	4.63% 12	259	1.05
I am aware that 20 different medical isotopes are approved for clinical use by Health Canada.	49.81% 130	50.19% 131	261	1.50
I am aware that more than 50 different medical isotope-based drugs and products are approved for clinical use by Health Canada.	38.22% 99	61.78% 160	259	1.62
I am aware that more than one million scans are done using Tc-99m in Canada each year to assess heart health in cardiac patients, and in cancer patients receiving chemotherapy.	55.98% 145	44.02% 114	259	1.44
I am aware that drugs containing Tc-99m are important for lymphatic mapping in patients with breast cancer or melanomas.	58.46% 152	41.54% 108	260	1.42
I am aware that drugs containing Tc-99m are essential to diagnosing bone abnormalities such as metastatic cancer and osteoporosis.	57.36% 148	42.64% 110	258	1.43

Q7 Do you now, or have you ever, worked at BWXTM's Class IB nuclear substance processing facility or in a center led role supporting BWXTM's Class IB nuclear substance processing facility?

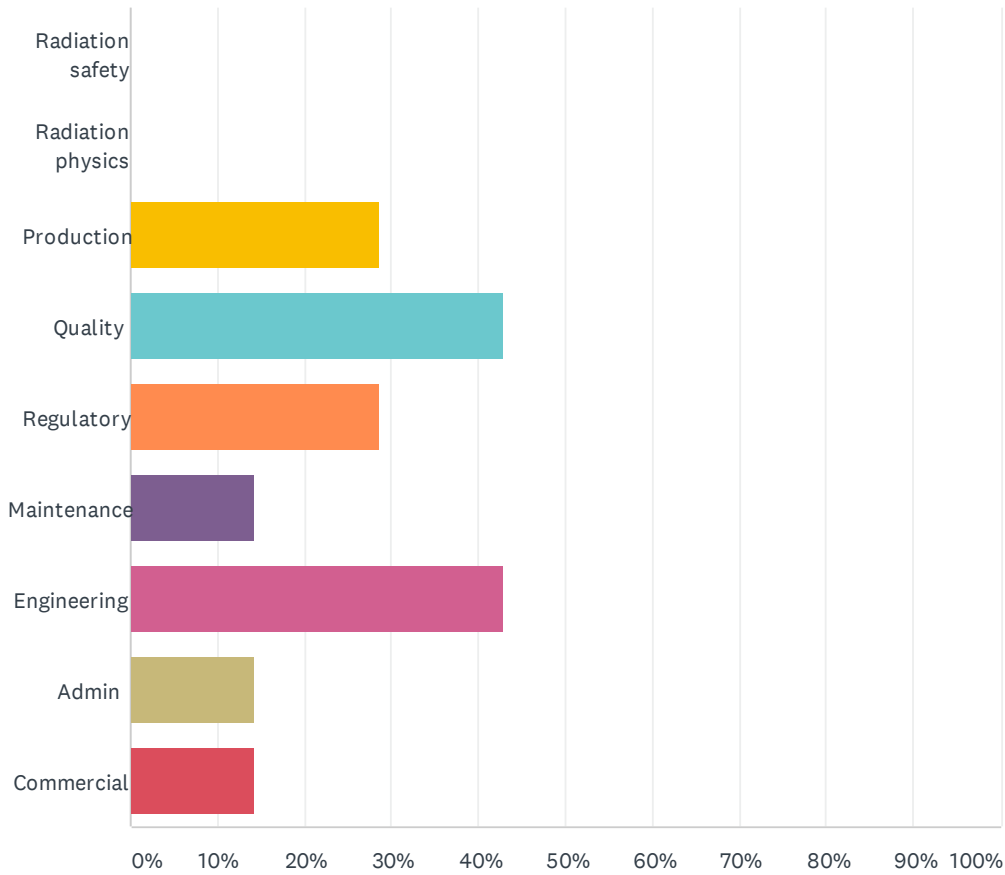
Answered: 260 Skipped: 19



ANSWER CHOICES	RESPONSES	
Yes	5.00%	13
No	95.00%	247
TOTAL		260

Q8 Identify your job family or skill set as:

Answered: 7 Skipped: 272

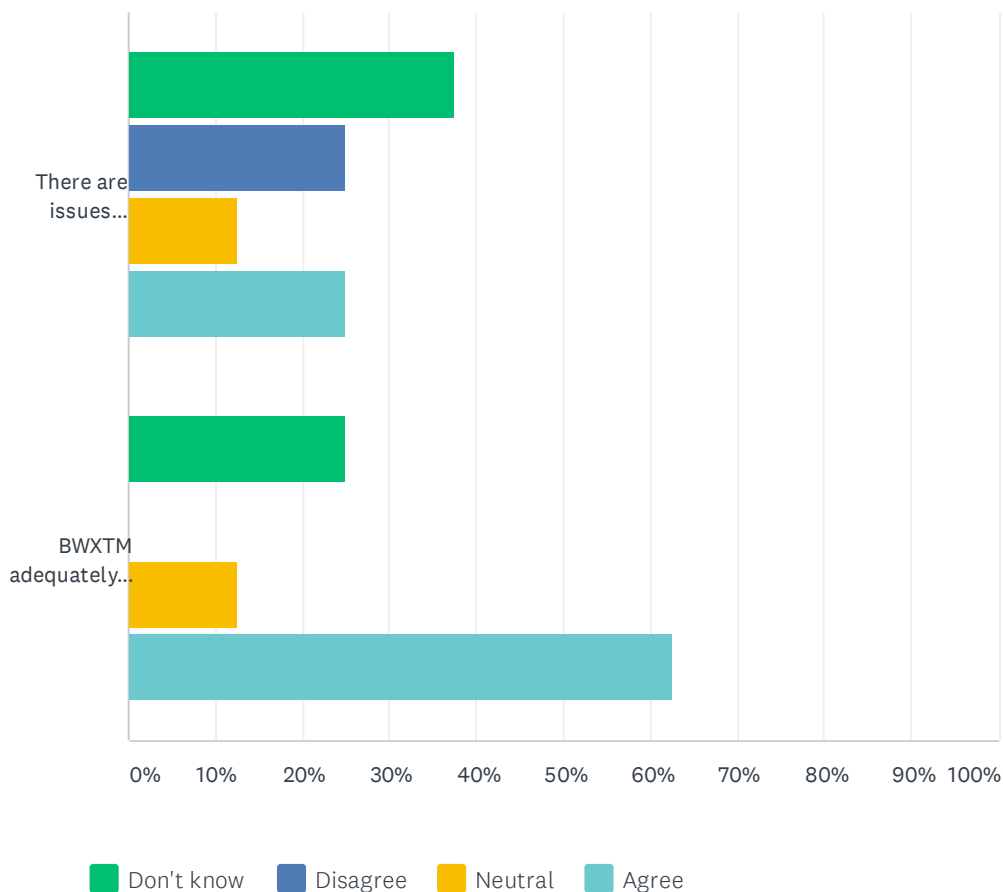


ANSWER CHOICES	RESPONSES	
Radiation safety	0.00%	0
Radiation physics	0.00%	0
Production	28.57%	2
Quality	42.86%	3
Regulatory	28.57%	2
Maintenance	14.29%	1
Engineering	42.86%	3
Admin	14.29%	1
Commercial	14.29%	1
Total Respondents: 7		

#	OTHER (PLEASE SPECIFY)	DATE
1	Supplier to the production facility	4/19/2021 8:52 AM

Q9 Management System At BWXTM processes and programs ensure achievement of safety objectives, continuous monitoring of performance against these safety objectives, and maintenance of a healthy safety culture.

Answered: 8 Skipped: 271



	DON'T KNOW	DISAGREE	NEUTRAL	AGREE	TOTAL
There are issues specifically related to women in the areas of organization or safety culture at BWXTM.	37.50% 3	25.00% 2	12.50% 1	25.00% 2	8
BWXTM adequately addresses Management Systems requirements.	25.00% 2	0.00% 0	12.50% 1	62.50% 5	8

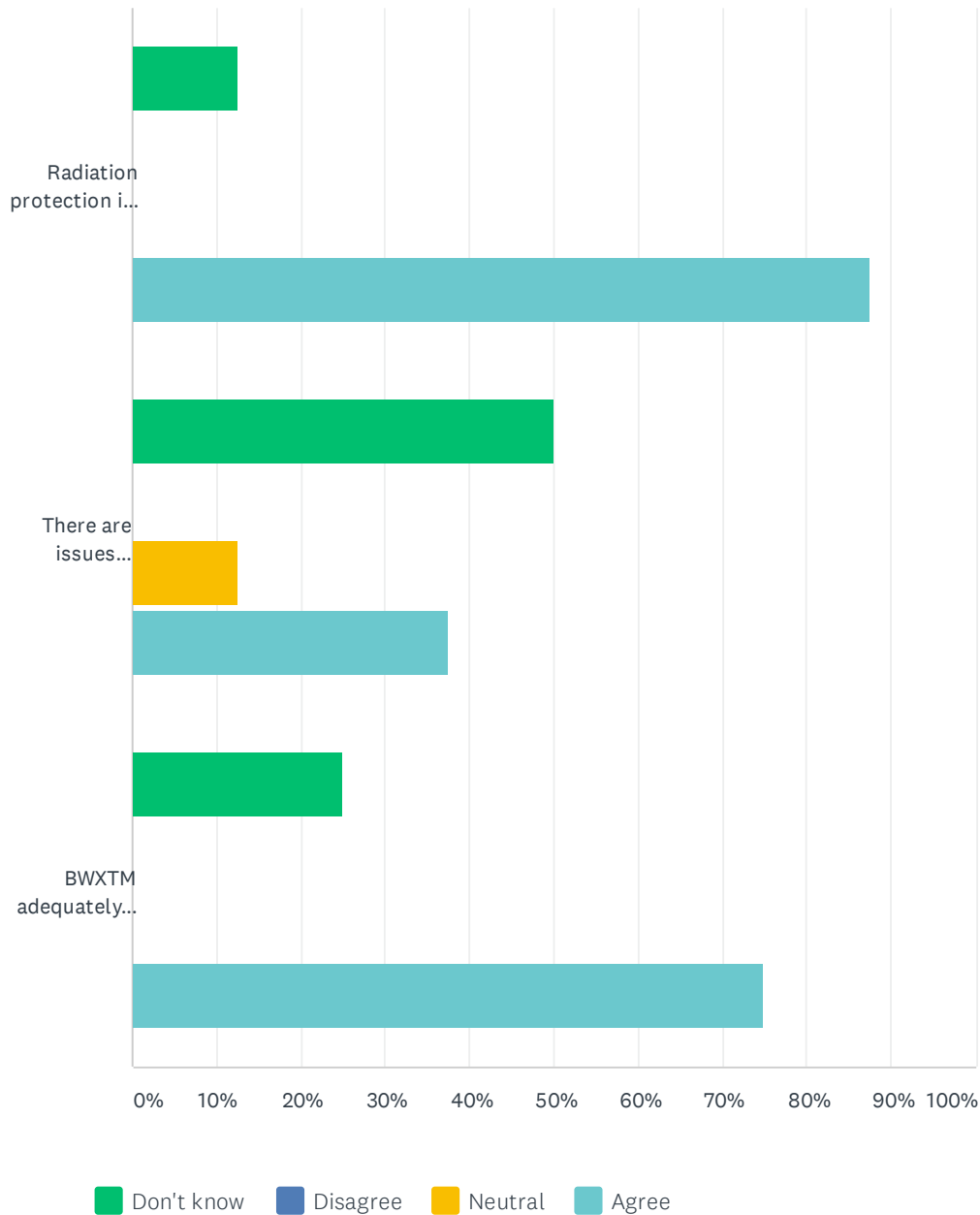
Q10 If you agreed there are issues specifically related to women in the areas of organization or safety culture at BWXTM, please specify what they are.

Answered: 3 Skipped: 276

#	RESPONSES	DATE
1	Women's network for employees, promotion of STEM studies for girls	4/19/2021 11:20 AM
2	N/A	4/19/2021 8:52 AM
3	Special care and consideration is given to women who are expecting (pregnant) to ensure they are not in the active areas.	4/17/2021 11:58 AM

Q11 Radiation ProtectionAt BWXTM, the dose to workers is proportional to the number of DSCs . Boundary monitoring is performed with Thermoluminescent Detectors (LTDs). No worker or member of the public received a radiation dose in excess of regulatory dose limits as a result of the licensed activities conducted at the BWXTM during the current licence period.

Answered: 8 Skipped: 271



	DON'T KNOW	DISAGREE	NEUTRAL	AGREE	TOTAL
Radiation protection is of particular importance to individuals who are attempting to conceive a child.	12.50% 1	0.00% 0	0.00% 0	87.50% 7	8
There are issues specifically related to women related to Radiation Protection at BWXTM.	50.00% 4	0.00% 0	12.50% 1	37.50% 3	8
BWXTM adequately addresses Radiation Protection requirements.	25.00% 2	0.00% 0	0.00% 0	75.00% 6	8

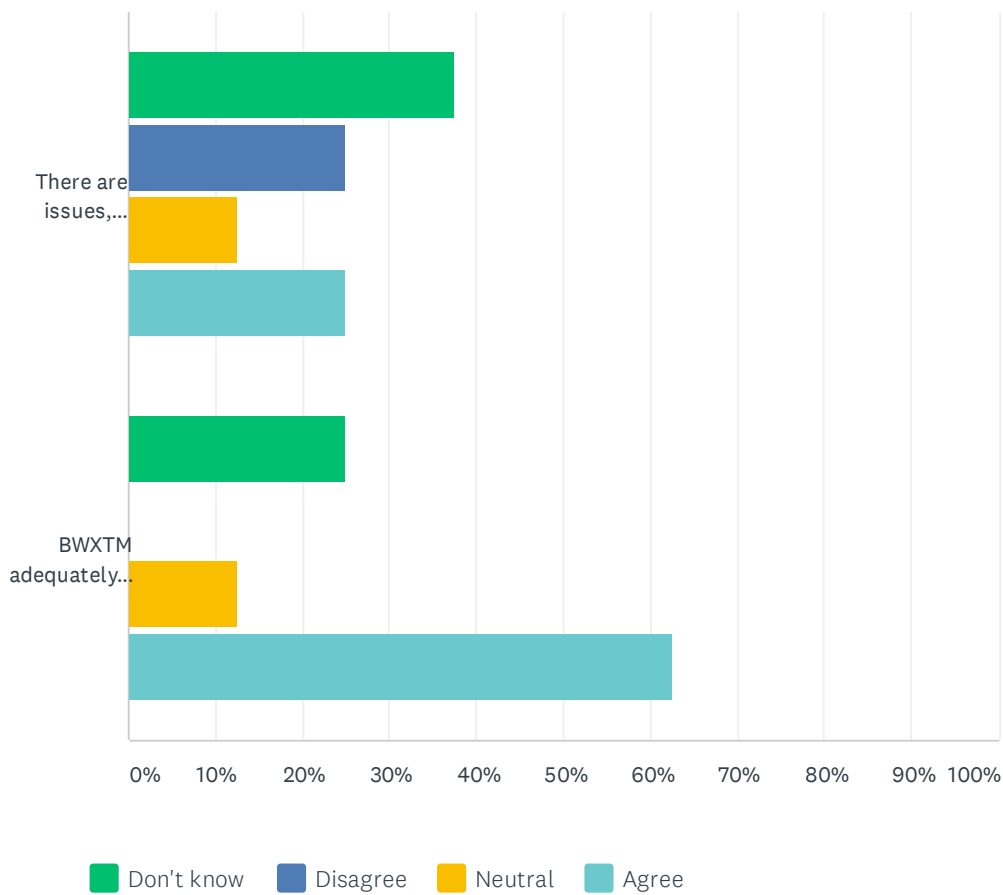
Q12 If you agreed there are issues specifically related to women related to Radiation Protection at BWXTM. please specify what they are.

Answered: 5 Skipped: 274

#	RESPONSES	DATE
1	There are concerns related to dose exposure for pregnant women.	4/21/2021 11:01 AM
2	Radiation affecting those who are pregnant or trying to conceive. General worry about reproductive health among younger female employees.	4/19/2021 4:07 PM
3	Neutral	4/19/2021 11:20 AM
4	N/A	4/19/2021 8:52 AM
5	See previous comment.	4/17/2021 11:58 AM

Q13 Conventional Health and Safety The frequency of Loss Time Incidents (LTIs) at BWXTM was consistently at zero for the current licence period. Hazardous materials found at the BWXTM include: paint, consumables for maintenance (adhesives, abrasives, various solvents, lubricants for operations and maintenance equipment, and janitorial and cleaning supplies), and fuel (for snow blowers and maintenance equipment). In addition to hazardous materials, the risks from conventional hazards at the BWXTM are primarily associated with the control and safe handling of large heavy waste packages, heavy equipment, and the use of conventional x-ray equipment for security-related purposes.

Answered: 8 Skipped: 271



	DON'T KNOW	DISAGREE	NEUTRAL	AGREE	TOTAL
There are issues, specifically related to women, regarding conventional health and safety at BWXTM.	37.50% 3	25.00% 2	12.50% 1	25.00% 2	8
BWXTM adequately addresses Conventional Health and Safety requirements.	25.00% 2	0.00% 0	12.50% 1	62.50% 5	8

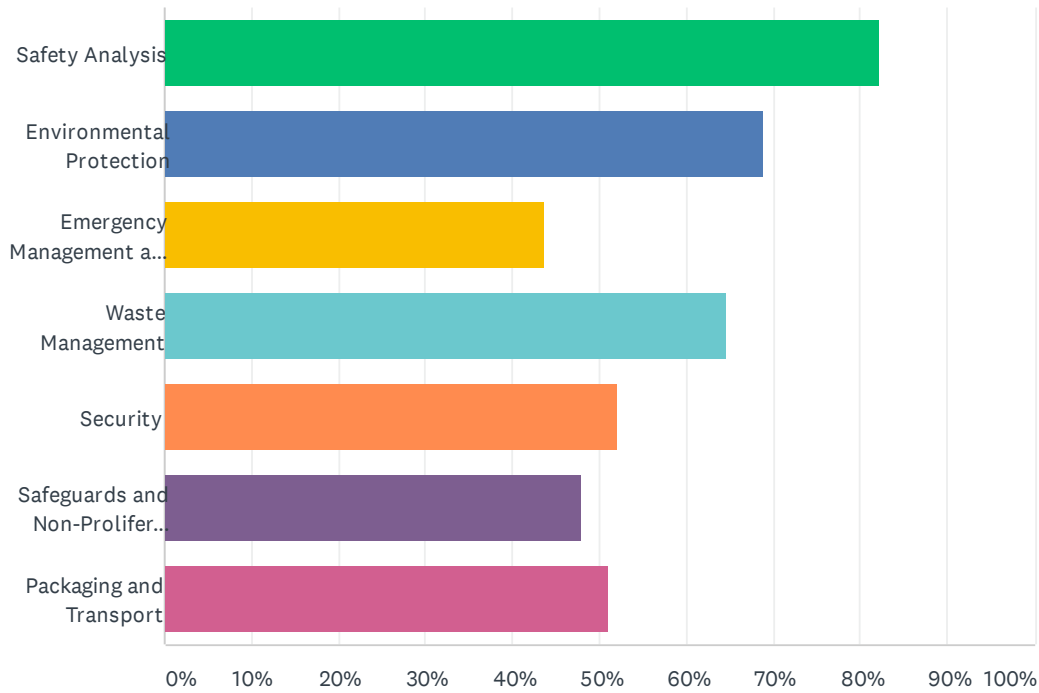
Q14 If you agreed there are issues, specifically related to women, regarding conventional health and safety at BWXTM, please specify what they are.

Answered: 4 Skipped: 275

#	RESPONSES	DATE
1	Carrying heavy weights may need some accommodation for some women's slighter build. Women require protection from x-ray exposure to reproductive areas (as do men).	4/21/2021 11:01 AM
2	N/A	4/19/2021 11:20 AM
3	N/A	4/19/2021 8:52 AM
4	I believe that women have different ergonomic requirements than men.	4/17/2021 11:58 AM

Q15 Below you will be asked questions about whether there are issues of particular relevance to women related to the following Safety and Control Areas (SCAs).

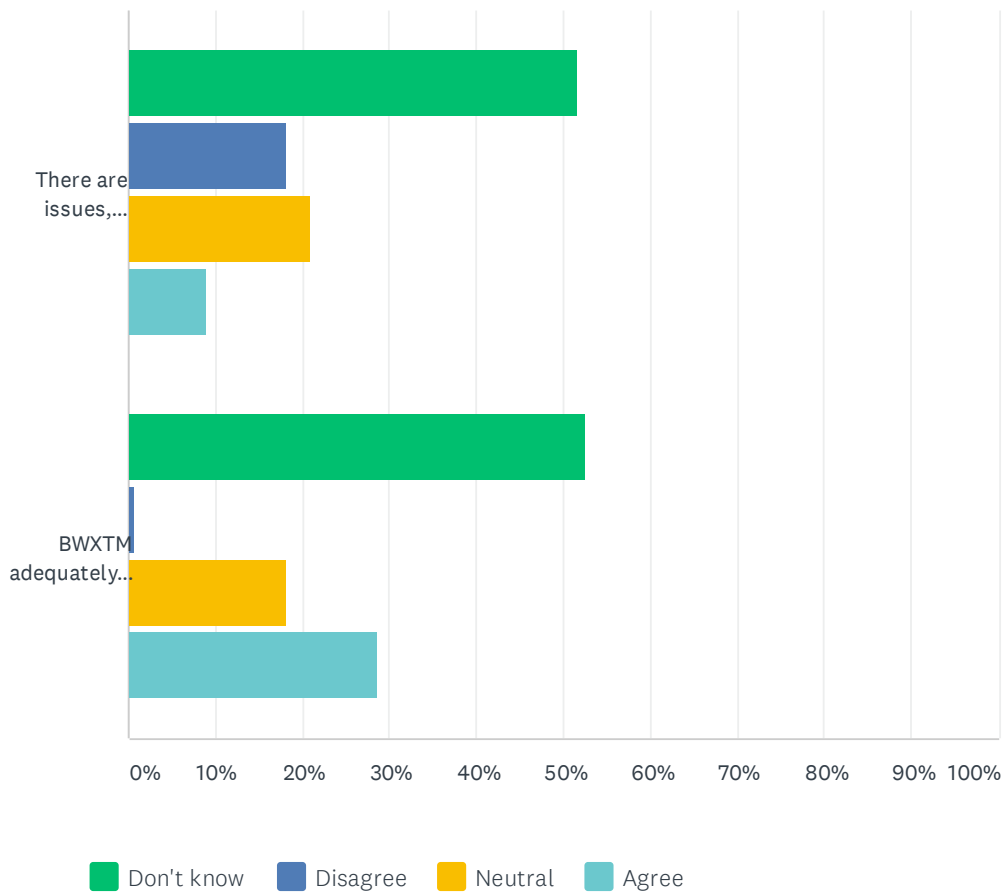
Answered: 96 Skipped: 183



ANSWER CHOICES	RESPONSES	
Safety Analysis	82.29%	79
Environmental Protection	68.75%	66
Emergency Management and Fire Protection	43.75%	42
Waste Management	64.58%	62
Security	52.08%	50
Safeguards and Non-Proliferation	47.92%	46
Packaging and Transport	51.04%	49
Total Respondents: 96		

Q16 Safety Analysis Below you will be asked questions about whether there are issues of particular relevance to women related to the following Safety and Control Areas (SCAs).

Answered: 177 Skipped: 102



	DON'T KNOW	DISAGREE	NEUTRAL	AGREE	TOTAL
There are issues, specifically related to women, regarding the safety analysis at BWXTM.	51.70% 91	18.18% 32	21.02% 37	9.09% 16	176
BWXTM adequately addresses Safety Analysis requirements.	52.57% 92	0.57% 1	18.29% 32	28.57% 50	175

Q17 If you agreed there are issues, specifically related to women, regarding the safety analysis at BWXTM, please specify what they are.

Answered: 33 Skipped: 246

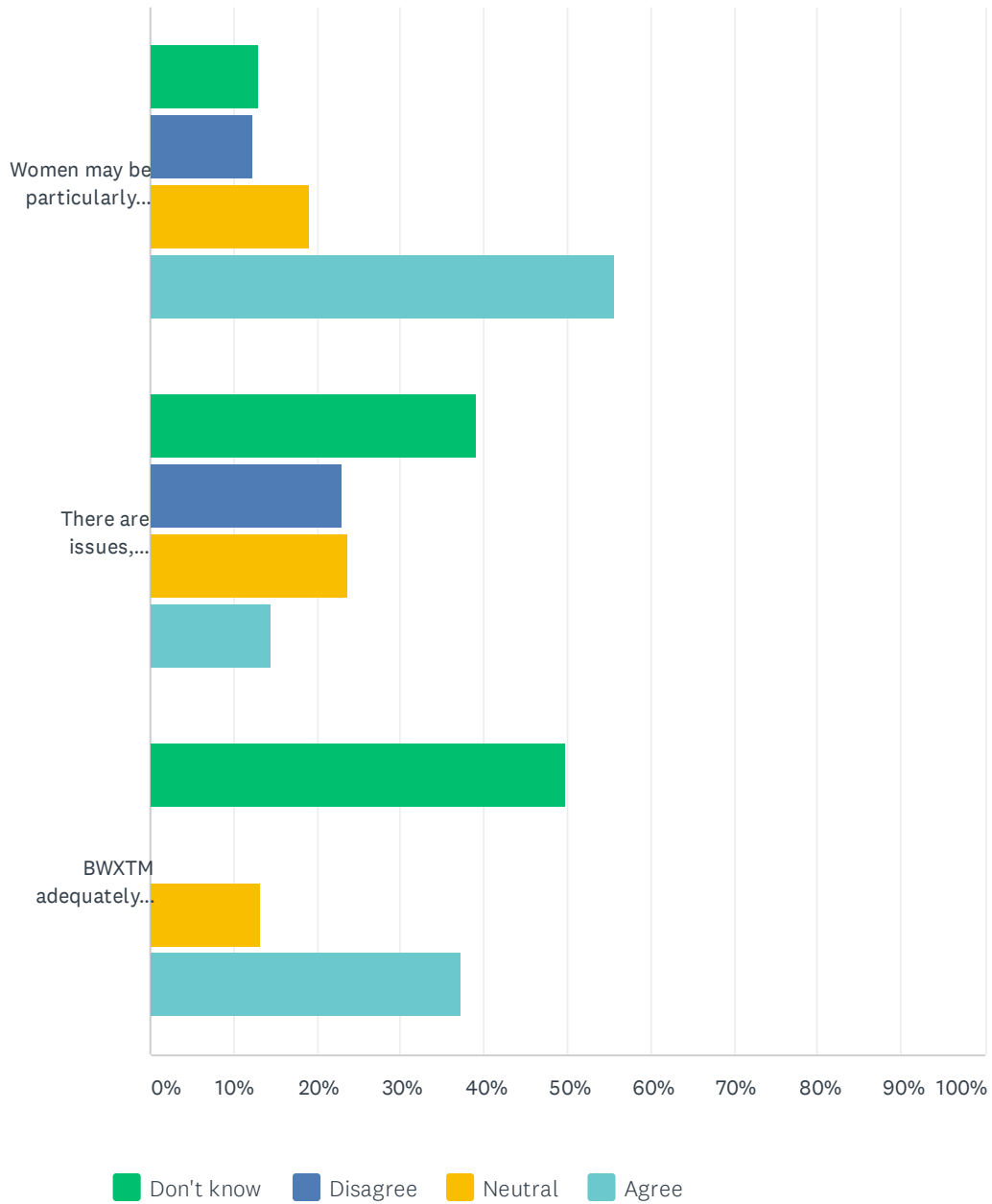
#	RESPONSES	DATE
1	No issues	4/25/2021 10:22 PM
2	Safety important regardless of gender	4/25/2021 7:43 PM
3	The safety analysis at BWXTM includes issues specifically related to women precisely BECAUSE data on the health affects of *everything that has ever been studied* has used white men as the default study subjects. Far too little empirical scientific data exists on the specific affects on a woman's body, and if BWXTM is serious about addressing gender discrimination, looking at EVERY existing issue specifically from the vantage point of the WOMEN affected by said issue, will reveal the next steps that need to be taken.	4/25/2021 4:15 PM
4	No	4/25/2021 3:58 PM
5	Anything relating to exposure of workers during pregnancy.	4/25/2021 2:46 PM
6	There physiological affects relevant to women different from men	4/25/2021 9:49 AM
7	Did not know	4/25/2021 8:12 AM
8	Exposure to radiation, particularly with relation to reproduction issues.	4/22/2021 1:02 PM
9	n/a	4/21/2021 9:35 PM
10	n/a	4/21/2021 12:15 PM
11	Properly fitting PPE	4/21/2021 10:27 AM
12	I did not agree, I don't know.	4/21/2021 9:46 AM
13	na	4/21/2021 9:30 AM
14	n/a	4/21/2021 9:21 AM
15	N/a	4/21/2021 9:21 AM
16	Don't know	4/21/2021 9:20 AM
17	N/A	4/21/2021 9:09 AM
18	Do not know.	4/20/2021 9:18 AM
19	No comment	4/20/2021 5:34 AM
20	NA	4/19/2021 11:23 AM
21	ALARA considerations and Derived Release Limits for the facility may be gender-specific, based on the postulated accident scenarios (i.e. women, particularly when pregnant or nursing, may be more vulnerable to releases)	4/19/2021 9:46 AM
22	N/A	4/19/2021 8:54 AM
23	All matters involving nuclear safety are related to woman and men. It is of the utmost importance that we nuclear safety is kept under constant scrutiny for the health and wellbeing of all	4/19/2021 8:15 AM
24	Safety analysis process and results must be protected from public disclosure as it is of a national interest. Personnel performing such work need a personnel screening at a minimum is treated as government of Canada SECRET including out of country verification.	4/19/2021 6:39 AM
25	If i'm honest, these affect everyone- not just women. Although some can be more prevalent in	4/19/2021 6:22 AM

women (breast cancer, heart disease) it affects us all. Where i care about these issues is related more to woman getting a fair and equal crack to be a part of manufacturing/testing, which means safety in the workplace, equal wages, ect...

26	Calculations of doses to protect pregnant nuclear workers	4/18/2021 7:33 PM
27	N/A	4/17/2021 9:06 AM
28	Exposure to radiation and its affect on their bodies	4/16/2021 5:30 PM
29	N/a	4/16/2021 4:00 PM
30	Safety analysis needs to be inclusive, so any issues that specifically relate to women should also relate to men/others in our communities.	4/16/2021 3:54 PM
31	Don't know	4/16/2021 3:52 PM
32	I have NO concerns with the analysis for BWXTM	4/16/2021 3:07 PM
33	Mainly pregnancy as fetuses are more vulnerable than the standard adult body	4/16/2021 2:59 PM

Q18 Environmental Protection Do you agree with the following statement?

Answered: 178 Skipped: 101



	DON'T KNOW	DISAGREE	NEUTRAL	AGREE	TOTAL
Women may be particularly concerned about nuclear or hazardous releases to the air or water. Hazardous releases to the air can affect the respiratory health of their children; releases to the water can affect the health of those drinking it, eating food from it, or crops watered with it. Although these concerns are not unique to women, it has been shown that these risks can more significantly affect women's perspectives of the risks in the nuclear industry.	12.92% 23	12.36% 22	19.10% 34	55.62% 99	178
There are issues, specifically related to women, regarding environmental protection at BWXTM.	39.08% 68	22.99% 40	23.56% 41	14.37% 25	174
BWXTM adequately addresses Environmental Protection requirements.	49.71% 87	0.00% 0	13.14% 23	37.14% 65	175

Q19 If you agreed there are issues, specifically related to women, regarding environmental protection at BWXTM, please specify what they are.

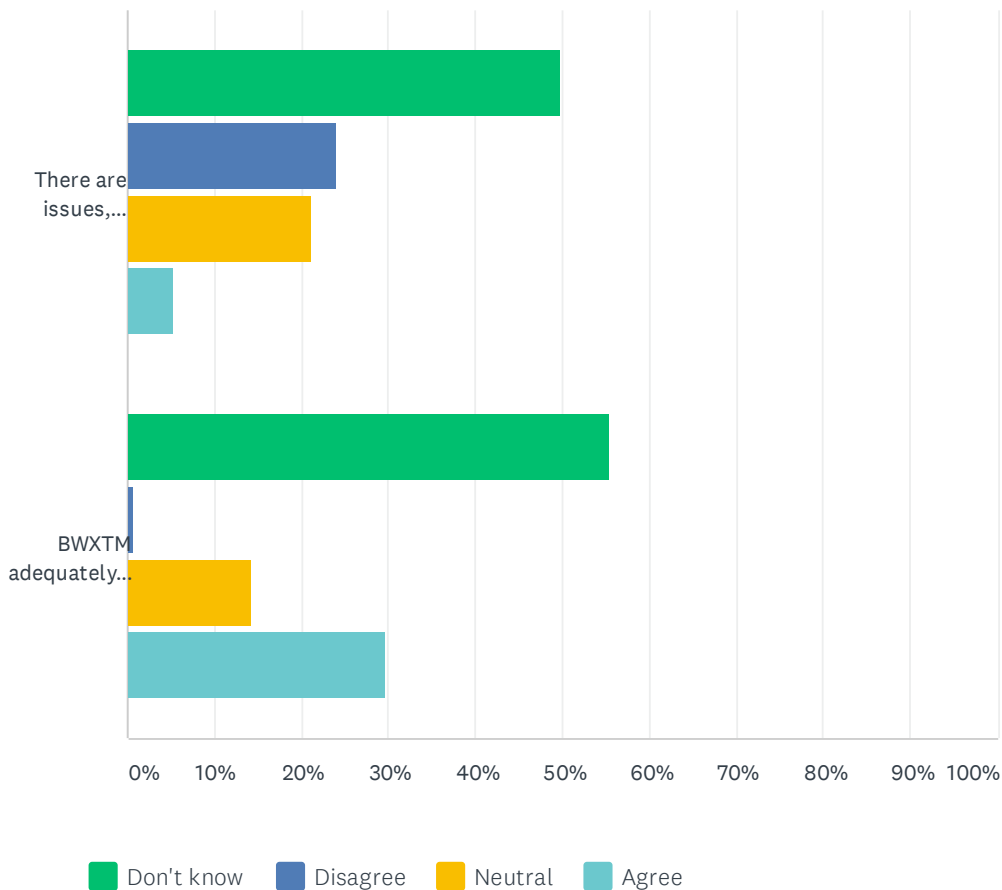
Answered: 37 Skipped: 242

#	RESPONSES	DATE
1	No issues	4/25/2021 10:22 PM
2	Just education in general about what credible risks are and aren't	4/25/2021 8:44 PM
3	Air pollution, as radioactivity particularly harmful to children and developing embryos	4/25/2021 7:43 PM
4	The EP at BWXTM includes issues specifically related to women precisely BECAUSE data on the health affects of *everything that has ever been studied* has used white men as the default study subjects. Far too little empirical scientific data exists on the specific affects on a woman's body, and if BWXTM is serious about addressing gender discrimination, looking at EVERY existing issue specifically from the vantage point of the WOMEN affected by said issue, will reveal the next steps that need to be taken.	4/25/2021 4:15 PM
5	Safety of families in vicinity of BWXT facility.	4/25/2021 2:46 PM
6	Environmental issues impact everyone	4/25/2021 10:12 AM
7	Women have different perceptions on environmental protection then men (statistically, not necessarily individually)	4/25/2021 9:49 AM
8	As defined in the first question ...Women may be particularly concerned about nuclear or hazardous releases to the air or water. Hazardous releases to the air can affect the respiratory health of their children; releases to the water can affect the health of those drinking it, eating food from it, or crops watered with it. Although these concerns are not unique to women, it has been shown that these risks can more significantly affect women's perspectives of the risks in the nuclear industry.	4/25/2021 9:22 AM
9	Don't know	4/25/2021 8:12 AM
10	Women who work at BWXT need to work in an environmentally safe place.	4/22/2021 1:02 PM
11	n/a	4/21/2021 9:35 PM
12	Women may be particularly concerned about nuclear or hazardous releases to the air or water. Hazardous releases to the air can affect the respiratory health of their children; releases to the water can affect the health of those drinking it, eating food from it, or crops watered with it. Although these concerns are not unique to women, it has been shown that these risks can more significantly affect women's perspectives of the risks in the nuclear industry.	4/21/2021 12:35 PM
13	n/a	4/21/2021 12:15 PM
14	na	4/21/2021 9:46 AM
15	na	4/21/2021 9:30 AM
16	n/a	4/21/2021 9:21 AM
17	NA	4/21/2021 9:21 AM
18	don't know	4/21/2021 9:20 AM
19	release of materials to the environment.	4/20/2021 4:42 PM
20	I am all for BWXT pursuing the license for this facility. however, I can agree that there may be a perception in the community that this facility could pose an environmental threat and thus adversely affecting women (water contam leading to reproductive issues etc). This is all about education and messaging, and changing perceptions.	4/20/2021 1:24 PM

21	n/a	4/20/2021 9:18 AM
22	Women's education on nuclear is necessary	4/20/2021 5:34 AM
23	NA	4/19/2021 11:23 AM
24	N/A	4/19/2021 8:54 AM
25	Hazardous releases to the air can affect the respiratory health of their children; releases to the water can affect the health of those drinking it, eating food from it, or crops watered with it. Although these concerns are not unique to women, it has been shown that these risks can more significantly affect women's perspectives of the risks in the nuclear industry. It is imperative that nuclear operations be held in high standards by the CNSC and the work is controlled and executed in a safe manor	4/19/2021 8:15 AM
26	The standard of care for the programs needs to better understand safety culture expectations. Near miss release need to be investigated and the corrective actions public ally disclosed.	4/19/2021 6:39 AM
27	Consideration of effects on children and pregnant women from releases	4/18/2021 7:33 PM
28	I believe women are more risk adverse than men and thus why women are more concerned about ensuring a safe environment for both themselves and their families.	4/17/2021 12:03 PM
29	N/A	4/17/2021 9:06 AM
30	Effects of exposure to such environment	4/16/2021 5:30 PM
31	N/a	4/16/2021 4:00 PM
32	Women tend to be more aware of what they 'think' will be harmful to their families, however, everyone needs to work together to try and eliminate the overall community bias' that relate to the nuclear industry.	4/16/2021 3:54 PM
33	Disagree	4/16/2021 3:52 PM
34	I do not work at BWXT, so I am not informed on safety hazards, concerned etc. or actions to address concerns if any. I work at OPG, and I would like to think safety measures are taken where required to all staff, women included.	4/16/2021 3:52 PM
35	There are no issues, the BWXTM facility meets CNSC regulatory requirements which considers the most at risk individuals.	4/16/2021 3:07 PM
36	Water is Life, Children Grow in Water, women are responsible for protecting water and children	4/16/2021 3:05 PM
37	General knowledge that women and children may be identified as vulnerable population based on scientific data from exposure research studies.	4/16/2021 3:04 PM

Q20 Emergency Management and Fire Protection The specific areas dealing with emergency management and fire protection at BWXTM include: nuclear emergency preparedness and response, fire emergency preparedness and response. There are emergency response procedures for the BWXTM that identify requirements for fire, medical, and radiation emergencies.

Answered: 176 Skipped: 103



	DON'T KNOW	DISAGREE	NEUTRAL	AGREE	TOTAL
There are issues, specifically related to women, regarding emergency management and fire protection at BWXTM.	49.71% 87	24.00% 42	21.14% 37	5.14% 9	175
BWXTM adequately addresses Emergency Management and Fire Protection requirements.	55.43% 97	0.57% 1	14.29% 25	29.71% 52	175

Q21 If you agreed there are issues, specifically related to women, regarding emergency management and fire protection at BWXTM. please specify what they are.

Answered: 28 Skipped: 251

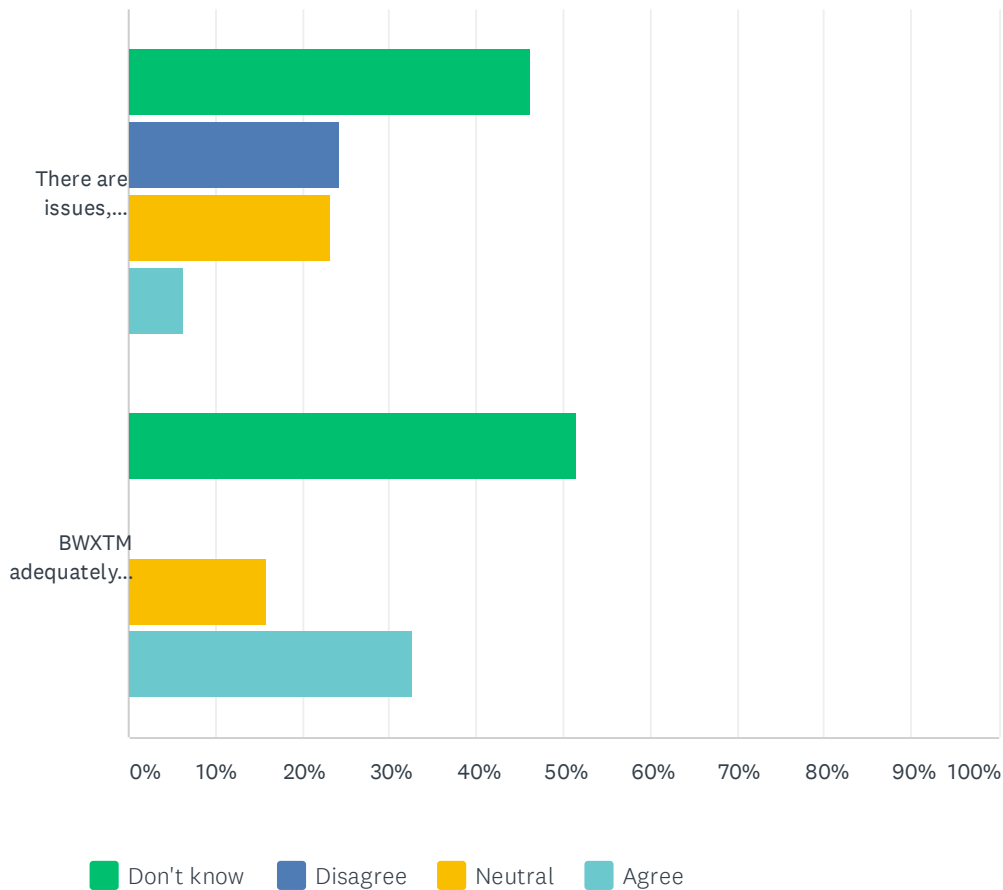
#	RESPONSES	DATE
1	No issues	4/25/2021 10:22 PM
2	Women generally havd a lower tolerance for risk. A gender diverse workforce is healthier	4/25/2021 7:43 PM
3	The EM&FP at BWXTM includes issues specifically related to women precisely BECAUSE data on the health affects of *everything that has ever been studied* has used white men as the default study subjects. Far too little empirical scientific data exists on the specific affects on a woman's body, and if BWXTM is serious about addressing gender discrimination, looking at EVERY existing issue specifically from the vantage point of the WOMEN affected by said issue, will reveal the next steps that need to be taken.	4/25/2021 4:15 PM
4	Ensuring safety of workers and communities in the event of a fire	4/25/2021 2:46 PM
5	Did not agree	4/25/2021 9:49 AM
6	What are their arrangements, how are these exercised and how are they communicated to the surrounding community. What is their history of incidents and accidents. What are the risks	4/25/2021 9:22 AM
7	Don't know	4/25/2021 8:12 AM
8	Not sure how they would specifically relate to women, they're important for everyone who works there.	4/22/2021 1:02 PM
9	n/a	4/21/2021 9:35 PM
10	n/a	4/21/2021 12:15 PM
11	na	4/21/2021 9:46 AM
12	na	4/21/2021 9:30 AM
13	n/a	4/21/2021 9:21 AM
14	NA	4/21/2021 9:21 AM
15	don't know	4/21/2021 9:20 AM
16	n/a	4/20/2021 9:18 AM
17	None	4/19/2021 11:23 AM
18	N/A	4/19/2021 8:54 AM
19	Again fire and emergency preparedness is necessary for any type of industry dealing with nuclear	4/19/2021 8:15 AM
20	None that I am aware of	4/19/2021 6:39 AM
21	n/a	4/18/2021 7:33 PM
22	N/A	4/17/2021 9:06 AM
23	NA	4/16/2021 5:30 PM
24	N/a	4/16/2021 4:00 PM
25	If there are not issues that relate to women, then the emergency management and fire protection program would be flawed.	4/16/2021 3:54 PM

26	Don't know	4/16/2021 3:52 PM
27	no concerns	4/16/2021 3:07 PM
28	Regardless of gender I assume that there is a emergency management and fire protection plan that has been approved under existing license at BWXTM.	4/16/2021 3:04 PM

Disregard data from Q22

Q22 Safeguards and Non-Proliferation The non-proliferation program for the BWXTM includes tracking and reporting of nuclear material. The International Atomic Energy Agency (IAEA) keeps an inventory of nuclear material, and prescribes security seals on the DSC welds. A new initiative for the licence renewal period is laser mapping for container verification.

Answered: 175 Skipped: 104



	DON'T KNOW	DISAGREE	NEUTRAL	AGREE	TOTAL
There are issues, specifically related to women, regarding nuclear safeguards at BWXTM.	46.24% 80	24.28% 42	23.12% 40	6.36% 11	173
BWXTM adequately addresses Safeguards and Non-Proliferation requirements.	51.43% 90	0.00% 0	16.00% 28	32.57% 57	175

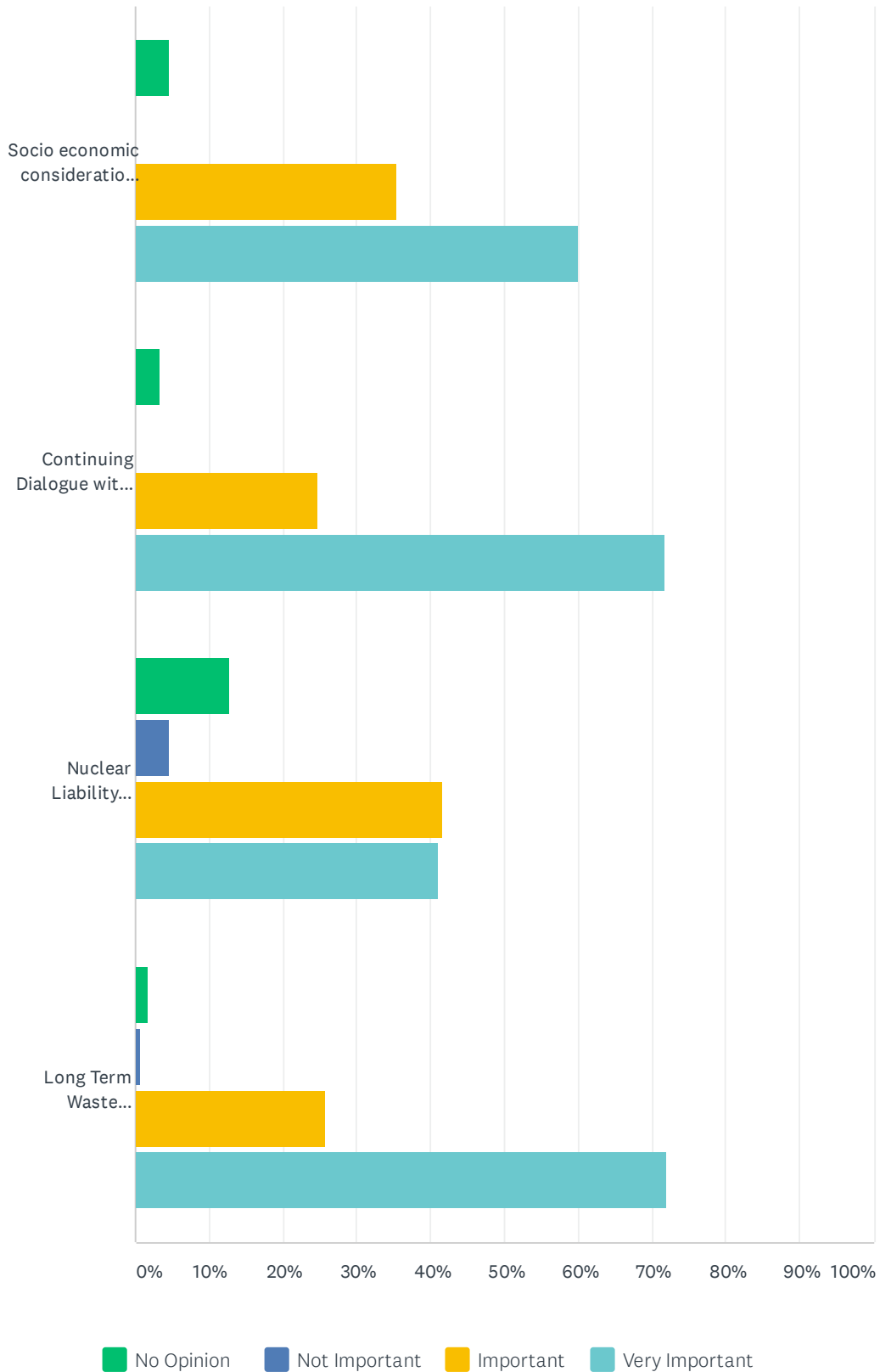
Q23 If you agreed there are issues, specifically related to women, regarding nuclear safeguards at BWXTM. please specify what they are.

Answered: 25 Skipped: 254

#	RESPONSES	DATE
1	No issues	4/25/2021 10:22 PM
2	Not sure to be hknest	4/25/2021 7:43 PM
3	The nuclear safeguards at BWXTM includes issues specifically related to women precisely BECAUSE data on the health affects of *everything that has ever been studied* has used white men as the default study subjects. Far too little empirical scientific data exists on the specific affects on a woman's body, and if BWXTM is serious about addressing gender discrimination, looking at EVERY existing issue specifically from the vantage point of the WOMEN affected by said issue, will reveal the next steps that need to be taken.	4/25/2021 4:15 PM
4	Disagreed	4/25/2021 9:49 AM
5	Knowledge and confidence - can I trust BWXTM in my community, and their commitment to safeguards, and their processes to meet the commitments. Are they transparent?	4/25/2021 9:22 AM
6	Don't know	4/25/2021 8:12 AM
7	Nuclear safeguards are important to women in general but particularly in reproductive years.	4/22/2021 1:02 PM
8	n/a	4/21/2021 9:35 PM
9	n/a	4/21/2021 12:15 PM
10	na	4/21/2021 9:46 AM
11	na	4/21/2021 9:30 AM
12	n/a	4/21/2021 9:21 AM
13	NA	4/21/2021 9:21 AM
14	don't know	4/21/2021 9:20 AM
15	n/a	4/20/2021 9:18 AM
16	None	4/19/2021 11:23 AM
17	N/A	4/19/2021 8:54 AM
18	Need to improve processes and tightened data management oversight for export and import controls to conform to the REGDOC expectation	4/19/2021 6:39 AM
19	n/a	4/18/2021 7:33 PM
20	N/A	4/17/2021 9:06 AM
21	NA	4/16/2021 5:30 PM
22	N/a	4/16/2021 4:00 PM
23	Don't Inow	4/16/2021 3:52 PM
24	I believe there is an error in this question. I do not believe that Mo-99 production uses DSCs or laser mapping. This is used for used fuel.	4/16/2021 3:07 PM
25	Again, under assumed existing license, I realize that there is or may be a nuclear safeguards plan at BWXTM.	4/16/2021 3:04 PM

Q24 Indicate how important you consider each of the following areas

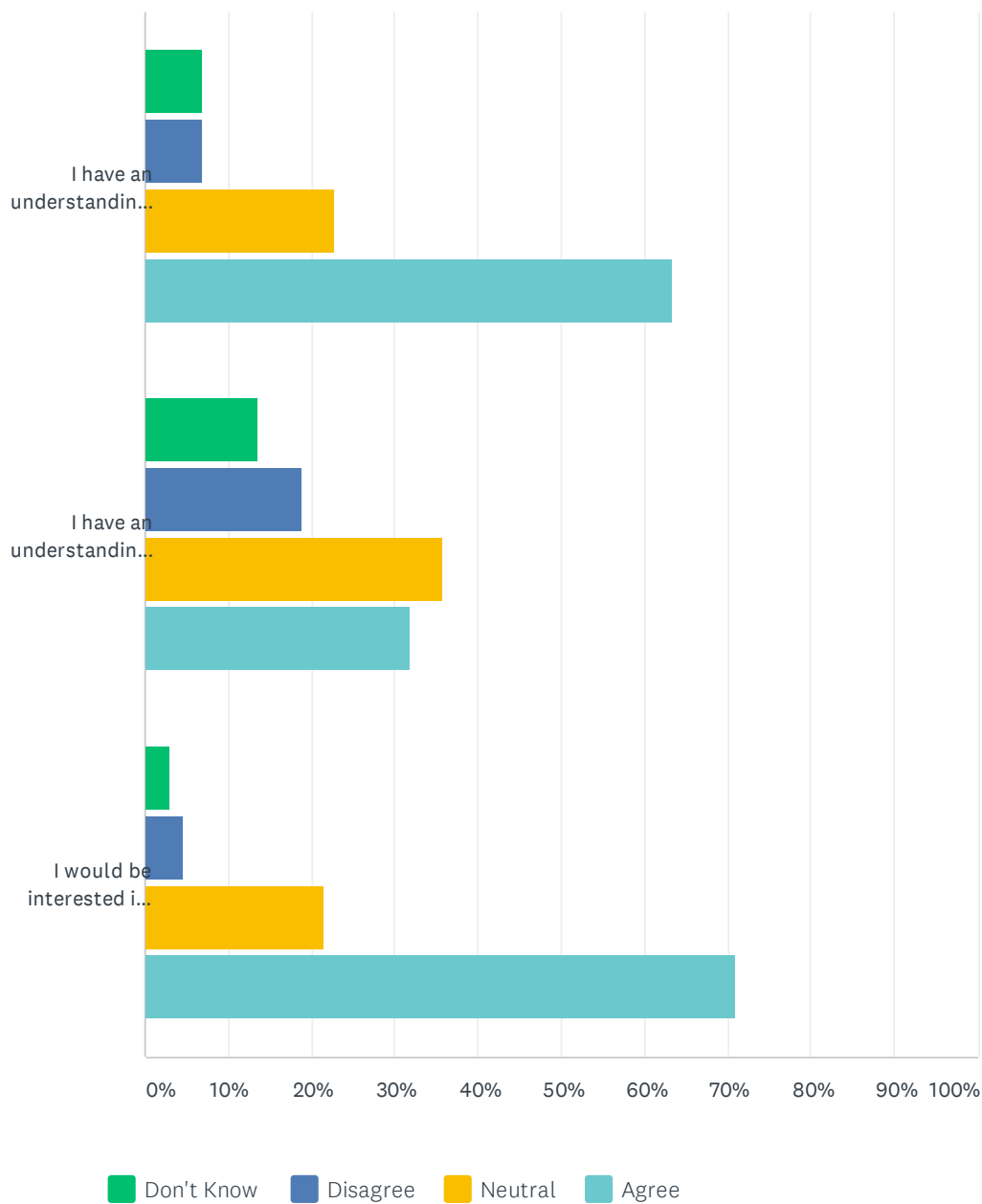
Answered: 175 Skipped: 104



	NO OPINION	NOT IMPORTANT	IMPORTANT	VERY IMPORTANT	TOTAL
Socio economic considerations. For example, WiN seeks to promote career interest in nuclear engineering, science, technology, the trades and other nuclear-related professions, especially among women and young people	4.57% 8	0.00% 0	35.43% 62	60.00% 105	175
Continuing Dialogue with the Public and Employees	3.45% 6	0.00% 0	24.71% 43	71.84% 125	174
Nuclear Liability Insurance	12.72% 22	4.62% 8	41.62% 72	41.04% 71	173
Long Term Waste Management	1.71% 3	0.57% 1	25.71% 45	72.00% 126	175

Q25 How would you rate your knowledge about medical isotopes in general and BWXTM's Class IB nuclear substance processing facility in particular?

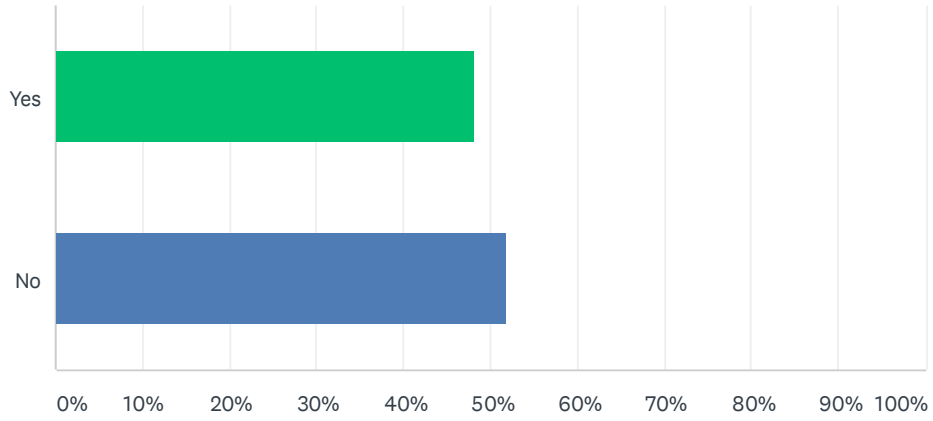
Answered: 176 Skipped: 103



	DON'T KNOW	DISAGREE	NEUTRAL	AGREE	TOTAL
I have an understanding of the nuclear isotopes in Ontario.	6.86% 12	6.86% 12	22.86% 40	63.43% 111	175
I have an understanding of the role of the BWXTM's Class IB nuclear substance processing facility.	13.64% 24	18.75% 33	35.80% 63	31.82% 56	176
I would be interested in learning more about BWXTM's Class IB nuclear substance processing facility and the processing nuclear isotopes.	2.84% 5	4.55% 8	21.59% 38	71.02% 125	176

Q26 Have you or a family member benefited from the treatments of medical isotopes?

Answered: 179 Skipped: 100



ANSWER CHOICES	RESPONSES	
Yes	48.04%	86
No	51.96%	93
TOTAL		179

Q27 If yes, how did you/your family benefit from the treatments of medical isotopes?

Answered: 85 Skipped: 194

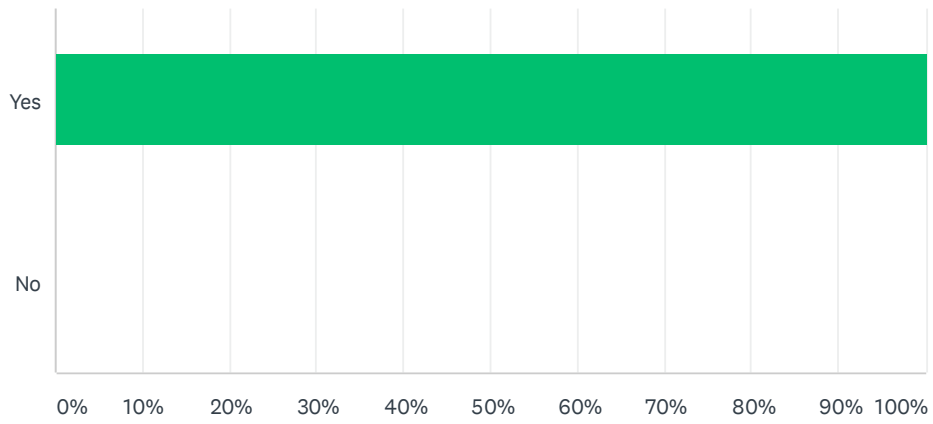
#	RESPONSES	DATE
1	Cancer treatment	4/25/2021 11:01 PM
2	Cancer diagnosis and treatment	4/25/2021 10:22 PM
3	Cancer diagnosis	4/25/2021 8:44 PM
4	Tumor treatments and surgery	4/25/2021 8:09 PM
5	Cancer treatments	4/25/2021 7:43 PM
6	cancer diagnosis	4/25/2021 4:15 PM
7	Cancer treatment	4/25/2021 3:58 PM
8	chemotherapy	4/25/2021 1:19 PM
9	Tracing for heart ailment	4/25/2021 12:26 PM
10	cancer treatment	4/25/2021 10:16 AM
11	Diagnosis	4/25/2021 10:12 AM
12	Unsure	4/25/2021 9:49 AM
13	Cancer Treatments	4/25/2021 9:08 AM
14	Cancer	4/25/2021 8:31 AM
15	cancer treatment	4/25/2021 8:14 AM
16	Not applicable	4/25/2021 8:12 AM
17	Melanoma removed using cobalt radiation	4/25/2021 8:11 AM
18	Diagnostic methods	4/23/2021 10:54 AM
19	Cancer treatment	4/21/2021 10:33 PM
20	Cancer treatment	4/21/2021 1:39 PM
21	Radiation therapy for thyroid cancer and breast cancer	4/21/2021 12:35 PM
22	medical imaging	4/21/2021 12:15 PM
23	cardiac diagnosis, breast cancer diagnosis and treatment.	4/21/2021 11:34 AM
24	My mother's cancer treatment	4/21/2021 11:17 AM
25	imaging	4/21/2021 11:12 AM
26	Diagnostic imaging for several issues.	4/21/2021 11:05 AM
27	Radiation therapy to treat cancer for my self and family.	4/21/2021 10:27 AM
28	Imaging	4/21/2021 10:21 AM
29	My wife's aunt had treatment for lung cancer. The treatments improved her health outcome and extended her lifetime and improved her quality of life.	4/21/2021 9:57 AM
30	Cancer treatment	4/21/2021 9:53 AM
31	cancer related treatments	4/21/2021 9:46 AM

32	Co treatment	4/21/2021 9:37 AM
33	Cancer scan	4/21/2021 9:34 AM
34	na	4/21/2021 9:30 AM
35	Breast screening for cancer	4/21/2021 9:21 AM
36	Family member was diagnosed with breast cancer.	4/21/2021 9:21 AM
37	NA	4/21/2021 9:21 AM
38	I had osteomyelitis as a child and received nuclear imaging	4/21/2021 9:20 AM
39	I am a breast cancer survivor and part of the diagnosis, treatment used medical isotopes to identify cancer in my lymph nodes.	4/21/2021 9:20 AM
40	cardiac tests	4/21/2021 9:17 AM
41	My grandfather was treated with medical isotopes when he was suffering from bowel cancer	4/21/2021 9:12 AM
42	Radioactive Iodine for Thyroid	4/20/2021 5:52 PM
43	My mom had her overactive thyroid treated with medical isotopes	4/20/2021 2:30 PM
44	thyroid operation	4/20/2021 2:13 PM
45	My mother was treated with radiation therapy for breast cancer.	4/20/2021 1:24 PM
46	radiation treatment - cancer	4/20/2021 1:00 PM
47	Was used in a medical diagnostic procedure.	4/20/2021 12:59 PM
48	Diagnostic imaging as well as cancer treatment.	4/20/2021 10:00 AM
49	n/a	4/20/2021 9:18 AM
50	Medical treatments and scans for diagnosis	4/19/2021 4:09 PM
51	diagnosis of different conditions.	4/19/2021 3:15 PM
52	None	4/19/2021 11:23 AM
53	used for diagnosis of breast cancer spread in both my mother and my aunt (lymph nodes, bones, etc)	4/19/2021 9:46 AM
54	during treatment for Multiple Myeloma	4/19/2021 9:31 AM
55	N/A	4/19/2021 8:54 AM
56	Im familiar with lots of people who have benefited from treatments	4/19/2021 8:15 AM
57	MRI diagnostic, cancer treatment	4/19/2021 8:03 AM
58	Diagnostic testing Tc99	4/19/2021 7:05 AM
59	Not applicable	4/19/2021 6:39 AM
60	Cancer treatments, heart injections... multiple members for both	4/19/2021 6:22 AM
61	Cancer radiation treatment	4/18/2021 10:35 PM
62	MRI and other diagnostics	4/18/2021 10:28 PM
63	n/a	4/18/2021 7:33 PM
64	My mother received a whole body scan as part of her cancer diagnostic	4/17/2021 8:26 PM
65	MRI, diagnostics	4/17/2021 6:29 PM
66	N/A	4/17/2021 9:06 AM
67	Radiotherapy;	4/17/2021 12:53 AM
68	My mother had a thyroid issue that was helped with medical isotopes. My father had a diagnostic procedure with one.	4/16/2021 6:19 PM

69	Cancer treatment	4/16/2021 5:30 PM
70	Cancer scans	4/16/2021 4:16 PM
71	Chemotherapy	4/16/2021 4:00 PM
72	Cancer treatment.	4/16/2021 3:58 PM
73	No	4/16/2021 3:52 PM
74	cardiac issues	4/16/2021 3:52 PM
75	Cancer treatment	4/16/2021 3:43 PM
76	Cancer treatment	4/16/2021 3:41 PM
77	I have had isotope medical diagnoses for 2 different conditions	4/16/2021 3:34 PM
78	Cancer treatments; diagnostics	4/16/2021 3:24 PM
79	My Aunt underwent targeted treatment for breast cancer. I am sure everyone had benefitted from the sterilization of medical instruments.	4/16/2021 3:21 PM
80	Radiation Therapy	4/16/2021 3:12 PM
81	My husband had cancer 16 years ago and is now in full remission. My father has undergone radiation therapy for prostate cancer and is in remission. I got to spend 10 more years with my mother because of nuclear medicine.	4/16/2021 3:07 PM
82	Radiation Therapy for breast cancer therapy.	4/16/2021 3:06 PM
83	No past family history	4/16/2021 3:04 PM
84	Cancer treatment and diagnosis	4/16/2021 3:02 PM
85	Internal Medicine	4/16/2021 2:56 PM

Q28 I believe medical isotopes are an important for health/medical treatment.

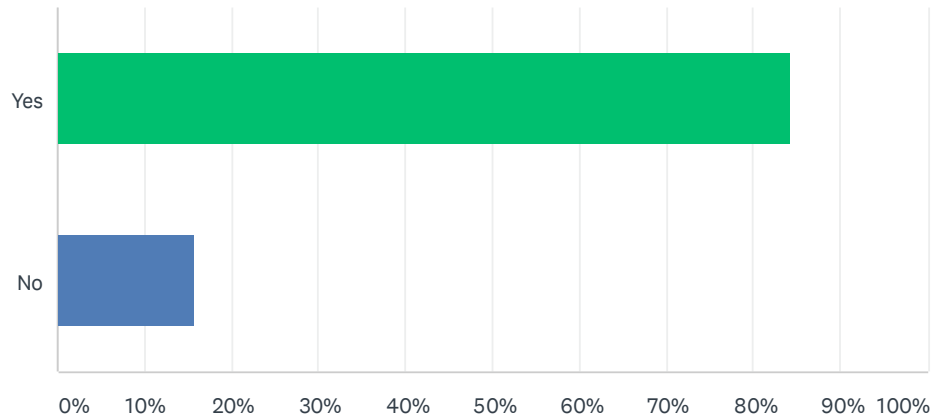
Answered: 177 Skipped: 102



ANSWER CHOICES	RESPONSES	
Yes	100.00%	177
No	0.00%	0
TOTAL		177

Q29 I am concerned about the potential shortage of supply of (isotope) and the impacts that may have on medical treatments for myself or my family.

Answered: 179 Skipped: 100



ANSWER CHOICES	RESPONSES	
Yes	84.36%	151
No	15.64%	28
TOTAL		179