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# **Consideration of Administrative Monetary Penalties in Nuclear Safety and Security**

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## **Abstract**

An Administrative Monetary Penalty (AMP) is a penalty imposed by the Canadian Nuclear Safety Commission (CNSC), without court involvement for a violation of a regulatory requirement. An AMP can be applied against any individual or corporation subject to the Nuclear Safety Control Act, which regulates the development, production and use of nuclear energy and the production, possession and use of nuclear and radioactive material. However, AMPs are not the same as criminal offences. They are civil sanctions which try to secure compliance through the application of monetary penalties for non-compliance with regulatory requirements. The AMP program was introduced in 2013 in Canada and to this date over 30 penalties have been issued. In all of these cases, the violations were related to handling and security of radioactive material. Based on these issued penalties investigations were conducted to discover pros and cons of the AMP system and to propose potential improvements for future implementation. This paper also addresses some of the complicated issues of the system, such as the economic aspect of the process, and the subjectivity and relative ease of issuing these penalties. In order to improve nuclear security and safety in Canada, the regulator must be aware of possible violations of the Nuclear Safety Control Act and work on prevention of these violations. It is postulated that current AMP policy may not motivate individuals or corporations to report violations. The paper gives recommendations on modifications which could be implemented to motivate self-identification of violation and give significant benefit to the AMP system. Other than the issued AMPs, the paper will analyze data obtained through the survey conducted on human readiness to self- identify violations in the nuclear industry under different circumstances. This confirms that the modified AMP policy would improve the body of knowledge and provide significant information on violations of the Nuclear Safety Control Act and improve nuclear security.

## **I. Introduction**

The risks of security and safety violations in the nuclear industry are obvious when considering the consequences that they might have. In other low-probability high-consequence industries, great effort is made to minimize these risks. Nuclear regulation authorities in Canada aim to lower the probability of violations by introducing regulations and policies. A major role in lowering the risk, however, lies with

the licensees and nuclear workers themselves. By reporting mistakes made in their own facilities, licensees would contribute to the prevention of similar mistakes in the future.

Security and safety violations can vary from accidental non-compliance with regulations to deliberate acts that compromise the safety or security of a facility and/or people. Available measures to suppress such behaviours include [1]:

- regular interactions with licensees (discussions/meetings/letters)
- written notice or warning
- increased regulatory scrutiny (more frequent inspections)
- an order by an inspector or designated officer
- formal request under subsection 12 (2) of the *General Nuclear Safety and Control Regulations*
- licensing action (licence hold points, suspension, revocation)
- decertification of persons or equipment
- investigation and prosecution
- administrative monetary penalty (AMP).

Enforcement measures may not necessarily be chosen in the order presented. A measure can be used independently or in combination with others, resulting in a wide range of options.

This paper's focus is on AMP use in Canada, how they are calculated, potential issues in the current calculation process, and how this process might be improved.

The AMP is a tool used for discouraging non-compliance with rules and regulations in a certain area. An AMP is an administrative penalty imposed by the Canadian Nuclear Safety Commission (CNSC), without court involvement. It is used in the case of a violation of a regulatory requirement. An AMP can be applied against any individual or corporation subject to the Nuclear Safety and Control Act (NSCA), which regulates the development, production, and use of nuclear energy, and the production, possession, and use of nuclear and radioactive material. However, AMPs are not the same as criminal offences. They are civil sanctions which try to secure compliance through the application of monetary penalties for non-compliance with regulatory requirements and have been used in Canada's nuclear industry since 2013. AMPs are not exclusive to the CNSC and are used by several other federal and provincial government agencies, including Canadian Food Inspection Agency, Transport Canada, Canada Border Service Agency, Canadian Radio-television and Telecommunications Commission, and The Financial Transactions and Reports Analysis Centre of Canada. Organizations in other countries, such as the United States, have also incorporated AMPs as a part of their regulatory regimes [2]. One of the characteristics of this system is that it can cause significant financial loss to the organization through reoccurring non-compliance and subsequent penalization [3].

To better understand the paper, an example is provided of a violation of a CNSC regulation and the subsequently issued AMP [4]:

On September 24, 2016, a consignment of packages containing radioactive medical isotopes was picked up from FedEx Mirabel destined to the hospital in Chandler, QC. The shipping documents indicate that the consignment consisted of two packages: one package with a II- Yellow label and one with a III-Yellow label. The Bill of Lading confirm that Mr. Bruno Ricignuolo picked up the consignment of packages containing radioactive medical isotopes at FedEx Mirabel on September 24, 2016 and that these were delivered to the hospital in Chandler, QC on September 25, 2016. Around noon on September 24, 2016, Mr. Bruno Ricignuolo picked up passengers in Montreal to drive them to the Gaspésie region of Québec. When Mr. Bruno Ricignuolo picked up the passengers, the two packages remained in the vehicle. No Class 7 placards were displayed on the vehicle as required by section 4.15 of the Transportation of Dangerous Goods Regulations. Paragraph 25(4)(a) of the

Packaging and Transport of Nuclear Substances Regulations 2015 refers to paragraph 574 of the IAEA Regulations and states that: In the case of road vehicles, no persons other than the driver and assistants shall be permitted in vehicles carrying packages, overpacks or freight containers bearing category II-YELLOW or III-YELLOW labels. On September 24, 2016, Mr. Bruno Ricignuolo violated paragraph 25(4)(a) of the Packaging and Transport of Nuclear Substances Regulations 2015. According to the carrier's investigation report, provided to the CNSC and reviewed by CNSC staff:

- Mr. Bruno Ricignuolo admitted that he had transported passengers while transporting packages with II-Yellow and III-Yellow labels.
- Mr. Bruno Ricignuolo admitted that he did not display the required Class 7 placards on his vehicle.

On December 7, 2016, Mr. Ricignuolo acknowledged having transported the consignment with passengers on board and without displaying the required placards to a CNSC inspector. He also admitted having transported passengers on other occasions.

For this violation, the amount of administered penalty was \$1949.

The above example demonstrates a case where the violation impacts both safety and security.

The main problem demonstrating the need for AMPs is that the current policy motivates violators to hide their violations, the reason being that self-reporting leads to a penalty. Since inspectors cannot be present at all the licensees' sites at all times, there are many opportunities for violations to remain hidden. The idea behind the AMP should be to support self-identification of violations and therefore build a body of knowledge on how the violations occur and how to prevent their reoccurrence.

## **II. AMPs in Nuclear Industry in Canada**

In June 2012, as part of the Government of Canada's Responsible Resource Development initiative, amendments were made to the NSCA to authorize the CNSC to implement the AMP system to strengthen the environmental protection and to increase compliance with the NSCA and its associated regulations [5].

The CNSC has a robust compliance and enforcement program, which includes several tools to enforce compliance when requirements are not met. Among these tools are orders, revocation of a license, and prosecution. An AMP system should provide the CNSC with additional means for enforcement. The selection of the appropriate enforcement tool depends on factors such as the severity and risk posed by the act of non-compliance [5].

AMPs came into force in 2013, and since then over 30 AMPs have been issued [2]. These penalties do not require or create any new regulations. AMPs are only a tool for enforcing existing regulations. Also, the AMP will not be the only tool for enforcing regulations or responding to non-compliance, but only the non-compliance listed as violations in the AMPs regulations may be subject to monetary penalties.<sup>1</sup> Other than written orders, warnings or licensing actions the CNSC as well use prosecution for actions that are considered offences under the NSCA [6]. The reasons for the implementation of AMPs are that it is faster, and the fact that judicial proceedings often result in considerable costs to the federal government and to the individual and/or corporation involved. Unlike prosecution, an AMP is a monetary penalty that is imposed for violations of regulatory requirements. The introduction of the AMP Regulations benefits the Canadian public by allowing the CNSC to enforce requirements using an administrative process rather than resorting to prosecution in the courts. Judicial proceedings often result

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<sup>1</sup> A non-compliance is a regulatory requirement that has not been met. A non-compliance becomes a violation if it is listed in the schedule to the AMP Regulations and the CNSC selects AMPs as the appropriate enforcement option. [6]

in considerable costs to the Government of Canada and to the individual and/or corporation involved and may be too strict of a tool to utilize except in extreme circumstances.

Prosecution is also often lengthy for all parties. An AMP system is relatively inexpensive to administer within an existing compliance program, and it normally results in more timely and effective enforcement than prosecution. As a result, the individual or corporation may present a case without needing a lawyer. The maximum monetary penalties under the AMP system (Table 1) are significantly less than the maximum allowed amount under the NSCA. An AMP system simply provides the CNSC with an additional tool to address non-compliance. Penalty ranges are different for individuals and corporations and are divided in three categories depending on the severity of the violation. Violations are listed under these categories in the Schedule of violations [7].

**Table 1 Penalty ranges [6]**

	Category A	Category B	Category C
Individual	\$300 - \$3,000	\$300 - \$10,000	\$300 - \$25,000
Corporation	\$1,000 - \$12,000	\$1,000 - \$40,000	\$1,000 - \$100,000

### III. Procedure

An AMP can be applied against any individual or corporation subject to the NSCA. The CNSC may consider issuing an AMP for any of the following reasons [2]:

- Compliance is not obtained using either regular interaction or written notices.
- The non-compliance is likely to reoccur.
- There is a history of repeated non-compliance.
- The non-compliance was intentional or a result of negligence.
- Harm resulted or could have resulted from the non-compliance.
- The non-compliance was motivated by competitive or economic benefit
- There was unreasonable risk to health, safety, the environment, security, or Canada's international obligations.
- There is a need to correct behaviour that violates requirements.

The NSCA allows both CNSC Inspectors and Designated Officers to issue AMPs. However, under the CNSC program, AMPs will be issued only by Designated Officers, on the recommendation of Inspectors, Licensing Officers, Specialists, or other trained staff. Every AMP is issued in the form of a Notice of Violation (NoV) along with instructions on payment and request for review. According to the CNSC, AMPs will rarely be the first response to the non-compliance. Licensees will be given several opportunities to correct a non-compliance prior to AMPs being considered. In rare circumstances will AMPs be the first response to a non-compliance [6].

For calculating the penalty there are seven factors against which the violation is compared, each with a scale with six levels, and regulators choose a weight for each factor from the levels. The weights are added up to give a score.

Once an AMP is chosen as an appropriate tool for the certain violation, the amount is determined using the following factors [6]:

- the compliance history of the person who has committed the violation
- the degree of intent or negligence on the part of the person
- the harm that resulted or could have resulted from the violation

- whether the person derived any competitive or economic benefit from the violation
- whether the person made reasonable efforts to mitigate or reverse the violation's effects
- whether the person provided all reasonable assistance to the Commission
- whether the person brought the violation to the attention of the Commission

Currently, the AMP calculation process consists of 5 steps:

- 1) Subtract the minimum penalty amount from the maximum penalty amount of the applicable penalty range (Table 1).
- 2) Assess the score for each factor and add the scores up to one final number (Table 2).
- 3) Divide the total of the assessed scores by 29, which is the maximum score of the determining factors.
- 4) Multiply the result from step 1 by the result from step 3.
- 5) Add the minimum penalty amount for the applicable category to the result from step 4.

**Table 2 Factors and assigned scales**

	Factor	Description	Scale
1	Compliance history	Compliance history of the person who has committed the violation	0 to +5
2	Intention or negligence	Degree of intent or negligence on the part of the person	0 to +5
3	Actual or potential harm	Harm that resulted or could have resulted from the violation	0 to +5
4	Competitive or economic benefit	Whether the person derived any competitive or economic benefit from the violation	0 to +5
5	Efforts to mitigate or reverse effects	Whether the person made reasonable efforts to mitigate or reverse the violation's effects	-2 to +3
6	Assistance to Commission	Whether the person provided all reasonable assistance to the Commission	-2 to +3
7	Attention to Commission	Whether the person brought the violation to the attention of the Commission	-2 to +3

Using this process, even if the score is zero, the minimal penalty amount will apply, which may explain why self-identification is not used very often. Moreover, even if the individual or company proactively admit to a violation of the Act, which reduces the penalty amount, they will be negatively impacted in case of any future violation, where even if they self-identify, they will have a bad history of compliance, and therefore pay a higher penalty.

An AMP can be reviewed, upon request by the recipient, by submitting a request for review to the Commission within 30 days of receiving the Notice of Violation. The Commission Members then form a Review Panel and make a decision. Once the Commission has reviewed the case and made a

determination, the decision is final and binding, and except for judicial review under the *Federal Courts Act*, is not subject to appeal or to review by any court [6].

#### **IV. Optimization of AMPs**

In order to prevent violations, the regulator must have insight into the potential violation methods. Building a body of knowledge is an effective method to accomplish that. As violations such as the one in the aforementioned example may not be foreseen by the regulators, self-identification is crucial to compile enough information that can be used for the development and optimization of AMPs.

It appears, currently, that there is an opportunity for improvement. In previously issued penalties, only 12% of all violations were self-identified [8]. The reason for this might be that in the best-case scenario they will still be penalized (\$300 for individuals and \$1000 for companies) or have a “non-compliance” on their record. Another reason might be in the nature of violation.

For the purpose of this paper, violations will be classified into two categories: first – violation committed by accident, and second – violations committed on purpose. The first group represents violations that were not planned, and without malicious intent or for economic benefit. The second group includes premeditated violations committed in order to obtain certain benefits. These violations will rarely, if ever, be self-identified, therefore the aim of the research is to increase the probability of the first group self-identification, and therefore building the body of knowledge.

One possible solution would be to use AMPs with some modifications so that self-identification of non-compliance would be treated with positive effect to a certain extent. This could be done by changing the minimum penalty to \$0. Moreover, companies and individuals would have the self-identification on their compliance history, so if the next time a discovery of a violation is made, this would come as a redeeming feature. This would be calculated as a negative score in the determining factor, and the final score would be lower, meaning a lower applicable penalty. This would reduce the AMP amount for future non-compliance.

The current AMP system takes into consideration self-identification, but in every next violation after self-identified, the first violation will be taken as “bad compliance history” which means that previous violation will increase every next penalty, regardless of self-identification.

The adjustment of the calculation could be done by introducing changes in two important parts of the already existing formula:

1. No minimal penalties *or* remove Step 1 from the previous calculation, and instead multiply the total score by the maximum amount for the category; remove Step 5
2. Change compliance history range from [0 to +5] to [-2 to +3].

After introducing these changes, the calculation of the penalty amount should consist of the following steps:

1. Assess the score for each factor and add the scores up to one final number (Table 3)
2. Divide the total of the assessed scores by 27, which is the maximum score of the determining factors
3. Multiply the result from step 2 by the maximal penalty for the category (Table 1)

**Table 3 Modified factors and assigned scales**

	Factor	Description	Scale
1	Compliance history	Compliance history of the person who has committed the violation	-2 to +3
2	Intention or negligence	Degree of intent or negligence on the part of the person	0 to +5
3	Actual or potential harm	Harm that resulted or could have resulted from the violation	0 to +5
4	Competitive or economic benefit	Whether the person derived any competitive or economic benefit from the violation	0 to +5
5	Efforts to mitigate or reverse effects	Whether the person made reasonable efforts to mitigate or reverse the violation's effects	-2 to +3
6	Assistance to Commission	Whether the person provided all reasonable assistance to the Commission	-2 to +3
7	Attention to Commission	Whether the person brought the violation to the attention of the Commission	-2 to +3

These modifications would improve the current system because there will be no minimum penalties required in every case. Moreover, the change in factor scale from [0 to +5] to [-2 to +3] would maintain the 6 levels of compliance history, but it would offer negative points for violators in the case that they self-identified previous violation. This modification would reduce future penalty amounts and motivate individuals and corporations to report every non-compliance with the Act.

In addition to these modifications it would be crucial to define strict descriptions for the use of factor 1 – Compliance history. Considering all issued cases of AMPs, this factor demonstrates a considerable subjectivity in the AMP calculations. In order to further improve this policy, compliance history should be defined further by clearly describing each level of the scale and determining when they will be used. This will not only help in self – identification of violations, but also prevent subjectivity in the score assessment. Finally, one new level “Not applicable” (N/A), would be introduced. This level would be used for those who did not have previous violations. In case a violator has N/A for compliance history the total score will be divided by 29 instead of 27 (leading to a lower final score and corresponding penalty). This is to make a distinction between a score of N/A and 0. For those who had previous violations, the scale [-2 to +3] would be used in a precisely defined manner as described in Table 4.

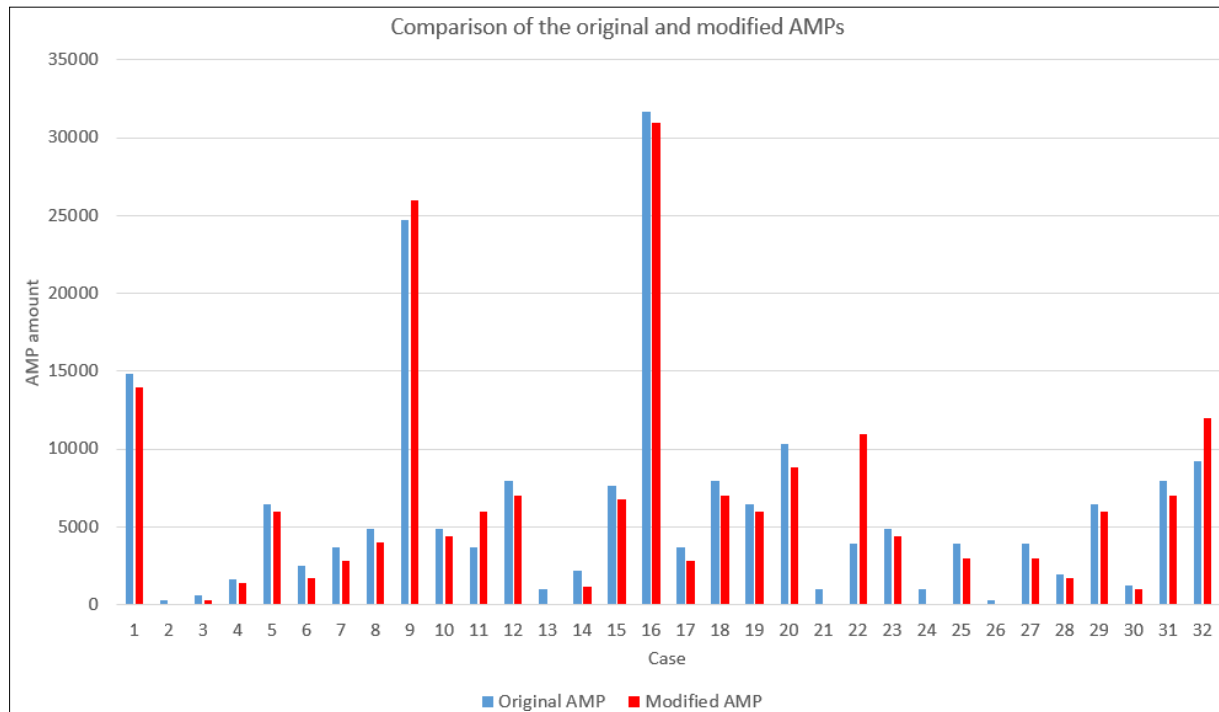


**Table 4 Compliance history levels**

Score	Definition
N/A	$si = 0$ and $nsi = 0$
-2	$si = 1$ and $nsi = 0$
-1	$si = 2$ and $nsi = 0$
0	$si \leq 2$ and $nsi = 1$ or $si > 2$ and $nsi = 0$
+1	$si = 2$ and $nsi = 2$ or $si = 0$ and $nsi \leq 2$ or $si > nsi$ and $2 < si + nsi \leq 4$
+2	$si = 3$ and $nsi = 3$ or $si < nsi$ and $2 < nsi \leq 4$ or $si > nsi$ and $nsi > 0$ and $4 < si + nsi \leq 6$
+3	$si = nsi \geq 3$ or $si = 0$ and $nsi > 5$ or $si < nsi$ and $nsi \geq 5$ or $si > nsi$ and $si + nsi > 6$

\*si: self-identified; nsi: not self-identified

While the proposed modifications do not alter the structure of the current system fundamentally, they do introduce improvement to the outcome. Not only does the amount of penalties change, but also, due to change of compliance history factor, violators would be motivated to self-identify their violations. The change of the issued penalty is shown in the graph (Figure 1) where issued penalties are recalculated according to the new formula and compared. This comparison is based on all 32 cases in Canada between 2015-2018.



**Figure 1: Comparison of the original and modified AMPs**

In this modified AMP system, if a person commits a violation listed in the schedule, self-identifies and reports, the amount will be significantly lower for the first violation. If the same person commits additional violations after the first self-reported, every subsequent violation will be penalized, but the amount would be lower than if the violations were discovered by inspection due to good compliance history. An example is shown in Table 5, which shows a case of a violation committed for the first time where it was self-identified and reported. This calculation is only hypothetical, unlike the calculations in Figure 1, which are applied to real cases.

**Table 5 Comparison of the original and modified AMP - For the first violation**

Factor	Original AMP	Modified AMP
1. Compliance history	0	NA
2. Intention or negligence	+2	+2
3. Actual or potential harm	+2	+2
4. Competitive or economic benefit	0	0
5. Efforts to mitigate or reverse effects	-1	-1
6. Assistance to Commission	-1	-1
7. Attention to Commission	-2	-2
Final penalty	\$300	\$0

A second case shown in Table 6, representing a repeated violation, where the same person from the first case committed second violation which was also self-identified and reported.

**Table 6 Comparison of the original and modified AMP - For a second violation**

Factor	Original AMP	Modified AMP
1. Compliance history	+1	-2
2. Intention or negligence	+2	+2
3. Actual or potential harm	+2	+2
4. Competitive or economic benefit	0	0
5. Efforts to mitigate or reverse effects	1	1
6. Assistance to Commission	-1	-1
7. Attention to Commission	-1	-1
Final penalty	\$1658	\$400

In both cases, the difference in the amount between the original and modified AMP is significant, which should motivate individuals and corporations to report any non-compliance with the Act. Moreover, it is important that in cases where violations are not self-reported but discovered through inspection or in any other way, the amounts between the original and modified AMPs will not differ significantly, which emphasises the impact of these modifications on the self-identification.

While factor 7 acknowledges the self-identification for the current violation, it does not take into consideration previous cases, which is the role of the factor 1. Introducing changes to factor 1 would significantly improve the system and take all previous violations into account.

## V. Survey

A survey was conducted amongst students at the University of Ontario Institute of Technology (Ontario Tech), and amongst members of academia and nuclear industry to discover if the proposed changes would result in the anticipated outcome. The survey was sent to all undergraduate and graduate students of the nuclear engineering program of this university, as the future workers in the nuclear industry, the most relevant subjects of the survey. Members of academia and industry were surveyed during related conferences. The survey was voluntary, anonymous, and was approved by the Ontario Tech Research Ethics Board, REB 15003, on October 26, 2018. 50 individuals have participated in this survey to date.

The results of the study have shown that the baseline is 62% who would self-report under the current system. Removing the negative effect on the compliance history could increase self-identification by 24% (to 86%). This would increase a further 1.8% (to 87.8%) if there was no monetary penalty or a negative compliance history. Having a positive compliance history (good behavior) would increase the self-identification by a further 8.1% (to 95.9%).

The most effective way of ensuring higher self-reporting appears to be by reducing the impact on the compliance history, followed by a positive (rewarding) compliance history.

## VI. Conclusions

AMPs are not a substitution for any existing tool. They are, however, highly significant as they represent the only tool which could provide knowledge on potential violations of the Act since they could motivate self-identification and reporting of a non-compliance. This is important for the nuclear industry, but it could also be important for other low-probability high-consequence industries.

Modifications in the calculation of penalties could have a significant role in improving the system. Such modifications, as presented in this paper, show significant improvements to current systems can be made with minimal interference with the existing implementation.

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