BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

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Risk-Based Planning Project - *ENVIRONMENTAL MANAGEMENT ACT AND INTEGRATED PEST MANAGEMENT ACT*

Environmental Protection Division | Regional Operations Branch
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TABLE OF CONTENTS

1. BACKGROUND

The Ministry of Environment and Climate Change Strategy's (Ministry) Compliance and Environmental Enforcement team plan inspections by following guidelines under two operational policies: The Compliance Verification Planning Policy under the *Environmental Management Act* (EMA) and the Compliance Inspection Planning and Procedures Policy under the *Integrated Pest Management Act* (IPMA). The primary purpose of these policies is to set inspection priorities for active authorizations, establish minimum frequencies of planned inspections, and to use a risk-based standard for prioritizing and conducting inspections.

In 2021, the Ministry chose to explore and evaluate options for a new risk-based prioritization approach for all compliance inspection planning. As factors had been identified over the previous years of inspection planning that indicated that actual and potential risk were not being well incorporated into the current planning policies for inspections under EMA and IPMA. Incorporating factors that reflect environmental, including human health or safety, risks into inspection planning is important to ensure the best possible protection of the environment and human health using the finite resources available.

This report details the process used to develop a new risk-based prioritization approach for inspection planning including an evaluation of the current policies for inspection planning, research of alternative methods for risk-based inspection planning, risk factors incorporated or considered in the approach, how the approach was developed and tested, and recommendations for future inspection planning improvements.

EMA and IPMA regulate different activities each with unique legislative requirements. Additionally, EMA and IPMA have historically been administered under separate sections within the Environmental Protection Division. As a result, there are still differences in the way inspection planning is currently being conducted under each Act. With respect to the Ministry policies and procedures for inspection planning under EMA and IPMA, it is important to understand that:

- The EMA inspection policy current at the time of creation of this document, titled "Compliance Verification Planning under the *Environmental Management Act*" and dated May 2018, relies on a semi-automated approach using the Ministry's Comparative Priority Index (CPIX), compliance history generated in the Ministry's Natural Resource Information System (NRIS) inspection database, and authorization holder data from the Authorization Management System (AMS) database to prioritizes inspections; and,

- The IPMA inspection policy current at the time of creation of this document, titled "Compliance Inspection Planning and Procedures under the *Integrated Pest Management Act*" and dated June 2020, relies on a manual approach to set inspection priorities and is primarily based on the sector, the compliance history generated from NRIS, stakeholder interest, date of last inspection, and the risk to human health and the environment.

The new risk-based approach will include an assessment of both inspection planning policies under EMA and IPMA and will aim to ensure that inspections are planned in a consistent manner across the compliance team, where practical.

2. CURRENT INSPECTION POLICIES UNDER EMA AND IPMA

2.1. EVALUATION OF RISK-BASED PLANNING PRIORITIES UNDER EMA AND IPMA

An assessment was conducted of the current inspection planning policies under EMA and IPMA dated May 2018 and June 2020, respectively, to determine the effectiveness of each risk-based prioritization approach. The findings from this assessment are summarized in Table 1.

Table 1 – Effectiveness of inspection planning policies under EMA and IPMA.

Compliance Verification Planning Policy -EMA		Compliance Inspection Planning Policy - IPMA	
Effective	**Not Effective**	**Effective**	**Not Effective**
Use of CPIX is consistent and automated.	CPIX does not accurately assess risk and environmental risk factors not effectively considered.	Manual assessment of inspection priorities based on some environmental risk factors.	No automated system is used that can incorporate all risk factors from available databases.
Aims to look at all authorized sites within a 4-year timeframe.	4-year timeframe is not be achievable with resources available.	Incorporates the most current and pressing issues regarding pesticide use and sales.	Manual approach can lead to inconsistencies and therefore fail to accurately prioritize inspections.
Prioritizes escalated non-compliance determinations.	Does not indicate how to prioritize warning and AMP follow-up inspections generated each year over the unique inspections (not inspected during the 4-year cycle).	Prioritizes escalated non-compliance actions and is flexible at incorporating referrals, complaints, audits, and other reports.	Does not always clearly or consistently define inspection priorities. No true quantitative approach is incorporated into inspection planning.

The main issue identified under the compliance verification planning policy under EMA is the reliance on CPIX as a surrogate for environmental risk for inspection prioritization. CPIX was originally designed as a tool to assess workload priorities but was not designed to compare the environmental risk of authorizations. CPIX priority levels High, Medium, or Low are assigned to authorizations based on a matrix of discharge fees, environmental security bonds or reclamation ponds (Figure 1).

MATRIX OF INDEX

	HIGH INDEX	MEDIUM INDEX	LOW INDEX
Discharge Fee, or	> $20,000	$1,000 - $20,000	<$ 1,000
Env Security Bond, or	≥ $100,000	< $100,000	$ 0
Reclamation Bond	≥ $100,000	< $100,000	$ 0

Figure 1 Comparative Priority Index (CPIX) Matrix

The use of CPIX as a surrogate for risk has resulted in ineffective prioritization of inspections from a risk perspective: CPIX has artificially elevated the risk of some discharges while other larger or more significant discharges have been deprioritized unintentionally. For example, small privately-owned wastewater dischargers may be required to hold large securities and therefore are ranked as high CPIX and were prioritized over larger public wastewater discharges (e.g. municipal sewage) which are not required to hold security and are ranked as low or medium CPIX despite large discharge volumes. Additionally, municipal refuse dischargers are exempt from discharge fees and as a result, these sites would be ranked low CPIX and would not be prioritized for inspection. To appropriately prioritize inspections based on environmental risk, the risk-based planning team proposed that a purpose-built tool which incorporated multiple risk factors would be more effective then the use of CPIX as stand-alone surrogate for risk.

The main issues identified under the compliance inspection planning policy under IPMA relate to challenges extracting all relevant authorization holder data from the Comprehensive Record and Information System for Pesticides (CRISP) database, and the fact that pesticide use and sales data submitted by authorization holders is not submitted in a digital format that is easy to analyse. The risk-based planning team verified that a new risk-based planning approach should be considered for both planning policies under EMA and IPMA.

3. RESEARCH ALTERNATIVE METHODS FOR RISK-BASED INSPECTION PLANNING

After evaluating the current inspection planning policies under EMA and IPMA, the risk-based planning team composed a list of other ministries and regulators that would likely have similar inspection planning challenges and policies based on the activities they regulate. A total of eight organizations were contacted to determine what type of risk-based factors were incorporated in their inspection planning process.

It was determined that each organization used a risk-based approach and that each approach was based on distinct risk-based factors that influenced inspection priorities. Each organization provided a list of

risk-based factors that were considered for their inspection planning process and are summarized in Table 2.

Table 2. Contacted organizations who conduct compliance inspections and the identified risk-based factors incorporated into their respective inspection planning policies.

Organization	Risk-Based Factors considered when planning inspections
Canadian Energy Regulator (CER)	Environmentally sensitive areas, above-ground facilities, population density, utility and transportation crossings, compliance history, recent or outstanding issues raised by stakeholders, active projects, and environmental mitigation commitments.
Environment Canada	Substance or activity presents to the environment or to human health, compliance record/history, company, new regulations, Ministerial orders, directions by enforcement officers, complaints and, company expansions.
Environmental Assessment Office (EAO)	Project risk based on 5 pillars (environmental, social, health, heritage and economic), project phase, compliance history, time of year, new authorization, government priorities, and inter agency inspections.
Alberta Ministry of Environment and Parks	Potential to cause adverse effect, compliance history, environmental performance, and time since last inspection.
Energy, Mines and Low Carbon Initiatives (EMLI)	Type and size of operation, phase of mine development, risks associated with activities and conditions specific to each site, reclamation liabilities, compliance history, and date of last inspection. Adaptive management and event-based inspections are conducted as required to deal with events or emerging issues.
Environment and Climate Change Canada (ECCC)	Effluent toxicity, discharge volume, compliance history, age of facilities, industry size and type.
Pesticide Regulatory Agency (PMRA)	Environmental risk to area, sector, re-evaluations, or new products released, interface with the public, compliance history, date of last inspection and, new registrant.
WorkSafeBC	Compliance history, sector, types of employers, officer's discretion, injury or death data, time of year, use of automated system that takes in risk factors and generates a priority ranking for inspections.

4. IDENTIFIABLE RISK FACTORS FOR INSPECTION PLANNING UNDER EMA AND IPMA

A review of the main factors that affect environmental risk for discharge under EMA and IPMA was conducted next. A total of 24 risk-based factors that inform risk were identified between EMA and IPMA. Not all of them however, had data readily available to incorporate into an inspection planning

process. Risk factors identified were considered as either factors to incorporate, factors for future considerations, or factors to not incorporate.

Of the 24 risk factors identified, seven can be immediately incorporated into a new risk-based approach for EMA and four can be incorporated for IPMA as they can be quantitatively or qualitatively measured using the available information from the existing Ministry's databases. The seven risk factors, as well as the rationale for including them in the new approach is summarized in Table 3. These risk factors can be readily extracted from the AMS, CRISP, and NRIS and can be used to formulate inspection priorities using a risk-based approach.

Table 3. Identified risk-based factors that will be incorporated into the new risk-based approach for EMA and IPMA.

Risk Factor	Applicable Act(s)	Rationale/Justification
Discharge rate and contaminant loading	EMA	The type and volume of pollutants discharged is directly linked to risk to the environment. This information, including discharge rate and contaminant loading, is available and extractable from AMS; however, there are concerns about the accuracy of this data in AMS. QA/QC efforts to improve AMS data will improve the accuracy of this risk factor. The industry/sector type will be considered along with this risk factor particularly with industries with no fees.
Industry/sector type	EMA and IPMA	Some industry or sector types require specific prioritization measures in our inspection planning; therefore, we will use Industry/Sector Type as a filter in our approach. Industries or activities regulated under a Regulation or Code of Practice may not pay discharge fees (such as the Asphalt Plant Industry); therefore, an industry ranking is applied to account for risk in the absence of accessible discharge rate and contaminant loading data. If there are no fees associated with the discharge rate and contaminant loading, the industry/sector type can be partially indicative of the risk posed to the environment and human health.
Compliance history	EMA and IPMA	The Compliance Matrix level of escalating environmental, human health or safety impacts and category of likelihood of compliance are a compliance inspector's assessment of risk. This information is accessible and extractable from NRIS. Differentiating between the matrix level, category and inspection outcome will allow for prioritization based on risk to the environment rather than a blanket approach based solely on inspection outcome.
New authorization	EMA and IPMA	Issuance of new authorizations is an opportunity for compliance promotion, including educating new authorization holders about regulatory requirements and the compliance process.
Time since last inspection	EMA and IPMA	The longer timespan between inspections poses a risk that authorization holders will be unaware of the regulatory requirements necessary to protect the environment.
Unauthorized sites	EMA	Unauthorized discharges to the environment pose a risk due to the lack of regulatory oversight. We propose prioritization of sites with unauthorized discharges identified through previous inspections.
WDR Schedule	EMA	The Waste Discharge Regulation (WDR) divides all prescribed industries, trades, businesses, operations, and activities which are regulated under EMA under two schedules: Schedule I or II. Schedule I industries, trades, businesses, operations, and activities are deemed to be more complex or have potential for more significant environmental impacts. Schedule II denotes industries, trades, businesses, operations, and activities which are governed by codes of practice and may pose less risk than Schedule I. It is proposed to use the WDR schedules as a coarse-scale filter for prioritizing inspections.

Of the 24 risk factors identified for both EMA and IPMA, six were considered for future inclusion in the risk-based planning process and are summarized in Table 4. These risk factors could not be immediately incorporated into the new risk-based approach because information on these factors are not readily available, data submission tools are out of date and are not set up to readily extract the necessary data, and/or the inspection details are inconsistently entered in current databases. These risk factors are important to consider as they can be used for future improvements to the inspection planning process and enhance the risk-based approach.

Table 4. Risk Factors that should be considered in future risk-based planning approaches for both EMA and IPMA.

Risk Factor	Applicable Act(s)	Rationale/Justification (What is the ask/solution?)
Type of Pesticide and Active Ingredient Used or Sold	IPMA	The type of pesticide and active ingredient used and sold contributes to environmental risk; however, there is currently no automated tool for imputing this information. Annual Use and Sales summary forms are currently submitted by authorization holders by email or mail. The forms are then manually entered by the Ministry into the IPM Program's Annual Sales and Use Database. Electronic submission of pesticide use and sales summary data by authorization holders would make data more easily extractable and could be used for inspection planning purposes as a risk-based factor.
Amount of Pesticides Used and Sold	IPMA	The amount of pesticides used or sold should be considered as an important risk-factor when planning inspections. The more pesticides used or sold by an authorization holder, the greater the potential for risk to the environment. Electronic submission of pesticide use and sales summary data by authorization holders would make data more easily extractable and could be used for inspection planning purposes as a risk-based factor.
Sensitive receptors and proximity to public and wildlife	IPMA and EMA	Proximity of a waste discharge to a sensitive receptor (environment or proximity to public or wildlife) would be a valuable tool for risk-based prioritization. This information may be documented on a site-specific basis in Ministry assessments; however, we do not have an easily accessible data source for this information. A Sensitive Receptors field in AMS with check boxes or drop-down menus would allow Authorizations staff to identify factors such as sensitive ecosystems, proximity to schools or hospitals, species-at-risk presence, and so forth for new authorizations. This information would be valuable as a risk factor for work plan prioritization.
Change in ownership	IPMA and EMA	When a site changes ownership, there is a risk that the understanding of regulatory requirements may be lost. Ability to prioritize sites which have had a recent change of ownership creates a promotional opportunity to ensure that regulatory requirements are understood and adhered to. Currently, change of ownership for authorizations is documented in AMS as an authorization amendment; We do not have an easily accessible data source to differentiate ownership change amendments with all other amendments. A check-box field in AMS to denote a change of ownership amendment would allow for this data to be easily collected and available for incorporation into the risk-based approach.
Active site vs inactive	EMA	Sites that are actively discharging to the environment should be prioritized over sites that are idle, in a period of care and maintenance or no longer operating. The status of a facility is not adequately recorded by the Ministry; therefore, Officers are unable to prioritize active sites. More diligent use of the Status field in AMS in the future would allow for more efficient prioritization of active sites.
Inspector's observations (NRIS follow-up functionality)	IPMA and EMA	No specific fields are currently extractable from NRIS or AMS for inspectors to provide a follow-up recommendation based on findings from a compliance inspection. Inspectors observations may also be biased and require a specific internal guidance document for defining different kind of sites and the hazards associated with them.

The remaining 11 risk factors identified are listed in Table 5 and were not incorporated into the new risk-based approach for either EMA or IPMA. These risk factors were excluded for either not having a tangible way of assessing risk, having too many variables that could not be easily incorporated into a risk-based approach, or were subject to inspector bias and may not reliably demonstrate a true risk assessment.

Table 5. Risk Factors that will not be incorporated into a risk-based approach for EMA or IPMA and the rationale.

Risk Factor	Applicable Act(s)	Rationale/Justification
Discharge/Waste type (effluent, air contaminants, refuse, etc)	EMA	At the time of creation of this document there is insufficient evidence to suggest that one waste/discharge type (air, effluent, or refuse) is higher risk than another.
Number of Discharge locations	EMA	The number of discharge locations may be linked to more contaminant loading to the environment; however, as a stand-alone factor, it is not a suitable assessment of risk.
Number of monitoring locations	EMA	The number of monitoring locations is not directly connected to potential risk to the environment.
Monitoring frequency	EMA	The frequency of monitoring varies greatly across authorization types and is not directly connected to potential risk to the environment.
Number of authorized works	EMA and IPMA	The number of authorized works is only applicable to permits and approvals and is not directly connected to potential risk to the environment.
Region	EMA and IPMA	Higher population density and proximity of discharges to the public may result in greater potential risk to human health or safety; however, prioritization based on regions does not accurately reflect potential risk to the environment.
Reporting requirements (frequency and quantity).	EMA and IPMA	Reporting frequency varies greatly across authorization types and is not directly connected to potential risk to the environment.
Number of "management plans" (trigger response, aquatic effects, construction management plans, etc)	EMA	The number of management plans is not directly connected to potential risk to the environment.
Stakeholder interest (public, first nations, inter-agency, etc.)	EMA and IPMA	Stakeholder interest does not denote an increased risk to the environment. Waste discharges with high stakeholder interest will be prioritized by management outside of the annual risk-basked work plan.
Authorization "age"	EMA	Older authorizations may be less protective of the environment; however, there is not enough evidence to support the use of this factor in the risk-based approach.
CPIX	EMA	Based on 'polluter pays" principals, CPIX uses permit fees and securities and bonds to assign an index ranking of high, medium or low. Discharges authorized under solid waste management plans do not pay discharge fees or hold securities. The Municipal Wastewater Regulation exempts municipalities from maintenance of security; therefore, CPIX does not adequately account for municipal refuse or effluent discharges.

5. DEVELOP A RISK-BASED PRIORITIZATION APPROACH FOR INSPECTION PLANNING THAT CAN BE APPLIED TO EMA AND IPMA INSPECTIONS.

The new risk-based prioritization approach for EMA and IPMA inspection planning policies involved creating a risk assessment for all active authorization holders which incorporated the seven identified risk factors for EMA and the four identified risk factors for IPMA. Each identified risk factor was assigned a point value based on the level of risk posed to the environment. The risk factors, point values, and rationale are shown in Table 6. It should be noted that the data used for each risk factor could not always be extracted from one single data source. As such, subfactors had to be used to capture the point values assigned to each risk factor. For example, compliance history has three subfactors including level of risk, likelihood of compliance, and inspection outcome that each get ranked individually. The points assigned for each risk factor are then added together to produce an overall risk ranking. Authorizations with the highest risk ranking are considered the highest risk and therefore the highest priority for inspections based on the new risk-based approach model. It is important to note that the point values do not represent an absolute measure of risk. The intent of the point values is to provide a relative measure of risk when comparing the seven identified risk factors to one another. The same applies to the risk rank when comparing one authorization holder to another.

The identified risk factors used to rank authorizations in the new risk-based approach can be broken into three categories:

- Inherent Risk – speaks to the intrinsic risk associated with the specific discharge type and scale of an industry, operation, business, or activity. The risk factors in this category include discharge rate and contaminant loading, industry, or sector type, WDR schedule and unauthorized sites.
- Behavioural Risk – captures the risk associated with how well a regulated party has adhered to the requirements under either EMA or IPMA in the past. The risk factor in this category is the compliance history.
- Modifiers – captures other factors that influence risk but are not inherent or behavioural. The risk factors in this category are time since last inspection, new authorizations and mine effluent discharges.

Table 6: Ranking system used for each identified risk-factor in the new risk-based approach for inspection planning and the rationale used.

Identified Risk Factors	Subfactors	Point Value	Rationale
Inherent Risk			
Discharge Rate and Contaminant Loading	Discharge Rate + Type and number of pollutants discharges	1= $0 - $500 2 = $501 - $5,000 3 = $5,001 - $10,000 4 = $10,000 - $50,000 5 = >$50,001	The larger the fee, the greater the discharge volume and/or the more toxic the pollutants.
	Mine Effluent	2	Mine effluent permits are exempt from fees charges for total suspended solids (TSS); however, TSS is a key contaminant of concern in mine effluents and should be considered in a risk-based approach. An additional 2 points has been added to account for this fee's exemption.
Industry/Sector Type	EMA Industry/Sector	1 = Code of Practice with no modifiers 2 = Code of Practice with modifiers 3 = Regulation or variable risk activity	Codes of Practices are written for lower risk activities or operations. Codes with modifiers are typically for low to medium risk activities or operations. Most regulations are written for moderate risk activities.
	EMA Hazardous Waste CPIX	CPIX 1 = Low 2 = Medium 3 = High	The Hazardous Waste Regulation covers a very wide range of risk, but not all facilities have to pay fees. Higher risk facilities will either pay fees or securities. CPIX considers fees and securities.
	IPMA Industry/Sector	5 = High 4 = High-Medium 3 = Medium 2 = Medium-Low 1 = Low	Sectors are ranked based on the type of pesticides used or sold. Sectors that generally use or sell pesticides that are considered higher risk are given a higher point value.
	Non-AMS, Non-UA Sites	1	These cover activities or operations that do not require an authorization, but still fall under a Code or Reg. These are all low risk, since authorization isn't required.
Unauthorized Sites	-	5	Unauthorized discharges have not been assessed by the Ministry's regulatory regime and therefore have an inherent risk.
WDR Schedule	-	0 = Schedule 2 2 = Schedule 1	The WDR lists the higher risk activities or operations in Schedule 1.

Behavioral Risk			
Compliance History	Level of Risk	0-5 = Point per level of risk	This is environmental risk assessed by the Officer at the time of the inspection so is very valuable and follows the matrix scale.
	Likelihood of Compliance	0-5 - Point per level of unlikelihood	Poor compliance history increases the likelihood of future non-compliances. Follows the matrix scale.
	Inspection Outcome	0 = Notice 1 = Advisory 3 = Warning 5 = AMP or Investigation 7 = Admin Sanction	Point values are assigned based on the inspection outcome. As the compliance response escalates, the higher the point value assigned.
	Orders	10	Orders do not have a compliance history as they are a new unique authorization. They are also only written for discharges that are likely to cause pollution.
Modifiers			
Time Since Last Inspection	-	0 = <1 year 2 = 4-6 years 1 = 1-3 years 5 = 7-10 years 10 = 10 + years	The length of time since last inspection can have a greater potential for environmental risk as there can be many changes to the facility or staff in a longer timeframe.
New Authorization	-	5	New authorizations do not have any compliance history. Early inspections can also help prevent issues.

The rating scale for each risk factor was kept between 0 to 10. Each risk factor was evaluated by the risk-based planning team using their knowledge of the subject matter and input from internal resources to develop a rating scale to prioritize inspections.

The seven identified risk factors have been incorporated into the existing EMA master inspection list[1] system and each authorization have been assigned points for every risk factor that is applicable. The points are then added up to give a total risk ranking. All authorizations can then be sorted based on their total risk ranking and the highest ranked authorizations prioritized for inspection during that fiscal year. Once the calculations are complete, leadership team estimates the amount of achievable inspections that can be completed in the coming year and this number is reflected by assigning a rank 1 to the highest scoring files. Any files that need to be prioritized based on factors not included in this approach (audit inspection, internal referral or issues management that do not naturally fall above the

[1] The EMA master inspection list is a semi-automated work planning tool used to prioritize and assign authorizations to Officers for inspection.

line) are assigned a rank 2. Where the line sits may fluctuate over the course of year as/if resource levels change.

For the IPMA inspection planning policy, a risk-based approach that incorporates the four identified risk factors including the industry/sector type, compliance history, new authorizations, and time since last inspection is already being utilized as part of the inspection planning process. These risk factors however are inconsistently assessed as there is no automated process in place (e.g. an "automated IPM master inspection list") that combines and generates a list of all active authorization holders and their compliance history. Currently, the IPM team manually reviews NRIS and authorization files to evaluate the sector, compliance history, and date since last inspection to see if an inspection is required. Sectors are ranked high, high-medium, medium, medium-low, or low based on the pesticides generally used by each sector and the current stakeholder interest. The risk-based approach for the IPM planning policy will need to focus on a more structured tool such as an automated IPM master inspection list to ensure consistency in the inspection planning approach.

6. TEST THE RISK-BASED PRIORITIZATION APPROACH.

The risk-based prioritization approach was tested on the 2020/21 EMA master inspection list. The results were reviewed to see if the new prioritization accurately represented the relative risk for known sites. A number of quality assurance tests were run on the data to ensure accuracy. The results were also presented to the Compliance Leadership Team for review. During the testing phase, it was discovered that the new approach takes less time to develop the annual inspection list than in previous years and will allow for a generation of an updated risk assessment each time the master inspection list is updated.

7. FUTURE CONSIDERATIONS

The seven identified risk factors were selected based on relevancy and ability to easily extract data from existing databases. Six additional risk factors listed in Table 4 were identified as relevant; however, either no data source was available, or the data was not easily extractable (e.g. data only available in hard-copy format). The risk-based planning team found that database improvements or the development of online reporting tools would be the next steps required for these risk factors to be incorporated into the risk-based approach in the future.

The database improvement recommendations for EMA and IPMA are summarized below:

- Pesticide authorization holder data in CRISP should be fully extractable and should be able to merge with NRIS data so that an IPMA master inspection list can be created each year.
- Add ability to input and track sensitive environmental receptors and proximity to public or wildlife in AMS with check boxes, drop-down menus, or alternative means.
- Add field in AMS to denote a change of ownership authorization amendment.
- Ensure consistent use of the Status field in AMS.

Recommendations for the development of online reporting tools for IPMA are summarized below:

- Electronic submission of pesticide use and sales data by authorization holders into the IPM Programs Pesticide Use and Sale Database.

The ability to incorporate these additional six risk factors could strengthen future iterations of the risk-based approach. The highest priority improvement recommended is the creation of online reporting tools for the annual use and sales summaries associated with pesticide use because availability of this data will dramatically improve the risk-based approach for IPMA work planning. Additional information on risk factors identified for future consideration are listed in Table 4 of this report.

The foundations of the risk-based approach can also be applied to other inspection-based business areas within the Ministry. Information sharing about the risk-based planning project at the leadership level will be important to spread awareness about the project's applicability to other business areas with needs for risk-based work plan prioritization tools.

8. CONCLUSION AND NEXT STEPS

Inspection planning under EMA and IPMA has been conducted under the Compliance Verification Planning Policy (EMA) and the Compliance Inspection Planning and Procedures Policy (IPMA). In 2021, the project team was formed to evaluate these policies and develop a new approach for work planning under EMA and IPMA that better considers risk to the environment, human health, and safety. The project team established six major project objectives:

1. Identify risk factors that could be considered in a new risk-based approach.
2. Evaluate effectiveness of current EMA and IPMA inspection planning policies in risk-based inspection prioritization and identify deficiencies.
3. Research alternative methods for risk-based inspection planning by interviewing external compliance agencies such as the Ministry of Energy, Mines and Low Carbon Initiatives and the Pesticide Management Regulatory Agency.
4. Develop a risk-based prioritization approach for inspection planning for EMA and IPMA inspections.
5. Test and refine the risk-based approach.
6. Share findings and provide recommendations.

The project team successfully completed the project objectives and as a result, the new risk-based approach was implemented in April 2021 for the EMA 2021-2022 work plan. The seven identified risk factors for EMA were fully incorporated into a semi-automated work plan. The risk-based approach will still need to be applied to the IPMA work plan in the following fiscal once an IPM master inspection list is developed. The four identified risk factors for IPMA will for now be manually reviewed for future work plans.

The project team recommends that the new approach is piloted in 2021-2022 and a review of the approach is undertaken prior to the next fiscal work planning cycle. As part of the review, the effectiveness of risk factor rankings should be evaluated. Compliance and Environmental Enforcement

staff and leadership should be given the opportunity to provide feedback on the new approach and feedback should be considered in the review process. The new risk-based approach was designed to be easily adapted and changes can be made to the model as part of the 2021-2022 review process to refine and improve risk evaluation as needed.

Upon completion of this project, it is recommended that a review and update of the current EMA and IPMA inspection policies is conducted that includes the incorporation of the new risk-based approach. To further improve the risk-based approach the recommended database improvements should also be pursued. Consideration should be given to developing a new master inspection list specifically for IPMA inspections that can utilize and incorporate the new risk-based approach using an automated system.