ES INCIDENT MANAGEMENT GOVERNANCE

PROGRAM EVALUATION AND AUDIT

METROPOLITAN COUNCIL

Contents

Highlights

Processes are in Place, Data and Investigations Have Room to Improve

What We Found

What's Working Well

Environmental Services' (ES's) policies and procedures outline roles & responsibilities in the incident management process. Access to the Spills, Odor, and Safety (SOS) system is controlled. Required reports on worker safety are kept up to date and published. There is also a process to catch serious injuries by collaboration with the Workers' Compensation team. Staff receive training on and use the reporting system – more than half of incident reports came from people who reported only one, two, or three incidents. This shows that it is not just a handful of managers who report incidents. ES management also use process improvement activities such as piloting a way to speed up investigations and using surveys.

What Needs Improvement

Data entered in the SOS system is inconsistent. This makes it difficult to analyze and draw conclusions from reports. There are mixed levels of guidance on which incidents should get a root cause analysis (RCA) using the TapRooT tool, and there is no clear guidance on when to use other forms of analysis for an incident. Action items that come out of investigations are mostly focused on administrative changes, like training. The National Institute on Occupational Safety and Health (NIOSH) recommends eliminating, substituting, or engineering around a hazard, when possible, since training is less effective in the long term.

What We Recommend

ES should conduct data reliability assessments and use that information to improve data entry controls in SOS. SOS could also be modified to make it easier for users to pick the right kind of analysis tool for an incident, and ES should create guidance that can triage incidents to more than one kind of analysis. Finally, ES should improve documentation and expand research of action items other than training, so that more effective long-term solutions can be put in place when it makes sense to do so.

Why We Did This Work

We conducted this audit to verify that systems exist and are operating effectively to report incidents in a timely manner, ensure remediation and/or root cause analysis to prevent repeat occurrences, comply with regulatory reporting, and facilitate training of employees

What We Reviewed

We reviewed incidents reported to SOS from January 1, 2022, to December 31, 2023. This also included any applicable Root Cause Analyses, policies/procedures, records of training, and mandatory reports such as to OSHA. We also looked over documents related to the Incident Management Governance Team as it existed from 2019 – 2022.

How We Did This Work

We reviewed policies, procedures, work instructions and the Incident Management Charter from ES. We interviewed relevant personnel and attended Safety meetings to review processes for assessing incidents reported and action items implemented.

Summary of Findings

Number	Description	Recommendation	Follow-up Action	Page
Observation 1	Inconsistency in SOS Data entry	The Incident Management Governance Team should conduct a periodic data reliability assessment (or similar measure) to assess the extent to which data is recorded accurately, completely, and consistently in the SOS system.	Confirmation	*14*
		ES should make changes to the SOS system user interface to streamline reporting and promote standardization of data entry, such as drop-down menus, skip logic, work instructions imbedded into the SOS system, etc.	Confirmation	*14*
Observation 2	Few incidents went through the TapRooT Root Cause Analysis process	ES should revise and adopt criteria that triage incidents and directs users to an appropriate analysis tool based on both the severity and complexity of the incident.	Confirmation	*17*
		ES should revise the user interface in the SOS system to incorporate guidance on choosing an appropriate analysis tool based on the severity and complexity of the incident... Whatever tools are selected should improve user access and ease-of-use in the SOS system.	Confirmation	*17*

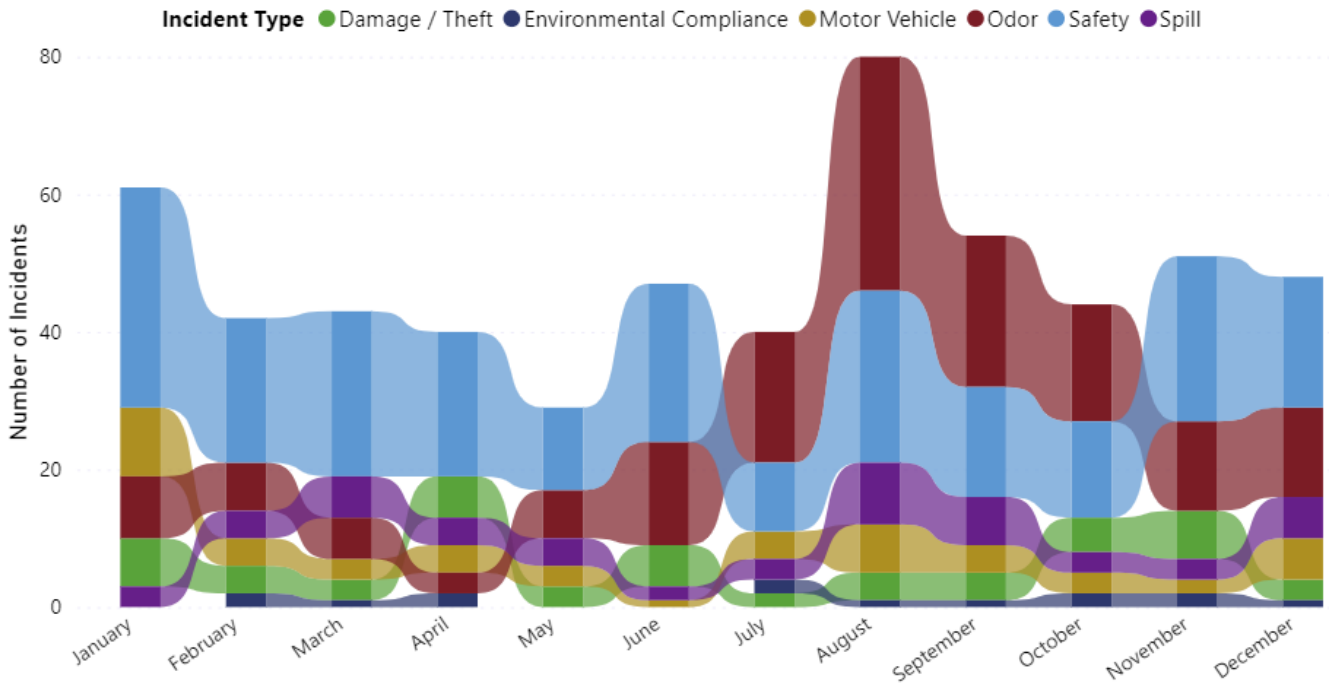
Number	Description	Recommendation	Follow-up Action	Page
Observation 2 (Cont.)	Few incidents went through the TapRooT Root Cause Analysis process	The Property Damage/Motor Vehicle Matrix should be revised to prevent real or perceived penalties for employees who report incidents.	Confirmation	*17*
Observation 3	Action items need improvement	RCA teams should research and document potential Elimination, Substitution, and Engineering controls, so that the information is available for future consideration. If one of these will not become an action item, RCA teams should document the reason why it is not being pursued at that point in time.	Retest	*19*
		If an administrative or PPE control failed during an incident, the RCA team should consider and document the reasons why that control failed.	Retest	*20*

Introduction

Background

Environmental Services (ES) treats a daily average of 250 million gallons of wastewater for the region, distributed across nine treatment plants. Given the nature of the work, interruptions or issues with operations have the potential to greatly impact residents, the environment, and employees. There are several types of "incidents" that must be reported to Minnesota's Occupational Safety and Health Administration (MNOSHA) and Minnesota Pollution Control Agency (MPCA). These incidents include work-related injuries and illnesses as well as environmental releases such as chemical spills and odors. Internal processes also involve reporting on incidents such as property damage, theft, equipment failure, and safety incidents not considered reportable by MNOSHA. Figure One summarizes data from 2022 and 2023 by month.

Figure One: Incident Type by Month for 2022 – 2023 (Aggregated)



Incident reporting allows for accountability for action items and data on recurring issues, which can prevent repeat incidents. ES uses the "Safety, Odors, and Spills" (SOS) online tool which was built for this purpose. Additionally, a small number of incidents are flagged for a more detailed Root Cause Analysis (RCA) using the TapRooT tool. The number of incidents undergoing RCA varies each year, from 13 in 2019 to seven in both 2022 and 2023. Table One summarizes annual reported incidents that are within scope for this audit.

Table One: Audit Universe

Year	2022	2023
Incidents Reported	281	298
RCAs Conducted	7	7

In 2020 ES instituted an oversight body, the Incident Management Governance Team (IMGT) to continually seek process improvements to incident reporting and governance. However, this group paused by the end of 2022 due to a restructuring within ES and few team-wide goals. The 2023 Audit Plan included a review of SOS. Following a meeting with ES Management, who planned to re-establish the IMGT, Audit expanded the scope to include the entire incident management governance process with a focus on RCA.

Objectives

The objectives of the audit were to:

- Identify areas to improve communication and clarity of roles for incident management governance.
- Assess record-keeping and reporting for compliance with MNOSHA, MPCA, and state statute requirements.
- Evaluate the alignment of current incident response and analysis practices with OSHA best practices.

Scope

Audit reviewed Environmental Services' current incident management and governance structures, policies and procedures related to incident reporting, analysis, evaluation, and remediation. This included reviewing incidents that had been reported via SOS; determining when, why, and how RCA methods such as TapRooT have been used; and attending safety committee meetings. The time frame subject to audit was incidents that occurred between January 1, 2022, and December 31, 2023, including any related documentation and other processes for these incidents. Also, in scope were meeting notes and other documentation about the IMGT related to the 2020 charter.

Methodology

To identify areas to improve communication and role clarity, Audit reviewed policies, procedures, and work instructions related to incident reporting, SOS, and incident investigation. These were compared against OSHA guidance, reviewed for clarity of roles, and validated against the actual activities taking place in SOS such as action item creation and approval. Audit also reviewed training on how to use SOS and user roles within the system.

When assessing record-keeping and reporting for compliance, Audit reviewed the retention schedule for SOS, requested evidence that OSHA logs were posted as required, and confirmed for a sample of incidents whether they were reported to regulatory agencies as needed. Additionally, the minimum

level of detail required for reporting informed review of data contained within SOS as without complete data it would not be possible to determine record-keeping compliance.

To evaluate the alignment of current practices with OSHA guidance, Audit calculated average timelines for incident investigation and action item completion, determined if action items were completed, compared action items to National Institute on Occupational Safety and Health (NIOSH) guidance, reviewed data in SOS and interviewed staff to learn about different methods of incident investigation, confirmed the presence of training on incident reporting for staff, and attended a monthly safety meeting.

Limitations

Audit was unable to physically confirm that some action items were implemented via site visits due to time constraints. Additionally, Audit was not able to directly interview or survey operations staff to confirm their understanding of the processes or identify possible instances of employees being disciplined for reporting an incident.

Thrive 2040 – Strategic Planning - Equity

This audit considered the Council's *Thrive MSP 2040* Outcomes and Principles of Accountability by ensuring that the Council is reporting incidents, implementing action items and conducting root cause analysis when appropriate, and formulating policies which provide a safe environment for our operations and employees.

Recognition

Audit appreciates that ES leadership approached us with their request for the scope expansion and their proactive desire to seek input before making process changes. We also would like to thank them for their open discussion of the processes involved and the collaboration across departments needed to implement our recommendations.

Non-Finding Observations

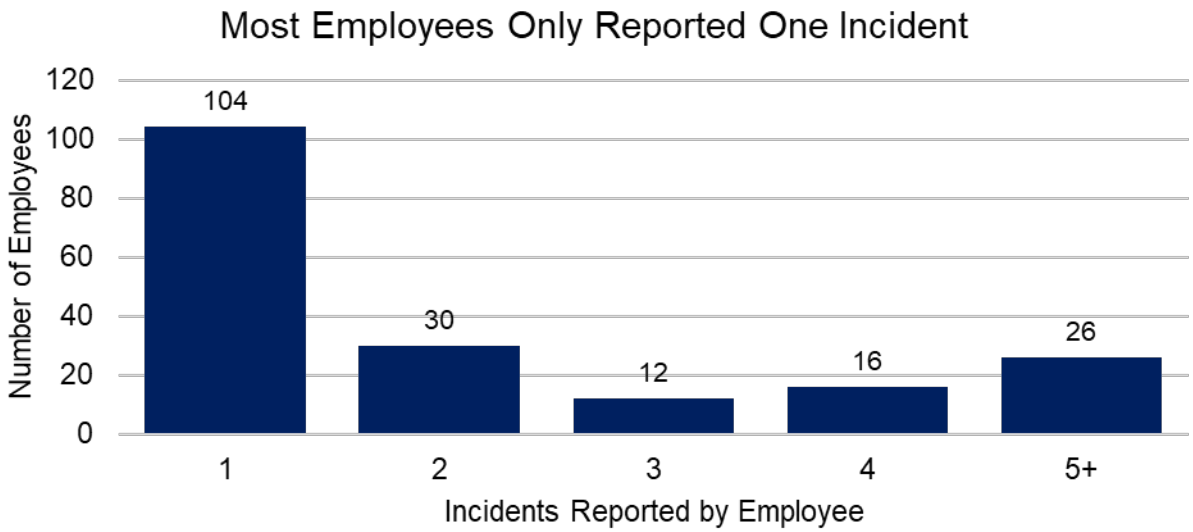
Audit completed testing on incident reporting, initiating RCAs, training, maintaining policies/procedures, defining roles/responsibilities, and seeking process improvement opportunities. The following observations did not result in a finding, and represent processes that are working well:

Incident and Regulatory Reporting

Employees Use SOS to Report Incidents

Employees who reported three or fewer incidents in 2022 and 2023 accounted for 56% of Safety, 77% of Property Damage/Motor Vehicle, and 72% of Environmental Compliance and Spill incidents. Figure Two below demonstrates that 104 employees (out of approximately 500 within ES) reported one incident each, while only 26 employees reported five or more incidents each. This indicates that a wide variety of staff within ES are aware of and use SOS to report incidents.

Figure Two: Reporting Frequency per Employee



OSHA Logs

ES maintains a system to report all incidents, including OSHA reportable ones. Audit reviewed 10 random incidents to determine if they were OSHA reportable incidents or not. For those which were OSHA reportable, Audit traced them to the appropriate OSHA 300 Logs. A sample of the OSHA 300 logs were reviewed and found to be posted at the required locations as per regulations.

RCA Initiation

No "Low" Severity Incidents Received an RCA

When reviewing the incidents that went through the RCA process in TapRooT, 10 of the 14 would have been scored as *High* or *Critical* based on the Incident Severity Matrices (Table Two). The four *Moderate* incidents were either near-misses or incidents that could have easily had bigger

consequences and received TapRooT as a precaution. This indicates that in general, TapRooT is being used for the “right” incidents when it is used.

Table Two: Incident Severity for TapRooT Incidents

Incident Type	Low	Moderate	High	Critical
Safety	0	2	2	1
Property Damage/Motor Vehicle	0	0	1[1]	0
Environmental Compliance/Odor/Spills	0	2	3	4
Total	**0**	**4**	**5**	**5**

All RCAs Requested by the Appropriate Authority

Audit verified that all RCAs were appropriately requested by either a department manager, a supervisor, or a safety employee.

Policies, Roles, and Training

ES Provided SOS Training for New and Transitioned Staff

SOS Training is carried out for both new hires and employees who transferred into their roles in a relatively short time. Audit’s testing revealed that the average time for the SOS Training for staff was within 14 days of hire or transition. The training materials contained adequate information on incident reporting.

Roles and Responsibilities Are Defined and Adhered To

ES maintains a procedure which defines the roles and responsibilities of each category of staff in the incident management process. Audit sampled 10 incidents and confirmed adherence to the procedure.

Role-Based Access to SOS System is Adequately Controlled

For all permission groups (Power User, SOS Businessowner, SOS AppAdmin, SOS FullSafetyAccess, and SOS CreateIncidents), Audit determined that each user within a group was assigned correctly based on their title, department, and business need. Several users who work outside of Environmental Services had access to SOS FullSafetyAccess. According to the Health and Safety Manager this was correct because Human Resources (HR) and Risk Management (RM) must check if certain incidents require follow-up or additional actions such as compensation. Additionally, HR and RM must share some incident information with the Department of Labor. All the other Regional Administration (RA) managers in the list were given access as there was an effort to determine if SOS was the best method to address incidents that happened within RA.

[1] This incident was also a Safety incident.

Process Improvement

The RCA Team Trialed a Faster Process

One Environmental Compliance incident attempted to reduce the length of time to complete an RCA investigation by setting a limit on the number of meetings. This incident took less than the median number of days to complete. Although the team still exceeded the goal number of business days, they were able to stick to their goal for the number of meetings, and the team noted areas that they were not able to review in depth for the sake of time.

The RCA Team Surveyed Participant Satisfaction

The RCA team administered surveys to RCA participants following each RCA within the scope of the audit. Participants gave anonymous feedback on the facilitation and value of the RCA process.

Observations

Incident Contributory Factor Data Not Standardized or Complete

SOS collects information about incident contributory factors using both manual checkbox and open-ended data fields. The checkboxes prompt users to select up to 50 applicable "Contributory Factors" across four categories: Management Factors, Employee Factors, Equipment Factors, and Environmental Factors (see Appendix B, Figure One). The open-ended response data fields prompt users to complete an Accident Analysis which collects information including, but not limited to: the task being completed at the time of the incident, what job training an employee received prior to the incident taking place, whether or not Personal Protective Equipment (PPE) was provided and used correctly, what equipment was used and whether or not it was used correctly, and whether or not there was a safety procedure in place that addresses the incident.

While nearly 100% of incidents had at least one contributory factor identified in a checkbox, the open-ended data fields across the dataset were frequently left blank, marked as "not applicable," or did not address the data field/prompt for which it was entered. There are several key examples that made analysis of incident causal factors difficult:

The data received was not standardized and was difficult to analyze.

- When Audit received the incident data, fields that aimed to capture whether equipment for PPE were provided, and whether they were used correctly. Employees or managers who reported these incidents completed the fields with a variety of response formats, including "Yes," "Y," "No," "N," "Not Applicable," "NA," "Not sure," and "unknown." These fields were also sometimes left blank. Additionally, many fields contained additional information or commentary in response to "yes/no" prompts. This information was sometimes contradictory to what was entered in other data fields related to the incident.

- When entering data, one field is worded as "[w]ere written safety procedures available? Where?" Some responses to this field referenced "slips, trips, and falls" procedures or Job Hazard Analysis forms. However, no incident reports from this dataset listed a safety procedure by name**.**

The incident data was often incomplete, or did not appropriately address the data field for which it was entered. Out of 200 incidents reported to SOS with contributory factors identified,

- 41 incidents (about 20%) reported "on the job training" or "standard training" but did not describe that training or how it related to the incident. 28 incidents (14%) listed the employee's job title. One incident listed the university the employee attended as the training the employee had received prior to the incident. Less than 1% of incidents did not list any training at all.
- 27 incidents reported that "walking" was the activity during which an incident occurred. While 16 incidents reported that an employee was walking to or from work, walking up a ramp, or walking through snow, 11 only listed "walking." In all but one incident report, it was unclear from the activities reported what, if any, additional factor contributed to the incident.

The *Assessing Data Reliability* guidebook, from the United States Government Accountability Office (GAO) states:

"In an audit environment, reliability of data means that data are applicable for audit purpose and are sufficiently complete and accurate.

- **Applicability for audit purpose** refers to whether the data, as collected, are valid measures of the underlying concepts being addressed in the audit's research objectives.
- **Completeness** refers to the extent to which relevant data records and fields are present and sufficiently populated.
- **Accuracy** refers to the extent that recorded data reflects the actual underlying information."

The GAO also recommends data reliability checks, which include looking for missing values, reviewing edit checks, and confirming correct skip logic translations from questionnaires. Data reliability can be impacted by:

- data generated using a manual process rather than an automated process,
- data fields not being well-defined in data documentation and training materials,
- data entered in open-ended text fields instead of controlled with a drop-down feature,
- whether or not data is subject to verification.

Additionally, the Minnesota Department of Labor and Industry[2] states that "[a]ccurate injury and illness records help [the organization] assess [the organization's] safety and health needs. To do this, the OSHA Log and other recordkeeping of incidents should "[d]escribe the injury location, event, source, the equipment used, the exact nature of the injury and the precise part of body affected in enough detail that someone else can understand what happened." Although not all SOS incidents are OSHA-reportable, a minimum amount of information to determine reportability or next steps ensures that no reportable incidents or learning opportunities are missed.

The interface of the SOS system prevents the Council from getting the most value out of the data stored in the system. Lack of adequate instruction for reporting incident contributory factors affects the quality of the data in the system, which has cascading effects on the quality of incident reports, action items, and potential root cause analyses. This could have human effects such as repeated injuries that could have been prevented through better use of data. Without reliable data, the Council is missing opportunities to identify common causes of accidents and injuries of employees, contractors, members of the public, and Council property. This creates safety, legal, financial, and environmental risks to the Metropolitan Council.

Audit was not able to obtain sufficient data from the SOS system to identify common themes or recurring contributory factors of incidents. Audit had difficulty cleaning, analyzing, and interpreting the data as it exists in the SOS system due to data incompleteness, lack of adequate details about the incident, and other irregularities that made the data unreliable.

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[2] Minnesota OSHA Workplace Safety Consultation, "Tips for Improving Your OSHA Log Accuracy," *Minnesota OSHA Workplace Safety Consultation*, 2022, https://www.dli.mn.gov/sites/default/files/pdf/rckp_tips_for_recordkeeping_accuracy.pdf.

Audit concluded that the data fields to collect incident contributory factor data in SOS are not completed in a consistent manner for two reasons: First, there is not adequate instruction within the SOS system to guide incident reports through the incident factor process. Within the Contributory Factors section, none of the 50 possible checkbox factors are defined within SOS. In the Accident Analysis section, the only instruction to complete the open-ended responses reads, *"Enter the sequence of events in clear, brief statements using a maximum of 20 steps."* (See Appendix B, Figure One). Second, there is no mechanism, such as skip-logic or a drop-down menu, that controls, standardizes, and streamlines the information entered into the Accident Analysis section.

Recommendations:

1. The Incident Management Governance Team should conduct a periodic data reliability assessment (or similar measure) to assess the extent to which data is recorded accurately, completely, and consistently in the SOS system.

   Management Response: Management agrees with this observation and intends to build it into a revised charter for the Incident Management Governance team.

   Timetable: Concept of periodic review will be included in updated Incident Management Governance team. Charter will be updated Q1 of 2025; timetable of periodic review will be determined by the team.

   Staff Responsible: Incident Management Governance Team (roster to be revisited in Q1 2025)

   Audit Follow-Up: Confirmation.

2. ES should make changes to the SOS system user interface to streamline reporting and promote standardization of data entry, such as drop-down menus, skip logic, work instructions imbedded into the SOS system, etc.

   Management Response: Management agrees with this observation. This will be a task of the Incident Management Governance team.

   Timetable: Q4 2025

   Staff Responsible: Incident Management Governance team

   Audit Follow-Up: Confirmation.

Few incidents went through the TapRooT Root Cause Analysis process.

Of over 550 incidents reported to SOS in 2022 and 2023, 14 (2%) went through the TapRooT process and another 19 (3%) went through the Safety department's Incident Analysis Form. An estimated 160 incidents qualified for RCA,[3] or about 27%. Audit estimates that there were approximately 45 *Critical* incidents over the two-year span (8% of total), with the rest of the estimate coming from incidents that Audit scored as *High*. All major categories had incidents that rated *High* or *Critical* in severity and did not receive an RCA, shown in Tables Three through Five.[4]

Table Three: Safety Incident Severity

# of Sampled Incidents	Low	Moderate	High	Critical
TapRooT Completed	0	0	0	1
Analysis Form Completed[5]	5	7	5	2
No RCA	12	14	8	4

Table Four: Property Damage/Motor Vehicle Severity

# of Sampled Incidents	Low	Moderate	High	Critical
RCA Completed[6]	1	0	0	0
No RCA	12	8	15	5

Table Five: Environmental Compliance/Spills/Odor Severity

# of Sampled Incidents	Low	Moderate	High	Critical
RCA Completed	0	1	0	0
No RCA	38	5	7	2

OSHA's *Incident Investigations: A Guide for Employers*[7] recommends that all incidents, even "close calls" should be investigated to look "beyond *what* happened to discover *why* it happened." OSHA also recognizes that the same approach is not going to suit all incidents, listing "brainstorming, checklists, logic/event trees, timelines, sequence diagrams, [and] causal factor determination" as potential tools. Simpler incidents may only require simple tools like brainstorming and checklists, while more complex ones should use more complex tools. Triaging can help direct incidents to appropriate tools, making it easier to allocate resources appropriate to the investment needed for a given investigation.

Internally, informal documents called the "Incident Severity Matrices" offer guidance on which incidents should go through RCA and goal timelines for completion (see Appendix B, Figures Two through Four). Conditions such as severe injury or reportable quantities of chemical spills are

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[3] Auditors reviewed a statistical random sample of incidents against internal guidance to estimate the percentage of incidents that should have had an RCA. Audit used this to estimate the total. The chi-square test p-value was <0.0001.
[4] Highlighted cells indicate those in alignment with the Incident Severity Matrix guidance, where *High* and *Critical* incidents must be investigated.
[5] Safety incidents used Incident Analysis forms and sometimes referred to these as a form of RCA.
[6] This incident received RCA in the form of a non-TapRooT process.
[7] Occupational Safety and Health Administration, "Incident Investigations: A Guide for Employers: A Systems Approach to Help Prevent Injuries and Illnesses," *Occupational Safety and Health Administration* (Occupational Safety and Health Administration, December 2015), *https://www.osha.gov/incident-investigation#worksiteincident*.

examples of *High* and *Critical* severity, which requires an RCA. Near-misses and property damage below a certain value are examples of *Low* and *Moderate* severity, where an RCA is optional. Outside of TapRooT, there are other kinds of incident investigation in use within ES that are less formal. Minor incidents may be fixed on the spot with no further RCA, such as moving a tripping hazard that was misplaced or fixing equipment. Maintenance staff referenced informal problem-solving discussions when asked about incident analysis, though this is not a documented process. Safety incidents have analysis forms in SOS. Additionally, safety managers meet monthly to discuss recent incidents and referenced a Power BI dashboard in progress to improve trend analysis.

ES never formally adopted the Incident Severity Matrices. Some teams generally try to follow them, while others do not consider them to be anything beyond an initial draft. Reasons reported for not adopting the matrices include leadership turnover (including the IMGT) and changing demands due to the COVID-19 pandemic beginning in 2020. Even if the matrices were implemented and used by all teams, there is room for revision to better align with industry best practices; one has an implied penalty for reporting prior incidents built-in.[8] If ES staff used the Safety matrix as written, 7 of 19 sampled incidents that used an analysis form (37%) would have gone through TapRooT.

As with any activity, time and resources available for root cause analysis are limited by the staff available and the length of time analysis takes. Per ES leadership, RCAs usually take 100 – 200 hours to complete. There is a perception within ES that TapRooT takes “too long” to complete in terms of calendar days as well. RCA leaders stated that they often need to wait for staff feedback, reschedule meetings, and generally feel that they could condense the work in terms of calendar days if they were given higher priority and buy-in. Choosing incidents for TapRooT is an opt-in process, so teams may be dissuaded from selecting incidents for RCA if they feel it will be more burden than it is worth. The more severe an incident, the faster the matrix states the investigation should be completed, ranging from 60 to 30 days. 7 of 9 Environmental Compliance/Odor/Spill incident investigations took more than 30 days to complete, as did 5 of 5 for Safety. Of the Safety incidents, the median number of days to complete TapRooT were 40 for *High* severity incidents and 33 for *Critical* ones and ranged from 33 to 160 days. Environmental Incidents took a median of 88 days for *High* and 86.5 days for *Critical* and ranged from 7 to 300 days.[9]

While TapRooT is only one of many kinds of analysis that ES uses, the existing matrices have no way to triage incidents through different methods that may be a better fit. The only two outcomes for the matrices are TapRooT required or TapRooT optional, and the target timeline for both *High* and *Critical* incidents is 30 business days which makes the two categories functionally the same. However, some incidents may be better reviewed as trends, a post-analysis form, or the other techniques listed by OSHA in their guidance for employers. Directing the right incident to the right tool could address employee reluctance to opt-in to the RCA process and could produce more valuable results in a timely manner. It may also help business units better understand when and why TapRooT is used, in order to participate more fully.

If a qualifying incident is not reviewed for root causes, then the department loses out on the learning opportunities including the chance to prevent future injuries or other human impacts. Based on

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[8] If an employee was involved in at least one prior incident in the last 24 months, including for a safety near-miss, then any of their motor vehicle or property damage incidents is escalated to the high or critical level.
[9] There was one environmental incident that was not identified until months later, this median value represents an adjusted timeline based on when the incident was discovered to better reflect the length of time spent in the process.

Workers' Compensation claims data, ES has incurred $243,191 and has lost at least 60 days of staff time due to workplace injuries sustained in 2022 and 2023.[10] This does not include potential effects on morale, health and well-being of employees, overtime to cover shifts, or the administrative burden to provide these benefits. It also does not account for instances where someone may have a claim that is OSHA reportable but not Workers' Compensation compensable or claims where people never filed a claim.

In addition to the risk of missed opportunities for RCA, TapRooT investigators may also focus their time on incidents with lesser impact or fewer opportunities for lessons learned. Choosing to pursue TapRooT analysis when not indicated may mean that more serious incidents go under-investigated, reducing the benefits of the analysis. A total of four *Moderate* severity incidents went through TapRooT. Although the incidents that underwent TapRooT may have been sufficiently complex to qualify under revised criteria, the large proportion of *High* and *Critical* incidents going un-investigated represent a process not currently allocating investigatory resources as well as it could.

Recommendations:

3. ES should revise and adopt criteria that triage incidents and directs users to an appropriate analysis tool based on both the severity and complexity of the incident.

   Management Response: ES management agrees with these observations. The Incident Management Governance team will revisit and revise the severity matrix. The team will also review and make recommendations for a variety of options for reviewing and learning from incidents (TapRoot is one tool the team will evaluate and recommend others as well)

   Timetable: Q4 2025

   Staff Responsible: Incident Management Governance Team

   Audit Follow-Up: Confirmation.

4. ES should revise the user interface in the SOS system to incorporate guidance on choosing an appropriate analysis tool based on the severity and complexity of the incident. This could include automated controls like skip logic, calculated risk scores, text-based information items, or links to documents. Whatever tools are selected should improve user access and ease-of-use in the SOS system.

   Management Response: ES management agrees with this observation and recommendation.

   Timetable: To be determined. Management will work with the Incident Management Team to assess when and how to implement this recommendation.

   Staff Responsible: Incident Management Governance Team

   Audit Follow-Up: Confirmation.

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[10] With another approximately 250 days of restricted workdays.

5. The Property Damage/Motor Vehicle Matrix should be revised to prevent real or perceived penalties for employees who report incidents, such as the existing “second incident by employee” and “third incident by employee” criteria.

   Management Response: ES management agrees with this observation. Facility mgmt. will review what and how to make improvements.

   Timetable: Q4 2025

   Staff Responsible: Facility and fleet manager

   Audit Follow-Up: Confirmation.

Action Items Need Improvement

NIOSH recommends that organizations implement the “controls that are the most feasible, effective, and permanent” and to “emphasize engineering solutions first, followed by safe work practices, administrative controls, and finally [Personal Protective Equipment (PPE)].” Most action items in SOS were administrative controls, and approximately a third of the total related to training/SOPs. The tiers of NIOSH safety controls are defined in Table Six and in Figure Three.

Table Six: Action Item Summary Table

Tier	NIOSH Definition	Example	% of RCA Actions	% of Non-RCA Actions[11]
Elimination	Remove the hazard	“Get the leaks on the seal water repaired”	2%	13%
Substitution	Replace the hazard	“Replace air actuated dampers with electrically actuated”	5%	7%
Engineering	Separate people from the hazard	“Operations will be closing damper and cover closed”	8%	0%
Administrative	Change the way people work	“ABUM will confirm safe practices and remind staff to be mindful of surroundings”	83%	27%
PPE	Protect people with personal equipment	“Can the employee wear Traks?”	0%	7%

RCA staff expressed a desire for rapid resolution of critical incidents to prevent further harm, and administrative controls can be implemented faster. Staff also stated that they may discuss some higher-level action items such as equipment change, but that as per senior staff, the RCA teams often need to start from scratch due to incomplete data on prior incidents.

Staff reporting incidents may not be aware of the NIOSH hierarchy or other frameworks that promote a systems focus, rather than an individual one. This could cause individual contributing factors to be

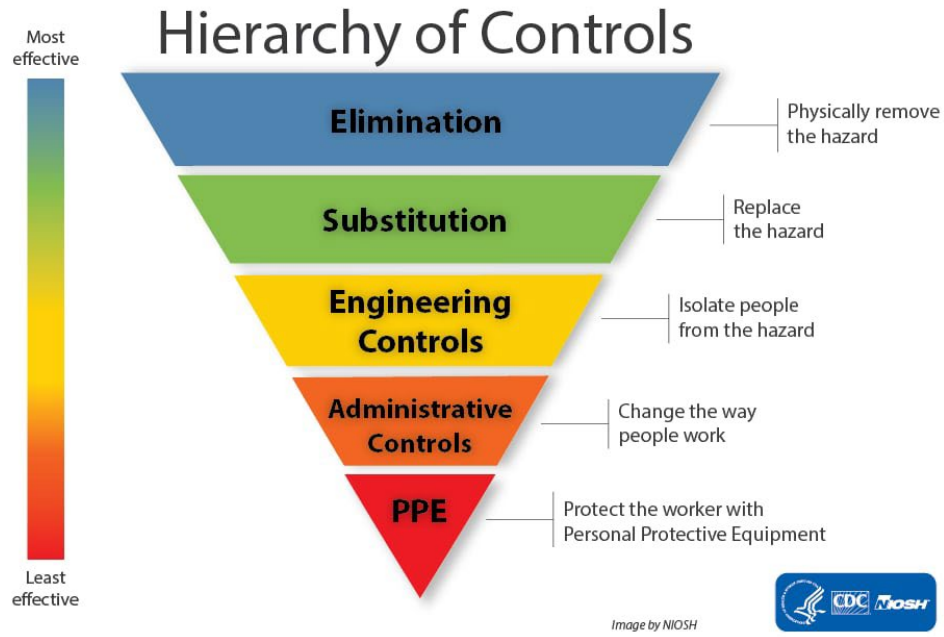
[11] Some of the sampled non-RCA incidents had action items that only repaired damage that occurred from an incident, such as Incident 12124, where a 3rd party vehicle damaged a gate. The action item for a work order to fix the gate was marked “repair only” during testing and not counted towards any of the NIOSH categories.

overstated or for systemic causes to be underreported in SOS before an incident is forwarded on to TapRooT. For instance, incident 12176 stated “this is a commonsense issue, it was not used” in response to “what training should the person have received?” in the incident analysis form.

Safety’s role in proposing major changes such as redesigning a high-hazard area is generally limited to reviewing construction for the introduction of new hazards, rather than giving input into or suggesting changes to improve safety of the existing facility. Although some more expensive action items have been pursued, such as investing $20,000 into lifting equipment for manholes, these came out of monthly safety committee meetings that aggregated multiple incidents for discussion rather than the RCA process in TapRooT.

Per NIOSH, administrative controls and PPE may be faster to implement but are less effective. 129 of 146 (88%) tested incidents stated that PPE was provided and used correctly by the individual involved in the incident, but did not prevent it. Additionally, 27 separate incidents involved “walking” while 47% of incidents with an incident analysis form said that safety procedures were “not applicable.” Data on policies and procedures that may have prevented the incident, as well as the presence and employee awareness of training materials, were inconsistent as described earlier in this report. If action items fail to prevent future incidents, there can be serious human impacts, such as physical injury or exposure to harmful chemical agents. For instance, incident 12676 stated that incomplete action items from a prior RCA (incident 11314) may have contributed to the incident.

Figure Three: NIOSH Hierarchy of Controls[12]



[12] National Institute for Occupational Safety and Health (NIOSH). “About Hierarchy of Controls,” April 10, 2024. Accessed October 15, 2024. https://www.cdc.gov/niosh/hierarchy-of-controls/about/index.html.

Recommendations:

6. RCA teams should research and document potential Elimination, Substitution, and Engineering controls, so that the information is available for future consideration. If one of these will not become an action item, RCA teams should document the reason why it is not being pursued at that point in time.

   Management Response: Management is interested in spending more time to understand this observation and recommendation. Will work with the Incident mgmt. team to fully understand and implement improvements.

   Timetable: Q4 2025

   Staff Responsible: Sponsor of and Incident management governance team.

   Audit Follow-Up: Retest.

7. If an administrative or PPE control failed during an incident, the RCA team should consider and document the reasons why that control failed.

   Management Response: Management agrees with observation and recommendation. This will be reviewed and how to implement it will be defined by safety department.

   Timetable: Q4 2025

   Staff Responsible: Safety steering team and safety department.

   Audit Follow-Up: Retest.

Conclusions

Environmental Services' Incident Management processes for training are well-established, including training on how to report incidents and investigate serious incidents. Environmental Services follows mandatory reporting requirements, such as maintaining an OSHA log on site. Valuable information is collected and maintained in SOS, but efforts should be made to improve the usefulness and accessibility of that information. This can be done through improving data entry standards, providing guidance on when to use different forms of analysis, and documenting research on action items such as eliminating, substituting, or engineering controls for hazards. These activities could help reduce the severity and frequency of incidents, as well as legal and financial risks.

November 29, 2024
Matthew J. LaTour, Chief Audit Executive
Program Evaluation & Audit

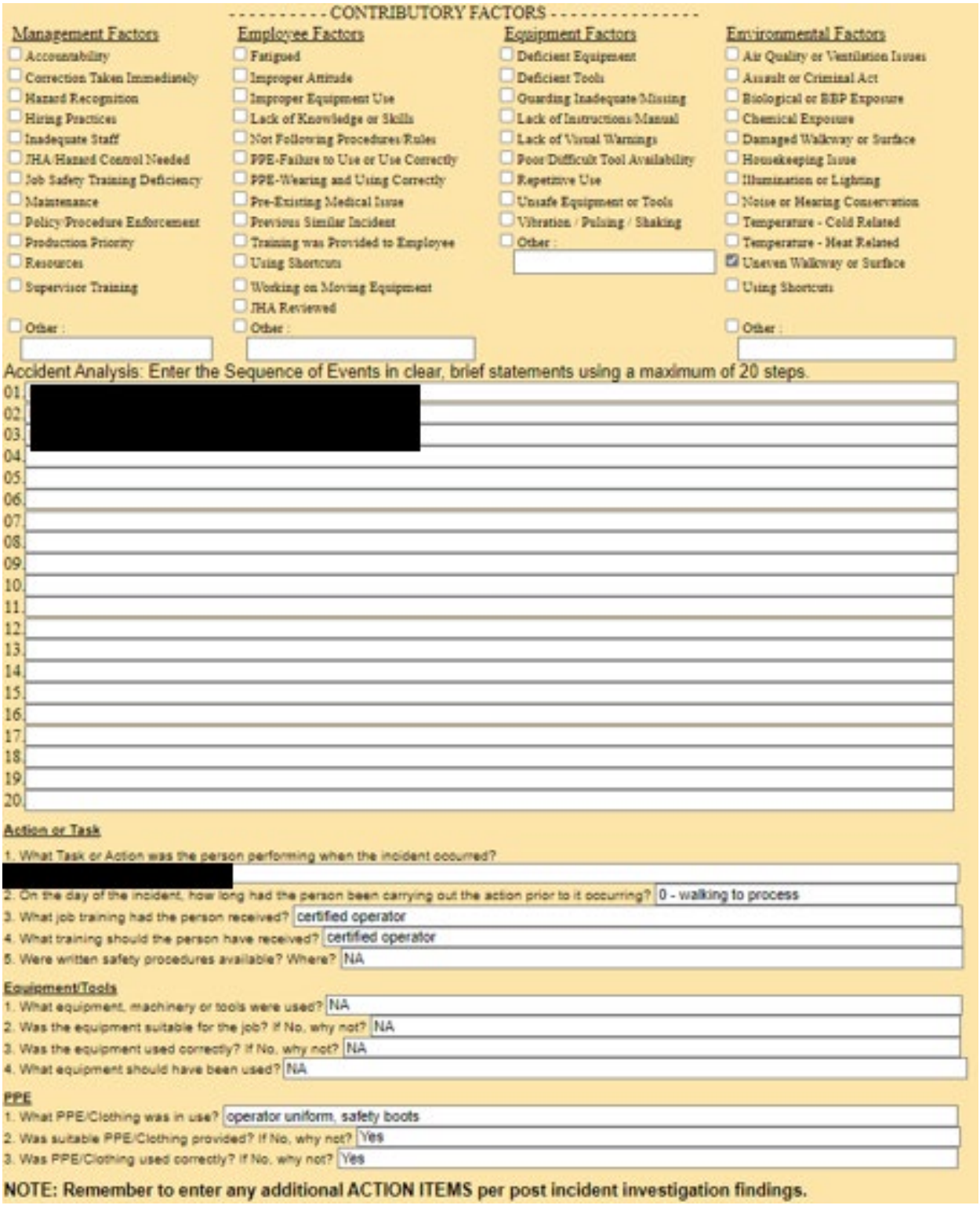
Appendix A

Program Evaluation and Audit recommendations are categorized according to how Audit will follow-up on them. The categories are:

- **Retest —** Audit will retest the area using the same or similar procedures after a recommendation has been implemented and sufficient time has passed for the changes to take effect. The retest will take place on a specified timetable. The recommendation will be closed once the change has occurred. A new audit project will be opened for retesting and any new findings will include new recommendations
- **Confirmation —** Audit will confirm that an adequate risk response has been completed on the agreed upon timeline. The recommendation will be closed once the change has taken place.
- **Assess Risk —** Audit will not plan for specific follow up to these recommendations. Audit will discuss the area as part of its annual risk assessment activities and consider future audit work in the area.

Appendix B

Figure One: Contributory Factors and Accident Analysis in SOS



---------- CONTRIBUTORY FACTORS ----------

Management Factors
- ☐ Accountability
- ☐ Correction Taken Immediately
- ☐ Hazard Recognition
- ☐ Hiring Practices
- ☐ Inadequate Staff
- ☐ JHA/Hazard Control Needed
- ☐ Job Safety Training Deficiency
- ☐ Maintenance
- ☐ Policy/Procedure Enforcement
- ☐ Production Priority
- ☐ Resources
- ☐ Supervisor Training
- ☐ Other :

Employee Factors
- ☐ Fatigued
- ☐ Improper Attitude
- ☐ Improper Equipment Use
- ☐ Lack of Knowledge or Skills
- ☐ Not Following Procedures/Rules
- ☐ PPE-Failure to Use or Use Correctly
- ☐ PPE-Wearing and Using Correctly
- ☐ Pre-Existing Medical Issue
- ☐ Previous Similar Incident
- ☐ Training was Provided to Employee
- ☐ Using Shortcuts
- ☐ Working on Moving Equipment
- ☐ JHA Reviewed
- ☐ Other :

Equipment Factors
- ☐ Deficient Equipment
- ☐ Deficient Tools
- ☐ Guarding Inadequate/Missing
- ☐ Lack of Instructions/Manual
- ☐ Lack of Visual Warnings
- ☐ Poor/Difficult Tool Availability
- ☐ Repetitive Use
- ☐ Unsafe Equipment or Tools
- ☐ Vibration / Pulsing / Shaking
- ☐ Other :

Environmental Factors
- ☐ Air Quality or Ventilation Issues
- ☐ Assault or Criminal Act
- ☐ Biological or BBP Exposure
- ☐ Chemical Exposure
- ☐ Damaged Walkway or Surface
- ☐ Housekeeping Issue
- ☐ Illumination or Lighting
- ☐ Noise or Hearing Conservation
- ☐ Temperature - Cold Related
- ☐ Temperature - Heat Related
- ☑ Uneven Walkway or Surface
- ☐ Using Shortcuts
- ☐ Other :

Accident Analysis: Enter the Sequence of Events in clear, brief statements using a maximum of 20 steps.

01. [redacted]
02.
03.
04.
05.
06.
07.
08.
09.
10.
11.
12.
13.
14.
15.
16.
17.
18.
19.
20.

Action or Task

1. What Task or Action was the person performing when the incident occurred? [redacted]
2. On the day of the incident, how long had the person been carrying out the action prior to it occurring? 0 - walking to process
3. What job training had the person received? certified operator
4. What training should the person have received? certified operator
5. Were written safety procedures available? Where? NA

Equipment/Tools

1. What equipment, machinery or tools were used? NA
2. Was the equipment suitable for the job? If No, why not? NA
3. Was the equipment used correctly? If No, why not? NA
4. What equipment should have been used? NA

PPE

1. What PPE/Clothing was in use? operator uniform, safety boots
2. Was suitable PPE/Clothing provided? If No, why not? Yes
3. Was PPE/Clothing used correctly? If No, why not? Yes

NOTE: Remember to enter any additional ACTION ITEMS per post incident investigation findings.

Figure Two: Safety Matrix

Severity Rank → / Incident Type ↓	1. Low	2. Moderate	3. High	4. Critical
Safety - Injury Incident	o Minor first aid with low probability of increased severity or Near Miss with low severity potential.	o Minor first aid or chemical exposure with potential to cause moderate injury or illlness o Moderate Injury or chemical exposure with low probability to cause Significant Injury.		o Minor first aid or chemical exposure with potential to cause Significant Injury or illness. o Moderate Injury or chemical exposure with high probability to cause Significant Injury. o Significant Injury or chemical exposure
Safety - Safe Work Practice Incident	o Paperwork non-conformance, all other levels of protection are in place	o Missed layer of protection with 1 or more still in place		o No layers of protection in place when incident occurred
Root Cause Analysis	o Optional as a learning exercise or continuous improvement effort. Initiated upon request by user (if a manager) or user's manager, or relevant process owner. o 60 business day target for completion	o Optional as a learning exercise or continuous improvement effort. Initiated upon request by user (if a manager) or user's manager, or relevant process owner. o 45 business day target for completion	o RCA Required. Initiated user (if a manager) or user's manager, or relevant process owner. o 30 business day target for completion	o RCA Required. Initiated by user (if a manager) or user's manager, or relevant process owner. o 30 business day target for completion

Figure Three: Motor Vehicle/Property Damage Matrix

Severity Rank → / Incident Type ↓	1. Low	2. Moderate	3. High	4. Critical
Property Damage	o Property damage ≤ $1,000 o No injuries occurred	o Property damage > $1,000 and ≤ $10,000 o No injuries occurred	o Property damage > $10,000 and ≤ $25,000 o Injuries occurred o Second incident by employee in 24 months o Non-council property involved	o Property damage > $25,000 o Injuries occurred o The damage was the result of equipment failure or sabbotage o Third incident by employee in 24 months
Motor Vehicle-Accident	o Vehicle damage ≤ $1,000 o No injuries occurred	o Vehicle damage > $1,000 and ≤ $5,000 o No injuries occurred	o Vehicle damage > $5,000 and ≤ $10,000 o Injuries occurred o Second incident by employee in 24 months o Another vehicle was involved	o Vehicle damage > $25,000 o Death, injury, or loss time occurred o Incident was caused by equipment failure o Third incident by employee in 24 months
Root Cause Analysis	o Optional as a learning exercise or continuous improvement effort. Initiated upon request by user (if a manager) or user's manager, or relevant process owner. o 60 business day target for completion	o Optional as a learning exercise or continuous improvement effort. Initiated upon request by user (if a manager) or user's manager, or relevant process owner. o 45 business day target for completion	o RCA Required. Initiated user (if a manager) or user's manager, or relevant process owner. o 30 business day target for completion	o RCA Required. Initiated by user (if a manager) or user's manager, or relevant process owner. o 30 business day target for completion

Figure Four: Spills, Odors, and Environmental Compliance Matrix

Severity Rank → / Incident Type ↓	1. Low	2. Moderate	3. High	4. Critical
Process Upset	o Minor process upset due to known cause	o Repeated minor process upsets due to known or unknown cause	o Major process upset due to known or unknown casue with no permit exeedance(close call)	o Major process upset due to known or unknown casue with permit exceedance
Environment - Permit Rule or Non-Compliance	o	o Close call, had stronge potential / nearly resulted in permit vioaltion	o	o Permit limit or rule is exceeded with of site consequences
Environment - Odor Complaints	o The odor strength was not give, or was reported as 'faint' o Caller has not experienced this odor prior to this incident oMCES confirmed as odor source	o The odor was reported as 'noticeable' in strength o Odor frequency was reported as periodically or yearly oMCES confirmed as odor source	o The odor was reported as 'noticeable' in strength o Odor frequency was reported as monthly oMCES confirmed as odor source	o The odor was reportedas 'unbearable' in strength o The odor frequency was reported as weekly, daily, or hourly oMCES confirmed as odor source
Environment - Release	o Spill is wastewater or sludge of minor volume (< 5 gallons) with no anticipated impact to water, land and air	o Spill is wastewater or sludge of > 5 gallons and < 1,000 gallons o Local limited impact to water (did not reach surface water but ground with potential), land and air, readily cleaned up	o Spill is wastewater or sludge of > 1,000 gallons and < 100,000 o Impact to water (surface water and impact to non-mces land.) o Spill is chemical not associated with a Reportable Quantity o Heavy contamination, localized effects of extended duration	o Spill is wastewater or sludge of less than 100,000 gallons. o Impact to water (surface water and impact to non-mces land). o Spill of Reportable Quantity-regulated chemical o Very heavy contamination, widespread effects of extended duration
Root Cause Analysis	o Optional as a learning exercise or continuous improvement effort. Initiated upon request by user (if a manager) or user's manager, or relevant process owner. o 60 business day target for completion	o Optional as a learning exercise or continuous improvement effort. Initiated upon request by user (if a manager) or user's manager, or relevant process owner. o 45 business day target for completion	o RCA Required. Initiated user (if a manager) or user's manager, or relevant process owner. o 30 business day target for completion	o RCA Required. Initiated by user (if a manager) or user's manager, or relevant process owner. o 30 business day target for completion

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