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Safety Classification and Learning Model 2023 Data Analysis Report

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Overview

EEI member companies began to submit data in accordance with the EEI Safety Classification and Learning (SCL) Model in 2021. In the first year, 3,375 cases were submitted by 12 companies and only 3 of these companies submitted over 100 cases each. In 2022, 8,985 cases were submitted by 22 companies and 12 companies submitted over 100 cases each. In 2023, 11,118 cases were submitted by 33 companies and 13 companies submitted over 100 cases each, half of which submitted over 500 cases. This represents over 25% year-over-year growth in submissions and 50% growth in companies participating, which shows stable growth and adoption of the SCL model in 2023. In total, the EEI SCL Model database now contains 23,478 records, which are all contained in the SCL model dashboard located in EEI's *eSafetyLine* portal.

This memo includes salient trends from the 2023 data analysis. EEI members are strongly encouraged to use the dashboard in the EEI *eSafetyLine* portal for further inquiry. The dashboard allows the user to filter and sort by date, case classification, high-energy type, and direct control type. The dashboard also allows a utility to compare their own trends to the overall EEI trends. Data such as time, location, narratives, etc. will remain hidden to keep the source of specific cases anonymous.

In the 2023 analysis, 7,936 cases (71%) were related to electric power transmission and distribution; 1587 (14%) electric power generation; 820 (7%) were related to gas, and 775 (7%) were related to facilities, administrative, and warehousing in consistency with 2022 trends. The data presented here are analyzed in aggregate form but the dashboard in the *eSafetyLine* portal allows the user to break down the analyses by work type.

The purpose of this report is to demonstrate the type of data analytics that may be performed on the data submitted. As organizations continue to improve the accuracy of classification and completeness of data submissions, the results will increase in fidelity. This report concludes with recommendations for future data collection, classification, submission, and analysis.

Summary Statistics

Based on a detailed review of the data submitted, the technical advisors found serious systematic problems associated with the classifications of motor vehicle incidents. Given the magnitude of the issues, motor vehicle incidents were removed from this analysis (Total Count = 614). The same observation was made in the summary of the 2021 and 2022 years, suggesting that motor vehicle incident classifications persist and may not be appropriate for inclusion in the annual reports.

The data across all work types are summarized below in Figure 1 (Total Count = 10504). As one can see, most cases submitted were low-severity cases (i.e., those where high energy was not present and where a less-than-serious injury was sustained).

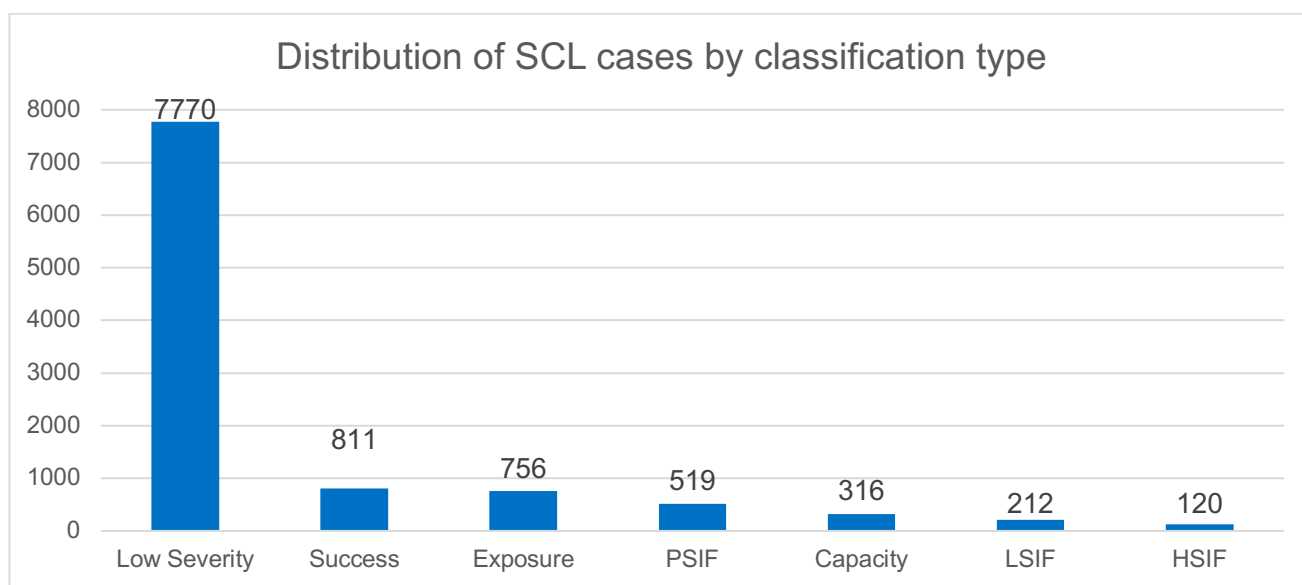


Figure 1 – SCL Model Classification Summary for 2022 Data

High-Energy Hazard Summary

The data were sorted and analyzed to reveal trends in the 13 high-energy hazards. Although most non-MVI cases were classified correctly, a total of 261 cases were reclassified because the case descriptions contained information about the controls that contradicted the classification. Most of the 261 cases involved situations where a direct control was marked as present, but the control provided in the free text portion of the “other” category clearly did not meet the definition of direct control. Please see Appendix A for keyword search rules to categorize non-compliance with Direct Control definition. Key examples include the following:

- Not Available (89 classifications). A common pattern was marking Direct Controls as present and choosing the Other category while not entering a control or recording “Not Available”.
- Keeping distance from the hazard (55 cases misclassified). A common misconception is that keeping distance is a direct control. However, keeping distance does not mitigate the energy and is vulnerable to human error.
- Safety practice (55 misclassifications). A common misconception was that good safety practices such as communication, awareness, job briefings, knowledge, and training constitute a direct control. Although vitally important, none of these practices conform with the definition of direct control because they are not targeted at the high energy source, they do not mitigate the energy, and they are still vulnerable to human error.
- Spotter or observer (37 cases misclassified). Heavy mobile equipment with workers on foot remains one of the most challenging hazards to control. Although perhaps the most realistic safety measure, having a spotter is not a direct control because it does not mitigate the energy and it is vulnerable to human error.
- PPE (22 misclassifications). Per Direct Control definition generic PPE such as hard hats, steel toed boots are not considered a Direct Control.
- Uncategorized (138 classification). Remaining entries did not follow any rule, consistent description, or trend. No corrections were made on these 138 classifications.

When the above errors were obvious, the cases were reclassified in the dataset. Cases were only reclassified when there was concrete evidence that the classification was obviously

incorrect. Therefore, it is possible that there are more cases that should be reclassified. Note that, although the cases were reclassified for the analysis presented in this memo, cases in EEI's *eSafetyLine* portal remain as submitted.

The properly classified cases are summarized in Table 3 and visually presented in Figure 2. The results reveal that arc flash, excavation and trenching, steam, and electric contact hazards had the highest proportion of controlled cases. These trends are nearly identical to those reported in 2022. In addition to explosion, high surface temperature and mobile equipment with worker on foot from last year, heavy rotating equipment and fire with sustained fuel source were the least controlled.

Table 3 – Summary of high-energy hazards and proportion controlled (properly classified). Motor vehicle incidents have been omitted because of the rate of misclassification. ¹

High Energy Hazard	#Controlled	#Uncontrolled	All	%Controlled
Arc Flash	319	194	513	62%
Excavation Or Trench	6	4	10	60%
Steam	11	9	20	55%
Electrical Contact with Source	487	425	912	53%
Fall From Elevation	75	122	197	38%
Suspended Load	80	171	251	32%
High Dose of Toxic Chemical or Radiation	7	15	22	32%
Mobile Equipment and Workers on Foot	51	113	164	31%
Fire With Sustained Fuel Source	16	38	54	30%
Heavy Rotating Equipment	24	64	88	27%
High Temperature	5	18	23	22%
Explosion	15	66	81	19%
Other/Energy Calculator	28	150	178	16%
Grand Total	1124	1389	2513	45%

¹ 9 classifications were marked "Yes" as High Energy but a category was left NA. These were removed from analysis.

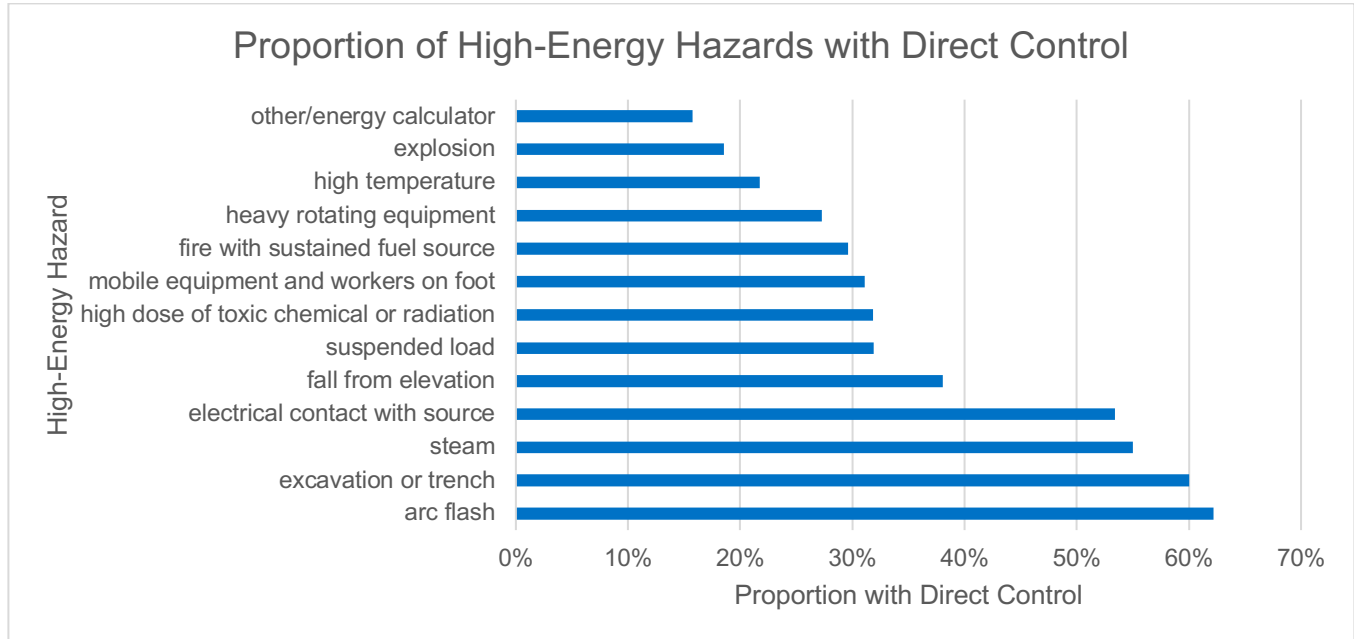


Figure 2 – Proportion of high-energy hazards controlled.

Control Summary

A secondary analysis was performed on the data to sort and trend the data to reveal patterns in the specific controls. This analysis was performed when the data for the case was associated with the presence or absence of a control in the available pull-down list. Controls listed in the free-text form of the “other” category are not included. The data are summarized in Table 4.

Some controls were absent in every case submitted but these controls were involved in only one or two cases (e.g., relief valve, thermal insulation, whip restraint). Also, there are some controls that are almost always present in the cases (e.g., barricades, hot sticks, seat belt/vehicle systems, and grounding). Cases were recorded where the data is entered as Other instead of using the dropdown list, causing inconsistent data entry.

Most cases submitted were associated with incidents rather than observations. The percentage of observation submissions were dropped to 15% from an already low number of 18% in 2022. 85% of cases involved an incident. This highlights the need to include high-energy control assessments (HECA) from safety observations to truly understand the proportion of time each

high-energy hazard is controlled, and which controls are present or absent. We hope to include these data in the submission for future years.

Table 4 - Proportion of cases where direct controls were present (properly classified)²

Control	#Controlled	#Uncontrolled	All	%Controlled
Hot Sticks	103	6	109	94%
Grounding	20	8	28	71%
Insulating Barriers	398	181	579	69%
Switching	41	19	60	68%
Vehicle Systems	22	11	33	67%
Fall Arrest Systems	48	71	119	40%
Barriers/Guards	164	261	425	39%
De-energize/LOTO	106	183	289	37%
Rigging	18	42	60	30%
Testing for Voltage/Air quality	1	8	9	11%
Grand Total	921	790	1711	54%

Similar to 2022 results, Hot Sticks were a Direct Control that was properly in place with 95% performance followed by Grounding, Insulating Barriers, Switching and Vehicle Systems.

Conclusions and Recommendations

The data summaries proved to be very insightful. In almost every case, the trends observed in 2023 similar to earlier years. However, authors were able to draw more insights due to abundant data. Total number of companies reporting grew 50% showing growing adoption and reporting on SCL model. The error rate associated with misclassifications stayed at 2% requiring the Community of Practice to address data entry issues in 2024. Since classification errors almost exclusively relate to the application of the definition of Direct Control, further training and calibration is suggested for that definition.

Several conclusions and recommendations are offered by the technical advisors below. Several from 2022 are repeated because they are important and still apply based on the 2023 analysis.

² Percentages are slightly different due to the removal of Other Category from Direct Controls.

- The correct classification for almost all motor vehicle incidents is “Capacity” because vehicles tend to exceed 30 mph and the vehicle itself provides sufficient controls (roll cage, frame, seat belt, and air bag) to meet the definition of direct control. Therefore, there may be limited use in classifying these incidents using the SCL model considering that they represent a very large proportion of incidents. In this analysis, all incidents marked as motor vehicle incidents are removed.
- The Community of Practice should discuss whether motor vehicle incidents should be included in the SCL submissions and analysis.
- Most motor vehicle incidents were incorrectly submitted. A frame, roll cage, seat belt, and air bags represent the direct control. Awareness, use of the Smith method, and good driving behavior are not direct controls.
- Top vulnerabilities include explosions, high temperature, and heavy rotating equipment. It was shown that in all these categories control rate is at or under 22%. Identifying reasonable and effective direct controls for these high-energy hazards is very important.
- Organizations should consider aligning with high-energy observations and sharing these data through the emerging high-energy control assessment (HECA) method. The potential trends could provide greater insight on the actual proportion of high-energy hazards that are controlled, and the specific trends associated with each high-energy hazard and direct control.
- The activities of the community of practice should continue and the group should discuss common misclassifications before the 2023 data are submitted in the fourth quarter of the year.
- Participating companies should continue with training and calibration to ensure that data are correctly recorded, submitted, and classified.

This report provides very high-level analysis of the data submitted. EEI organizations are encouraged to view, filter, and sort the data in the SCL model dashboard in EEI’s *eSafetyLine* portal. The data can be analyzed in innumerable ways including time-based trending and analysis for specific work types.

Authors

Dr. Elif Erkal - EEI OSH Technical Advisor

Dr. Matthew Hallowell - EEI OSH Technical Advisor

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Appendix A: Other Categorization Rules and Keywords

Categorization	Keyword
Distance	"Distance", "distance", "away", "proximity", "Work Zone"
PPE	"PPE", "hat", "boots"
Observer	"spotter", "observer", "spotters", "inspection", "peer", "oversight", "SECOND MAN"
Practice	"Check", "awareness", "employee", "stop", "employees", "3 points", "communication", "JHA", "Safe Work", "stopped", "moved", "should have been", "could have been", "pulled off", "extinguisher", "procedure", "Procedure", "rule", "HU Tools", "Program"
Warning	"lights", "warning", "attentive"
Direct Control added	"hard physical barrier", "hard barrier", "Physical barrier", "Drop zone", "air bag", "cover up", "insulated", "Insulated", "lifeline", "Air bag", "auto-shutoff", "scaffolding", "FR", "roll cage", "breaker", "Breaker", "Surge protector", "cover", "Cover", "volt"
Smith	"Smith", "smith", "SMITH"