RECLAMATION

Managing Water in the West

Final Report

Reclamation Leading Safety Metrics

Safety and Occupational Health
Program Action Team #13 Recommendations



U.S. Department of the Interior
Bureau of Reclamation

MAY 2015

Mission Statements

The mission of the Department of the Interior is to protect and manage the Nation's natural resources and cultural heritage; provide scientific and other information about those resources; and honor its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Reclamation Leading Safety Metrics

Final Report

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Safety and Occupational Health
Program Action Plan Team #13

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Executive Summary

In 2013, the U.S. Department of the Interior's Office of Safety and Health (DOI) conducted a review of Reclamation's Safety and Occupational Health (SOH) Program and identified numerous areas for safety improvements across the agency.

In 2014, Reclamation initiated a SOH Action Plan (Plan) Team to develop a strategy for addressing DOI's concerns and for establishing a vital, proactive, and collaborative safety culture. As part of the Plan, this team suggested the creation of 21 interdependent safety action teams to provide specific recommendations to the Reclamation Leadership Team (RLT) regarding how to move forward expeditiously and effectively.

Safety Team #13 (Team) was created to: research industry efforts in SOH to develop meaningful, useful leading safety indicators; recommend a series of leading safety metrics by which Reclamation may measure the health of its safety culture; and consider the relevance of "near-miss" reporting and metrics as tools for hazard recognition and mitigation. Effective management of leading indicators is a part of the ongoing process improvement cycle of the American National Standards Institute (ANSI) Standard Z10, Occupational Health and Safety Management Systems.

Leading safety indicators, specifically leading metrics, are intended as a predictive and controllable management leadership tool. The most effective leading metrics engage employees in their specific work environment while also maintaining relevance to the overarching organization.

The Team conducted extensive research of relevant reference materials and successful employers and conducted feedback sessions with Reclamation staff at safety councils, partnership meetings, and other meetings at area offices for feedback on current work methods. The Team also coordinated efforts with other related SOH teams individually as well as at the Team Leaders Meeting in March 2015.

The Team recommends a 3-phase plan to establish initial Reclamation-wide leading metrics using existing data collection systems. Phase 1 includes development and distribution of a revised Reclamation safety dashboard, as well as implementation of the near-miss module in SMIS (Safety Management Information System). Phase 2 involves examining baseline near-miss data gathered from SMIS to develop appropriate leading metrics related to near misses. Phase 3 occurs annually and involves assessing the effectiveness of metrics in use and adjusting or replacing them as necessary to maintain relevance and employee engagement over time.

Background

SOH Program Evaluation

Published in December 2013, DOI's SOH program evaluation of Reclamation facilities indicates that Reclamation needs to "clarify and define the expectations of performance measurement and continuous improvement under SAF P01 and ANSI Z10" across the agency.

SOH Action Plan

In May 2014, Reclamation issued its *Safety and Occupational Health Action Plan*, including a description of actions required for development of leading safety metrics to use across Reclamation for facilitating SOH program continuous improvement through measuring safety performance. Specifically, the plan calls for the following deliverables from Team #13:

- SOH industry efforts to identify leading indicators that are closely correlated with current indicators that focus on program outcomes of lost-time accidents;
- Development of a consistent set of metrics to be used throughout Reclamation for periodic reporting at a facility Area Office, Region, and Reclamation levels; and
- Consideration of "near-miss" reporting and metrics as tools for recognition and mitigation of hazards.

Reclamation Safety Vision Statement

On January 30, 2015, Reclamation issued its SOH Vision Statement as developed by SOH Team #5 and approved by the RLT on January 12, 2015:

"Reclamation embraces safety excellence by empowering employees and integrating safety into our mission, achieving a culture which results in a safe environment for our employees, contractors, visitors and the public."

Team #13's leading metrics efforts are consistent with this vision of achieving a healthy safety culture and emphasizing continuous improvement principles of an effective SOH program.

Leading Metrics

The Team completed actions necessary to present a meaningful recommendation of leading safety metrics for Reclamation, including:

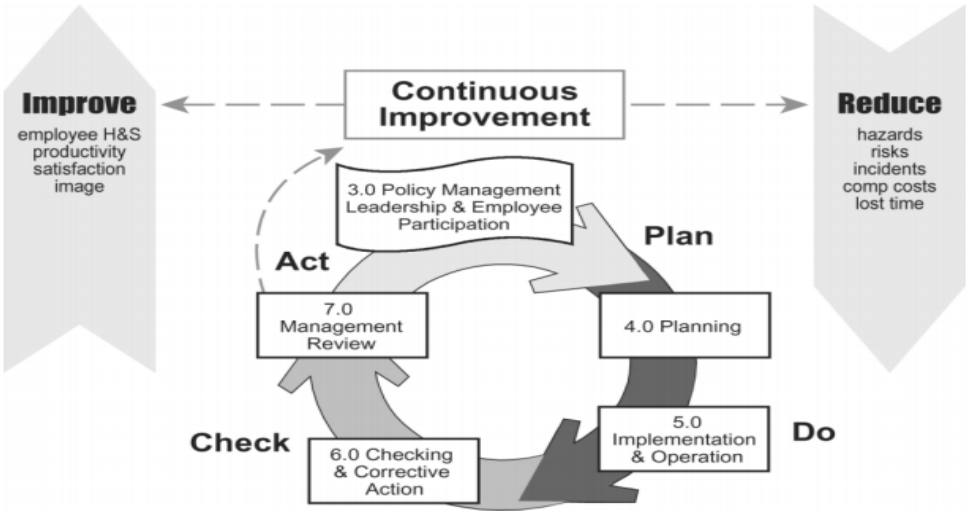
- Research and discussion with employees, management, safety professionals, union representatives, and industry leaders to determine current practices and areas of intersection and exploration, including the importance of documenting and learning from "near-miss" incidents;
- Careful consideration of potential obstacles, including the challenge of creating metrics with relevance to all facets of the agency;

- Participation in current industry training on the subject of leading safety metrics.

ANSI Z10

Reclamation's SOH Program is defined at its highest level in the Reclamation Manual in policy SAF P01.[1] This policy describes the responsibilities of personnel from the Commissioner to employees. The policy also defines the roles of SOH personnel. In July 2013, Reclamation issued an update to SAF P01 to improve the foundation of an effective SOH program by adopting ANSI Z10, Occupational Health and Safety Management Systems (OHSMS), *Principles for a SOH Management System*, as an effective tool for continuous process improvement of the SOH Program.

Figure 1: OHSMS Cycle[2]



[1] *Safety and Occupational Health Action Plan*, Bureau of Reclamation, May 2014.
[2] ANSI Z10-2012 Now Available, *ASSE Tech Brief*, American Society of Safety Engineers, 9/5/12.

Deliverables/Recommendations

Deliverable #1

SOH industry efforts to identify leading indicators that are closely correlated with current indicators that focus on program outcomes of lost-time accidents

DOI Finding

DOI's report, Conclusion 4-1, indicates that Reclamation's SOH management systems do not clearly define expectations and initiatives related to continuous improvement. To determine a reasonable benchmark to base recommendations, Team #13 conducted extensive research and relevant training on the subject of leading safety metrics.

Leading vs. Lagging Metrics Overview

Metrics must be viewed as a management reporting tool, not a form of management action, and are limited to measurable information.[3] For organization performance issues, metrics can indicate what an organization is accomplishing as well as what it is not accomplishing (i.e., confirming results of management action or discovering what needs management action).

As such, leading safety indicators, specifically leading metrics, are intended to either predict the occurrence of accidents in the future or to measure the effort spent to address hazards. Lagging metrics, on the other hand, reflect those times when preventative steps have failed or when people have been lucky enough to simply avoid an accident. Typically, lagging metrics include accident rates, safety violations, or other operational failures. Compliance with regulatory reporting requirements often drives emphasis on lagging metrics; however, a complete process improvement program also uses leading metrics to guide and lead resources to safe work practices to avoid accidents.

Team Research

A recent webinar presented by Summit Safety Technologies clearly articulates basic information regarding safety metrics as they relate to the Team's work. Traditional lagging safety metrics are used by management to measure incidents or accidents that have already occurred (e.g., DART rate), but they do not measure management's efforts to proactively improve safety conditions. Leading safety metrics are designed to measure management's work to reduce the likelihood or risk of incidents and accidents before they happen. Leading metrics, as part of an improved safety reporting system, can indicate what an organization is doing well and indicate areas for improvement over time.

[3] How to Use and Understand Safety Metrics, Summit Safety Technologies presentation, September 8, 2014.

An effective safety performance management process, as described by Summit Safety Technologies, includes three basic components:

1) Development of a strategy for improving safety performance, including initiatives that affect performance outcomes, while defining a cause-and-effect relationship between metrics and results;
2) Development of metrics to measure the processes or initiatives; and
3) Use of metrics to manage the processes or initiatives and confirm they have the desired required effect on performance.

Dr. Earl Blair and Barry Spurlock, Esq., noted academics and practitioners in the field of safety metrics, explained in a February 2015 workshop sponsored by the American Society of Safety Engineers[4] that effective leading safety metrics are:

1) Customized and site-specific;
2) Prioritized to emphasize high-impact drivers of safety;
3) Designed for long-term value;
4) Used in conjunction with lagging safety metrics when appropriate;
5) Developed in conjunction with employees across an organization; and
6) Written simply and clearly.

Industry Interviews

Team members interviewed leaders in utilities services and other industries to discuss safety performance measurement and relevant techniques for improving safety culture by means of leading metrics. Organizations contacted included:

- Caterpillar, Inc.
- Salt River Project (Arizona-based utility)
- Tennessee Valley Authority
- Western Area Power Administration
- NRG Energy, Inc. (Fortune-250 power plant operations company)
- Southwest Gas
- Los Angeles Department of Water and Power

Questions asked to industry included:

1) Is your organization using leading metrics in its safety management program? If yes, what safety metrics are being reported and has safety improved as a result?

[4] Blair, Earl, and Barry S. Spurlock, 2015. Leading Measures of Safety Performance: A Measurement and Metrics Workshop. American Society of Safety Engineers SeminarFest, February 7-8, 2015.

2) What have you learned in your own exploration of leading metrics which would be useful to someone new to the topic?

Industry leaders confirmed they are engaged in the development of proactive leading metrics but, by and large, are still feeling their way through the process. Most industries, with a few exceptions, are still using traditional lagging indicators including DART rates and recordable injury rates to determine the success of their safety programs, but are attempting to determine a series of meaningful leading indicators along with mechanisms and processes for modifying employee behavior.

Generally, industry suggests that leading safety metrics are most meaningful at the lowest organizational level and should be tailored to fit the unique environment of each facility or office. Leading metrics relevant across an organization may be measured and rolled up to the highest level for reporting.

Significant Findings

An example list of leading metrics used in various industries is included as Appendix 1 to this report; the Team recommends an emphasis on tailoring metrics to specific safety issues needing improvement in a given work environment.

As expressed by Summit Safety Technologies, "Metrics in themselves will not achieve excellence, but do provide a 'window' through which management can see the effectiveness of their systems."[5]

Lagging indicators show when a desired safety outcome has failed or has not been achieved. Further, lagging metrics do not necessarily indicate the health of an organization.[6] For example, a very low accident rate would not indicate near misses, unreported accidents, or the impact of luck.

Conversely, leading indicators are measures that may predict or anticipate incidents. They are also measures of planned processes or inputs essential to deliver desired safety outcomes. Because leading indicators are based on effort, they cannot be falsely inflated by simple good fortune.

Conclusions

While a good DART rate or low recordable injury rate appears to imply that an organization is safety-minded, these statistics do not necessarily correlate with a healthy safety culture. Industry has determined that a quantifiable, proactive approach allows for the demonstration of continuous effort to improve the safety culture. Emphasizing and tracking organizational behaviors in specific work environments are influential to the success of this effort.

[5] *How to Use and Understand Safety Metrics*, Summit Safety Technologies presentation, September 8, 2014.
[6] Ibid.

Industry experts do not appear to agree on the best means for modifying employee behavior. Some experts suggest that employees should be rewarded for meeting established safety goals as a part of sustaining maximum motivation, while others recommend disciplining employees if goals are not met. When employees are rewarded for meeting safety goals, they may underreport actual accidents because they do not want to minimize their chances, or the chances of their peers, to receive awards. At the same time, raising the specter of termination also tends to drive reporting of safety issues underground. Please see our "Implementation" recommendations below regarding ways to address these issues.

Deliverable #2

Development of a consistent set of metrics to be used throughout Reclamation for periodic reporting at facility, area office, region, and Reclamation levels

Guidance

DOI's report, Conclusion 4-1, states that Reclamation must "clarify and define the expectations for performance measurement and continuous improvement under SAF P01 and ANSI Z10."

Reclamation-wide Outreach: Leading Metrics in Practice

The Team conducted outreach to Denver/Regional Safety Councils, Regional Partnership Councils and employee groups at area offices to understand if any leading metrics were already being used to ensure that a) the Team didn't make recommendations that would be counterproductive, and b) existing practices that the team could leverage and build upon in the organization were explored.

Outreach discussion topics included:[7]

1. What metrics do you currently use? And how do they work for you? Do you think they are effective or ineffective? Why/Why not?
2. Do you have any reaction to what we already have in the Safety Factor?
3. What metric would you like to see us have in place Reclamation wide?
4. What type of change do you think our metrics should try to effect?

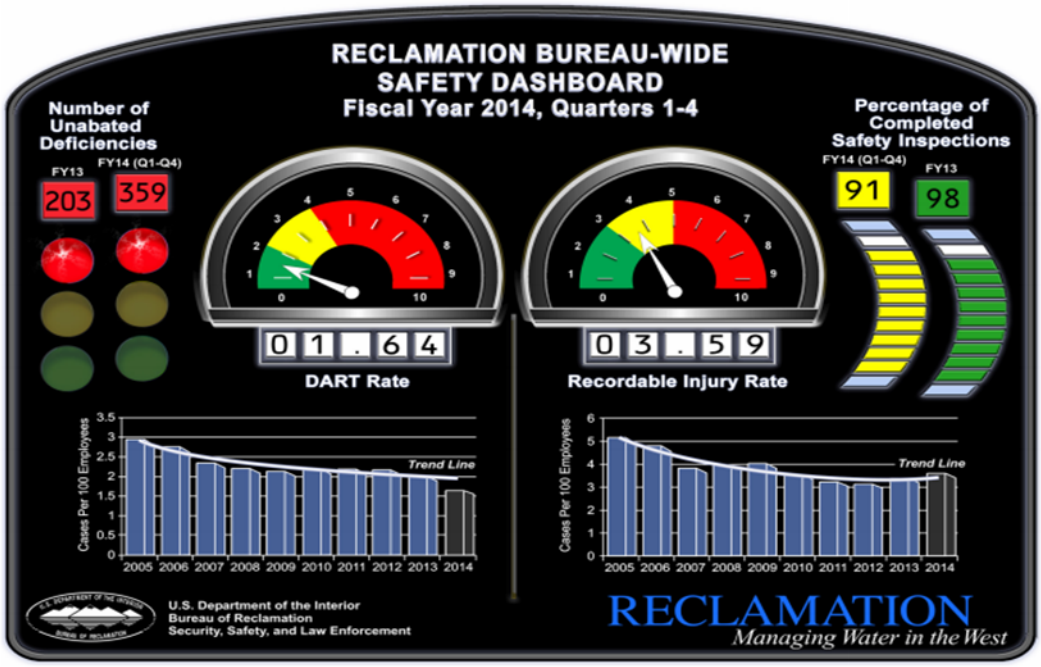
Outreach indicated that there were few metrics other than DART and OSHA reporting in place. One "best practice" that the team identified is the publication of the safety dashboard in *The Safety Factor*. The dashboard incorporated leading metrics and was generated on a Reclamation-wide and Regional levels.

Current Dashboard

Reclamation's current safety dashboard (Figure 2) is published quarterly in the final pages of *The Safety Factor* newsletter to present agency-level metrics and data to all employees. Each Region's metrics and data are distributed by email to Regional management. The centerpiece of the dashboard is current and historical lagging metric data related to the DART rate and the recordable injury rate. The upper left and right corners include leading metrics for data related to unabated deficiencies and completed safety inspections. All current measurements on this dashboard are color-coded to allow a quick visual determination of success or needed improvements.

[7] McCloskey, Jennifer. Guide for employee and Safety council conversations. Team #13 email 8/14/14.

Figure 2: Reclamation's Current Safety Dashboard



Current Dashboard Explanation

As explained in *The Safety Factor* newsletter:

> Safety data used in the dashboard is drawn from the Safety Management Information System (SMIS), and the Workplace Inspection Module, Dam Safety Information System (DSIS). The dashboard is currently set up to provide information on four key safety metrics:
>
> 1. Days Away Restricted/Transferred (DART) Rate: DART injuries are the most severe category of injuries, preventing an employee from returning to work the next day. The DART rate shows how many DART injuries occur per 100 employees. The DART rate is depicted as a speedometer on the left side of the dashboard, with historical data and a trend line below it.
>
> 2. Recordable Injury Rate (RIR): Recordable injuries are injuries that require more than first aid to treat. The RIR shows how many recordable injuries occur per 100 employees. The RIR is depicted as a speedometer on the right side of the dashboard, with historical data and a trend line below it.
>
> 3. Percentage of Completed Safety Inspections: Occupational Safety and Health Administration (OSHA) requires Reclamation to conduct annual workplace safety inspections. This metric shows what percent of Reclamation's safety inspections have been conducted for the current fiscal year. Two fuel meters on the right side of the dashboard show the

percentage of inspections completed to this point in the fiscal year, as well as at the end of the previous fiscal year

4. Number of Unabated Deficiencies: Number of identified deficiencies for which corrective actions have not been implemented. The set of stoplights on the left side of the dashboard show the number of unabated deficiencies still in DSIS through the end of the first quarter of FY 2015, as well as at the end of FY 2014.

For ease of interpreting the above 4 metrics, a red/yellow/green color coded system is used in the graphics. The color ranges are based on historic performance data in Reclamation, and indicate whether each rate is on track with historic performance (green), trending higher than normal (yellow), or is significantly higher than recent rates (red). These color ranges are only rough guides of performance

Reclamation-wide Outreach: Feedback on the Current Dashboard

The Team's discussions with Reclamation employees indicate that employees are not aware of the dashboard, nor do they understand how the DART and recordable injury rates are calculated, in spite of definitions provided in *The Safety Factor* newsletter. Furthermore, because of this lack of understanding and the minimal presence of the dashboard in Reclamation's collective safety culture, employees are unable to embrace fully the concept of continuous improvement as expressed by DOI.

Effective Leading Metrics Philosophy

The Team's research indicated that leading safety metrics are most effective when tailored closely to sites at the lowest organizational level. Indeed, a common industry practice is to develop leading safety metrics at the headquarters level and then establish customized goals for subordinate offices based on historical safety information and regulatory requirements. Additionally, the number of leading safety metrics emphasized at one time should be kept small to facilitate clear presentation of related safety data to employees and to simplify administration of the dashboard.

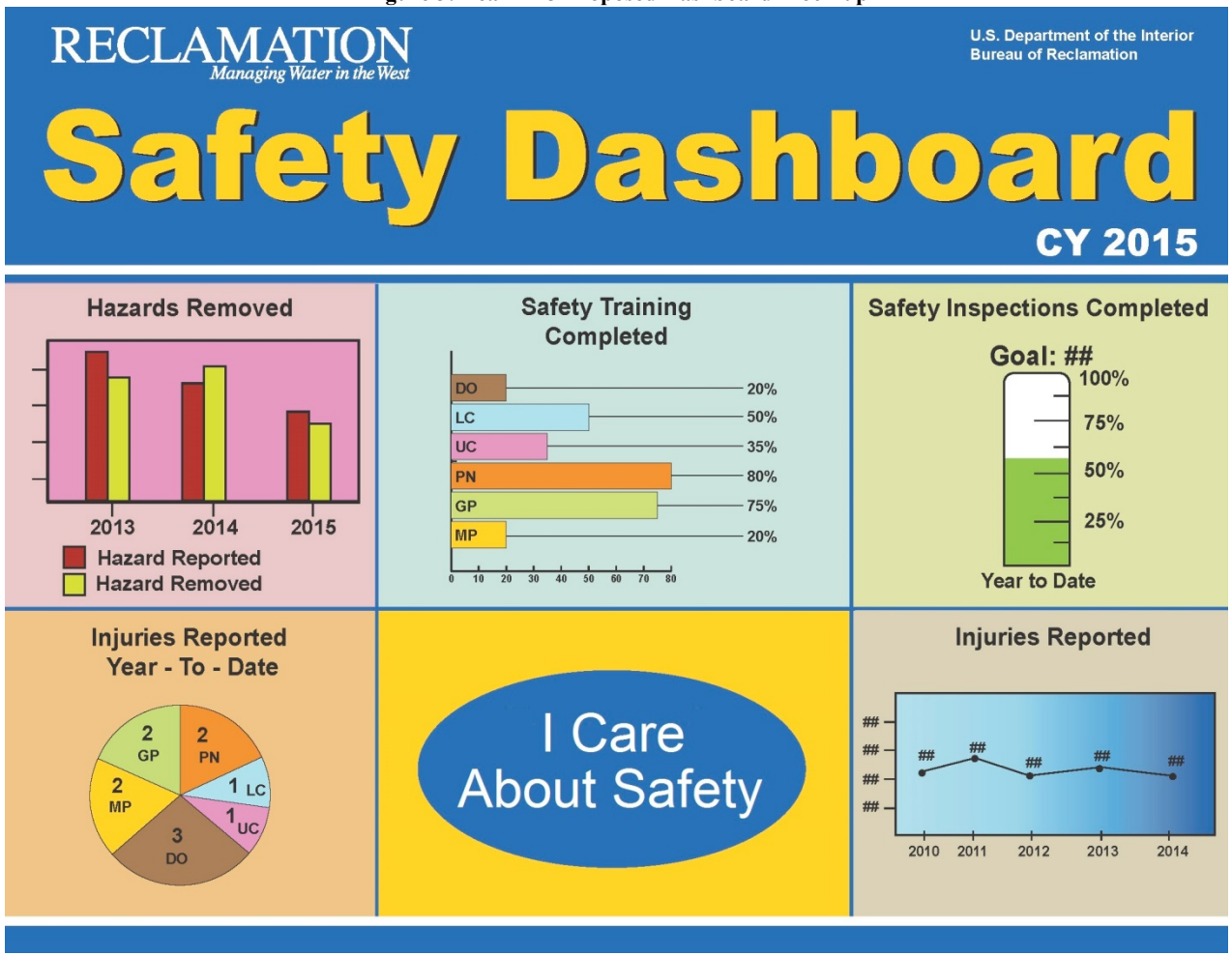
Finally, the Team considered that the initial metrics use data available from existing reporting systems used throughout Reclamation for rapid implementation, so the safety culture can progress immediately. The Team wants initial metrics that are recognizable to staff that already collect some data from these systems.

Recommendation: Revised Dashboard

To incorporate leading metrics into Reclamation reporting and more effectively display safety metrics to employees, the Team recommends implementation of a revised safety dashboard (Figure 3).

Figure 3: Team #13 Proposed Dashboard Mock-up

Leading Metrics: data from existing reporting systems (SMIS/DSIS) →



Graphical information display to maximize visibility in all media within Visual Identity format

Lagging Metrics: for easy comparison; from existing reporting systems →

Current year-to-date and recent annual trend for relevance

Reclamation safety motto; tailored and updated as-needed, or replaced with metric as-needed

This dashboard includes the following agency-level information, based on a calendar year cycle:

- Hazards-reported and hazards-removed (leading metric). Hazards-reported information is tracked within DSIS and is currently reported on the existing dashboard. The Team recommends continuing this metric because, based on the feedback sessions the team conducted, this is the most meaningful metric to employees. Employees want to see that progress is made to remove hazards in the work environment. This metric demonstrates that Reclamation management is committed to an active program to monitor, identify, and then remove hazards. This metric accomplishes the goal of being organization-wide for consistent awareness, especially as employees move to various roles around the agency, but is also very powerful for personally engaging employees locally, since it can be applied at the workplace-level for added emphasis. For implementing future hazards-removed data collection in SMIS, Team #13 has coordinated with Team #12 (Evaluate and Recommend Improvements for Recording Safety Deficiencies and Tracking Progress). The data can be added to the dashboard as soon as available. This metric conveys ongoing annual commitment to discovering and mitigating hazards; as such, there may not be an annual correlation which tracks when a hazard is removed. This is acceptable, since the priority is to readily demonstrate consistent annual progress.
- Injuries reported (lagging metric, historical data by year). This information is currently available in SMIS. The current dashboard reports a Recordable Injury Rate (Rate); however, the Team discovered that the Rate is not easily understood by employees and therefore recommends reporting actual injury numbers. The Team believes that this historical trend is the most meaningful manner for employees to assess the effectiveness and progress of Reclamation's safety program.
- Safety inspections completed (leading metric, as a percentage of anticipated safety inspections). This information is currently available in DSIS and is currently reported on the existing dashboard. The team recommends continuing to report this leading metric as a good practice to maintain focus in the organization on completing inspections. Expressed as a percentage, a 100% goal is consistent and easy to understand for promoting awareness across the organization.
- Injuries reported year-to-date (lagging metric, by Region, to include all recordable injuries). This information is currently available in SMIS. Similar to the historical trend metric discussed above, the current dashboard reports a Rate; however, for effective employee engagement the Team recommends year-to-date actual numbers.
- Safety training completed (leading metric, by Region, as a percentage of all anticipated/required safety training for the year). Team #17 and Team #19 are preparing safety training courses for all employees.

> Given the emphasis on this aspect of Reclamation's safety culture, the Team felt it appropriate and timely to report a leading metric related to training accomplishment. In fact, since training is a foundation of any safety program, any initial leading metrics reporting would be remiss without it. Data represents training completed up to 100% per Region, and is obtained from DOI Learn.

This dashboard mirrors the recommendations of Blair and Spurlock [2015]. The recommended leading metrics reflect agency-wide efforts, but may be tailored to any office level. The metrics represent expected high-impact drivers of safety (training, removal of known hazards, and inspections to uncover unknown hazards). Lagging metrics are used as appropriate. The metrics were developed with and reviewed by employees across the agency and are clearly articulated. Metrics expressed as percentages readily show progress towards 100% completion goals.

The intent of this revised dashboard is to provide employees with information meaningful and engaging to them. Additionally, this dashboard will serve as a starting point for agency-level discussions of future metrics based on changing conditions and needs. For example, if Reclamation discovers a trend in incidents or injuries, a new leading metric can be added to the dashboard to track proactive efforts to reduce them. Over time, this dashboard is a tool for continuous improvement in safety as expressed in ANSI Z10.

The Team recommends that Regional and field/area offices develop and report on their own leading metrics based on their specific environments and needs, in conjunction with their active safety committees. For example, using this format for consistency, an area office with trending sprain injuries may track a leading metric related to the job hazard analysis process, material handling equipment utilization or employee understanding of sprain injury causes. Team outreach efforts indicated that if employees feel the leading metrics are relevant to them and discussed regularly, they are more likely to modify their behaviors to increase safety achievements.

Additionally, the Team's research indicated that successful leading safety metrics must be reviewed regularly to evaluate their effectiveness. When a particular metric no longer provides useful information to indicate growth in the safety culture, the agency or facility should discard it and select another metric.

Revised Dashboard Distribution

For information distribution, the Team recommends that the quarterly publication of the Reclamation dashboard continue. Additionally, the agency-level dashboard should be available online (e.g., as part of a web portal recommended by Team #4) and emailed to managers to remind them of the status of each metric. Like the current dashboard, the revised dashboard should be developed by the Technical Services Center (TSC) for metrics data input.

The dashboard should also be given prominent placement on the front page of *The Safety Factor* newsletter. The Visual Identity Program-compliant graphic is scalable to any size and all workplaces should be encouraged to display the dashboard on bulletin boards (poster or electronic bulletin boards) and discuss it at appropriate meetings. This allows for a greater presence of leading safety metric data in the Reclamation safety culture at all levels, promotes ownership of safety by employees, and facilitates employee involvement.

Revised Dashboard Layout

All graphical information is displayed to maximize visibility in multiple media while adhering to Reclamation Visual Identity Program requirements. The top half of the dashboard includes current and new leading metrics, measured using data currently available in SMIS, DSIS, and DOI Learn. The bottom half of the dashboard includes two lagging metrics related to reported injuries and an extra space for a Reclamation safety motto or an additional metric.

Deliverable #3

Consideration of "near-miss" reporting and metrics as tools for recognition and mitigation of hazards

Reclamation defines a near miss in SAF 01-02 as "an unplanned series of events that could have resulted in death, injury, occupational illness, or damage to or loss of property, but did not."

The Team's research indicates that industry and agency safety professionals concur that data related to near misses are important indicators of the health of safety communication channels and provide critical information regarding potential safety issues at a location. Along with incident reports, audits and inspections, near misses are a significant source for hazard identification; however, two major obstacles preclude Reclamation from implementing leading metrics related to near misses at this time:

1. The Team's understanding is that no systematic data collection related to near misses is currently done by Reclamation. Some regions/area offices/facilities currently capture near-miss information in Excel spreadsheets or SharePoint sites; however, there is no common Reclamation-wide repository to capture such data for a potential leading metric. The module in SMIS related to near misses is currently not used. Because of this, insufficient baseline data exists with which Reclamation may create meaningful goals or metrics. Team #13 supports Team #12's efforts to turn on the SMIS near-miss module. The Team is aware of potential obstacles to obtaining useful near-miss information from SMIS including difficulties in upgrading the software and the inability of non-supervisors to enter near-miss information into the system.

2. Discussions across the agency suggest that employees are largely hesitant to report or discuss near misses for fear of discipline, frequently from first-hand experience. The Team believes that training is required and the safety culture must be allowed to strengthen and evolve before attempting to implement leading safety metrics related to near misses. The confidence to discuss near misses without fear is, as the Team learned from training,[8] a sign of an advanced safety culture and Reclamation must allow time for this confidence to take root. MESH training proposed by Team #18 may include relevant training on near misses.

Implementation

Reclamation-wide Outreach: Feedback on Team's Recommendation

Team #13 initiated implementation efforts through another phase of outreach. The Team developed a PowerPoint presentation explaining the Team's assignment, corresponding research, summary of findings, and resulting recommendations. The same presentation was used in all regional feedback meetings with employees and safety managers. Since the Team's recommendations were based heavily on employee-focused input data, feedback was largely confirmation and supportive acknowledgement of the proposed dashboard and implementation. Specific feedback addressed by the Team concerns emphasis on existing data collection systems and not introducing additional data entry/database management tasks to the organization. The Team's proposal addresses this concern while staying coordinated with the plans of other related SOH teams.

As such, the Team recommends a three-phase approach to implementation of these changes.

Phase 1: Revised Dashboard

In Phase 1, implementable immediately as part of a larger rollout of safety improvements and anticipated to be complete by the end of CY 2015, the revised safety dashboard is generated using current available safety data. Team members develop a statement of work for TSC staff to follow as they create the dashboard. Quarterly distribution of agency and Regional dashboards begins via the Reclamation Intranet, *The Safety Factor*, and for use on office bulletin boards (paper and electronic versions). Regional and facility/area offices are encouraged to implement and track leading safety metrics of value to them. Additional leading safety metrics should be developed, as appropriate, by the lowest organizational levels of the agency. The appendix to this report identifies some potentially meaningful leading safety metrics offices may explore.

[8] How to Use and Understand Safety Metrics, Summit Safety Technologies presentation, September 8, 2014.

Reclamation begins gathering near-miss information in a systematic way. The SMIS module related to near misses is activated to allow for tracking of baseline data at the agency level and training on the importance of capturing and reporting near misses is incorporated into the mandatory safety training curriculum.

Per coordination with Team #12, the Hazards Removed SMIS data collection module should also be activated as soon as possible. When available, this data will be added to the proposed dashboard.

Phase 2: SMIS 1-Year Review

In Phase 2, implementable approximately one year later, baseline data on near misses from SMIS is evaluated by the Reclamation Safety Council for usefulness in developing appropriate leading safety metrics. The number of safety hazards reported and mitigated because of near miss reports should be included in the proposed dashboard. Also if sufficient data exists to do so, establish other leading metrics and goals (for example, the number of days required to share relevant near miss information with employees to reduce the likelihood of similar incidents in the future).

Phase 3: Ongoing Metrics Updates

In Phase 3, implementable approximately one year after Phase 1 begins and annually thereafter (or as appropriate), the Reclamation Safety Council reviews Reclamation-wide dashboard metrics in use, determines their usefulness, and recommends changes to the RLT. As appropriate, based on current needs and trends, new metrics are implemented and tracked. Metrics that are no longer useful are retired. Regional and facility/area offices are encouraged to review their own metrics for relevance and adjust them as appropriate.

Implementation Summary

This type of phased implementation, coupled with annual reviews of leading safety metrics by safety committees and the Reclamation Safety Council as described in Phase 3, allows for employee involvement at all levels of the agency and facilitates continuous improvement as defined in ANSI Z10 and implemented in Reclamation Manual SAF P01. The expectation is that effective leading metrics will become part of routine safety discussions in Reclamation, will be evaluated regularly for their usefulness in decision making, and will be fully developed over time as part of Reclamation's revitalized safety management program.

Conclusion

The recommendations presented in this report are only a portion of a much larger, systematic program for safety improvements at Reclamation.

Reclamation, like many other agencies and industrial counterparts, suffers from complacency in the safety culture due to the absence of efforts to collect and distribute meaningful information as part of a proactive approach to preventing incidents and accidents; however, Reclamation has sufficient data and expertise available to begin a process of continuous improvement by enhanced implementation and use of leading safety metrics.

Using a three-phase approach, Reclamation may systematically gather and present safety data to employees at all levels of the agency. Employees may be involved with measuring safety in ways that are meaningful to them on a daily basis and claim ownership of these measurements. As Reclamation's safety culture develops, more sophisticated leading metrics may be implemented, to include metrics related to near misses.

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Appendices

Appendix 1: Typical Leading Safety Metrics[9]

TABLE 2
Safety Factors and Subsidiary Metrics

Safety Factors	*Subsidiary Metrics*
Communication	Number of mechanisms for communicating safety to employees (e.g., newsletters, toolbox talks, meetings, training, incident findings) Percentage of safety training in native languages Frequency of safety meetings Frequency of toolbox talks
Empowerment	Number of job procedures that require modification due to safety concerns, per employee Percentage of employees receiving ALL safety training
Feedback	Percentage of safety reports on which feedback was provided Number of mechanisms by which safety is communicated from employees to management (e.g., suggestion boxes) Percentage of safety suggestions on which feedback was provided Percent of employees who have their performance appraised annually
Mutual Trust	Percentage of employees receiving ethics training Percentage of procedures provided in native language of crew, as well as English
Problem Identification	Number of hazard analysis techniques utilized Percentage of jobs that have safety checklists Average update period of safety checklists Average update period of standard operating procedures Number of safety inspections per annum Percentage of jobs requiring pre-operational checks if pre-operational check is required Number of corrective action reports (CARs) originating from audits
Promotion of Safety	Frequency of safety meetings attended by senior management Percentage of crew receiving feedback on safety audits, issues, and concerns Percentage of new hires put through a formal induction process Percentage of time schedules affect crew/vessel safety Percentage of safety meetings attended by senior management Number of safety management meetings
Responsiveness	Percentage of correction action reports (CARs) closed out within 6-9 months Percentage of employees provided with ALL PPE Percentage of safety concerns that are addressed within 3 months
Safety Awareness	Number of safety performance indicators utilized Percentage attendance at safety meetings

[9] *Guidance Notes on Safety Culture and Leading Indicators of Safety*, American Bureau of Shipping, 2012

TABLE 3
Safety Factors and Core Metrics

Safety Factors	*Core Metrics*
Communication	Percentage of employees receiving communication training Budget for communicating safety to employees (e.g., newsletters, toolbox talks, meetings, training, incident findings)
Empowerment	Percentage of employees with accident investigation training Percentage of safety training that includes competency testing
Feedback	Percent of performance appraisal based on safety related matters
Mutual Trust	Average turnover rate (%) Average length of stay in organization Average absenteeism Percent increase in crew staffing per vessel
Problem Identification	Percentage of accidents reported per employee Number of safety audits completed per year Number of safety inspections per year Percentage of incident reports on which causal analysis was undertaken Number of completed safety inspection/monitor/audit/review activities vs. planned in the past year
Promotion of Safety	Percentage increase in annual safety budgets from previous year Percentage of employees receiving onboard or in-service training Percentage of closure for CARs over three months' old Percentage of total operational budget allocated to safety items Number of training hours logged Average number of safety training sessions logged per employee
Responsiveness	Average time to implement action on complaints or suggestions Number of safety audit recommendations closed out in time Percentage of maintenance items completed on time in the past year Percentage of maintenance items that have been postponed in the past year
Safety Awareness	Number of safety suggestions submitted per employee Percentage of incidents reported per employee Number of job hazard analyzes conducted per employee Percentage of time a Job Safety Analysis (JSA), Project Safety and Health Review (PSHR) (or similar) was conducted when there were changes to jobs, tasks, or equipment in the past year Number of near misses reported per employee

Appendix 2: Coordination with Other SOH Teams

The Team coordinated with other SOH teams to ensure that its recommendations are useful as part of a cohesive, agency-wide effort. Initial coordination as well as examples of further opportunities for synergy include:

- Team #2, Complete Implementation of Policy SAF P01 "Safety and Occupational Health Program": Opportunity to use leading metrics to address gaps in implementation of ANSI Z10.
- Team #4, Communication: Incorporated use of proposed web portal to report Team metrics and distribute dashboard.
- Team #6, Incentives: Explored relationships between metrics and incentives. For example, employee recognition data is a possible leading metric.
- Team #7, Funding: Team #13 will assist in funding one-time cost to prepare dashboard template; existing resources used to support existing dashboard will be used to maintain the revised dashboard going forward. Additional cost associated with entering near-miss data into SMIS will be borne across the organization.
- Team #8, Trust and Cooperation: Opportunity to use leading metrics to track employee safety feedback, actions taken by management, and communication back to employees. Also coordinated on Team 8's safety motto for dashboard.
- Team #11, Employee Engagement: Selection of metrics intended to engage employees, as well as identification of transmittal methods for metrics information to reach broadest audience possible.
- Team #12, Deficiency Tracking: Dashboard metric related to hazard and mitigation data will incorporate output from Team #12 as discussed in revised dashboard section above.
- Team #14, Safety Perception Survey: Team #13 reviewed Team #14's proposed survey questions related to metrics for team consideration. A possibility exists to use baseline employee perception assessment data as part of future safety leading metrics.
- Team #15, Facility Review: The process proposed can improve hazard identification and mitigation data that is incorporated into the proposed dashboard.
- Teams #17 and #19, Employee Safety Training: As training is completed and recorded in DOI Learn, information becomes available for training metric on the proposed dashboard.
- Team #18, SOH Training for Managers and Supervisors: Potential for proposed MESH training to include training on near misses.