



Independent Assessment of Safety Culture Survey Methods and Interpretation at the Nevada National Security Site

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**Office of Enterprise Assessments
U.S. Department of Energy**

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Acronyms

DOE	U.S. Department of Energy
EA	Office of Enterprise Assessments
EFCOG	Energy Facility Contractors Group
ISMS	Integrated Safety Management System
MSTS	Mission Support and Test Services, LLC
NFO	Nevada Field Office
NNSS	Nevada National Security Site
OFI	Opportunity for Improvement
SCWE	Safety Conscious Work Environment
VPP	Voluntary Protection Program

INDEPENDENT ASSESSMENT OF SAFETY CULTURE SURVEY METHODS AND INTERPRETATION AT THE NEVADA NATIONAL SECURITY SITE

Executive Summary

The U.S. Department of Energy (DOE) Office of Enterprise Assessments (EA) conducted an independent assessment of safety culture survey methods used by Mission Support and Test Services, LLC (MSTS), the management and operating contractor at the Nevada National Security Site (NNSS), the interpretation of survey data by the MSTS management team, and the oversight provided by the National Nuclear Security Administration's Nevada Field Office (NFO).

DOE allows each organization to determine how they will promote and maintain a strong safety culture, and how they will assess or monitor their culture. MSTS monitors its organizational safety culture using a monthly, pulse-type survey that samples specific topics, consisting of 10 multiple-choice, 4 demographic, and 2 open-ended questions. The survey is managed entirely by MSTS staff; the NFO staff performs a high-level review of MSTS's safety culture survey results.

EA identified the following positive attributes:

- The two open-ended questions give employees an opportunity to share safety concerns and perceptions about topics not addressed by the multiple-choice questions.
- The MSTS Environment, Safety and Health Director and survey staff lead maintain ongoing awareness of survey results and any significant changes. The MSTS senior management team stays informed of significant changes in survey results through routine briefings.
- MSTS interview respondents stated that data from safety culture surveys have been instrumental in underlining the importance of management field observations as a method of shaping mutual trust and communication between management and field staff.

EA also identified several areas needing attention to support the continuous improvement of safety culture monitoring at NNSS, as summarized below:

- The current monthly survey is a pulse-type survey, which can provide only a narrow insight into culture and response. Additionally, improvement actions do not result from every pulse survey.
- Data from the survey is not formally compared with other data sources, such as the Beyond Zero program, the integrated safety management system, or the voluntary protection program. Lack of comparative data from other sources risks bias in interpretation of survey results.
- Employee feedback from the open text field is not trended, and actions taken in response to such feedback are not formally communicated, tracked to closure, and evaluated for effectiveness.
- There are no documented processes for training and qualification of survey administrators.
- The survey methodologies are inconsistent with accepted standards and practices for safety culture surveys as described in DOE guidance and other literature.
- NFO does not have a policy or procedure that provides guidance on oversight of safety culture.

While multiple MSTS management monitoring systems are currently in use, there is no integrated data strategy to generate a comprehensive status of safety culture. Based on information obtained during this assessment, assessment of safety culture is not a specific focus of MSTS management and is not consistent with generally accepted practices for safety culture assessments and surveys. While there is value in MSTS's performance of pulse surveys, the current survey approach does not ensure quality data to support decision-making.

INDEPENDENT ASSESSMENT OF SAFETY CULTURE SURVEY METHODS AND INTERPRETATION AT THE NEVADA NATIONAL SECURITY SITE

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Office of Nuclear Safety and Environmental Assessments, within the independent Office of Enterprise Assessments (EA), conducted an assessment of safety culture survey methods used by Mission Support and Test Services, LLC (MSTS), the management and operating contractor at the Nevada National Security Site (NNSS), and the interpretation of survey data by the MSTS management team. Assessment activities were conducted remotely from August 22-25, 2022.

The EA report, *Assessment of Safety Culture Sustainment Processes at U.S. Department of Energy Sites – June 2020*, is a rollup report of eight safety culture assessments performed at a cross-section of DOE sites, including NNSS. The rollup report identified that one of the most significant areas of variance within the DOE complex is the quality of safety culture survey instruments and the proper interpretation of gathered survey data. In consultation with the Office of Environment, Health, Safety and Security, program offices, and local DOE field offices, EA established the goal of conducting follow-up reviews of the quality of safety culture surveys used for safety culture decision-making, both of contractors that were assessed in the rollup report and some that were not, in accordance with the *Plan for the Enterprise-wide Assessment of Safety Culture Survey Methods and Interpretation – February 2022*.

MSTS monitors its organizational culture using a survey with 10 multiple-choice questions, 4 demographic questions, and 2 open-ended questions with a single open response section. Employees receive an invitation to complete the survey in their birth month, so a different sample of the organization responds each month, with all employees receiving an opportunity over the course of the year. The survey is managed entirely by MSTS staff. In accordance with the *Plan for the Independent Assessment of Safety Culture Survey Methods and Interpretation at the Nevada National Security Site – August 2022*, this assessment evaluated the survey, the survey results since October 2019, the analysis performed by MSTS, and the action plans developed in response to the survey results. This assessment also evaluated the effectiveness of safety culture monitoring activities conducted by the National Nuclear Security Administration’s Nevada Field Office (NFO).

DOE Policy 450.4A, *Integrated Safety Management Policy*, sets the expectation that all organizations embrace a strong safety culture where safe work performance and involvement of workers in all aspects of work performance are core values. That culture includes, among other key considerations, establishing a safety conscious work environment (SCWE) in which employees feel free to raise safety concerns to management without fear of retaliation. While DOE does not set specific requirements for how organizations should promote and maintain a strong safety culture or how they should assess or monitor their culture, DOE and industry guidance documents present acceptable methods for safety culture evaluation as described in section 2.0 below.

2.0 METHODOLOGY

The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*, which is implemented through a comprehensive set of internal protocols, operating practices, assessment guides, and process guides. As identified in the assessment

plan, EA used selected criteria from objectives SC.1 and SC.3 of EA Criteria and Review Approach Document 30-08, Rev. 0, *Safety Culture Assessment*, to guide the assessment.

Because DOE provides guidance related to safety culture but expresses no specific requirements, EA referenced generally accepted standards and practices for safety culture surveys and monitoring. Core references used in this assessment included the DOE Safety Culture Improvement Panel's *Tailoring the Analysis of Safety Culture Health Monitoring Means and Methods Working Group*, January 2022; the Energy Facility Contractors Group (EFCOG) *A Guide to Safety Culture Evaluation*, Rev. 0, September 2015; EFCOG's *Safety Culture Practitioner Guide*, Rev. 0, June 2019; EFCOG's *Best Practice #249: Strategy and Design for Internal Surveys*, November 18, 2021; and the International Atomic Energy Agency's *Performing Safety Culture Self-Assessments*, Rev. 0, June 2016.

EA examined safety culture survey documents, training documents, and assessment reports. EA also interviewed personnel responsible for developing and executing the MSTs culture survey and leadership responsible for acting on the survey results. Documentation related to the MSTs survey did not describe the standard survey design bases for validation and reliability. Therefore, interviews were the primary source of data for this assessment.

The members of the assessment team, the Quality Review Board, and management responsible for this assessment are listed in appendix A.

3.0 RESULTS

3.1 Valid and Reliable Methods to Maintain Cognizance of Safety Culture

Positive Attributes

Culture Survey Development and Survey Methods

MSTs uses "pulse surveys," which are frequent, short employee surveys that sample specific topics to gain an understanding of an organization's safety culture. The MSTs monthly pulse-type survey provides a practical opportunity for ongoing solicitation and review of employee perceptions related to safety culture, as opposed to less-frequent surveys that provide only a snapshot of employee perceptions at a moment in time. The MSTs survey provides an opportunity for management to notice and quickly respond to any large changes in survey results. The inclusion of 2 open-ended questions with an open text field gives employees an opportunity to share safety concerns and perceptions about topics not addressed by the 10 multiple-choice questions. This second type of data can be combined with the results of the multiple-choice questions to understand the culture more thoroughly.

MSTs's distribution of these surveys appropriately considers various work conditions. MSTs provides craft workers, who may not have regular computer access on the job, with paper copies of the survey and a pre-addressed envelope to return the survey anonymously. Employees taking the survey on a computer receive an email invitation via a survey tool that records their survey responses but not their names or personal identifiers. Tailoring the survey distribution for the worker's convenience can reduce obstacles to survey participation.

Culture Survey Results Analysis and Communication

The Environment, Safety and Health Director and survey staff lead have a comprehensive understanding of the survey results. The survey staff lead converts data from each monthly survey to Excel spreadsheets

for MSTS internal analysis. The survey staff lead conducts a brief check against the demographic data that effectively examines representativeness of responses. Participation rate is trended monthly.

The senior management team stays informed of significant changes in survey results through routine briefings provided by the Environment, Safety and Health Director and the Mission Assurance Director. MSTS interview respondents stated that data from safety culture surveys has been instrumental in underlining the importance of management gemba walks¹ as a primary method of shaping mutual trust and communication between management and field staff. MSTS uses a variety of management models and systems to monitor and provide feedback on performance; safety culture is addressed via the Beyond Zero program, the voluntary protection program (VPP), the integrated safety management system (ISMS), and the safety culture survey.

MSTS communicates the survey results beyond the senior management team on the Beyond Zero internal website, allowing employees with computer access to review the results. Interviewees mentioned several occasions when the open text field feedback information was provided to parties responsible for addressing the issues raised by the survey respondents.

Qualification of Responsible Personnel

As an effective practice, MSTS personnel responsible for analyzing the survey results are the same individuals who developed the question set. These personnel are experienced with the MSTS approach, having learned directly from the contract transition team when MSTS began the contract. In addition, these personnel are familiar with the Beyond Zero program, having taken and/or taught the Beyond Zero employee courses.

Areas Needing Attention

Culture Survey Development and Survey Methods

Pulse surveys have limitations; they can provide only a narrow insight into culture, are not necessarily correlated with other data collection methods, and do not always result in response or improvement actions. Correspondingly, pulse surveys may provide less credible information for decision-making than the standard practice of performing comprehensive safety culture surveys or assessments. (See **OFI-MSTS-1**.) In comparison, the 2013 Nevada Enterprise safety/security self-assessment conducted by the previous management and operating contractor, which EA's predecessor organization assessed in the 2014 *Independent Evaluation of Line Self Assessments of Safety Conscious Work Environment*, used multiple qualitative and quantitative methods of data collection: personnel interviews, evaluation of employee surveys, document reviews, and facility walkdowns. That self-assessment process evaluated the topical areas of leadership, employee/worker engagement, organizational learning, and performance measures and contract incentives. In 2018, JMJ Associates conducted an integral safety assessment of MSTS to assess its culture. The resulting report did not discuss the assessment model or the validity and reliability of assessment questions, but it did include both qualitative and quantitative measurements. The current practice of solely using pulse surveys is too limited to provide the comprehensive picture obtained through the 2013 or 2018 assessments.

The 10 multiple-choice questions in the current survey were developed by reference to DOE Guide 450.4-1C, *Integrated Safety Management System Guide*, attachment 10, *Safety Culture Focus Areas and Associated Attributes*. Interviewees stated that the survey questions were developed by MSTS staff

¹ In Lean and Six Sigma quality practice, "gemba walk" means taking the time to watch how a process is done and talking with those who do the job.

without conducting formal tests of validity, contrary to the recommended practice established in DOE and industry safety culture evaluation guidance for demanding, high reliability operations. The absence of question validation reduces confidence that survey results and employee feedback can be used to inform management decisions about key factors related to safety and mission success.

EA identified the following reliability issues that affect the credibility of data gathered from the MSTS survey question set:

- Questions are not pilot tested with the intended population to ensure accurate and consistent understanding. For example, some participants said that they did not know which management and supervisory levels should be considered in questions that ask about one's "managers."
- Some questions ask participants to evaluate multiple issues simultaneously.
- Some questions ask for opinions about issues that some participants may not have any knowledge of (e.g., one question asks whether personnel at all organizational levels are consistently held accountable for safety, security, standards, and expectations).
- Response options are too limiting and do not include non-responsive options, such as "not applicable" or "don't know."
- The number of survey questions is not sufficient to adequately assess all aspects of safety culture and safety conscious work environment.

MSTS has not documented the processes for survey administration or analysis and trending of survey data. Interviewees stated that only the Environment, Safety and Health Director and survey staff lead have full knowledge of the processes. The lack of formal processes could pose vulnerabilities to the credibility and reliability of survey data for decision-making and improvement.

Statements about protecting the anonymity of survey responses are provided to employees, but anonymity is encumbered by two factors. First, responses are not returned and processed by an independent external organization. Second, employees are offered opportunities to win gift cards for responding to surveys, potentially revealing respondent identity. These two factors could result in a lack of confidence in anonymity and contribute to employees' unwillingness to respond or to be candid in responses.

Another factor that could limit the value of the survey questions is a lack of a clear correlation between the questions asked and the MSTS safety culture model (i.e., Beyond Zero, a proprietary model developed by Jacobs Engineering Group, Inc.). The "4Rs" of Beyond Zero are: Reach Out, Recognize the Hazards, Do it Right, and Raise Your Voice. While MSTS has demonstrated that these concepts overlap with the integrated safety management concepts, MSTS uses different language to discuss them. Safety culture surveys as described by generally accepted survey practices should be designed to examine key factors of the organization's safety culture model. Using DOE Guide 450.4-1C to develop the survey questions results in questions that do not have a clear link to the "4Rs" of Beyond Zero.

Culture Survey Results Analysis and Communication

Survey responses are scored based on a five-point Likert scale (a response range from "strongly agree" to "strongly disagree"), with results expressed and reported in quantitative form. However, MSTS interview respondents stated that the Environment, Safety and Health Director interprets the survey data qualitatively based on expert knowledge of the types of work done by MSTS. This analytical approach may result in erroneous understanding and use by decision-makers and stakeholders due to unintentional analyst bias. EFCOG's *A Guide to Safety Culture Evaluation* recommends that survey data be interpreted by a safety culture improvement team. This team should be made up of members representing a cross-

section of functional areas, with knowledge of safety culture principles and a common understanding of organizational goals and objectives.

Safety culture results are reported to senior leaders when the results have changed from the previous month, primarily with positivity index changes. Positivity index is based on the ratio of positive responses (agree, strongly agree) to negative responses (neutral, disagree, strongly disagree) converted to a percentage. The results for only six survey questions, the three highest and three lowest positivity indices, are typically communicated to management. Covering only 6 out of 10 survey questions significantly reduces management's ability to understand the breadth of safety culture challenges facing the site.

Although MSTS uses a variety of management models and systems to monitor and provide feedback on performance, data from the safety culture survey is not formally compared with data gathered by other data sources, such as the Beyond Zero program, ISMS, or the VPP. (See **OFI-MSTS-2.**) Comparing data from multiple types of assessment methods strengthens the validity of conclusions. Employee feedback from the open text field is also not compared to the quantitative results; comparison of different data types may enhance the understanding of responses.

Survey response rates have averaged 45% during the approximately three-year time frame that surveys have been administered. Interviewees stated that they consider a 35% response rate to be satisfactory, in contrast to the minimum of 50% cited in EFCOG's *A Guide to Safety Culture Evaluation* or the 70% response rate cited as acceptable in the International Atomic Energy Agency's *Performing Safety Culture Self-Assessments*. Survey findings based on less than 50% of the organization's population may not be an accurate reflection of the organization as a whole.

MSTS communicates survey results on the Beyond Zero internal website; however, 21% of its employees are craft employees who do not have computer access. Interviews revealed that there is no defined method for consistently communicating survey results beyond the internal website. (See **OFI-MSTS-3.**) Additionally, the open text field data is not trended, and the actions taken in response to such feedback are not formally tracked to closure and evaluated for effectiveness. When employees do not receive consistent feedback on survey results, they may not think their concerns and opinions have been heard, may be less likely to participate in future surveys, and may not understand the basis for initiatives designed to improve their organization's safety culture and safety management.

Qualification of Responsible Personnel

Personnel responsible for question development, survey administration, and data analysis have no formal training or education in these areas. MSTS's organizational knowledge of survey development and administration resides in the practical management knowledge of the two primary survey administrators, who are both experienced safety professionals. Interviewees stated that they gained their familiarity with scientific methods of safety culture assessment from informal discussions with external culture consultants from the MSTS contract transition team and some culture literature reviews by the two primary survey administrators. (See **OFI-MSTS-4.**) MSTS is therefore unaware of best practices in this area.

3.2 DOE Oversight of Contractor Safety Culture Efforts

Positive Attributes

Culture Monitoring Framework

All seven of the interviewed NFO staff members demonstrated a clear professional interest in monitoring MSTS's safety culture and stated that all NFO staff members who provide oversight can incorporate safety culture principles into their observations. The interviewees provided evidence of multiple substantive examples of culture-related observations, both positive and negative, resulting from routine oversight efforts. For example, one NFO staff member detailed a discussion of recent MSTS issues at a weekly NFO staff meeting that led to considering those issues in a safety culture context broader than just the facility where they occurred. In addition, some interviewees related instances of raising safety culture oversight observations to NFO management for guidance and management awareness. Field staff (Facility Representatives and safety system oversight personnel) demonstrated an acute understanding of high-hazard facility personnel dynamics, specifically how various communication styles and organizational structures either contribute to or impede MSTS's safety culture in practice.

NFO appropriately reviews the results of MSTS safety culture surveys. Beginning in fiscal year 2022, MSTS committed to conducting monthly safety surveys and to identifying focus areas through evaluation of the positivity score of the survey questions. This commitment was for focus area #4 of the safety performance objectives, measures, and commitments. Because of this commitment, NFO performs a detailed review of the survey and the positivity scores. Additionally, several interviewed NFO staff members were aware of the survey and performed periodic high-level reviews of the results separately from the field office's commitment review.

Development of Safety Culture Competencies

Several NFO staff members have extensive experience with culture monitoring and culture oversight. This experience includes competencies gained at various organizations, such as the U.S. Nuclear Regulatory Commission, defense contracting companies, shipyards, mines, and other DOE sites and contractors. These staff members apply their previous experience effectively to their oversight at NNSS. In addition, some NFO staff members have participated in DOE safety culture training and/or the DOE Safety Culture Improvement Panel.

Areas Needing Attention

Culture Monitoring Framework

NFO does not have a culture monitoring framework that is defined by a process documented in a procedure. Further, NFO management does not provide overarching safety culture oversight guidance to its staff, instead relying implicitly on all NFO staff to provide safety culture feedback and providing case-by-case guidance, as necessary. According to the NFO staff members who were interviewed, NFO management feedback on its staff's adverse safety culture observations and concerns is narrowly focused on compliance-based oversight. Consequently, NFO staff sometimes do not feel empowered to capture and pursue formal issues or informal feedback relating to safety culture unless they are able to also note non-compliance with a requirement. This compliance focus may deter NFO's staff from positively contributing to NNSS's safety culture improvement process, because not all feedback can be linked to a specific non-compliance. (See **OFI-NFO-1.**) Reluctance to address perceived culture factors could result in NFO not addressing latent MSTS organizational weaknesses.

Development of Safety Culture Competencies

NFO has not initiated a formal effort to ensure that NFO staff members have safety culture training commensurate with their safety culture responsibilities. Based on interviews with a range of NFO staff members who have safety culture responsibilities, staff either have the required competencies from previous work experience or gain the skills through informal tutoring by more experienced staff. New NFO hires are not required to be trained in DOE's approach to safety culture beyond the minimal information contained in the General Technical Base qualification.

3.3 SUMMARY

While multiple MSTS management monitoring systems are currently in use, including VPP, Beyond Zero, and the contractor assurance system, MSTS provided no evidence that demonstrated an integrated data strategy to generate a comprehensive status of safety culture. Based on information obtained during this assessment, assessment of safety culture within MSTS is not a specific focus of management attention and is not consistent with generally accepted practices for safety culture assessments and surveys.

The goal of this assessment was to evaluate the quality of safety culture survey results used for safety culture decision-making. Quality of survey results is a function of the design of the survey, administration of the survey, and analysis of results. Standards for such survey factors are addressed by the field of psychometrics, a scientific discipline concerned with the construction of assessment tools, measurement instruments, and formalized models that are useful for the behavioral and social sciences. Key considerations include survey validity, reliability, and representativeness of the population. These scientific tests are discussed in EFCOG's *A Guide to Safety Culture Evaluation*. While there is value in MSTS's performance of pulse surveys, the credibility of safety culture surveys is judged by established scientific measures. The current MSTS pulse survey approach does not ensure quality data to support decision-making.

NFO appropriately distributes the responsibility for safety culture oversight among staff responsible for technical areas of oversight; however, the lack of correlation of safety culture responsibilities to safety culture competencies limits the effectiveness of the oversight. Incorporating the MSTS safety culture survey into the safety performance objectives, measures, and commitments is a good first step toward ensuring reliable data for contractor culture oversight, but some NFO staff currently lack the expertise to assess the quality of the survey data; this shortcoming can negatively affect decision-making.

4.0 OPPORTUNITIES FOR IMPROVEMENT

EA identified five opportunities for improvement (OFIs) to assist cognizant managers in improving programs and operations. These OFIs are offered only as recommendations for line management consideration; they do not require formal resolution by management through a corrective action process and are not intended to be prescriptive or mandatory. Rather, they are suggestions that may assist site management in implementing best practices or provide potential solutions to issues identified during the assessment.

Mission Support and Test Services, LLC

OFI-MSTS-1: Consider performing periodic comprehensive safety culture surveys supplemented with the monthly surveys.

OFI-MSTS-2: Consider developing a data mapping strategy that lays out the disparate sources of data used for culture monitoring to allow formal comparison of survey results to these sources.

OFI-MSTS-3: Consider defining a consistent method for communicating safety culture survey results to the workforce, particularly considering workers without regular internal website access.

OFI-MSTS-4: Consider using EFCOG's *Safety Culture Practitioner Guide* to help develop in-house expertise.

Nevada Field Office

OFI-NFO-1: Consider developing a formal safety culture monitoring strategy and providing guidance for NFO staff on how to tailor their oversight efforts to inform that monitoring strategy on an ongoing basis. This effort could include consideration of differing strategies applied to compliance- vs. non-compliance-based issues and concerns, as well as an NFO strategy for employee safety culture training.

Appendix A Supplemental Information

Dates of Assessment

Remote Assessment: August 22-25, 2022

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