

**Martinez Refining Company  
Spent Catalyst Release  
November 24-25, 2022  
Independent Safety Culture Assessment**

Report prepared by  
Scott Berger and Associates, LLC

Version 2  
July 5, 2024

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## I. Foreword

On the night of November 24-25, 2022, a large amount of solid material, called catalyst, was released from the Catalytic Cracking Unit (CCU) of Martinez Refining Company, Inc. (MRC), part of the PBF Energy family of refineries. During the incident, a large amount of catalyst was released; it fell onto the City of Martinez, California, and surrounding areas. The Contra Costa [County] Health Hazards Materials Programs (CCHHMP) classified this incident as a Community Warning System (CWS) Level 2 or higher incident,<sup>1</sup> defined in the Contra Costa Industrial Safety Ordinance (ISO) as a Major Chemical Accident or Release (MCAR).<sup>2</sup>

After the incident, the MRC Oversight Committee was formed. The Oversight Committee commissioned (1) an independent incident investigation, (2) a human health and ecological risk assessment, and (3) this independent safety culture assessment.<sup>3</sup> The Committee chose Scott Berger and Associates, LLC to perform the independent safety culture assessment. This report describes the results of this independent assessment.

Our assessment started with a review of an internal safety culture survey that had been conducted by MRC between November 2022 and April 2023. Following this review, we evaluated how MRC leadership developed, deployed, and enforced process safety management systems (PSMS) to establish a culture of process safety throughout the refinery. Our assessment included a review of MRC's PSMS documents plus interviews with MRC employees in leadership roles.

Our assessment protocol drew heavily on publications of the Center for Chemical Process Safety (CCPS), most notably the following:

- *Process Safety Leadership from the Boardroom to the Frontline*, AIChE/Wiley, 2019
- *Essential Practices for Creating, Strengthening, and Sustaining Process Safety Culture*, AIChE/Wiley, 2018
- *Guidelines for Risk Based Process Safety*, AIChE/Wiley, 2007
- *Guidelines for Auditing Process Safety Management Systems, 2<sup>nd</sup> ed*, AIChE/Wiley, 2011

These publications, and CCPS publications in general, describe the best practices in managing and leading process safety and driving a strong culture of process safety.

Our assessment protocol also drew on Standards and Recommended Practices of the American Petroleum Institute (API), guidance documents provided by Contra Costa County, and our experience working with a wide range of domestic and international refining, chemical, and other relevant companies.

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<sup>1</sup> See <https://www.cchealth.org/health-and-safety-information/hazmat-programs/community-warning-system>.

<sup>2</sup> Contra Costa County. (2023). § 450-8.016. stationary source safety requirements., Chapter 450-8. risk management, division 450. hazardous materials and wastes, Title 4. health and safety, ordinance code, Contra Costa County. The State of California; Contra Costa County. [http://contracostaco-ca.elaws.us/code/oc\\_title4\\_div450\\_ch450-8\\_sec450-8.014](http://contracostaco-ca.elaws.us/code/oc_title4_div450_ch450-8_sec450-8.014)

<sup>3</sup> While this assessment is termed a "safety culture assessment," this work was focused on assessing the culture of process safety in the refinery. Please also see page 4.

Assessment activities included reviewing MRC's process safety management system documents and interviewing MRC employees in leadership roles at the refinery leadership and subordinate levels. We sought to understand both the quality of MRC's management system element documents and the diligence of MRC's leadership in ensuring that these elements were executed professionally, faithfully, and on time.

We believe that the MRC employees we interviewed made true and accurate statements to the best of their abilities and volunteered honest opinions. We also believe that employees felt free to provide their input without retribution from management. We have confidence that both the identified strengths and the opportunities for improvement described in this report are accurate to the best of our knowledge of and experience in engineering and process safety. We also feel confident that our recommendations will help MRC drive improvement in the company's process safety culture.

## **II. Executive Summary**

Between about 20:30 on November 24, 2022, and 04:00 on November 25, 2022, about 24 tons of spent catalyst was released from Catalytic Cracking Unit (CCU) of Martinez Refining Company (MRC) into the City of Martinez, California, and surrounding areas. The catalyst, a white powder, was found on resident's vehicles and trash cans and covering horizontal surfaces on the ground in neighborhoods to the southwest, west, and northwest of the refinery. Based on the quantity of catalyst released and the impact to the community, staff of the Contra Costa Health Hazardous Materials Programs (CCHHMP) identified this incident as a Community Warning System (CWS) Level 2 or higher incident.<sup>4</sup> As a result, CCHHMP determined that the incident was a Major Chemical Accident or Release (MCAR).

Following the incident, an Oversight Committee involving government, labor, the community, MRC, and the union was established to manage actions in response to the incident. The Committee commissioned several independent studies, including this independent assessment of process safety culture. Scott Berger and Associates, LLC, a consultancy with expertise in best practices for process safety in chemical plants, refineries, and related facilities, was selected to perform this assessment.

The term "safety culture" can apply to process safety, occupational safety, vehicle safety, and other safety disciplines. Process safety addresses the policies, procedures, work activities, and oversight used to prevent release of hazardous materials from process equipment. Such releases can result in fires, explosions, toxic effects, and other potentially harmful impacts to people, the community, the environment, and the facility. Occupational safety addresses policies and activities that help prevent injury to workers as they carry out their job responsibilities. Often, when people hear the term safety, they are thinking only about occupational safety.

For purposes of this work, Contra Costa Health specified that we focus on MRC's culture of process safety, simply because the catalyst release incident was a process safety incident

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<sup>4</sup> See <https://www.cchealth.org/health-and-safety-information/hazmat-programs/community-warning-system>

Ultimately, the process safety culture of a company and facility depends on 1) the quality of the Process Safety Management System (PSMS) and 2) the rigor with which the company's leadership drives:

- execution of the PSMS;
- reduction of risk towards a level considered generally acceptable; and
- a focus on the elimination of process safety incidents, both site-wide and company-wide.

We found that MRC is performing well in all three of these high-level areas; their gaps are at a more detailed level. At the more detailed level, MRC also performs well in areas such as pressure equipment mechanical integrity, interlock integrity, and emergency preparedness and response. We believe that MRC's high-level performance, coupled with the company's success in managing these elements, will serve as a good foundation for addressing the improvement opportunities we identified in other areas at the detailed level of MRC's process safety management systems.

These improvement opportunities are summarized below. They correlate with cultural dimensions identified in MRC's November 2022 – April 2023 culture evaluation as being less than robust. Furthermore, the first two items on the list are directly linked to root causes identified in the independent investigation of the November 2022 catalyst release incident separately commissioned by the Oversight Committee.

- Tighten the policy for deviating from procedures, most notably the policy for use of manual control mode.
- Implement correct identification of root causes and improve the approach to making recommendations to better prevent repeat incidents.
- Set timely deadlines for correcting material process safety audit findings that have urgency.<sup>5</sup>
- Increase the rigor of several dimensions of the refinery's Asset Integrity program.

We recommend that MRC urgently address improvements in the first three areas. We also found that employees' reported feelings of confidence that they were working in a safe refinery--although not low--were not as high as workers and refinery leaders would like them to be. We believe that the recommendations made in this report, when implemented, will help MRC realize their GOAL ZERO<sup>6</sup> vision, which MRC describes as a "... *proactive safety approach [that] is designed to help us anticipate areas for improvement and execute preventative measures before incidents occur.*"

### **III. Introduction**

#### **A. Objective**

The objective of this work was to perform an independent assessment of process safety culture of the MRC refinery. On behalf of the MRC Oversight Committee, CCHHMP hired Scott Berger and Associates, LLC, to conduct the assessment. Information about our team may be found in Appendix A. This report

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<sup>5</sup> MRC's current audit resolution times reflect the regulatory requirement. However, certain findings should be corrected much sooner. For example, a material finding related to a procedure should be addressed before the next use of the procedure.

<sup>6</sup> See <https://martinezrefiningcompany.com/safety-culture/>

describes the findings of the independent safety culture assessment and offers recommendations for improving safety culture in the future.

## B. Scope and Approach

As discussed in the book *Process Safety from the Boardroom to the Frontline*,<sup>7</sup> a publication of the Center for Chemical Process Safety (CCPS), the degree to which company and facility leadership drives the execution and improvement of process safety ultimately determines the company's and facility's culture of process safety.

This, and other CCPS publications, were used to form the protocol by which we conducted our assessments. Since 1985, CCPS has been advancing the technical, leadership, and culture practices of process safety with a vision of *A World Without Process Safety Incidents*.<sup>8</sup> While organizations such as the American Petroleum Institute (API) and the National Fire Protection Association (NFPA) establish standards that are minimum performance requirements, CCPS publications go well beyond these minimums, and are therefore a yardstick against which performance can be measured and improvement opportunities identified. The other publications included:

- *Essential Practices for Creating, Strengthening, and Sustaining Process Safety Culture*, AIChE/Wiley, 2018
- *Guidelines for Risk Based Process Safety*, AIChE/Wiley, 2007
- *Guidelines for Auditing Process Safety Management Systems, 2<sup>nd</sup> ed*, AIChE/Wiley, 2011

Therefore, the scope of this project included assessing all relevant elements of MRC's process safety management system (PSMS) refinery-wide, considering both the quality of each element and the way MRC's Refinery Leadership Team (RLT) put these elements into practice. We coupled this part of the assessment with a deep analysis of the regulatorily mandated<sup>9</sup> safety culture survey conducted by MRC between November 2022 and March 2023.

As is typical in management system and culture evaluations, we identified both positive and negative findings. We followed an approach where positive findings are presented first, then negative findings, and finally recommendations that were "SMART", that is, Specific, Measurable, Aligned, Realistic, and Time-bound.

The report highlights how the positive findings provide a path to addressing the recommendations. In forming our recommendations from this assessment, we sought actions that would make real improvements in MRC's process safety culture and performance. To ensure that our recommendations were "SMART", we discussed the recommendations from our first draft report with the MRC RLT, as indicated in our response to the Oversight Committee's request for proposal. This allowed us to more specifically indicate which management system should be improved, and to indicate timing consistent with MRC's resource availability. No improvement opportunities or recommendations that we identified were dropped or materially changed as part of this discussion.

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<sup>7</sup> CCPS, *Process Safety Leadership from the Boardroom to the Frontline*, AIChE/Wiley, 2019. This book was prepared by our project team on behalf of CCPS with extensive inputs from a committee of experts with extensive experience in driving strong process safety performance and culture.

<sup>8</sup> See <https://www.aiche.org/ccps>

<sup>9</sup> MRC is required under the Contra Costa ISO, CalARP, and Cal/OSHA PSM regulations to perform periodic "safety culture surveys." MRC's safety culture surveys are intended to meet the requirements of all three regulations.

## C. Report Format

Section IV of this report explains the connection between process safety culture and the way in which MRC defines and then drives its PSMS through its leadership. Section V provides a detailed analysis of MRC's 2022-23 process safety culture survey, highlighting areas of relative strength as well as areas that should be targeted for improvement. Section VI discusses the findings of our analysis of MRC's PSMS documents, key data, and the rigor with which the MRC Refinery Leadership Team (RLT) uses data to drive execution of the PSMS and to create a GOAL ZERO culture. Section VII summarizes SMART recommendations based on our discussions with MRC. The Appendices describe our team experience and project responsibilities, provide a glossary of terms and acronyms, and tabulate Oversight Committee [and ultimately Community] comments and their resolutions. Subsequent versions of this report will summarize the resolution of comments received from the MRC Oversight Committee and the public.

## IV. Background

In a presentation of how process safety culture is built and strengthened, the book *Process Safety Leadership from the Boardroom to the Frontline*<sup>10</sup> states:

*Investigation of many process safety incidents have shown that cultural failures rival management system failures as leading causes. Similarly, when long term successes have been achieved, strong cultures of process safety excellence have been an integral factor.*

*Just as leaders establish the overall corporate culture, they equally establish process safety culture... Much of that depends on how you [the leader] exercise Conduct of Operations and Operational Discipline.*

"Conduct of Operations" refers to how leaders specify clearly what needs to be done. This process starts with defining the policies and procedures of the PSMS and includes setting clear expectations that the work specified in these policies and procedures is carried out faithfully and professionally.

"Operational Discipline" refers to how everyone in the organization carries out their assigned roles. If leaders set clear expectations and verify that tasks are executed faithfully and professionally, the organization will follow; this dynamic is an essential part of a strong culture. As such, understanding the policies and procedures that MRC has established and how the RLT drives them has to be a key feature of a culture assessment.

*Process Safety Leadership* also summarizes the role of an organization's leaders in process safety:

*...unless you also fulfil your role in the PSMS with professionalism and drive your leaders, peers, and reporting structure to do the same, you will not achieve results. Driving the PSMS includes:*

- *developing and understanding corporate risk criteria;*
- *understanding your hazards and implementing a fully functioning set of barriers required to meet your company risk criteria;*

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<sup>10</sup> CCPS, 2019 (see above)

- *executing the elements of the PSMS with rigor and professionalism to measure barrier performance and ensure barriers remain effective;*
- *ensuring that your organization has the required competencies in the right places; and*
- *verifying performance and driving continual improvement.*

*Only then will you be able to create the disciplined process safety culture you need to achieve the desired results - zero process safety incidents.*

This speaks to the rest of the process safety culture assessment process, which involves evaluating:

- the risk targets set by leadership and the rigor with which leaders strive to meet those targets;
- the rigor and pace with which the refinery closes action items related to gaps in process and management that are identified through activities such as incident investigations, audits, and process hazard analyses (PHAs); and
- the way leaders drive continuous improvement aimed at eliminating process safety incidents of all kinds.

## **V. MRC's Culture Survey**

### A. Introduction

The Contra Costa County Industrial Safety Ordinance, CalARP, and CalOSHA require companies to conduct safety culture surveys every 5 years. MRC conducts their safety culture surveys about every four years. Surveys are developed collaboratively by MRC staff and site representatives of the United Steelworkers, the union that represents MRC's hourly workforce. While most of the questions on MRC's survey pertain to process safety, a few questions cover occupational safety topics. At the direction of Contra Costa Health, we focused only on the process safety questions.

MRC conducted their most recent culture survey between November 2022 and March 2023. All 560 employees and 250 contractors<sup>11</sup> received the survey, and 485 responded, a response rate of about 60%. This response rate is somewhat higher than other refineries in Contra Costa County, but not as high as the 70% response rate that the county would like to see. There are many articles available online that opine on what a good response rate. The 60% rate for MRC's culture survey is considered high by some, and middle of the pack by others.

The survey contained 57 core questions. Responses were also requested for an additional five questions directed solely to members of the Emergency Response Crew. Two additional freeform text responses solicited employees' positive and negative thoughts about safety culture.

MRC tabulated and documented the results of their survey in April 2023. Many of the questions on this survey had been asked in previous surveys, but several new questions were added. By comparison with past responses to the repeated questions, MRC concluded that their culture scores had declined somewhat since the previous survey.

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<sup>11</sup> See <https://martinezrefiningcompany.com/>



## B. MRC's Methodology

MRC requested employees to provide a ranked response to all 57 questions (62 for members of the emergency response crew) based on a scale of 1 to 10, defined as follows:

- 1 or 2: unfavorable
- 3 or 4: less favorable
- 5 or 6: good
- 7 or 8: more favorable
- 9 or 10: most favorable

In order to verify that employees had read the questions (rather than, for example, checked the same number response for every question), eight questions were worded such that the scale was inverted. For those questions, a response of "1" or "2" represented the most favorable response while "9" or "10" represented unfavorable. Before performing the mathematical analysis of survey responses, MRC re-inverted the responses to the inverted questions so the responses to every question could be displayed on the same scale.

The response scale used by MRC was not symmetrical. When rating on any scale, a normal expectation would be that the lower third of the scale would represent unfavorable, the middle third would represent mediocre, and the upper third would be favorable. Therefore, respondents would tend to use a score of 4-6 to represent a mediocre sentiment, while MRC designated 5-6 as "good".

MRC then calculated the overall result for each question by averaging all of the non-blank responses. While a blank response could indicate that the respondent had no experience with the topic of the question, this would not have been the case with the vast majority of questions. Therefore, in almost every case, a blank response to a question suggests that the respondent had an unfavorable opinion of the topic of that question. The number of blank responses ranged from 4 to 136, with an average of 47. Depending on the number of blank responses and how unfavorably the respondent viewed the question, the score for each question determined by MRC could have been inflated anywhere from 0% to 35%.

## C. Methodology Used in this Assessment

As described in Section IV, a strong process safety culture results from a drive, spearheaded by company and refinery leadership, to eliminate major (API Tier 1) and lesser (API Tier 2) incidents,<sup>12</sup> meet corporate risk criteria, and ensure the quality and execution of all PSMS elements. Therefore, in our evaluation, we sought to understand how the actions taken by MRC leadership and the policies, goals, and risk criteria that they implemented shaped the culture.

In the desired strong safety culture, every question should receive a high score. No segment of the workforce should give any question a low or mediocre rating, nor should they decline to respond to an appropriate question. With this in mind, we used a method called top-screening to re-analyze MRC's culture survey data. The top-screening method focuses only on responses that were

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<sup>12</sup> API Recommended Practice 754, *Process Safety Performance Indicators for the Refining and Petrochemical Industries*, 3<sup>rd</sup> edition, 2021

unquestionably positive. This approach highlights questions that demonstrate strength across the refinery, provides greater distinction from questions demonstrating strength in some departments and weaknesses in others, and clearly shows areas that are weaker.

To illustrate how this works, consider a hypothetical survey consisting of two questions. Respondents answer each question with a rating from “1” to “10”. The survey is sent to ten individuals, all of whom respond. For the first question, all respondents gave a value of “8.” For the second question, half of the respondents give an outstanding rating of “10” and the other half give a more mediocre rating of “6.” MRC’s averaging method would show each question as having the same average score of 8.

Using the top-screening method, however, we disregard all mediocre, negative, and blank scores, and total only those scores that were 7 or greater. For the first question, we sum all ten “8’s” to obtain a total score of 80. For the second question, we neglect the five lukewarm responses of “6” and sum the remaining five scores to obtain a total score of only 50. This scoring method highlights the second question as an area where improvement should be given higher priority.

#### D. Assessment Results

##### 1. Impact of change of ownership and COVID-19-era restrictions

Ownership of MRC changed from Shell to PBF in February 2020. Whenever there is a change in ownership of a facility or company, there will also be a change in policies and leadership style, and leadership personnel may also change. Such changes are not necessarily for the worse, but there are changes that employees must get used to. Change can motivate employees around retirement age to retire sooner rather than later, and for younger employees to consider other employment.

In any case, it takes significant effort on the part of leadership to describe the new organization, reassure employees, and hire replacements for those that left. For MRC, this was greatly complicated in March 2020 when the escalating COVID-19 pandemic led to distancing, masking, and other requirements that made interpersonal interactions more difficult. These requirements were ended by the State of California in June, 2022, but many people did not feel comfortable with in-person interactions until the end of winter 2023. COVID-19 has been recognized as another factor precipitating retirements and job changes (i.e., jobs with a remote work option).

We found that the answers to a number of the questions on MRC’s culture survey were likely impacted by the large turnover of personnel, difficulty in getting workers together effectively for group tasks, and difficulty in leaders interacting personally with workers to communicate cultural expectations effectively. In our onsite evaluations, we determined that the conditions twenty months following the lifting of COVID-19 restrictions and twelve months after the end of the survey period were considerably improved. Since the purpose of this project was to assess MRC’s current culture, but did not include re-surveying employees, we excluded these questions from the evaluations presented in the following subsections. The full list of questions that were excluded is presented in Table 1 on the following page, from the lowest scoring to highest via the top-screening method. Nonetheless, we recommend that MRC resurvey their workers, with a focus on these excluded questions, at an appropriate time after the other recommendations from our evaluation have been implemented.

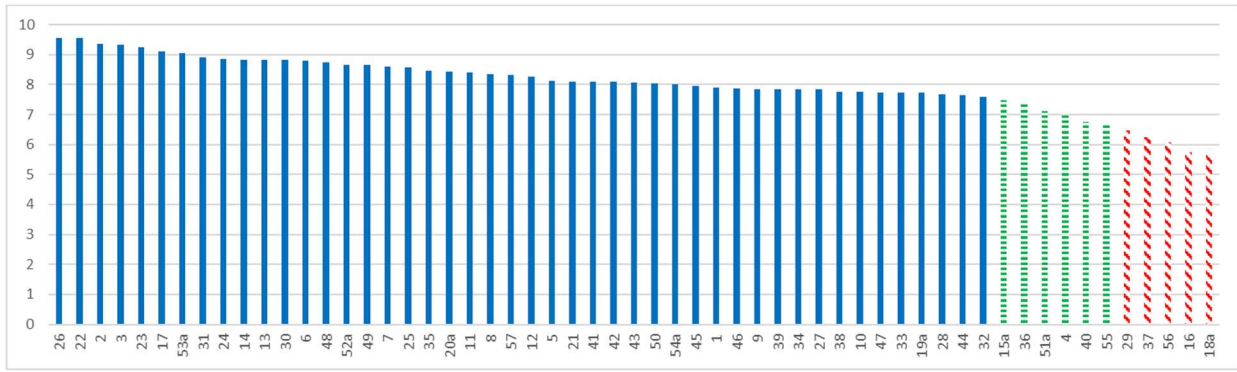
**Table 1:** MRC culture survey questions excluded from current evaluation due to likely impact of COVID-19 restrictions, ranked lowest to highest scoring by the top-screen method

<b>Table excluded from</b>	<b>Question #</b>	<b>The question result indicated:</b>
Excluded from table 2, page 13	55	Insufficient encouragement to participate in Process Hazard Analyses and Corrosion Control Document revalidations.
	16	Low awareness of GOAL ZERO FOCUS rewards and incentives program
	56	Inadequate staffing to allow involvement in process safety work activities
	40	Procedures, drawings, etc. not being timely updated
	37	Inadequate staffing to avoid employee fatigue
	4	Incentives that do not encourage reporting unsafe conditions
Excluded from table 3, page 14	28	Lack of knowledge of where to obtain needed process safety information
	46	Process safety (and Health, Safety, and Environment) not given sufficient priority in decision-making
	9	Incident reporting system doesn't provide details quickly enough to prevent future incidents
	50	Unresolved process safety (and Health, Safety, and Environment) issues allowed to continue
	41	Permitting process involving contractors not sufficiently effective
N/A (scores higher than those in table 3)	1	Insufficient awareness of GOAL ZERO hazard reporting tool
	27	GOAL ZERO sessions have not improved process safety performance
	5	Low acceptance/implementation of safety suggestions
	45	Insufficient HSE performance of contractors
	44	A feeling that the refinery isn't doing more for process safety
	21	Process safety and HSE programs weren't valued
35	Insufficient awareness and knowledge of process safety by individuals	

## 2. Comparison of Top-Screen Method to MRC's Averaging Method

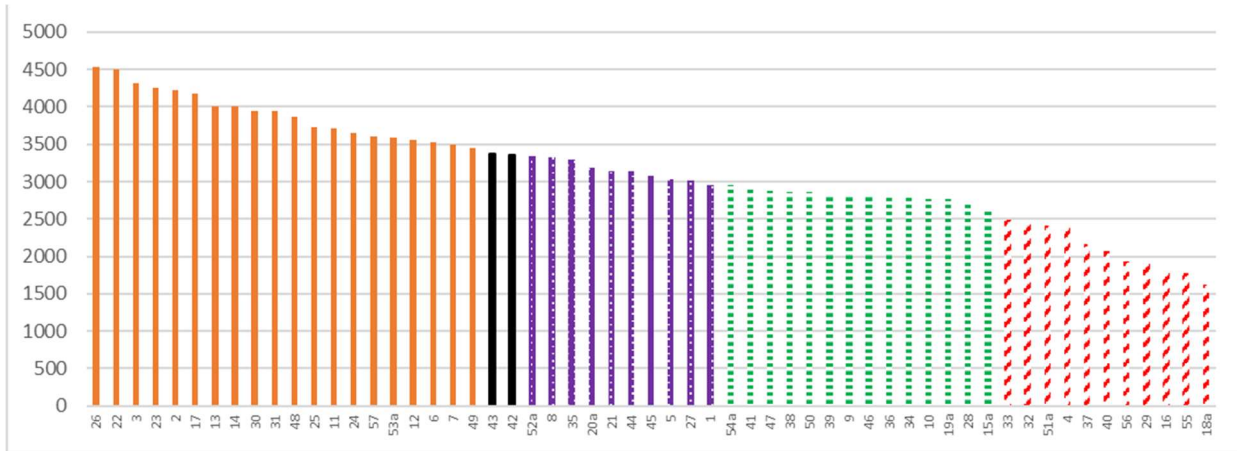
The distribution of scores from highest to lowest are shown in Figures 1 (MRC) and 2 (Top-screen) on the following page. In both figures, the X-axis contains the question number. The Y-axis of the MRC graph in Figure 1 is the average score (with blank answers omitted). The Y-axis of the top-screening graph in Figure 2 is the sum of all scores 7 or greater. In the top-screening graph, the maximum possible score would be 4,850, that is, a score of 10 from all 485 respondents.

Both graphs omit the questions that were directed solely to members of the emergency response crew, but these responses were positive by all measures.



**Figure 1:** All scores by MRC's averaging method

In Figure 1, MRC's averaging method highlights five questions (red-striped bars) considered to be improvement opportunities. There are an additional six questions (green-striped bars) that stand out as noticeably lower than the others, but MRC considered their scores acceptable.



**Figure 2:** All scores by the Top-Screen Method (maximum possible score =4,850)

In Figure 2, the top-screen graph, there are also eleven questions (red-striped bars) that stand out from the rest as obvious improvement opportunities. Among these, the question with the largest score was 2500, about 51% of the maximum score, and therefore clearly not positive.

### 3. Greatest improvement opportunities

Table 2 on the following page summarizes the five questions among the eleven that, based on our evaluation, were not affected by COVID-19 restrictions.

**Table 2:** Survey results indicating improvement needed by the top screening method, ranked from lowest to highest

Question #	The question result indicated:
18a	There is pressure to get the job done from peers/coworkers
29	There are challenges accessing Industrial Hygiene (IH) monitoring reports
51a	There is excessive pressure to get the job done from supervisor or manager
32	Preventive maintenance is not carried out on time
33	Incident investigations and reports are not effective in improving HSE-PS performance

There are two questions related to pressure to get a job done. It's not unusual for people working in a production environment to feel this pressure internally, with or without pressure from coworkers or supervisors. This becomes a safety culture weakness only when management systems related to consistent adherence to procedures and to reviewing and formally approving changes to procedures are weak or are not enforced. Sections VI and VII describe findings and recommendations related to MRC's procedure management systems.

Preventive maintenance is also discussed in Sections VI and VII in terms of MRC's asset/mechanical integrity programs, which have a good foundational core but need to be upgraded. MRC's approach to investigating and learning from Incidents are highlighted in Sections VI and VII as a key area where improvements can lead to upgraded process safety culture and performance.

Question 29, pertaining to Industrial Hygiene reports, focused on occupational safety and was therefore outside the scope of this project.

#### 4. Additional improvement opportunities

It's important to focus on the two questions indicated by black bars in Figure 2. These asked employees if they agree that "I often feel I am working in a safe refinery," and "I often have felt that we are working in a safe workplace." By MRC's averaging method, these questions rate an average of about 8 and are ranked close to other high-scoring questions. But when the 100+ mediocre, bad, and blank responses for each question are omitted from the calculation using the top-screening approach, these questions score well below the most favorable ones. In other words, there are a significant number of employees who don't feel as safe as they believe they should be.

Addressing the questions highlighted immediately before in the preceding two sections above should help improve employees' perceptions about their safety, leading to improved scores for these two questions in the future.

Note also that there are fourteen 14 additional questions with top-screening scores that were not significantly higher than the 11<sup>th</sup>-ranked question, highlighted in green-striped bars in the top-screening graph, Figure 2. Effectively, all of these questions are tied for 11<sup>th</sup> or 12<sup>th</sup> place, something not obvious from MRC's averaging method shown in Figure 1. Table 3 on the following page summarizes the implications of these additional questions. Again, the questions that, based on our evaluation, were affected by COVID-19 restrictions have been excluded from Table 3.

**Table 3:** Survey results by the top screening method that are additional improvement opportunities

<b>Question #</b>	<b>The question result indicated:</b>
15a	Negative repercussions after using Stop Work Authority.
19a	Pressure to take shortcuts from peers
10	Incident reporting system doesn't provide sufficient information needed to learn from incidents
34	Incident investigations more focused on blame than identifying management system gaps
36	Lack of comfort to use Stop Work Authority within work group
39	Insufficient training after changes have been made
38	Insufficient refresher training after changes have been made

The two questions related to using Stop-Work Authority appear inconsistent with some positive findings regarding this topic to be discussed in the next section. We believe that this inconsistency may be tied either to the above questions related to pressure to get the job done, or to some confusion related to a difference between the narrow California regulatory definition of Stop-Work Authority and the common, broader use of the term among process safety professionals.

Pressure to take shortcuts from peers is a more serious version of pressure to get the job done, discussed in the previous section, because a shortcut is a deviation from a procedure. Again, pressure isn't unusual, and becomes a safety culture weakness only when management systems related to consistent adherence to procedures and review and approval of changes to procedures are weak or are not enforced, as discussed in Sections VI and VII.

During our review, we didn't find evidence of training gaps. We thought that could have been caused by a systemic gap in one or more refinery work groups. However, we found that the operational and maintenance departments across the site scored these questions fairly consistently. There are two possible explanations:

- (1) This question asks about changes in general, while the training program's focus relative to changes are those changes that were formally reviewed by the site's Management of Change process. Changes enabled by the site's gap in managing changes to procedures (as will be discussed in section VI) would not be addressed by the site's training program.
- (2) Personnel new to the refinery within the past few years may have been trained, but have not yet developed confidence in their skills.

## 5. Relative Cultural Strengths

Questions with a predominance of high scores and few, if any, blanks, should produce very similar results between the averaging method used by MRC and the top-screening method we used, and we found this to be the case. Table 4 on the following page presents the top ten positive scores by the top-screen method.

**Table 4** Top ten positive survey results by top-screen method, ranked from highest

Question #	The question result indicated:
26	HSE/Process Safety is everyone's responsibility
22	I take my HSE/Process Safety responsibility seriously
3	I am encouraged to report incidents
23	I know my role in an emergency
2	I have made sure every incident I'm aware of has been reported
17	I feel comfortable using stop-work authority in my work group
13	I feel comfortable reporting incidents without fear of repercussion
14	I feel comfortable using stop-work authority anywhere in the refinery
30	I can readily obtain personal protective equipment
31	Safety equipment is kept in good, safe, clean condition

Questions 17 and 14, show worker comfort in using stop-work authority. We had previously noted that repercussions from using stop-work authority appeared as an improvement opportunity. Additionally, the independent investigation of the November 2022 catalyst release found that work was not stopped or paused to reevaluate when appropriate. As described above, the California definition of stop-work authority is more limited than what is more globally understood, leading to potential worker misperceptions about the limits of their authority. But more importantly, when workers believe they must deviate from a procedure, including extended use of manual control when automatic control is specified, it is important that they pause, competently analyze the safety implications of the deviation, identify alternative risk control measures, and obtain approval from a competent authority. Not doing this was a key factor in the November 2022 catalyst release incident. This will be discussed further in sections VI and VII.

All of these questions with positive responses represent attitudes that are essential to laying the foundation of a good safety culture. MRC is encouraged to maintain the status of these questions, and build on them, as well as other questions that scored in the top twenty, as they continue to drive safety culture improvement.

## **VI. Findings From Onsite evaluations**

As discussed in Section IV, the process safety culture of a company and facility depends on the quality of the PSMS and the rigor by which leadership drives:

- execution of the PSMS;
- reducing risk towards a level considered generally acceptable; and
- company and sitewide focus on elimination of process safety incidents.

We evaluated the elements of MRC's PSMS and the culture generated by the execution of this management system by reviewing the company's policies, standards and procedures. We also conducted interviews with the management system element owners and with the individuals who

perform the management system activities. Finally, we reviewed both records of completion of the management system tasks, as well as metrics and incident reports.

#### A. Positive Findings

We found that MRC has commendable performance in all three of the high-level areas listed above. Examples of a strong process safety culture driven by the Refinery Leadership Team (RLT) and other refinery leadership include:

1. The RLT sets objectives with a regular cadence of management system reviews and monitors and acts on key metrics and investigation findings.

2. The RLT demonstrates their commitment to GOAL ZERO<sup>13</sup> which aims to drive:

*"...a culture where people deeply care about each other and our community. It is a personal and organizational commitment to be intolerant of injury, leaks or incidents that can impact our workers and the environment."* [Note: This program is being leveraged to the other refineries of the PBF Energy group].

3. MRC has many robust management system elements in place, conducted with a high degree of efficacy, that are critically important to driving good process safety performance and the desired culture. Examples include:

- Pressure Equipment Mechanical Integrity Program: The integrity processes defined by Recognized and Generally Accepted Good Engineering Practices (RAGAGEP) to ensure pressure equipment is designed, installed, operated, and maintained to be "fit for service". Note: MRC has been an active contributor to some of these RAGAGEP standards and has helped the industry improve in the areas of recognizing different types of failures on piping systems.
- Interlock Mechanical Integrity Program: The integrity processes defined by RAGAGEP to ensure safety interlocks<sup>14</sup> are designed, installed, and maintained to be "fit for service".
- Process Hazard Assessment Processes and the use of MRC Risk Matrix: The process that MRC uses to identify and ensure implementation of the adequate number of sufficiently robust protection layers to meet the corporate risk criteria. MRC's process is in the range of what other facilities of their size and complexity practice. Although managing risk via a risk matrix is relatively common, there is no regulatory requirement to do so. Like similar facilities, MRC's risk matrix process helps them identify the appropriate protection layers to implemented to mitigate risk. MRC takes a relatively more proactive approach to resolving the risk of scenarios that are found to fall outside of the broadly acceptable risk zone.
- Emergency Preparation and Response Capabilities: MRC's overall approach to emergency management includes (1) planning for possible emergencies, (2) providing resources to execute the plan, (3) practicing and continuously improving the plan, (4) training or informing employees, contractors, neighbors, and local authorities on what to do, how they will be

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<sup>13</sup> See <https://martinezrefiningcompany.com/safety-culture/>.

<sup>14</sup> Devices such as switches that prevent a piece of equipment from operating when a hazard exists. See Glossary.



notified, and how to report an emergency, and (5) effectively communicating with stakeholders in the event an incident does occur.

- Operating procedure development and procedure format: Operating procedures are written instructions that (1) list the steps for a given task and (2) describe the manner in which the steps are to be performed. Good procedures also describe the process, hazards, tools, protective equipment, and controls in sufficient detail that operators understand the hazards, can verify that controls are in place, and can confirm that the process responds in an expected manner. MRC's procedure development process is generally strong.
- Shift turnover and relief process: MRC uses a formalized process for shift turnover to ensure seamless communication, continuity, and awareness of safety-critical information and activities during transitions between shifts. Organizations that adhere to these principles can reduce the risk of incidents, enhance operational continuity, and foster a safety-conscious environment among personnel.

We believe that MRC's strong performance in these areas can serve as a good foundation for areas where MRC performs less well.

## B. Opportunities to Improve

We have broken MRC's improvement opportunities into two groups. The first group includes high priority items that directly relate to and are highly leverageable to preventing future incidents. The second group includes continuous improvement opportunities.

### High priority improvement opportunities

1. The MRC incident investigation process is not designed to be effective in preventing future incidents. There are two areas of improvement:
  - MRC's incident investigation does not properly define management system failures as root causes. Several of the investigations we reviewed (including MRC's November 2022 catalyst release incident) stopped at the direct cause for the failure, for example, operator error or equipment failure, without identifying the management systems that led to those error or failures. Speaking about the notion that operator error and equipment cause incidents, process safety pioneer Trevor Kletz said:

*This is true in a sense. But it's not very helpful. It's a bit like saying "Falls are caused by gravity."*

Correcting a human or mechanical failure may prevent that particular incident from happening again, but correcting a management system gap or failure prevents all of the incidents that the gap or failure could lead to. As described in the CCPS incident investigation guideline:

*"Correcting only a causal factor is a simplistic approach that may prevent the identical incident from occurring again at the same location, but will not prevent similar incidents. Identifying and correcting the root causes should eliminate or substantially reduce the likelihood of recurrence of the incident and other similar incidents at the location. More importantly, the*

*new knowledge and corrective methods resulting from the investigation may be shared for use throughout a company and possibly apply to an industry as a whole".<sup>15</sup>*

- The process that MRC currently uses does not include a repetitive incident analysis of incident root causes. While MRC does currently perform repetitive analysis of their incident investigation findings, we found they weren't finding true root causes. Repetitive root cause analysis should be conducted as part of every incident investigation to help determine the scope of the management system failure(s) and identify the proper corrective actions that will fix the management system. This answers the question: should the corrective actions be exclusive to the specific equipment/situation, extended to the entire refinery unit, or applied across the entire refinery or company? We did observe one example where corrective measures from an investigation were applied across the entire refinery, and this should be done in all cases. As CCPS explains:

*"A thorough incident investigation identifies and addresses all of the causes of an incident, including the root causes. It also provides the mechanism for understanding the interaction and impact of management system failures. This analysis provides the means for fully addressing the incident, similar incidents, and even dissimilar incidents caused by the same root causes, throughout the facility, company, and industry. Addressing management system failures is the ultimate goal, yielding the maximum benefit from an incident investigation."<sup>16</sup>*

By revamping the investigation process to ensure all incident root causes are identified and fixed at the correct level within the company, MRC will be able to eliminate repeat incidents. By becoming a more effective learning organization, MRC can accelerate progress towards eliminating Tier 1 and 2 Process Safety Events and High Potential Tier 3 Process Safety Events.

2. The MRC PSMS element for Process Control does not address the appropriate considerations for the use of the "manual mode of control" for process variables typically controlled by the computer. In a refinery, many pieces of machinery are controlled by computers. Typical modes of computerized process control include automatic, manual, and cascade modes. Automatic and cascade are the preferred modes of control. In these modes, the computer monitors process parameters on a continuous basis and controls the process to pre-determined set points. Manual control is where the control loop is taken out of automatic, or cascade control, and the operator monitors the process and makes manual adjustments to the process to achieve the same predetermined control strategy. Manual mode is typically used to correct unusual process upsets that the computer cannot respond to adequately. The independent investigation of the November 24-25, 2022, incident determined that switching to manual mode, without close monitoring of the process as one of the root causes. As described in CCPS' safe automation guidelines:

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<sup>15</sup> CCPS, *Guidelines for Investigating Process Safety Incidents, 3<sup>rd</sup> Edition*, AIChE/Wiley 2019

<sup>16</sup> Ibid

*There have been many high-profile Process Safety Incidents having process control systems in manual, e.g., March 2005 BP Texas City Explosion. Based on the authors' experience and interactions with chemical and refining company's process safety professionals, it is common for leading companies to establish rigorous processes to manage the risk from changes of mode of process control. This is important because: "Operator actions are subject to errors. These errors may be more likely than the dangerous failure of the automated equipment. When things go wrong, the operator may become overwhelmed and be unable to respond timely." <sup>17</sup>*

Additionally, the operating procedure called for operating this control variable in "automatic". An upset necessitated taking manual control, but it was not returned to automatic until near the end of the release. This reinforces the need for a stand-alone process for the use of manual control and brings up this issue of ensuring the process for "managing deviations" from all procedures is strictly followed. The MRC management system for procedure use, and specifically for deviations, calls for an evaluation of the consequences of not deviating, the possible impacts from deviating and stipulates an approval and a recording of deviation duration and time returned to normal. However, it does not include how the process will be monitored for the possible impacts, triggers for action and what interim controls might be needed while the deviation is in progress.

The improvement opportunity for MRC is three-fold:

- A) Define a clear, time-bound Modes of Control policy with criteria for operating in manual. After operators gain immediate control of the situation that prompted putting the control system in manual, criteria should include the following:
- Assessment of the risk of continued operation in manual.
  - Time triggers for performing this assessment (e.g., operating in manual for more than a specified length of time).
  - When and how approval is obtained for continued manual operations.
  - Documented plan for monitoring and controlling the process in manual.
  - Contingency plan with action if the process exceeds operating limits defined by process safety alarms indicated in risk assessments.
  - Plan for resolution to get the process control back in Automatic or Cascade mode.
  - System allowing the RLT to monitor and enforce this policy
- B) Upgrade the procedure use deviation process/form to include, where appropriate, how the process will be monitored for the possible impacts, triggers for action and what interim controls might be needed while the deviation is in progress.
- C) Formally track and assess efficacy of all procedure deviations and improving the management system where analysis indicates. The efficacy review must ensure that the need to meet production is not a trigger for classifying/initiating a deviation request as urgent.

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<sup>17</sup> CCPS, *Guidelines for Safe Automation of Chemical Processes, 2<sup>nd</sup> Edition, page 104, AIChE/Wiley, 2016*

### Continuous improvement opportunities

3. A review of recommendations/action items from process safety audits found action items related to updates to or development of procedures with an unreasonable amount of time to close these actions. We understand that MRC may have specified the timing for consistency with applicable regulatory requirements. Logically, however, procedural action items should be closed prior to the next use of the procedure. While the facility may be in legal compliance for closure of action items, a good process safety culture always drives procedures to be current and accurate, giving personnel the greatest chance of success in carrying out work activities. Additionally, procedures that aren't current and accurate can be one reason an operator may feel the need to put controls in Manual.
4. Interviews with leadership indicates that the asset integrity processes for electrical and rotating equipment integrity are being "revitalized." There is an opportunity to leverage the strong, positive approach the RLT uses for monitoring the pressure equipment mechanical integrity and interlock integrity programs performance to achieve similar performance for other asset integrity processes. This should include communication with the RLT when metrics show needed improvement or that assistance from the RLT is needed in focusing the organization on these activities or overcoming roadblocks.
5. Many of the less favorable survey responses appear to have been linked to restrictions imposed between March 2020 and June 2022 due to the COVID-19 pandemic. Distancing requirements made it difficult for leaders and workers to engage directly with each other while focusing work efforts on the most basic individual tasks. Also, the implementation of COVID restrictions coincided with sale of the refinery by Shell to PBF, making it more difficult to address worker concerns related to the transition. The MRC culture survey identified these factors as reasons why culture scores had regressed compared to the prior culture survey. Based on our interviews with employees and leadership, we understand that engagement has improved significantly in the last one + years since the 2023 culture survey, but this was not directly measured. The Contra Costa ISO, CalARP, and CalOSHA require performing the safety culture survey every five years, and MRC typically conducts these surveys every four years. However, since engagement is so critical to MRC's GOAL ZERO, we believe it is important for MRC to confirm the general impression that this dimension of culture has improved.

### **VII. Recommendations**

Except as noted, these recommendations and the timing for their resolution have been discussed with MRC to ensure that the management systems have been specified accurately and that the action and timing are reasonable and achievable.<sup>18</sup>

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<sup>18</sup> Please see section III.B, which discusses why this was done.

A. Improve the process of incident investigation:

1. Upgrade the incident and high potential near-miss investigation processes used by MRC to ensure that investigations do not stop with human errors and equipment failures, and instead continue on to identify gaps and weaknesses in the relevant PSMS elements (i.e., Root Causes).
2. Train MRC investigators based on the improved incident and near-miss investigation approach and ensure that that investigation teams can begin using the new approach as of the completion date below.
3. Establish a program of repetitive incident analysis that evaluates completed incident investigations to specifically identify all barrier failures, their direct causes, and each barrier failure root cause (management system failure). From there, identify all barrier failure causes and their root causes that have been seen historically in other incidents in the refinery so that appropriate corrective measures to the management system can be implemented.

Timing: We recommend that items A.1 and A.2 are complete by August 31, 2024. We recommend that the program of item A.3 should begin August 31, 2024, with retroactive analysis of the past ten years of investigations completed by August 31, 2025. MRC agrees with the scope of this recommendation but has asked for time to evaluate whether the timing can be met, to be determined in time for Draft 2 of this report.

B. Establish and enforce clear expectations for operation of the process control system in manual mode and other deviations from procedures.

1. Establish a new procedure (or modify an existing one) that sets clear limits (situational and time) on changing the control mode of one or more process control loops from automatic to manual control mode or from cascade to either automatic or manual control mode such that if these limits are to be exceeded, there will be a professional review and approval of the deviation, and if appropriate, referral to the Temporary Management of Change process.
2. Additionally, expand the procedure use management system element for deviations to include, where appropriate, how the process will be monitored for possible impacts, trigger criteria for action and what interim controls might be needed. In other words, if there is a need to deviate from procedures, the procedure deviation requires a professional review, has a strong control plan and is then approved. Alternately, where appropriate, the deviation request is referred and processed through the Emergency, Temporary, or Permanent Management of Change process.
3. Establish metrics and tracking system for these deviations and include reviews in regular RLT cadence of reviews.

Timing: Complete development and roll-out by December 31, 2024.

C. Set appropriate completion dates for audit action items related to procedures.

1. Establish due dates for action items requiring material changes to procedures to ensure that such changes are implemented before the next use. It is understood that the regulatorily-defined due date is commonly 18-months, and it may be necessary to have an internal due date as well as a regulatory due date associated with the action item.

2. Immediately resolve any existing material action items with a due date extending beyond one month after the above change.

Timing: Change policy by July 31, 2024; resolve then-pending action items before next use of the relevant procedure.

D. Ensure that oversight is provided of all Inspection, Testing, and Preventive Maintenance (ITPM) asset integrity items not currently overseen by the RLT.

1. Establish appropriate leading metrics for asset integrity items not currently overseen by the RLT, for example, electrical equipment and rotating equipment.

2. Establish a process by which an appropriate functional leader tracks performance and either corrects issues or escalates them to RLT for resolution.

Timing: Complete December 31, 2024.

E. Conduct the next culture survey ahead of schedule.

1. In order to confirm that survey impacts attributed to COVID-era limitations have been resolved, include these items in the next state and ISO-required interim culture assessment.

Timing: Complete September 30, 2025.

## Appendix A. Process Safety Culture Team Makeup

The independent investigation team included Scott Berger, President of Scott Berger and Associates, LLC, as project manager, working with Kenan Stevick, President of KPS Process Safety, Inc., (under subcontract) as study leader.

**Scott Berger, CCPSC** has forty-five years of experience in process safety, environment, health, and safety (EHS) management, chemical engineering, chemical manufacturing, process engineering, and human factors. From 2001 to 2015 he served as Executive Director of CCPS. Since 2015 he has worked as a consultant in process safety, focusing on process safety leadership, process safety management systems, training for basic process safety competency, incident investigation, and litigation support. He is the co-author of three books on process safety for the Center for Chemical Process Safety (CCPS), *Driving Process Safety Improvement from Investigated Incidents* (2021), *Process Safety Leadership from the Boardroom to the Frontline* (2019) (with Kenan Stevick), and *Essential Practices for Creating, Strengthening, and Sustaining Process Safety Culture* (2018).

Berger is a CCPS-certified process safety professional (CCPSC), a Fellow of the American Institute of Chemical Engineers, and a Fellow of the Center for Chemical Process Safety.

**Kenan Stevick** has 42 years of chemical industry experience in process safety, manufacturing, project management and EHS management. Since 2016 he has worked as a consultant in process safety with a focus on process safety governance and leadership, process safety management systems, improving process safety performance, training for basic process safety competency, incident investigation, and litigation support. During this period, he co-authored (with Scott Berger) the Center for Chemical Process Safety (CCPS) book *Process Safety Leadership from the Boardroom to the Frontline* (With Scott Berger).

From 1981 to 2015, Kenan worked for the Dow Chemical company. From 2010 to 2015 he served as the Chief Process Safety Engineer and Global Director of Process Safety. In this role, he worked closely with Dow senior executives and the Board of Directors to lead Dow's process safety improvement efforts. During this time Dow improved their Tier 1 and Tier 2 Process Safety Incident rate performance by approximately 85%.

Stevick's earlier career involved assignments leading Dow's process safety, reactive chemicals, mechanical integrity, and dust explosion prevention competencies, managing medium-sized manufacturing facilities, managing EHS for a large business unit, and a range of engineering and supervisory positions in manufacturing.

He holds a BSChE from Michigan Technological University and has been recognized as a CCPS Fellow.

## Appendix B. Glossary of Terms and Acronyms

Term	Definition
AIChE	American Institute of Chemical Engineers.
API	American Petroleum Institute; a trade and standards organization supporting the petroleum industry.
Asset integrity Management System	A management system for ensuring the integrity of all equipment and piping throughout their lifecycles so that they will perform their intended function.
Automatic (Auto)	A control mode where a component (e.g., a valve) is automatically adjusted to maintain a process parameter (e.g., a level) at a set value.
CalARP	California Accidental Release Program. A regulation of the state Environmental Protection Agency that aims to prevent accidental release of extremely hazardous materials. Please see <a href="https://calepa.ca.gov/california-accidental-release-prevention">https://calepa.ca.gov/california-accidental-release-prevention</a> .
Cal/OSHA PSM	Regulations of the California Division of Occupational Safety and Health, Process Safety Management (PSM) unit. State regulations aimed at preventing catastrophic explosions, fires, and releases of dangerous chemicals. Please see <a href="https://www.dir.ca.gov/dosh/psm-unit.html">https://www.dir.ca.gov/dosh/psm-unit.html</a> .
Cascade	A control mode in which a controller set point is obtained based on some other process variable or condition.
CCHHMP	Contra Costa Health Hazards Materials Programs.
CCPS	Center for Chemical Process Safety, a global technical organization operated by AIChE that supports the petroleum, chemical, and related industries with guidance and training for managing process safety.
CCU	Catalytic Cracking Unit, a grouping of refinery equipment that converts (cracks) high molecular weight hydrocarbons into hydrocarbons with lower molecular weight.
Conduct of Operations	An element of the Process Safety Management System described in CCPS, <i>Guidelines for Risk Based Process Safety</i> , AIChE/Wiley (2007). How leaders define the policies and procedures of the process safety management system and then ensure they are carried out faithfully and professionally.
CWS	Community Warning System, an all-hazards community notification system of Contra Costa County intended to alert residents about any potential health hazards and emergencies that may be occurring.
GOAL ZERO	An MRC program aimed at maintaining a culture in which employees and contractors deeply care about each other, working safely, the environment, and refinery neighbors in order to prevent all injuries, incidents, and



<b>Term</b>	<b>Definition</b>
	community impacts. See <a href="https://martinezrefiningcompany.com/safety-culture/">https://martinezrefiningcompany.com/safety-culture/</a> .
Human factors	The way that people interact with equipment, controls, and their work environment.
Incident investigation	A systematic process to determine the root causes of an incident and develop recommendations that address these causes to help prevent or mitigate future incidents.
Interlock	A protective response initiated by an out-of-limit process condition. For example, a device or software that will not allow one piece of equipment to function unless another part is functioning; or a switch that prevents a piece of equipment from functioning when a hazard exists.
ITPM	Inspection, testing, and preventive maintenance, that is, tasks associated with the refinery asset integrity management system,
ISO	The Industrial Safety Ordinance of Contra Costa County.
Management system	Policies, procedures, and standards that describe how specific functions are to be carried out, how performance is verified, and how performance is improved.
Manual	A control mode in which control devices (e.g., valves) respond only to operator input.
MCAR	Major Chemical Accident or Release, as defined by CCHHMP.
Mechanical integrity	See asset integrity.
MRC	Martinez Refining Company, a unit of PBF Energy.
Operating procedures	Written, step-by-step instructions and information necessary to operate equipment, compiled in one document that includes operating instructions, process descriptions, operating limits, chemical hazards, and safety equipment requirements.
Operational discipline	The way each person in the organization carries out their assigned roles faithfully and professionally. Both a driver and a result of good Conduct of Operations.
Operator	An individual who is trained and qualified to operate a process or some portion of a process.
PHA	Process Hazard Analysis, a study in which process hazards are identified and a wide range of deviation scenarios are analyzed to determine if the unit's safeguards are adequate.
PSMS	Process Safety Management System. Policies, procedures, and standards that describe how specific process safety functions are to be carried out, how performance is to be verified, and how performance is to be improved.

Term	Definition
RAGAGEP	<p>Recognized and Generally Accepted Good Engineering Practices. These are standards and practices defined for the design and maintenance of equipment and instruments. The California Code of Regulations Title 19, Division 5, Chapter 2, Article 1, Section 5050.3(jjj) identifies specific Standard Development Organizations whose standards are to be used as RAGAGEP. In this work, we also considered the broader definition of RAGAGEP provided by CCPS and OSHA, which also consider vendor recommendations and internal standards when they are more rigorous than those specified b California.</p>
RLT	<p>MRC's Refinery Leadership Team.</p>
Root causes	<p>Gaps in Process Safety Management Systems, including human factors. Please see Industrial Safety Ordinance § 450-8.014. Definitions: <i>"Root cause" means prime reasons, such as failures of some management systems [emphasis added], that allow faulty design, inadequate training, or improper changes, which lead to an unsafe act or condition, and result in an incident.</i></p>
Safety Integrity Layers	<p>Critical interlocks, relief devices, and other layers of protection that facilities rely on to reduce risk and meet risk criteria.</p>
SMART	<p>Recommendations that are Specific, Measurable, Aligned, Realistic, and Time-bound.</p>
Tier 1, Tier 2	<p>Classification of process safety incidents based on their severity, according to API Recommended Practice 754. Tier 1 incidents are of the greatest severity with regard to impacts to people, the community, the environment, and process facilities. Tier 2 incidents are of lower severity.</p>

## **Appendix C: Resolution of MRC Oversight Committee Comments**

See following page

Appendix C: Oversight Committee Comments on First Draft Report and Resolutions of Comments

No.	Commenter	Page <sup>19</sup>	Section	Where	Comment	Response	Action taken
1	(MD) M. Dossey	3	I	P3 L1	Follow Center for Chemical Process Safety with (CCPS)	Editorial	Change made
2	(MD) M. Dossey	3	III.C	Footnote	Use correct link for Contra Costa County: <a href="http://contracostaco-ca.elaws.us/code/oc_title4_div450_ch450-8_sec450-8.014">http://contracostaco-ca.elaws.us/code/oc_title4_div450_ch450-8_sec450-8.014</a>	Editorial	Change made
3	(MD) M. Dossey	5	II	P4 L6	Add end quote	Editorial	Change made
4	(MD) M. Dossey	6		Footnote	Change culture surveys to safety culture surveys	Editorial	Change made
5	(MD) M. Dossey	7	IV	P5 L4	Change "droves" to "drove"	"drives" was intended	Change made
6	(MD) M. Dossey	8	IV	B4	typo "rive"	"drive" was intended	Change made
7	(MD) M. Dossey	8	V	P1 L2	The regulations require this to be done every five years although they might do it more frequently	Clarify that the requirement is every 5 years but MRC has been doing every 4 years	Change made
8	(MD) M. Dossey	9	V	P2 L1	Suggest some additional lead in wording, such as, "In addition to the 5 entries previously mentioned, we found..."	(consider)	Addressed as part of changes in response to comment 21.
9	(MD) M. Dossey	12	V	P1 L1	Are you trying to say that using the top-screen method you found these two questions are at a "7"? Meaning all scores below these reflect topics that should be further evaluated? If so, suggest this be made more clear.	We mean that although many respondents rated this question well, there were enough that did not (or chose not to rate this question) than desirable.	Addressed and clarified as part of changes in response to comment 21.

<sup>19</sup> Page, section, and "where" refer to locations in the first draft, which do not correspond to their locations in the current draft.

Appendix C: Oversight Committee Comments on First Draft Report and Resolutions of Comments

No.	Commenter	Page <sup>19</sup>	Section	Where	Comment	Response	Action taken
10	(MD) M. Dossey	14	VI	P1 B1	Should this be its own bullet?	Editorial	Change made
11	(MD) M. Dossey	14	VI.A	P1 L1	Do you mean the 2 (although should be 3) bullets above?	Meant 3. Correcting line 10 corrects this	No change required
12	(MD) M. Dossey	14	VI.A.3	P1 L1	Should be singular	Editorial	Change made
13	(MD) M. Dossey	18	VI.A.5	P1 L11	replace four with five	Editorial	Change made
14	(MD) M. Dossey	24	Glossary	L1	It should be noted that the CalARP regulation defines RAGAGEP in a similar although a bit more restrictive manner.	Clarification noted	Glossary entry expanded for clarification
15	Thomas Lang	3	I	P1 L1-4	This should be rewritten. Catalyst is mentioned in the first sentence and defined in the second, making this important introductory paragraph seem awkward	Editorial	Change made
16	Thomas Lang	3	I	P2 L4	Perhaps a one sentence statement that this focuses on process safety as opposed to other aspects. This is a fairly critical point.	Editorial	Clarified in footnote
17	Thomas Lang	4	I	P2 (all)	This is one example of the tendency of this group to soften the impact of their work by seeking out good things to say about the subject of the investigation. I think it would be better if they just stuck to the facts. Maybe a simple statement that they perceived the interaction with the employees to be candid., and point out that the paper provides clear, actionable recommendations that MRC can use to improve their safety culture.	We acknowledge Mr. Lang's perception, but respectfully disagree. We believe it was important that we were able to have open and frank discussions.	None required

Appendix C: Oversight Committee Comments on First Draft Report and Resolutions of Comments

No.	Commenter	Page <sup>19</sup>	Section	Where	Comment	Response	Action taken
18	Thomas Lang	4	II	P3 L1-3	As stated before, point this out briefly at the beginning so that readers know from the get go that this is about process safety.	See comment 16	Change made
19	Thomas Lang	5	II	P2 (all)	<p>People who read the draft incident report would get cognitive dissonance from this paragraph. While technically, pressure vessels did not leak or fail, and the release was not due to an interlock failure, overloading of a pressure vessel caused the release, and a valve was run on manual because it was thought to be "balky". People might not see these things as being separate.</p> <p>Again, it's almost like the writer is trying to soften the impact by saying positive things before bringing the bad news.</p> <p>Maybe leave this paragraph out, and focus on the recommendations.</p>	<p>Pressure vessel and interlock failure played no role in the catalyst release incident. As explained in that report, while the valve was perceived to be "balky," the incident was caused by changes to the established procedure, without adequate evaluation or oversight, among other root causes. Nonetheless, the mechanical integrity of the valve falls in a part of MRC's overall mechanical integrity program recommended for improvement.</p>	<p>Pressure equipment integrity was updated throughout the report to clarify that we meant pressure equipment mechanical integrity.</p> <p>Regarding presenting positive findings first, please see action taken related to comment 23. Otherwise, no change required.</p>
20	Thomas Lang	8	V	P2 L3	Is a 60% response rate to be expected for this industry?	Many factors influence the response rates on surveys.	Typical survey response expectations added.
21	Thomas Lang	8	V	P4	<p>I like the methodology that Berger employed to do this analysis. I believe that their approach yielded information that was more precise and actionable than the approach of using average scores.</p> <p>My suggestion here would be to follow this up with a statement on why they thought that use of average scores could conceal important information. They could then</p>	Editorial. This suggested approach will also help address several comments from other committee members	Section V rewritten following the suggestions in this comment.

Appendix C: Oversight Committee Comments on First Draft Report and Resolutions of Comments

No.	Commenter	Page <sup>19</sup>	Section	Where	Comment	Response	Action taken
21	(continued)				take the approach of stating their contrasting method, following up on why they specifically chose it. For clarity it is better to state things up front rather than expect the reader to follow along as they slowly introduce the method.		
22	Thomas Lang	11	V	P3	It takes a long time to get to this point, and the readers can easily lose track. Maybe towards the beginning of the section, they could state that they used the "top screening method" to find problem areas and lay out why. Keep this much more brief. Lay readers will be more interested in the conclusions first, followed by justification, rather than having to read several pages to get the whole story first.	Addressed this comment along with comment 21.	See changes in response to comment 21
23	Thomas Lang	14-15	IV.A	All	Again, this causes cognitive dissonance. The report would read better if the problems and opportunities for improvement were brought up first.	The approach taken here is typical, but our reasons for doing so could be clearer. Among these: set a constructive tone to help build receptiveness to our recommendations, and show how the positive findings provide a path to resolving the negative ones.	Clarification regarding why this approach was taken was added to Section III.B
24	Kenneth Axe	1	Title		The Safety Culture Assessment Review was required in response to July 2023 coke dust incidents subsequent to (but unrelated to) the spent catalyst release. The SCA Review was not intended to focus on the spent catalyst release	The request for proposal for the safety culture assessment states that this work was undertaken in response to the catalyst release incident. Contra Costa Health has verified.	None required
25	Kenneth Axe	3	II	P1 L4	residents'	Editorial	Change made

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26	Kenneth Axe	5	II	P3 L2	Literally, they were identified in the 2023 PSCA "as having lower survey scores." The survey scores do not indicate that they are "less than robust." In fact, none of the scores in the survey fell below the "Good" range. (1 or 2 = Unfavorable; 3 or 4 = Less Favorable; 5 or 6 = Good; 7 or 8 = More Favorable; 9 or 10 = Most Favorable)	See comment 21. MRC's scoring scale was somewhat unbalanced and we need to explain this issue better.	See comment 21. A better explanation was included in the Section V rewrite.
27	Kenneth Axe	5		Footnote	We agree with the wording in VII.C. 1., regarding ". . . material changes to procedures . . ."	Editorial	Change made
28	Kenneth Axe	7	III.C	P1 L2	The Appendices describe our team experience and project responsibilities, <u>and</u> provide a glossary of terms and acronyms.	Had been written that way anticipating we would add "and Oversight Committee Comments and their resolutions."	Indicated addition made
29	Kenneth Axe	7	IV	P5 L4	Same as comment 5		
30	Kenneth Axe	8	IV	B4	Same as comment 6		
31	Kenneth Axe	8	V	P1 L2-3	These surveys are developed collaboratively by MRC staff and represented employees.	Editorial	Change made
32	Kenneth Axe	8	V	P1 L2	Same as comment 7		
33	Kenneth Axe	8	V	P3 L5	Change MRC to the refinery	Editorial	Change made
34	Kenneth Axe	8	V	P3 L6	MRC LLC	Editorial. Should first define Martinez Refining Company LLC, part of PBF as "MRC" and thereafter use MRC.	Changes made
35	Kenneth Axe	8	V	P3 L11	Change initiative to program.	Editorial	Change made
36	Kenneth Axe	8	V	P4 L2	identified as having lowest average scores	Editorial	Change made



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37	Kenneth Axe	8	V	P4 L3	MRC's	Editorial	Change made
38	Kenneth Axe				Same as comments 24 and 26	See comments 21, 24, and 26	See changes in response to comment 21
39	Kenneth Axe	9	V	P1 L5	MRC LLC	See comment 34	
40	Kenneth Axe	9	V	P2 L1	With scores of 6.8 to 7.3, these six questions scored in the "Good" to "More Favorable" range.	See comments 21 and 26	See changes in response to comment 21
41	Kenneth Axe	9	V	P2 L3-5	Same as comments 24 and 26	See comments 21, 24, and 26	See changes in response to comment 21
42	Kenneth Axe	9	V	P2 L5-6	Same as comments 24 and 26	See comments 21 and 26	See changes in response to comment 21
43	Kenneth Axe	9	V	P3 &4-5	Same as comment 26	See comments 21 and 26	See changes in response to comment 21
44	Kenneth Axe	10	V	P2 (below table)	Same as comment 24	See comments 21 and 26	See changes in response to comment 21
45	Kenneth Axe	10	V	P2 L4	Precise	The word "precise" would be misleading here. The California definition describes a more limited approach to Stop Work Authority compared to what is generally understood. Broad and narrow are appropriate antonyms	None required
46	Kenneth Axe	10	V	P3 L5-6	Same as comment 24		

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47	Kenneth Axe	10	V	P4 L1-3	Per current AFPM Tier 1 and Tier 2 incident rate data, MRC has the fifth best rate among the 104 refineries included in the data set.	We confirmed MRC's high ranking among US refineries. This ranking is consistent with our positive findings. Nonetheless, MRC's incident rate is not zero. We anticipate that the recommendations from this evaluation, when implemented, will help MRC improve further.	None required
48	Kenneth Axe	11	V	P3 L2-3	Same as comment 26	See comments 21 and 26	See changes in response to comment 21
49	Kenneth Axe	12	V	Table L15	Change earn to learn	Editorial	Change made
50	Kenneth Axe	13	V	P1 L3	See comment 39	See comment 34	See comment 34
51	Kenneth Axe	13	V	P6 L1-2	Questions 42 and 43 both scored 8.1.	See comments 21 and 26	See changes in response to comment 21
52	Kenneth Axe	14	V	P1 L1	Same as comment 34		
53	Kenneth Axe	14	VI.A.3	P1 L1	Change managements to management	Editorial	Change made
54	Kenneth Axe	15	VI.B.1	B1	The RCA method employed by MRC and approved by CCH does not define root causes as management system failures.	See the Industrial Safety Ordinance § 450-8.014. Definitions: " <i>Root cause</i> " means <i>prime reasons, such as failures of some management systems [emphasis added], that allow faulty design, inadequate training, or improper changes, which lead to an unsafe act or condition, and result in an incident. If root causes were removed, the particular incident would not have occurred.</i>	Industrial Safety Ordinance reference added to Glossary.  We suggest that CCH revisit the methodologies they have approved to verify these methodologies find Root Causes as per this definition.

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55	Kenneth Axe	16	VI.B.1	B1 L1	MRC does trend and analyze repeat incidents for common causes.	While MRC analyzes repeat incidents, their investigation method doesn't identify proper root causes. Therefore, they are not analyzing repeat incidents for common root causes.	Wording clarified according to this response.
56	Kenneth Axe	16	VI.B.1	Last 2 lines	MRC disagrees with the inference that MRC is not a learning organization. Per current AFPM Tier 1 and Tier 2 incident rate data, MRC has the fifth best rate among the 104 refineries included in the data set.	Since MRC currently analyzes repeat incidents without understanding true root causes, they are not as effective a learning organization as they could be.	Clarified in report.
57	Kenneth Axe	16	VI.B.1	L2	This statement is too general. MRC's Control Systems Engineering management system (part of the PSMS) addresses modes of control. We agree with the recommendation to "Establish and enforce clear expectations for operation of the process control system in manual mode."	Editorial	Change made
58	Kenneth Axe				Same as comment 34		
59	USW5 (Nick Plurkowski transcript of verbal comments)				First of all, I don't feel that sharing the findings with the company before sharing with the oversight committee is along the lines of what we're trying to accomplish here. I feel like the findings should have been shared with the oversight committee ahead of time. I just feel like the level of transparency and what got worked out with deadlines and agreement What are we missing. Did anything fall off in that regard?	This was part of the accepted proposal for conducting this assessment. "We plan to discuss our first draft report with MRC before delivering it to the committee. 2nd sentence about SMART actions..."	None required

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60	USW5 (Nick Plurkowski transcript of verbal comments)				<p>Second, and thanks for Scott mentioning this. There's a lot in the Culture Survey that was written off due to the sale from Shell to PBF and COVID at the same time. Lack of knowledge where to find process safety information. Process Safety not given sufficient priority and decision-making incident reporting system doesn't provide details quickly enough to prevent future incidents. These are serious findings that are getting written off as COVID / sale issues. I appreciate what Scott mentioned about reevaluating those in the future, but I believe that those could directly link to more incidents of a similar nature, and that they need to be addressed much sooner than that, and should be considered findings with immediate recommendation. I'd like to find out if it is something related to something else, and we've already taken care of it. But I think at this point, we can't just go off of a belief that that's true and check another year after another turnaround. I think we need to get started on working on all of those right now. So, there's a significant amount of finding that are written off due to Covid in the sale. believe that those are real findings and need real recommendations.</p>	<p>It is widely known that Covid disrupted workforces. Two-plus years of Covid precautions would be expected to impact survey responses, and would amplify the uncertainty of belonging to a new company. Furthermore, our evaluations were conducted a full year following the conclusion of the culture survey. That is, the refinery had a full year or more to re-establish interpersonal contacts. We concluded that the conditions identified as COVID-affected that existing at the time of our site visit were better than when the survey conducted.</p>	<p>See changes in response to comment 21</p>

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61	USW5 (Nick Plurkowski transcript of verbal comments)				<p>My third point. stop work authority on page 10. Scott mentions that it's possibly related to the narrow California regulatory definition, and that that is different than process safety professionals. I'd really like an elaboration on that to see if we're missing something or over-complicating the process because it is an integral process for safety, especially within a refinery to be able to identify something that's incorrect, and to be able to speak to that and stop something that's happening. And all the uncomfortable and pressure and retaliation stuff that goes along with that. That's a really big deal. And to just kind of, you know, mentioned that the definition might be off a little bit and keep going. If there's more there, I'd really want to hear what more is. And again, a lot of the Stop Work authority stuff was written off as Covid and the sale and again, that's huge. That's something that's happening right now that I know is wrong, and I'm not able to speak up. I you know whether I have the skill to identify it, or the knowledge to mention that. But do I have the authority? To actually speak up and put a stop to something that I know is wrong. Is a really big deal for every worker in the refinery.</p>	<p>When it comes to process safety and the execution of procedures, the question of stop work authority and managing field changes to procedures (including managing the use of manual mode of control) are tightly linked. If a procedure has to be modified in order to continue, workers should stop stepping through the procedure and conduct the appropriate analysis of proposed changes. That is the essence of our recommendation.</p>	None required

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62	USW5 (Nick Plurkowski transcript of verbal comments)				<p>Next number 4. So, in the report there's a few mentions of reduction of risk. It starts off with generally acceptable risk level, and then on page 7, it mentions, the goals should be 0 process safety incident on page 8. There're risk targets that are set by leadership. And on page 10 there's this corporate risk criteria. Did Scott get into corporate risk? Are the corporate risk criteria accurate? Is the risk target set by leadership, accurate and acceptable? If it's if it's too low or high meaning, there's too much risk going on in the plant. That's something that needs to be identified right there. Like the 4 graph that that you showed with the red, yellow, and green just having a good process at the at the plant. But if you're following a weak program, then you're set up for failure. Were you able to review the corporate risk criteria and the risk targets that were set by leadership? Are they real targets that are gonna eventually lead to 0 process safety incidents? So, I feel like the report was lacking, maybe in a sense, there.</p>	<p>We reviewed MRC's risk criteria and approach to managing risk in depth. MRC's risk matrix is within the typical range of risk matrixes used by other companies of its size. Their approach to addressing risk scenarios that fall outside of the acceptable ranges tends to be more proactive than most.</p> <p>It should also be pointed out that there is no regulatory requirement in the US for companies to use risk matrixes.</p>	Wording clarified according to this response.
63	USW5 (Nick Plurkowski transcript of				<p>Also, the page 11 and 12 talked about a notable number of workers that didn't feel safe. And this is regard to the safety</p>	<p>We believe this comment is in agreement with our report. While these questions scored "well" by</p>	See changes in response to comment 21

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	verbal comments)				<p>questions that were mentioned the 2 that were highlighted in black on the graph. A huge red flag. When you have an incident like what happened at Marathon last November, an employee being burned over 90% of his body. There was a lot of red flags and a lot of people feeling unsafe for a long time and to just kind of breeze over that as a lagging indicator. Who's gonna know what's going on in the plant better than the workers? If you're unsafe. who's gonna get hurt, it's the workers right there on the front lines that are gonna know exactly how safe they are and be able to speak to that. And when they do speak to that, we have to listen so that we're not acting surprised when something like this happens. So please don't overlook the fact that a notable amount of workers felt unsafe.</p>	<p>MRC's methodology, this score was achieved by disregarding those that didn't respond to this question. The top-screen method helped highlight that these questions didn't score as high as they should have.</p>	
64	USW5 (Nick Plurkowski transcript of verbal comments)				<p>Yeah. And then, you know. And one comment that I do wanna make I really respect the findings that are shared again. I don't. I don't agree with sharing them with the company first and working out. You know what they're gonna do in the timelines. But I really do agree with all the recommendations and the timelines that they do have in this report.</p>	<p>We did not eliminate or dilute any findings based on our discussion with MRC. We clarified the names of management systems that needed to be improved to match what MRC called them. We also modified the completion-by date of one recommendation to ensure that MRC would have the needed manpower to complete the recommendation properly.</p>	<p>Clarified in report.</p>

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65	USW5 (Nick Plurkowski transcript of verbal comments)				I just am concerned that a lot of these findings that are italicized and written off as covid findings or sale, findings are just as important as the other ones, and we and we need to handle those as well. So, thanks for pointing out the strength of the site. I'd like to cheer, lead the site for being strong in those areas. But I'm also skeptical that those might be inherited from shell, and they're still strong at this point. But are they degrading? I wish I could say that I believe that it's PBF. taking the reins and keeping that process going, but I believe that you know some of this stuff have fallen off and led to this catalyst incident, and I'd like to. Verify that. You know, these other processes actually are strong and continuing to improve. Not just left over from an era where shell was there. So, I like the report again. I'm just nervous. That stuff is falling off with regards to sharing it with the company and all that	In our management system assessment, we found evidence that the culture conditions existing on the site during our evaluations in March 2024 were quite different than November 2022- March 2023	Clarified in report.
66	USW5 (Nick Plurkowski transcript of verbal comments)				Also in a question for the county is Scott going to be around to verify that these recommendation actions are closed. Being the report and recommendation maker, and even working out timelines and stuff like that? Is it going to be the county that verifies action item closure or will Scott still be available for that?	The scope of the current project does not include our post-verification. We could do so via a contract extension. Also see response to question 64.	



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67	Benjamin Therrriault (transcript of verbal comments)				Benjamin Therrriault: Hey? Can you hear me? Hey, I just. I'm sorry I had some connection problems. I just want to know how. Come only 7. The 7 Survey scores were analyze, how come not the entire survey results? And if I miss that explanation, sorry.	This question didn't transcribe well, possibly due to Mr. Therrriault's connection problems. Our methods for analyzing the survey and its basis is discussed in the report.	None required
68	S Devine	3	I	2P, L1	Rewrite 2nd Paragraph to: After the incident, an MRC Oversight Committee was formed, pursuant to the ISO???, which commissioned 1) an independent incident investigation, 2) a human health and ecological risk assessment, and 3) this independent safety culture assessment. The Committee chose Scott Berger and Associates, LLC to perform the independent safety culture assessment. This report describes the results of this independent assessment.	Editorial.  Clarified with CCH, the oversight committee was not required by the ISO	Enumeration added.
69	S Devine			3P, L2	Rewrite 3rd paragraph, 2nd sentence: Utilizing that review, we evaluated how MRC leadership developed, deployed, and enforced process safety management systems (PSMS) to establish a culture of process safety throughout the refinery.	This comment isn't quite accurate. We compared our analysis with the culture survey with our assessment of MRC's management systems and how MRC leadership drive those systems.	No change required
70	S Devine	4	II	P2, L1	Rewrite 2nd paragraph Line 1: As outlined by the Contra Costa County Industrial Safety Ordinance, MRC established an Oversight Committee to investigate the incident.	Clarified with CCH, the oversight committee was not required by the ISO	Clarification made

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71	S Devine	4	II	P3	Indicated that paragraph was not clear: This was not clear to the "lay person", oversight committee participants at the outset. Is it the ISO or consultant that perceives it necessary to be restricted to just "process" safety?	Clarified with CCH, their expectation was that the focus of this work should be on process safety.	Clarification made
72	S Devine	5	II	Last set of bullets	Comment on the findings bullets: * Not having a finding or observation here, that the very high staff turnover at the time of the incident	While MRC performed their cultural assessment in Nov 2022 - March 2023, our work took place one year later and provided a snapshot of the status at that time. We believe Mr. Divine's comment underscores our recommendation that MRC revisit the COVID-era related questions in 2025.	None required
73	S Devine	15	IV		Circled Seamless Communication on the robust management system bullets with the following comment:  Seems contradictory to observation in the root cause incident investigation	A shift handover/relief process should be formal, detailed, and cover all functions being handed over. MRC uses a detailed "Start of Shift Operations" form and a formalized process to ensure seamless communication. We observed two different handovers that were done very professionally. During the independent investigation, we reviewed many very detailed shift handover forms. As noted in that report, the CCU shift	None required

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						handover form from the Day to Night shift on 11/24/2022 was missing.	

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**Appendix D: Responses to Community Comments (PENDING)**

[Pending version 2 of the report]