

## **BARBEE:**

**Chevron UR2 to Chevron: C-AAA (Chuck)**

**Chevron R26 to API: C-AAA (Chuck)**

The first two recommendations we will highlight come from the CSB's Chevron Refinery Fire investigation, one to Chevron, and another to API.

### **Incident Brief:**

On August 6, 2012, the Chevron Refinery in Richmond, California, experienced a catastrophic pipe failure in a crude unit, causing the release of flammable hydrocarbon process fluid, which partially vaporized into a large cloud. 19 Chevron employees engulfed by the vapor cloud escaped, narrowly avoiding serious injury. The ignition and subsequent continued burning of the hydrocarbon process fluid resulted in a large plume of unknown particulates and vapor. Approximately 15,000 people from the surrounding area sought medical treatment in the weeks following the incident.

The U.S. Chemical Safety and Hazard Investigation Board's (CSB) investigation found that the pipe failure was caused by sulfidation corrosion, a damage mechanism that causes piping walls to thin over time. The CSB found multiple reasons for the failure to detect this serious damage.

[We'll first discuss the Urgent Recommendation made to Chevron.](#)

**Number of recs (and/or urgent recs) issued in the investigation:** 37 issued, 2 of which were 'Urgent'

**Number of recs (and/or urgent recs) issued to that recipient:** (Chevron) 5 issued, 2 of which were 'Urgent' (all are now closed)

### **Recommendation Text:**

CSB Recommendation No. 2012-3-I-CA-UR02

*At all California Chevron U.S. refineries, report leading and lagging process safety indicators, such as the action item completion status of recommendations from damage mechanism hazard reviews, to the federal, state, and local regulatory agencies that have chemical release prevention authority.*

**State what the recipient did to close it:**

Pursuant to the newly adopted California process safety management regulations that became effective on October 1, 2017, refineries must develop, implement, and maintain an effective program to track and document process safety performance indicators. Chevron USA currently reports leading and lagging process safety indicator data for its Richmond refinery to Contra Costa Health Services, as required by the City of Richmond and the Contra Costa County Industrial Safety Ordinance. In addition, newly adopted California Accidental Release Prevention Program (CalARP) Regulations require all of California's covered facilities, which include the Chevron Richmond and El Segunda refineries, to report process safety indicators for the previous calendar year by June 30th. Chevron USA informed the CSB that on June 30, 2019, the Chevron Richmond refinery provided leading and lagging process safety indicator data to its Unified Program Agency (UPA) and to Cal/OES on June 28, 2019. An updated version was sent to both agencies on May 11, 2020. The Chevron El Segundo refinery provided its leading and lagging process safety indicator data to its UPA and to Cal/OES on June 26, 2019.

As a result, on Jan. 20, 2021 the Board Voted: **Closed – Acceptable Alternative Action**. The sole reason this was closed as “Acceptable Alternative Action” instead of “Acceptable Action” is that, under normal circumstances, Cal/OSHA only reviews process safety indicator data when they conduct a Program Quality Verification (PQV) inspection and they have not yet scheduled one.

**Answer any questions from the Chairman:**

**Q1 – What types of process safety indicators do petroleum refineries provide to their local unified program agency?**

A1 – The newly adopted California Accidental Release Prevention Program, or CalARP, regulations require all of California’s covered facilities, including refineries, to report the following process safety indicators annually:

- 1) past due inspections for piping and pressure vessels;
- 2) past due PHA corrective actions and seismic corrective actions;
- 3) past due incident investigation corrective actions for major incidents;
- 4) the number of major incidents that have occurred since the updated regulations were passed;
- 5) the number of temporary piping and equipment repairs installed on hydrocarbon and high energy utility systems that are past their date of replacement with a permanent repair and the total number of temporary piping and equipment repairs installed on hydrocarbon and high energy utility systems; and 6) site-specific indicators, consisting of activities and other events that are measured in order to evaluate the performance of process safety systems for the purpose of continuous improvement.

**Q2 – When California petroleum refineries submit their indicator data to their local unified program agency, is this information publicly available?**

A1 - Yes. Data is available from each refinery on the California Governor’s Office of Emergency Services website. In addition, Contra Costa County’s website contains annual process safety performance indicator data for four refineries located in Contra Costa County: Chevron Richmond Refinery, Marathon, Phillips 66 Rodeo Refinery, and PBF Energy.

Now we'll move on to a recommendation to API for this same incident.

**Number of recs (and/or urgent recs) issued to that recipient:** (API) 6 issued,

**Recommendation Text:**

CSB Recommendation No. 2012-3-I-CA-R26

*Revise API RP 939-C: Guidelines for Avoiding Sulfidation (Sulfidic) Corrosion Failures in Oil Refineries to establish minimum requirements for preventing catastrophic rupture of low-silicon carbon steel piping. At a minimum:*

- a) Require users to identify carbon steel piping circuits susceptible to sulfidation corrosion that may contain low-silicon components. These circuits have the potential to contain carbon steel components that were not manufactured to the American Society for Testing and Materials (ASTM) A106 specification and may contain less than 0.10 weight percent silicon content.*
- b) For piping circuits identified to meet the specifications detailed in 2012-03-I-CA-R26(a), require users to either (1) enact a program to inspect every component within the piping circuit once, known as 100 percent component inspection (per the requirements established pursuant to recommendation 2012-03-I-CA-R28(c)), or (2) replace the identified at-risk carbon steel piping with a steel alloy that is more resistant to sulfidation corrosion.*
- c) If low-silicon components or components with accelerated corrosion are identified in a carbon steel piping circuit meeting the specifications detailed in 2012-03-I-CA-R26(a), require designation of these components as permanent Condition Monitoring Locations (CMLs) until the piping components are replaced.*

**State what the recipient did to close it:**

API addressed all the issues raised by the CSB recommendation, but API retained the typical “should” language associated with its recommended

practice guidance documents. As a result, on Jan. 20, 2021 the Board Voted: **Closed – Acceptable Alternative Action**

**Answer any questions from the Chairman:**

**Q1 - How does API 939-C address piping that has been identified as being susceptible to sulfidation corrosion?**

A1 – When low-silicon carbon steel piping components are identified, 939-C relies on API 570, Piping Inspection Code, to manage their replacement. API 570 addresses requirements for piping inspection plans, inspection analysis and evaluation, performing remaining life calculations, and recommendations for repair and replacement. By following API 570, effective company management systems should ensure that susceptible low-silicon carbon steel piping components are replaced before they fail.

**Q2 - Why do we think this “should” language is sufficient versus what the actual recommendation language asked for?**

A2 - API 939-C is a recommended practice rather than a standard. Recommended practices generally include recommendations rather than requirements. The CSB’s recommendation did not address turning this into a standard, and so the CSB is accepting that 939-C includes “should” language instead of “shall” language. However, this is not a hard rule, there are times that “shall” language is required primarily for applicability issues, which is not the case with this recommended practice.

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## **BP Texas City R7a to API: C-AA (Chuck)**

## **BP Texas City R7b to USW: C-AA (Chuck)**

The next two recommendations come from the CSB's BP America Refinery Explosion investigation (also referred to as BP Texas City).

### **Incident Brief:**

On March 23, 2005, the BP Texas City refinery experienced severe explosions and fire in an isomerization unit (ISOM) that resulted in 15 deaths, 180 injuries, and significant monetary losses. The accident was caused by the overfilling of a raffinate splitter tower during startup that in turn opened pressure relief devices and dumped flammable liquid into a blowdown drum with a stack that was open to the atmosphere. The flammable liquid released from the stack exceeded the capacity of both the blowdown drum and its stack and was released into the surrounding area where it ignited, resulting in the explosions and fire.

The U.S. Chemical Safety and Hazard Investigation Board (CSB) investigation found that the incident was caused by multiple technical, system, and organizational deficiencies, and the agency issued recommendations to various parties. Among the findings, the CSB investigation concluded that the ISOM operators were likely fatigued from working long hours over consecutive days during the turnaround of the unit prior to startup. Additionally, the CSB found that there were no federal safety regulations, industry safety guidelines or voluntary standards to manage and prevent fatigue as a risk factor.

**Number of recs (and/or urgent recs) issued in the investigation:** 26 issued, 2 of which were 'Urgent'

**Number of recs (and/or urgent recs) issued to that recipient:** (API) 5 issued, 2 of which were 'Urgent' (only 1 remains open)

**Number of recs (and/or urgent recs) issued to that recipient:** (USW) 2 issued (only 1 remains open)

## **Recommendation Text:**

CSB Recommendation No. 2005-04-I-TX-R7 (a and b)

*Work together [API and USW] to develop two new consensus American National Standards Institute (ANSI) standards. In the second standard, develop fatigue prevention guidelines for the refining and petrochemical industries that, at a minimum, limit hours and days of work and address shift work. In the development of each standard, ensure that the committees a) are accredited and conform to ANSI principles of openness, balance, due process, and consensus; and b) include representation of diverse sectors such as industry, labor, government, public interest and environmental organizations and experts from relevant scientific organizations and disciplines.*

## **State what the recipient did to close it:**

API is accredited by the American National Standards Institute (ANSI) and developed the proposed 2nd Edition of RP-755 in accordance with ANSI standards. API RP 755 met all the requirements of the recommendation specific to developing fatigue prevention guidelines and the API RP 755 Revision Committee had diverse representation by the following sectors: industry, engineering and contractors, government, consultants, trade associations/professional societies, labor, and others. USW was one of the participants in those API RP 755 Revision Committee meetings. As a result, on Jan. 20, 2021 the Board Voted: **Closed – Acceptable Action.**

## **Answer any questions from the Chairman:**

**Q1 - What was it about this recommendation that was so groundbreaking?**

A1 – This was the first fatigue standard ever considered for the petroleum industry.

**Q2 - Why is part b of this recommendation of such importance?**

A2 – This type of recommendation allows the CSB to directly influence who participates with the primary recommendation recipient in implementing the

recommendation. We are not bound by specific numbers, so we could have easily required additional participants. This is important to keep in mind when developing or modifying consensus standards. ANSI requires balance as to committee make-up and committee participation is voluntary. It is important to remember that the CSB has the ability to influence that balance, when appropriate.

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## CAPECO R9 to API: C-AAA (Mark K.)

The last recommendation comes from the CSB's Caribbean Petroleum Refining Tank Explosion and Fire investigation and will be presented by Senior Recommendations Specialist Mark Kaszniak of my staff.

Mr. Kaszniak please proceed with your presentation.

### **KAZNIAK**

#### **Incident Brief:**

On October 23, 2009, explosions and fire occurred at the Caribbean Petroleum Corporation (CAPECO) facility in Bayamon, Puerto Rico. While offloading the contents of the tanker ship, Cape Bruny, into the CAPECO onshore tank farm, an estimated 200,000 gallons of gasoline overflowed from an aboveground storage tank into a secondary containment dike that had an open drain.

During the overflow some of the gasoline, which sprayed from the tank's roof vents and hit the tank's wind girder as it fell, aerosolized forming a large vapor cloud (estimated to encompass an area of about 107 acres) that subsequently ignited after reaching an ignition source in CAPECO's wastewater treatment facility. The ensuing blast, multiple secondary explosions and fire resulted in significant damage to 17 of the 48 petroleum storage tanks. The blast created a pressure wave that registered 2.9 on the Richter scale and damaged approximately 300 homes and businesses up to 1.25 miles from the site. Although there were no fatalities and only three people experienced minor injuries off site as a result of the initial blast, the fires burned for almost 60 hours. Petroleum products leaked into the soil, nearby wetlands and navigable waterways in the surrounding area.

As a part of its investigation, the U.S. Chemical Safety and Hazard Investigation Board (CSB) analyzed relevant regulatory, industry, and consensus standards for safety and management of bulk aboveground storage facilities. The CSB noted in its investigation report that a number of industry trade groups, professional associations, and code officials, such as the American Petroleum Institute (API), National Fire Protection

Association (NFPA), and International Code Council (ICC), publish national consensus standards that apply to aboveground storage tanks.

In its review of API's national consensus standards, the CSB determined that while API Standard 2350, Overfill Protection for Storage Tanks in Petroleum Facilities, and the API Manual of Petroleum Measurement Standards (MPMS) Ch. 3.1A were the most relevant to overfilling of tanks at storage terminals, many other API standards need to be taken into consideration for proper management of aboveground storage tank operations at terminal facilities. For example, API 2003, Protection against Ignitions Arising out of Static, Lightning, and Stray Currents, provides best practices for preventing static and stray electrical currents. API 2003 provides charts that compare pipe diameter, flow velocities, and flow rates that minimize static and stray currents during tank filling thus reducing the possibility of a fire/explosion, but this standard is not specific to tank filling operations.

Consequently, the Board issued a recommendation to API to create one standard practice, or publicize the existence of all standards and recommended practices, governing aboveground storage tank operations including references to international standards and best practices at tank terminals that would enable facilities to readily access these good engineering practices.

**Number of recs (and/or urgent recs) issued in the investigation:** 9 issued

**Number of recs (and/or urgent recs) issued to that recipient:** (API) 3 issued, (2 remain open)

**Recommendation Text:**

CSB Recommendation No. 2010-02-I-PR-R9

*Develop a single publication or resource describing all API standards and other relevant codes, standards, guidance, and information for filling operations of aboveground storage tanks in petroleum facilities that describes:*

- a) *The required design and management practices for control of filling operations;*
- b) *The minimum set of independent overfill prevention safeguards if the control fails; and*
- c) *Operational challenges (e.g., monitoring/calculating flow rates, ability to maintain constant line pressures, and influences of valve cracking) related to loading multiple tanks concurrently from a single product source.*

**State what the recipient did to close it:**

API Standard 2610 addressed all the requirements listed in the CSB recommendation, with the exception of information regarding loading multiple tanks concurrently. As a result, on Jan. 20, 2021 the Board Voted: **Closed – Acceptable Alternative Action.**

**Answer any questions from the Chairman:**

**Q1 - Why is this recommendation being closed as an “Acceptable Alternative Action”?**

A1 - While the third edition of API Standard 2610 addresses all the requirements listed in the CSB recommendation, the provisions listed in Section 11.2 pertaining to flow rates and line pressures are not explicitly linked to loading multiple tanks concurrently from a single product source that were mentioned in the CSB recommendation. The user of this standard needs to consult another referenced standard by API 2610 to find this information, so this is why the recommendation was closed as an “Acceptable Alternative Action.”

**Q2 - How many standards and other guidance documents apply to terminals and their storage tanks?**

A2 - The third edition of API 2610 lists 194 technical references that may be applicable to terminals and tank facilities. They include a variety of international standards, U.S. regulatory standards; building codes; as well as API and various other industry consensus and specification standards.

