Attachment 6:
Hydrogen Safety Plan

Shell Hydrogen Retail Stations in Northern California

Proposed Station Locations:

Ten Proposed Locations in the
San Francisco Bay Area

August 5, 2016

GFO-15-605
Alternative and Renewable Fuel and Vehicle Technology Program
Light Duty Vehicle Hydrogen Refueling Infrastructure

Applicant's Name:

Equilon Enterprises LLC (d/b/a Shell Oil Products US)

Applicant's Point of Contact:

James Martin
Hydrogen Retail Projects Manager
(925) 766-0906
james.c.martin@shell.com

Table of Contents

1) SCOPE OF WORK FOR THE SAFETY PLAN 3
Overview 3
Commonalities among the Multiple Stations 3
Project Site Descriptions 4
Station #1 – 1201 Harrison Street, San Francisco, CA 94103 4
Station #2 – 3550 Mission Street, San Francisco, CA 94110 4
Station #3 – 1250 University Avenue, Berkeley, CA 94702 4
Station #4 – 1288 W. El Camino Real, Mountain View, CA 94040 4
Station #5 – 3510 Fair Oaks Boulevard. Sacramento, CA 95864 4
Station #6 – 551 Third Street, San Francisco, CA 94107 4
Station #7 – 2900 N. Main Street. Walnut Creek, CA 94597 4
Station #8 – 101 Bernal Road, San Jose, CA 95119 4
Station #9 – 1300 Sunnyvale Saratoga Road. Sunnyvale, CA 94087 5
Station 10 – 6141 Greenback Lane. Citrus Heights, CA 95621 5
Description of Fueling Station Layout, Operation, and Equipment 5

2) ORGANIZATIONAL SAFETY INFORMATION 6
A) ORGANIZATIONAL POLICIES AND PROCEDURES 6
Shell's Commitment and Policy on Health, Security, Safety, the Environment and Social Performance 6
Commitment 6
Policy 6
Shell's Group Standards for Health, Security, Safety, the Environment & Social Performance 6
HSSE & SP Common Processes 6
Health 7
Personal Safety 7
Process Safety 7
Security 7
Environment 7
Contractor Management 7
Projects 8
Transport 8
Social Performance 8
Product Stewardship 8
Documentation 8
Project Team Involvement 8
B) HYDROGEN AND FUEL CELL EXPERIENCE 10
Shell 10
H2 Logic 10

3) PROJECT SAFETY 11
A) IDENTIFICATION OF SAFETY VULNERABILITIES (ISV) 11
The Hazards and Effects Management Process (HEMP) 11
Hazard Register 12
Bowtie Analysis 12
Gap Analysis 13
Typical HEMP Results 13
B) RISK REDUCTION PLAN 14
C) STATION OPERATING PROCEDURES AND SAFETY FEATURES 15
Operating Steps 15
Station Safe Design 18
Safety System Testing, Calibraton and Station Inspection 18
Sample Handling and Transport 19

d) Equipment and Mechanical Integrity 27
Materials Selection Process to Ensure Hydrogen Compatibility *27*
e) Management of Change (MOC) Procedures 27
f) Project Safety Documentation 29
Manuals *29*

4) COMMUNICATIONS PLAN 29
a) Training 29
b) Safety Reviews 30
c) Safety Events and Lessons Learned 30
Incident Management Tools *30*
FOUNTAIN INCIDENT MANAGEMENT (FIM) 30
NUOC INCIDENT LOG 31
NOTIFICATION & FIRST REPORT 31
INCIDENT CLASSIFICATION 31
INCIDENT INVESTIGATION 32
Closing the Incident Record *34*
Learning from Incidents *34*
d) Emergency Response 35
e) Self Audits 35

5) ADDITIONAL INFORMATION 36
Tables and Figures Referenced in Previous Sections 36
Site Layouts 36

Hydrogen Safety Plan
Bay Area Site Locations

1) Scope of Work for the Safety Plan

Overview

The scope of work covered by this safety plan includes integration of a new 400 kilogram per day capacity Light Duty Hydrogen Fueling Station within an existing Shell Branded Retail Gasoline Outlet as proposed at various San Francisco Bay Area and Sacramento locations. Shell will manage the engineering design, permitting, equipment installation and commissioning, to meet operational and safety requirements for commercial activity as an Open Retail Center. Shell's commitment for operation as an Open Retail Center will be for a minimum of five years.

Shell will use the Hazards and Effects Management Process (HEMP) as an element of its Health, Safety, Security, and Environmental control framework system (HSSE) to address risk assessment for these hydrogen fueling stations. The Hazards and Effects Management Process (HEMP) provides a structured approach to the analysis of safety hazards throughout the life cycle of an installation. The HEMP methodology identifies various hazards at the facility and assesses management of the identified hazards. The HEMP process requires key or critical tasks and/or activities to be identified with the individual who is accountable for maintaining the controls.

Commonalities among the Multiple Stations

All Shell's proposed stations involve gas distribution by truck delivery, onsite storage, compression, and dispensing. Although layouts of equipment may vary among the different sites, common to all sites will be storage, compression, and dispensing equipment. Nameplate capacities are identical for all stations. Given that each station's design, operational, maintenance, and safety issues are common, Shell is submitting one Hydrogen Safety Plan. Station locations are listed in the table below.

No.	List of Stations by Address Included in GFO Application	Nameplate Capacity (Kg)
1	1201 Harrison Street, San Francisco, CA 94702	400
2	3550 Mission Street, San Francisco, CA 94110	400
3	1250 University Avenue, Berkeley, CA 94702	400
4	1288 West El Camino Real, Mountain View, CA 94040	400
5	3510 Fair Oaks Boulevard, Sacramento, CA 95864	400
6	551 Third Street, San Francisco, CA 94107	400
7	2900 N. Main Street, Walnut Creek, CA 94597	400
8	101 Bernal Road, San Jose, CA 95119	400
9	1300 Sunnyvale Saratoga Road, Sunnyvale, CA 94087	400
10	6141 Greenback Lane, Citrus Heights, CA 95621	400

<u>Project Site Descriptions</u>
Project site descriptions are included in Attachment 8 for each of the ten stations and also included below. ***All of these sites are existing gasoline/diesel fueling stations.***

<u>Station #1 – 1201 Harrison Street, San Francisco, CA 94103</u>
The site is a retail gasoline/diesel fueling station. It is located on a corner intersection of Harrison Street and 8th Street, close to I-80 and US101. The property is zoned SALI – Service/Arts/Light Industrial, and the Bessie Carmichael Elementary School is located within ¼ mile.

<u>Station #2 – 3550 Mission Street, San Francisco, CA 94110</u>
The site is a retail gasoline refueling station located on the corner of Mission Street, Randall Street and San Jose Avenue directly across from Fairmount Elementary School. Overhead power lines run along all three frontage streets. A major electrical power enclosure resides on the property (with easement) on the Randall street side. The property is zoned NC-3 Neighborhood Commercial, Moderate Scale. The following daycare and senior care facilities are located within ¼ mile: Primeros Pasos, Foundations Home Daycare, Senior Helpers, On Lok Lifeways, 30th Street Senior Center.

<u>Station #3 – 1250 University Avenue, Berkeley, CA 94702</u>
The site is a gasoline refueling station listed as C1 General Commercial. Surrounding the site on the East and South are residences along the property line. Within ¼ mile of the site are the following: a Child Education Center – Preschool, 2100 Browning St; Berkeley Montessori School – 1310 University Ave; Berkeley Unified School District Offices, 2020 Bonar St; and the Berkeley Adult School, 1701 San Pablo Ave. There are no elder care or medical facilities with ¼ mile.

<u>Station #4 – 1288 W. El Camino Real, Mountain View, CA 94040</u>
The site is a gasoline/diesel fueling station, and is located on the western corner of Hickey Blvd and Gateway Drive with residential properties to the south and west. The property is zoned P38 – Special Zone, Planned Community/El Camino Real Precise Plan. Within ¼ mile there are four schools (National Bartenders School, Portnov Computer School, 9 Fruits Learning Center, and St. Josephs Catholic School) and one day care center (Safari Kid). There are no nearby senior care facilities.

<u>Station #5 – 3510 Fair Oaks Boulevard. Sacramento, CA 95864</u>
The site is a gasoline refueling station located at the SE corner of Fair Oaks Blvd and Watt Avenue. The surrounding area is a large parking lot on two sides for a shopping plaza to the North. Retail businesses and gasoline stations are located at the opposite sides of the streets. The property is zoned SC – Shopping Center. There are no schools, daycare or senior care facilities within ¼ mile.

<u>Station #6 – 551 Third Street, San Francisco, CA 94107</u>
This site is a retail gasoline refueling station and is zoned as SLI – Service/Light Industrial. On the east property line is a web design firm office. The nearest residence is approximately 75ft from the property line to the north. Within ¼ mile of the site are the following: Senior Helpers - Senior Citizen Center, 148 Townsend St; One Medical Group, 501 2nd St #415; and StarSeeds preschool, 599 3rd St #206. There are no day care facilities within ¼ mile.

<u>Station #7 – 2900 N. Main Street. Walnut Creek, CA 94597</u>
The site is a retail gasoline/diesel refueling station located adjacent to the 680 freeway at the NE corner of North Main Street and Treat Blvd. The surrounding area is a large parking lot on two sides for a shopping plaza to the east. Retail businesses are located to the north and to the west of the site. The property is zoned CC – Community Commercial. There are schools and daycare and senior care facilities within ¼ mile of this location, including: Fusion Academy, Kids Kastle Child Care of Walnut Creek, Pacific Senior Care Services, The Kensington, and ADG Referral Services.

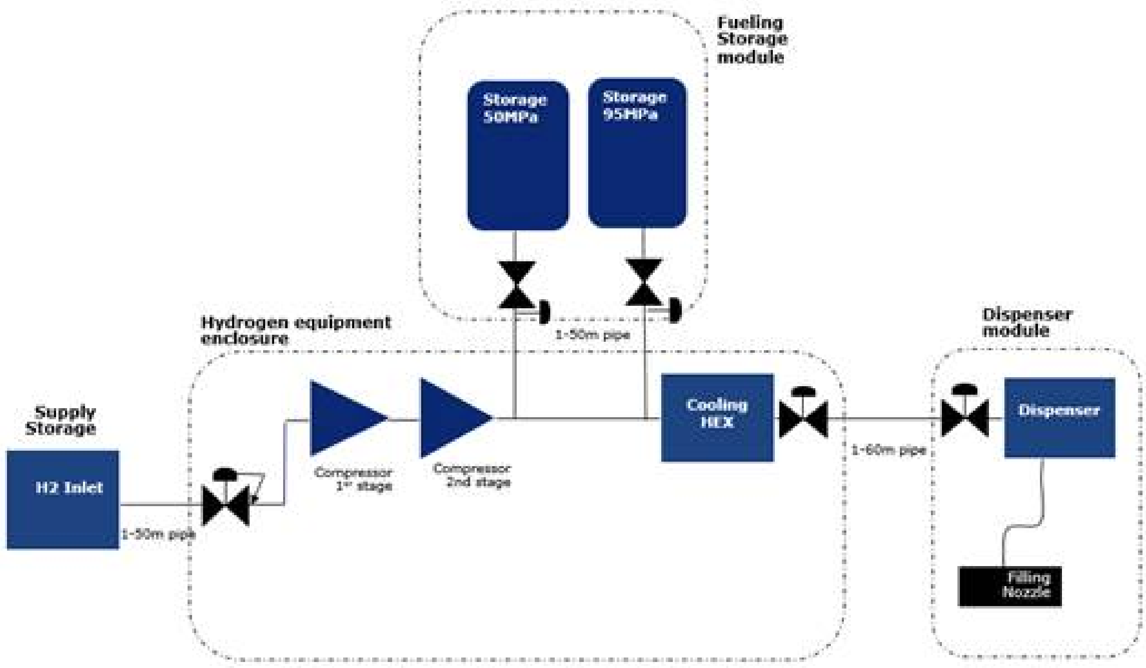
<u>Station #8 – 101 Bernal Road, San Jose, CA 95119</u>
This site is a retail gasoline refueling station and is zoned as Agriculture (Planned Development), but identified on the San Jose General Plan as “Neighborhood/Community Commercial.” Carrington College, 5883 Rue Ferrari, is located within ¼ mile of the site. There are no elder car or daycare facilities nearby.

Station #9 – 1300 Sunnyvale Saratoga Road. Sunnyvale, CA 94087
The site is a retail gasoline/diesel refueling station. The site is located on the intersection of Sunnyvale Saratoga Road and Fremont Ave. The property is zoned C1-PD, Neighborhood Business. Within ¼ mile are Fremont High School, Tulip After School, and Fournier Daycare. There are no senior care facilities nearby.

Station 10 – 6141 Greenback Lane. Citrus Heights, CA 95621
The site is a gasoline refueling station located at the North corner of Greenback Lane and Auburn Blvd. The surrounding area is a large parking lot on two sides for a shopping plaza to the North. Retail businesses and gasoline stations are located at the opposite sides of the streets. The area is zoned SC – Shopping Center. There are no schools, daycare facilities, or senior care facilities within ¼ mile.

Description of Fueling Station Layout, Operation, and Equipment
The Hydrogen Refueling Stations (HRS) will be integrated within the Shell Branded retail gasoline outlets located at the proposed locations described above. The equipment design and facility layout will be engineered in accordance with applicable standards, codes and local regulations. Shell has selected H2 Logic as the equipment provider to design fabricate and install the equipment to safely store, compress and dispense hydrogen fuel to the emerging fleet of fuel cell electric vehicles (FCEV). The HRS consists of the following main modules: 1.) The Hydrogen Equipment Enclosure (HEE) module which includes the compressor, cooling system, controls, and valve arrays for storage distribution, 2.) The supply and fueling storage module, and 3.) Fueling Dispensers are shown in the figure below. The HRS facility will include a separate electric power service with its own meter and main disconnect, vent system, lighting and fire rated walls as necessary for separation.

Process Flow Diagram for Shell's Fueling Stations



The operation of the station will be automated and equipped with a point of sale system to accept electronic transactions for fuel dispensing. The HRS station will be designed for a fail safe operation and will safely protect or shutdown operation with safety devices, control systems, or engineering controls and procedures.

2) Organizational Safety Information

a) Organizational Policies and Procedures

Shell's Commitment and Policy on Health, Security, Safety, the Environment and Social Performance

Commitment
At Shell we are all committed to:

- Pursue the goal of no harm to people;
- Protect the environment;
- Use material and energy efficiently to provide our products and services;
- Respect our neighbors and contribute to the societies in which we operate;
- Develop energy resources, products and services consistent with these aims;
- Publicly report on our performance;
- Play a leading role in promoting best practice in our industries;
- Manage Health, Safety, Security, and Environmental (HSSE) & SP (Social Performance) matters as any other critical business activity; and
- Promote a Culture in which all Shell Employees share this commitment.

In this way we aim to have an HSSE & SP performance we can be proud of, to earn the confidence of customers, shareholders and society at large, to be a good neighbor and to contribute to sustainable development.

Policy
Every Shell Company:

- Has a systematic approach to HSSE & SP management designed to ensure compliance with the law and to achieve continuous performance improvement;
- Sets targets for improvement and measures, appraises and reports performance;
- Requires Contractors to manage HSSE & SP in line with this policy;
- Requires joint ventures under its operational control to apply this policy, and uses its influence to promote it in its other ventures;
- Engages effectively with neighbors and impacted communities; and
- Includes HSSE & SP performance in the appraisal of staff and rewards accordingly.

Shell's Group Standards for Health, Security, Safety, the Environment & Social Performance
Business and Function Heads are Accountable for adherence to these standards. The scope for application of each of these standards is specified in the Shell HSSE & SP Control Framework manuals.

HSSE & SP Common Processes

- Significant HSSE & SP Risks associated with Business activities are assessed and controlled to levels As Low As Reasonably Practicable (ALARP).
- People who have responsibilities for HSSE & SP are Competent and have the resources to perform their roles.
- A Permit To Work process is used to manage the Risks of hazardous work.
- Changes to facilities, processes and organizations are managed to maintain Risk controls.
- Emergency Response plans, including those for medical emergencies and spills or releases to the environment, are established and exercised to maintain preparedness.
- Incidents are investigated and analyzed to identify improvements.
- HSSE and SP data is prepared and reported in conformity with the Group and relevant regulatory requirements applicable to such data.
- Assurance is provided to the Board of Royal Dutch Shell plc that HSSE & SP Controls, including Process Safety Controls, are effective.

Health

- Health Risks are systematically identified, assessed and controlled at all stages of the Business lifecycle.
- Fitness to work evaluations are established and applied where there are significant health or safety Risks.
- Policies and programs are established covering the use of alcohol and Drugs.
- Employees have access to medical services that take account of the Risks associated with the type and location of their work.
- Human factors engineering principles are applied during the design stage of projects.

Personal Safety

- Procedures and safe working practices are established for tasks with personal safety Risks.
- People understand the Hazards, the work Procedures and the safe working practices for their tasks.
- People use Personal Protective Equipment appropriate to their tasks.
- People performing tasks with safety Risks are supervised appropriately.

Process Safety

- The design and construction of New Assets and Modifications to existing Assets are in accordance with the Shell Design And Engineering Manuals, or industry standards in areas outside the scope of these manuals.
- Technical Authorities are established for the interpretation of the Shell Design And Engineering Manuals.
- Each Asset has a nominated Asset Manager with accountability for Process Safety in the operation of that Asset.
- The Technical Integrity of Assets is maintained by systematic inspection, testing, maintenance and Management Of Change.
- Assets are operated within established operating limits.

Security

- Security Risk management is conducted in accordance with national legal requirements and Internationally Recognized Standards, including the Voluntary Principles on Security and Human Rights.
- Armed security is not used unless it is a legal or government requirement or there is no acceptable alternative to manage the Risk. If armed security is used, it is in accordance with the Shell Rules on the Use of Force.
- Payments to host governments for the provision of security forces are approved and recorded.

Environment

- Major Installations are certified against an internationally recognized independent environmental Management System standard if they have significant environmental Risks.
- Ships that are owned, operated or managed by Shell comply with the International Convention for the Prevention of Pollution from Ships and are Accredited under the International Safety Management Code.
- Energy use and efficiency and Greenhouse Gas emissions are monitored and managed for continuous improvement and the global Greenhouse Gas emission inventory is subject to independent Assurance. Installations are designed not to flare or vent hydrocarbons continuously as a means of Disposal.
- SOx and NOx emissions, the discharge and disposal of process effluents and Produced Water, and the transport and Disposal of Waste are managed in line with Internationally Recognized Standards.
- The Risks of soil and groundwater contamination are assessed and managed.
- In areas of water scarcity, facilities are designed and operated to reduce water use to ALARP. Potential Impacts of Shell operations on Biodiversity and Ecosystems are assessed and managed.

Contractor Management

- Contracts to provide services or goods to Shell that have associated HSSE & SP Risks include requirements for the management of those Risks. The ability of Contractors and suppliers to manage the HSSE & SP Risks of contracted activities is taken into account in the selection process.
- Contractors and suppliers are appraised and monitored to verify that they meet the HSSE & SP requirements of the contract.

Projects

- HSSE & SP Risks are assessed and managed throughout the project lifecycle.
- Impact Assessments covering environmental, social and health aspects, and based on Internationally Recognized Standards, are performed for all major projects and for modifications to existing facilities.

Transport

- Road Controls to manage road safety are established for Drivers, Vehicles and Journeys.
- Extra Controls are established for Professional Drivers and in Areas with high road safety Risks.

Social Performance

- The Impacts of Shell operations on communities and other Stakeholders are assessed and considered in Business decisions. Respectful engagement with Stakeholders is maintained throughout the Business lifecycle.
- Negative Impacts of Business activities are minimized, and positive Impacts maximized, in a sustainable manner.

Product Stewardship

- The Risks associated with Products are assessed and managed throughout the Product lifecycle and at each stage of the supply chain in line with relevant standards and external commitments.
- The information needed to understand and manage the Risks associated with Products is communicated to employees, Contractors and customers.
- The use of animals to assess Risks is reduced, refined or replaced with alternative testing methods where law permits.

Documentation

Shell will develop the following documents, plans and procedures for each site:

- A joint Hazard and Operability Study (HAZOP) will be conducted with the equipment supplier.
- A Health, Safety, Security and Environmental (HSSE) case review will be jointly conducted with the engineering firm of record and the equipment supplier.
- An Emergency Response Plan (ERP) will be completed which outlines the procedures and organization structure to respond to emergencies.
- A Hazardous Materials Management Plan will specify the procedures for handling, storing or disposing of any hazardous materials during the life cycle of the project.
- A Permit to Work procedure will identify procedures for safely securing the work area and equipment before work is commenced.
- A Contractor Safety Plan will specify the qualifications, controls, safety programs, training, communication, and metrics for all contractor suppliers.
- The Operations Manual will document the installation, operations procedures and maintenance of the Hydrogen Refueling Station.
- The Management of Change Procedure communicates proposed facility and/or operational modifications to the appropriate stakeholders for review, analysis, documentation and approval.
- A Noise Study will document the noise levels for compliance and identify any mitigation methods to reduce noise levels or provide safety measures for hearing protection.
- A Pre-startup Safety Review checklist will be developed and utilized for commissioning.
- A Waste Management Plan will be developed for handling and properly disposing of waste materials.

Project Team Involvement

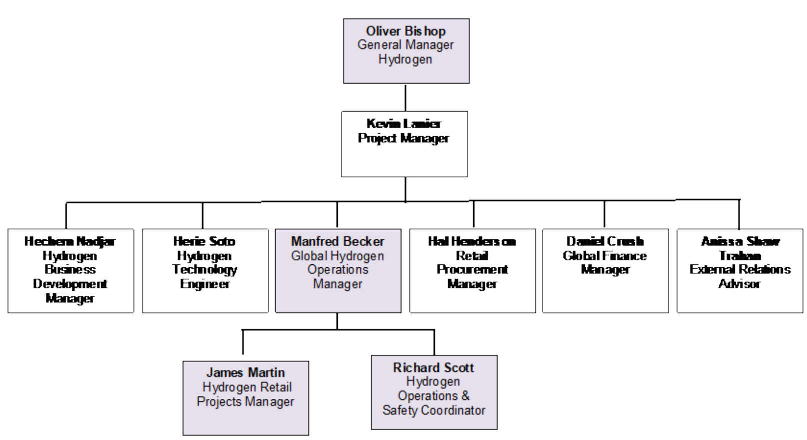
Shell's' management matrix is shown below. Of those listed, the following are directly involved in execution and operations for the proposed stations:

- Oliver Bishop, General Manager Hydrogen - Mr. Bishop is the General Manager for Shell's global activities in hydrogen. His team runs Shell's hydrogen stations in Germany and California, and is also responsible for research and development. He is responsible for Shell's participation in H2 Mobility Germany, a joint venture he negotiated and set up with five other partner companies, EU, and German government and which is now rolling out 400 hydrogen stations across Germany. Mr. Bishop is a Director of several Royal Dutch Shell companies. During his 18-year career at Shell, he was General Manager for Shell's trading business in Switzerland, held a post as Mergers and Acquisitions (M&A) Manager in Shell's M&A team, and has had previous roles in Fuels Retailing, Finance and Strategy. He holds a Bachelor of Science degree with Honours (First Class) in electronics engineering.

- Manfred Becker, Hydrogen Operations Manager – Mr. Becker has worked for Shell since 1988. He has a very broad experience of Retail business acquired via different roles in Marketing, Network and Sales & Ops, e.g. Bottom line accountability, Relationship management, Stakeholder Management, Self-Mastery, Coaching, Negotiations, Leading teams, Project management, Development of partnership models and marketing campaigns. Mr. Becker has been involved extensively in engineering and retail development projects throughout his career. As such he provides extensive know-how on Retail site design, Design& Construction optimization, and HSSE in design and site work. Currently Mr. Becker acts as Shell's Global Hydrogen Operations Manager for the Hydrogen Commercial and Operations activities within Shell's New Energies Business. In this role he manages the full life cycle of Shell's Hydrogen Retail stations, including close interaction with Shell's involvement in the H2 Mobility JV in Germany. This includes the planning of hydrogen stations, the safe and efficient operations of the stations as well as managing the external and internal stakeholders, manage HSSE aspects of the hydrogen business as well as a high-level oversight of HSSE in biofuels, Gas to Liquids (GTL) marketing and electric vehicle trials. Mr. Becker holds a Master's degree in civil engineering.

- James Martin, Hydrogen Retail Projects Manager **-** Mr. Martin has more than 30 years of petroleum project engineering experience including eight years of developing hydrogen refueling stations. Mr. Martin has completed four hydrogen refueling station projects for Shell in southern California including engineering scope development, permitting, cost and schedule management, Hazard and Operability (HAZOP) and Health, Safety, Security &Environmental (HSSE) case reviews, management of change (MOC), construction management, and commissioning. Mr. Martin has a B.S. in Mechanical Engineering from U. C. Davis, an M.B.A. from U. C. Irvine, and is a registered Professional Engineer, M28422, in the state of California.

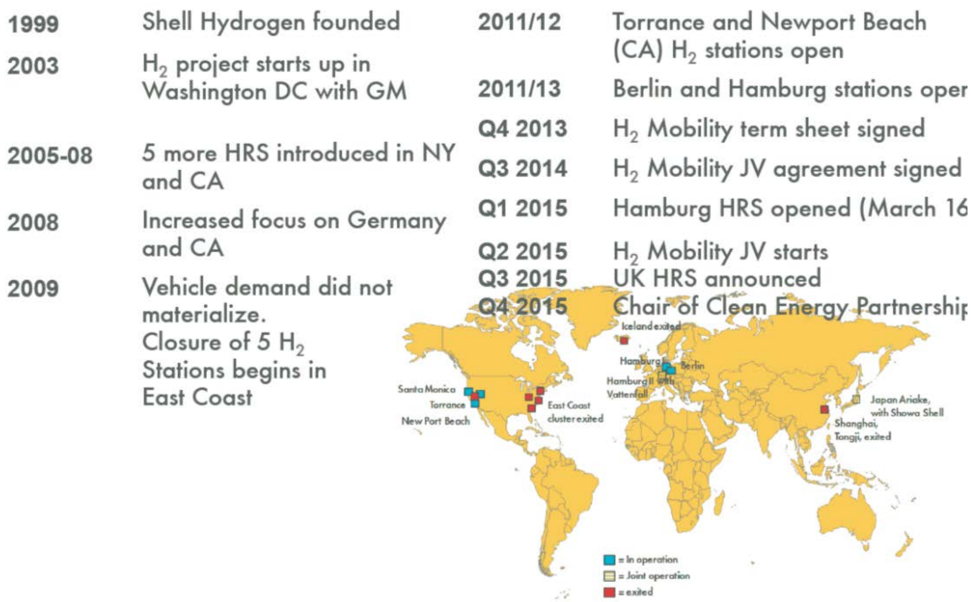
- Richard Scott, Hydrogen Operations and Safety Coordinator - Mr. Scott has more than 25 years of petroleum project technical and operations experience including twelve years of developing hydrogen refueling stations. Mr. Scott coordinates all site operations, data reporting, communications with hydrogen fuel cell vehicle OEMs, and oversees the safety program including training for multiple contractors/companies. Additionally, Mr. Scott has written site manuals, which include Operations, Training, Emergency Response Plans for the following sites: Washington DC (2004), White Plains NY(2007,: West Los Angeles CA,(2008), Culver City CA (2011), Torrance CA (2011) Newport Beach CA (2011). He also assures compliance with all government permits and Shell HSSE initiatives and conducts tours and demonstrations on site for interest groups and government officials.



b) Hydrogen and Fuel Cell Experience

Shell

Shell has a long history in the hydrogen refueling station (HRS) business for more than over 15 years now. In 1999 Shell Hydrogen LLC was founded. In 2003 we completed commissioning and began public operations at our first site in Washington DC. Between 2005 and 2008 five more HRS were introduced in NY and CA, but due to limited vehicle demand, sites on the East Coast were closed. Shell increased its focus on CA and Germany and in 2011 and 2012 Torrance and Newport Beach were opened successfully. Likewise we built and opened more hydrogen sites in Berlin and Hamburg. The dispensers at these sites will refuel hydrogen fuel cell electric vehicles (FCEV) in a few minutes.



SHELL HYDROGEN JOURNEY – OVER 15 YEAR HISTORY

Shell has extensive experience with light and medium duty vehicle hydrogen infrastructure projects. Shell has implemented and operated Hydrogen Refueling Stations in the United States, Germany, Japan, China and the United Kingdom. Shell has installed and operated eight locations in the United States. The table below shows four previous California hydrogen station installations completed by Shell and its commercial partners.

Name	Date	Description
West Los Angeles, California	2008	Retail Light Duty vehicle hydrogen fueling center using onsite generation by electrolysis and on site storage.
Culver City, California	2009	Retail Light Duty vehicle hydrogen fueling center using onsite storage replenished by mobile tube trailer gas distribution.
Torrance, California	2011	Retail Light Duty vehicle hydrogen fueling center using onsite storage replenished by underground Hydrogen pipeline distribution.
Newport Beach, California	2012	Retail Light Duty vehicle hydrogen fueling center using onsite SMR generation.

H2 Logic

H2 Logic has all competencies and processes internally involved in providing a hydrogen fueling station to the market. This covers sales, product development, production, quality, projects, siting, service, and maintenance. H2 Logic controls all the processes involved in building a hydrogen fueling station, installing and servicing it afterwards. This means that H2 Logic continuously capture substantial experience in the various processes with limited dependency on subcontractors.

3) Project Safety

a) Identification of Safety Vulnerabilities (ISV)

This section below discusses Shell's process to identify risks and manage hazards. To begin some questions asked in the GFO are briefly answered next:

The ISV method to be used - Shell utilizes the Hazards and Effects Management Process to manage potential hazards to "as low as reasonable practicable" (ALARP).

Who leads and stewards the use and results of the ISV process – Shell's Global Hydrogen Operations Manager (Manfred Becker) is the primary caretaker for implementing the safety reviews and maintaining the documents.

Significant risk and accident scenarios identified (e.g., higher consequence, higher frequency) - The HEMP process identifies the significant risks and consequences as well as the barriers in place to mitigate the risks.

Safety critical equipment - Shell utilizes a Health, Safety, Security, and the Environment (HSSE) case review to identify and track all preventative maintenance to safety critical equipment which is then fully documented.

The Hazards and Effects Management Process (HEMP)

Explained below is the HEMP process and its typical application to identify safety vulnerabilities and risk reduction in manufacturing or production facilities.

Shell's HEMP process is used as an element in the Health Safety and Environment Management System (HSE) to address risk assessment. The HEMP methodology identifies various hazards at the facility and assesses management of the identified hazards. The HEMP process requires key or critical tasks and/or activities to be identified with the individual who is accountable for maintaining the controls.

The HEMP process has been developed to identify the HSE hazards at a manufacturing facility and assess management of the hazard. The HEMP process is an analysis technique that reviews the identified hazards and uses a Risk Assessment Matrix to rank the risks based on consequence and likelihood. The hazards and identified risk rankings of high, medium or low are documented in the "Hazard Register". The hazards identified as a "high risk" ranking are reviewed using the "bowtie" technique. The bowtie technique combines a fault tree analysis with an event tree analysis into a pictorial representation. The "top event" is identified at the center of the bowtie, "threats" that could lead to the top event are identified on the left hand side, and the "consequences" from the top event are identified on the right hand side. The control measures that prevent the top event from occurring are reviewed for each threat and placed on the line from the threat to the top event, while recovery measures are identified for each consequence and are placed on the line from top event to consequence. The result is a pictorial representation that resembles a bowtie. Tasks and activities are identified for each of the measures with responsibility for maintaining those tasks and activities assigned. As a result the site has a identified list of tasks and activities that identifies the measures in place for the site to manage the identified "high risks."

The HEMP process is broken into structured parts that allows for a rigorous review of the potential hazards associated with operating the particular petrochemical facility. The process starts with "Identify" – Are people, the environment or assets exposed to potential hazard? Once this question is answered then the "Assess" stage is completed – What are the causes and consequences? How likely is Loss of Control? What is the risk? The next step is "Control" – Is it feasible and can the causes be eliminated? What controls are needed? Then the questions focuses on "Recovery" – Can the causes be eliminated or the potential effects mitigated? What recovery measures are needed? Are the recovery capabilities suitable and sufficient? Then identification of the "Critical Tasks and Activities" takes place – What are the critical tasks and activities needed to maintain control and recovery measures? Who is responsible? "Gap Analysis" is then completed to assess whether the systems are in place and the personnel are aware that they are responsible for particular parts of the systems. See Figure 1 at the end of the document.

To complete the above steps the review work is broken into three parts:

1. Hazard Register
2. Bowtie Analysis
3. Gap Analysis

Once these parts are completed, the work is combined into an "HSE Case" that is used as reference documentation for future work at the site or facility. This documentation is maintained via the management of change process, incident investigation, and other ongoing processes on an evergreen basis. A complete revalidation of the HSE Case is done on a five year interval.

Hazard Register
The Hazard Register is used to document the hazards identified, the consequences related to the hazard, the risks associated with the hazard, and what actions are used to control the risk. Hazard identification consists of reviewing all of the activities on site and determining the hazards associated with the activity. Typically, hazards are chemicals or physical phenomena such as heat, impact or height, such as high-pressure gas, LPG, and hot surfaces. Once a hazard has been identified, the "top event" that leads to the consequence is discussed. For example, a top event might be identified as "loss of containment" for a process fluid or "loss of control" for physical events. Consequences of the hazard are documented in the hazard register, and then each consequence is risk ranked using an internal risk assessment matrix. Risks are ranked in four categories: People (injury or illness); Assets (damage to or loss of assets, property, consequential business loss); Environment (affect on the environment or the community); and Reputation (of the company). A sample list of the hazards categories that may be reviewed can be found in Table 1. See Table 2 for a sample hazard register from a hypothetical olefins unit. Tables are at the end of the document.

The team of individuals used to complete the hazard identification process may include process specialists, HSE Specialists, industrial hygienists, hardware discipline specialists, and operational specialists. The team then reviews the hazards, and all the hazards identified as "high risks" are collated for further evaluation using the bowtie methodology. In general the bowtie is used to demonstrate the controls for identified "high risks". In some instances additional risk assessment techniques may be used to assess the risk management.

Bowtie Analysis
The bowtie analysis is a risk assessment tool that is designed to generate the following three outcomes:

1. A framework for each hazard that identifies incident scenarios and the associated threats that lead to one or more consequences. The framework associates control measures to the threat and consequence lines and relates these to the critical tasks and activities. In some cases, the bowtie analysis might combine multiple threats with multiple consequences into numerous theoretical incident scenarios and hundreds of control measures, critical tasks and activities. A bowtie analysis is different from other risk assessment or review tools that do not generate such a framework.
2. An action list of the status of controls and/or critical tasks and activities in the actual project, site or production unit.
3. A link between the management system of the site or production unit to the necessary controls and/or critical tasks and activities.

The bowtie starts with the hazard that has been identified in the hazard identification and assesses the potential threats that could lead to the top event. Here a threat is a possible cause that will potentially release the hazard and result in an incident. Examples of threats related to a hydrocarbon hazard are high temperature, corrosion, runaway reactions, metal fatigue, overpressure, freezing, and opening of equipment. The top event is the way in which the hazard can be released to do harm. Examples of "top events" are loss of containment, loss of control, oxygen deficiency, and uncontrolled release of energy.

“Control measures” are used to reduce the probability of either the hazard’s potential for harm and/or its consequence. These control measures are designed to prevent the threat from becoming an event or prevent a particular event from reaching a particular consequence. Examples of controls are materials of construction, protective devices, segregation, procedures, inspection, and training. The controls are represented on the main line of the bowtie between the threat and the top event (see Figure 2 at the end of the document).

Pursuant to the HEMP, the consequence is the final result of the hazard being released but not being controlled. Examples of consequences are fire, explosion, injury or illness, and vegetation or fish kills. Controls on the main line from the top event to the consequence are called recovery measures. These reduce the risk that the release leads to the consequence or mitigates the consequence. Examples of these include dikes, gas detectors, emergency responders, and fire suppression. These can reduce the likelihood that the top event will develop into further consequences and/or provide lifesaving capabilities should the event develop further. Figure 2, at the end of the document, shows the complete bowtie. The resulting bowtie is a combination of a fault tree analysis with an event tree analysis into a pictorial representation.

Each of the controls, whether on the threat side or consequence side of the bowtie, requires a critical task or activity to be defined to maintain the effectiveness of the barrier. At least one critical task or activity is required for each control, but there may be more, and they may be cross-functional. Engineering, operations, and maintenance may all have activities to support a single control on a given threat line. The task or activity is documented to identify the party (e.g. department head, inspector, operator, etc.) who is accountable for the activity. The critical tasks and activities identified during the bowtie analysis are then linked to the HSE-MS of the unit and/or site.

Gap Analysis

Once the bowtie analysis is complete and the critical tasks, activities and risk reduction controls are identified for the production unit, facility or site. The next step is confirmation that the risk reduction controls are in place and implemented. The next step is for the production unit, facility or site to complete a gap analysis. The gap analysis helps to determine if each of the identified required controls are in place and if the individuals responsible for maintaining the controls are aware of their respective responsibilities. These gaps are then documented, and remedial action plans are developed if necessary. Implementation is tracked via the HSE-MS management review process.

Typical HEMP Results

The time it takes to complete the HEMP work at a facility varies depending on the size of the site. The first sessions consists of the hazard identification phase for the site. The group completing the hazard identification may consist of process personnel, HSE specialists, public relations staff, pressure equipment specialists, and industrial hygienists, as well as the facilitator. The process units are broken into smaller process blocks with similar chemical and physical properties. An overview of what happens in the process block is given so the whole group understands the basis for the area. Then the top event and consequences are discussed for the process block. Each consequence is then risk ranked per the risk assessment matrix, and the risk is documented in the hazard register. Those items with high risks are identified and clearly marked. Table 2 shows a hazard registry from a sample olefins plant with the risk assessment completed for People, Assets, Environment and Reputation.

The analysis for the sample olefins plant unit results in bowties being developed, several of which are very similar due to the nature of the equipment. For example, the propylene and ethylene refrigeration systems are very similar in their design, with the exception of materials of construction and temperature of operation. Therefore, one bowtie could be developed for the ethylene refrigeration system and then modified to address the propylene refrigeration system. The bowtie analysis brainstorms the threats that could lead to the loss of containment. The controls that are in place for the prevention or reduction of the threat that leads to the top event are then documented.

As an example, internal corrosion is a threat to loss of containment of a process gas compressor. Controls that could mitigate this are:

- Design - Corrosion allowance, metallurgy, including the need to stress relief those systems in caustic service.
- Mechanical Integrity - Inspection of the pressure equipment and piping.
- Procedures - Decontamination of the lines in caustic service when down for maintenance.

Figure 3 at the end of the document provides a sample Process Gas Compressor Bowtie – Corrosion Threat Line. This process is completed for all the threats identified for the loss of containment scenario. A threat is identified the controls are discussed and documented, then on to the next threat. A single bowtie can have as few as one threat to as many as thirty or more threats identified.

The next step is to consider a hypothetical scenario that assumes the top event occurs and then review the controls for the recovery or mitigation of the consequence. For example, in a Process Gas Compressor case, one of the consequences could be a Vapor Cloud Explosion (VCE). The controls that mitigate or minimize the risk of a VCE from occurring might be as follows:

- Design - Control of ignition sources (electrical area classification, unit spacing, grounding requirements, etc.).
- Design - Fixed fire water system, deluge, gas detection, etc.
- Permit to Work - Control of ignition sources (vehicle entry, low energy/hot work, etc.).
- Initiate Emergency Response - Call the plant emergency number.
- Emergency Preparedness and Response - Drills, pre-plans, staging, people, equipment, etc.

See Figure 4 at the end of the document for a sample Process Gas Compressor Bowtie – Vapor Cloud Explosion Consequence Line

For each of the identified controls, the critical tasks and/or activities associated with the control are determined, and the responsible individual is assigned to the task. In this manner, a list of critical tasks is developed for each individual at the site from the operations/crafts specialists to the plant manager. These tasks are then collected and used to identify the tasks for each job role and to make the responsible individual aware of the tasks. For example, on the corrosion threat line the procedure for decontamination of caustic lines was identified as a control. The critical tasks for this control might be as follows:

- Operations Specialist – Follow the procedure for decontaminating all lines in caustic service to determine that the temperature of the piping does not exceed design requirements.
- Maintenance Foreman – Make craftsman aware of the lines to be worked on that may have caustic contamination and require stress relief after repair work.

This list of critical tasks and activities is now a tool for the site to use to help manage HEMP identified HSE risks, and assist in identifying training and development plans for the site. It also becomes a tool in the management of organizational change. It also provides an auditing tool. In many instances, most tasks and activities that are identified by this process are not new, and the site is already completing most of the tasks. The power of this tool is to put all this into a framework that can be used to document the identified HSE hazards and controls that are in place and implemented.

To summarize, Shell's HEMP process 1) builds a framework for the management of identified hazards at the site, 2) provides a systematic consistent method of risk assessment, 3) through the bowtie analysis provides a framework for documenting that controls are in place to manage identified "high risks", and 4) allows the facility to compile an action list of the status of controls and/or critical tasks and activities in the actual project, site or production unit.

b) Risk Reduction Plan

Cornerstone of Shell's approach to reduce or eliminate significant risks for station design and operations is the HEMP process discussed above. HEMP process is used to identify significant safety vulnerabilities which are then mitigated with the appropriate prevention measures.

The HRS equipment is fully tested and third party certified at the manufacturing facility where the program code is locked before shipment. Having confirmed that the program code is the same as stated on the third party certification documentation, the HRS may be commissioned which includes a range of commissioning procedures such as; start-up procedures, test of safety systems, boosting up of systems and storage containers, leakage testing at different pressure intervals, cooling and refueling tests according to relevant parts within standards such as CSA 4.3, ISO and or other applicable test procedures.

c) Station Operating Procedures and Safety Features

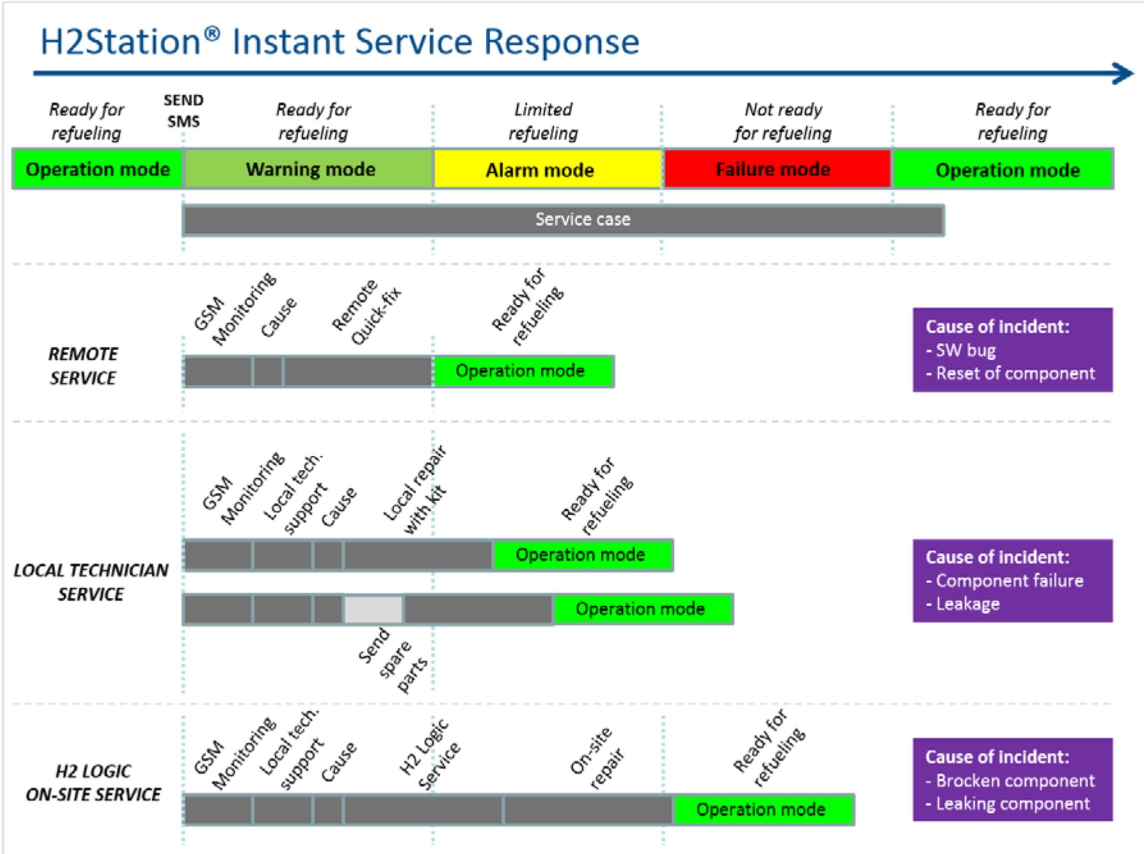
Operating Steps

The HRS equipment owner is provided with an “Operator Manual” which includes analysis of the potential hazards in and around the hydrogen refueling station equipment including requirements to obtain safety to the highest standards. This “Operator Manual” will be the incorporated into the Shell operating and safety documents.

The HRS facility will be operated on a 24 hour seven days per week station integrated within the retail gasoline outlet. Fueling process for FCEVs is similar to those of gasoline, diesel, and compressed natural gas (CNG) vehicles. Operating procedures will be specified in the Shell operations manual and will include normal and emergency procedures for Shell operations personnel.

Shell has a systematic approach to HSSE management designed to ensure compliance with the law and to achieve continuous performance improvement. We require station operators and contractors to manage HSSE in line with this policy. We engage effectively with neighbors and impacted communities to educate them the benefits of safe, zero emission vehicle technologies and fueling infrastructure.

Shell’s stations will be continuously monitored using an online system to provide both operation monitoring and service response on a 24 hour basis. H2 Logic handles operation monitoring and responding to any operation event, using the “H2Station® Instant Service Response” as outlined in the figure below.



When a potential upcoming error is detected an SMS is sent to H2 Logic (back-office). Depending on the event the HRS may still be able to fuel, but is in 'Warning Mode'. If event is affecting refueling performance, the HRS will go into 'Alarm Mode' but still providing limited refueling. At events affecting e.g. safety or performance significantly the HRS will go into 'Failure Mode'.

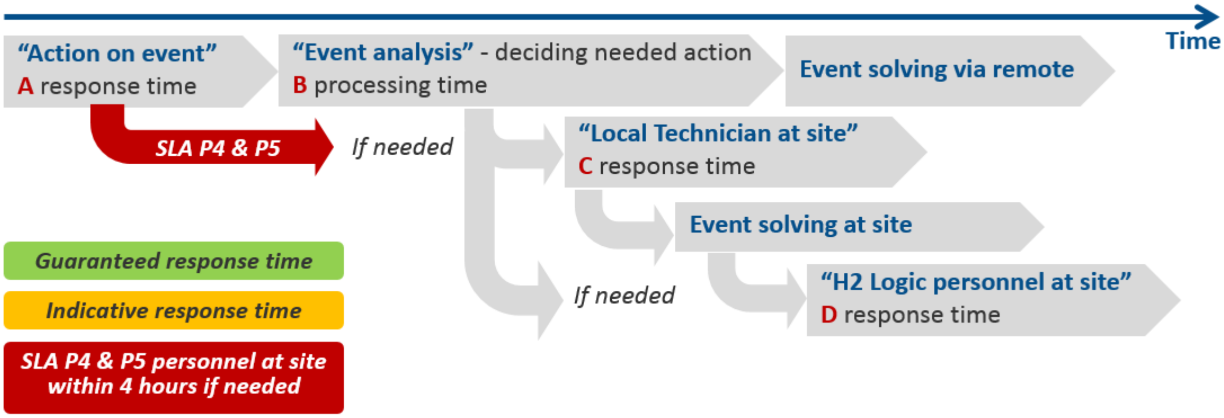
When an event is reported or observed, H2 Logic will firstly try to identify and solve this instantly through the Remote Support System. In the case that an onsite visit is required, local H2 Logic technicians will be called upon to assist in trouble-shooting and problem resolution. The dialogue between Local H2 Logic technician and H2 Logic staff (back-office) is by e-mail and mobile phone so that the local technician can be assisted to a very extensive level. This will ensure the HRS is returned to full operation mode as quickly as possible.

In the instance of events that cannot be solved remotely or by local H2 Logic technician, H2 Logic technical staff will be sent to the site to resolve the problem. If ordering of spare parts (not in stock) is required for handling of an event, Customer will be informed about the expected delivery time, and replacement will be done immediately when the spare parts arrive. Response time (in hours) is specified for the response sequence levels and type of SLA events as outlined in the figure below. The event addressing is conducted according to the following sequence:

1. Action on event
2. Event analysis
3. Local H2 Logic technician at site
4. H2 Logic technical personnel at site

Response process time – H2Station® Alarm + Failure mode (SLA P1, P2, P3)

Hours response time (PDT/PST)	Monday – Friday			Saturday-Sunday + Holidays	
	8:00-16:00	16:00-22:00	22:00-08:00	8:00-22:00	22:00-08:00
Action on event (A)	2	3	Before 9:00 same morning	5	Before 12:00 same day
Event analysis (B)	2	2	2	2	2
Local H2 Logic technician at site (C)	3	Before 10:00 next day	Before 12:00 same morning	5	Before 15:00 same day
H2 Logic technical personnel at site (D)	8	Before 10:00 next day	Before 17:00 same day	10	Before 20:00 same day



After finalized "Event analysis" event is either addressed or a decision is taken on requesting local technician or H2 Logic technical personnel to go for site inspection/repair. In the case of SLA P4 and P5 events personnel will be at site within 4 hours if needed.

A logbook of the HRS operation is included and provides a description of all operation events such as alarms, operation modes, work performed, exchange of components etc. Work Order Priorities are explained in the table below:

WORK ORDER PRIORITIES		
P5	This priority should only be used for: **a) Site Emergency** **b) Total Fuel Outage**	Emergency or SOOA
P4	To be used against HSSE related WO's. R:F within 4 hours (Make Safe)	Site or Person at risk
P3	Serious impact on the sites customer and/or their ability to sell. This priority should be used when the failure results in the site not being able to sell that product/service or has a major negative impact on the customer journee.	Equipment totally unavailable for customer
P2	Significant impact: An equipment fault that impacts the customer to a degree, but can be managed without the immediate attention. Alternative equipment is available.	Working, but operations affected
P1	Minor or no impact on the customer or the site's ability to sell. The failure on the equipment is look & feel only. P1 work orders cannot cause downtime.	Working - Look & Feel

Station Safe Design

HRS is designed with safety components and functions aiming at increasing safety by avoiding hazardous situations through:

- Limiting risk of hydrogen release and leaks at station
- Reduce risk of sparks in areas where there might be hydrogen leaks and releases
- Different precautions to limit leakages of hydrogen and fire and explosions

A range operation modes and set of alarms and actions are defined (shown below) with the aim to optimize availability while ensuring that operation is always safe

HRS Operation Modes	Status description	Alarm / situation examples
Operation mode	Ready for fueling	None
Warning mode	Ready for fueling – Warning on potential upcoming alarms	E.g., a transmitter has reached a warning level, but not a critical level (alarm) where action is taken.
Alarm mode	Limited fueling – Alarm and/or shot down of sub-systems	E.g., alarm that results in shutdown of compressor, but refueling from cascade is still possible.
Failure mode	Not ready for fueling – Alarm affecting safety – emergency shutdown entire system.	E.g. alarms on detection of hydrogen, smoke, flames or other safety critical situations.

Below are listed main safety features provided with the HRS:

- Separated safety PLC ensuring monitoring of safety critical processes during fueling
- Hydrogen dispenser with break away, tilt sensor and a sophisticated leakage monitoring
- Constant monitoring of hydrogen leaks in compressor room with hydrogen detector
- Constant monitoring of flames and sparks in compressor room with UV flame detector
- Isolated tanks with automatic shut off valves to isolate tanks from stations
- Constant monitoring of oxygen level inside compressor room
- Smoke detectors to detect fire in compressor room and control room
- Continuous mechanical EX ventilation in hazard areas to avoid occurrence of an explosive atmosphere.
- Wetted components are made of hydrogen compatible materials and relevant components tested after EN ISO 11114-4 “Test methods for selecting metallic materials resistant to H2 embrittlement”
- Higher pressure pipes are connected with C&T fittings (cone and thread)
- Multiple redundancy on critical safety and refueling parameters (pressure and temperature sensors)
- Safe release of hydrogen in case of hazards through hatches, chimneys

Safety System Testing, Calibraton and Station Inspection

Shell’s Safety Plan is developed to help ensure each safety component is operating and within its calibration specifications. All safety systems must pass to continue operations, especially the initial testing before a site is deemed operational. Shell will develop a custom site inspection sheet during station start-up. This is a “living document” and can change as needed through-out the life of the site

Service provider will conduct periodic and preventative maintenance with the following intervals:

- Level 0 – Every 3 months – independent of operation hours

- Level 1 – Every 6 months - independent of operation hours
- Level 2 – Every 12 months - independent of operation hours
- Level 3 – At each 4,000 hours of compressor operation - independent of duration

The various maintenance levels will be conducted at the same time to reduce down-time. Maintenance Reports for each event are included. Each maintenance levels are further specified below.

Level 0 – every 3 months
- Visual inspection of entire HRS
- External leak detection
- Lubricating of filling equipment

Level 1 – every 6 months
- Visual inspection of entire HRS
- Calibration of hydrogen detector
- External leak detection
- Lubricating of filling equipment
- Change of oils & filters

Level 2 – every 12 months (includes Level 1 maintenance)
- Level 1 items (see table for Level 1 at the end of the document)
- Compressor inspection
- Safety test of hardware and software
- Component leak test
- Inspection of cooling system
- Verification of flow meter

Level 3 – every 4,000 compressor hours (done together with Level 1 & 2 maintenance)
- Level 1 and 2 items (see tables for Level 1 and 2 at the end of the document)
- Change of wear parts
- Change of compressor oil (only if necessary)

Shell has an extensive set of procedures and protocols governing the visual inspection process that will be followed for each of the stations in this proposal. An example of the station inspection Shell uses at its hydrogen station in Torrance is presented below (beginning on page 21).

Sample Handling and Transport

Shell contracts with First Element to provide Hydrogen Gas Sampling. First Element has developed a Hydrogen Test Gas Sample System especially rated for 70Mpa. A compressed gaseous sample will be gathered for analysis every three months and sent to Atlantic Analytical Laboratory:

Atlantic Analytical Laboratory
Salem Industrial Park Building # 4
291 Route 22 East
Whitehouse, New Jersey 08888

Office (908) 534-5600; fax (908) 534-2017
Contacts: Richard Frisch; Email rfrisch@atlanticanalytical.com
Shipping: Art Ferrante

Analysis Description:
Compressed Gaseous Hydrogen – component list below.

Sample Cylinders:
FILL MAXIMUM TO 800 psi; two 1 Liter (pre-cleaned & conditioned Stainless Steel; one coated with sulfinert for sulfur compounds); fill pressure will be 1,000 psig. Each pre-cleaned / conditioned cylinder has indefinite shelf life. After taking

sample, stated shelf life is 2-3 weeks.

Sample Container:
D.O.T./I.A.T.A. approved outer shipping container with appropriate outside labels and shipping papers (see shipping procedures 3.0 below).

Cylinder Design, Production and Testing:
The design, manufacture and testing of steel sample cylinders is regulated by the US government in 49 CFR Paragraphs 178.36 Specifications 3A; seamless steel cylinders and 178.42 Specification 3E; seamless steel cylinders. Specification 3E is for cylinders having an outside diameter no greater than 2 inches (51 mm), with a length less than 2 feet (61 cm). Service pressure limited to 1,800 psi (124 bar) for Parker Sample Cylinders.

The above regulations control all aspects of the design and production of sample cylinders. Material physical properties and chemical characteristics are controlled. Each cylinder must be hydrostatically tested between 3,000 and 4,500 psi (207 and 310 bar). In addition, one cylinder out of each lot of 500 or less must be subject to a burst test and results in a safety factor on burst pressure of 3.3 minimum.

All cylinder tests must be inspected and verified by an independent inspection agency, and all test reports must be maintained for fifteen years. Each cylinder must also be marked and packaged in accordance with 49 CFR.

Sample Shipment:
D.O.T./I.A.T.A.trained individual to review and sign shipping paper work.

Receive Sample Containers:
Call Atlantic Analytical to receive two 1-liter pre-cleaned and conditioned Stainless Steel sample containers, one coated, as well as a DOT/IATA approved shipping container. Request all safety placards and/or UN labels for shipment.

Station Inspection Example in use at Shell's Hydrogen Station in Torrance

4.3 Station Inspection

4.3.1 Introduction

These procedures are a guide to complete the Shell Hydrogen Station and Dispenser Inspection form for site located at 2051 West 190th Street, Torrance, CA.

4.3.2 Safety Gear & Miscellaneous Equipment

Basic safety equipment on site: Flame retardant jackets, safety glasses, safety cones, permit to work instructions, material safety data sheets, and first aid kit are stored inside learning center.

Outside in dispenser area: When working, wear safety reflective vest

Secure equipment areas:

- Electrical/cooling area: No hydrogen present, no PPE required
- Hydrogen equipment area: As entrance sign states, PPE required is Nomex jacket, safety glasses, hydrogen sensor. When working inside a special area by S-700 compressor requires hearing protection (hearing protection ear plugs inside within labeled container.

4.3.3 Alarm & Lock Systems

See section 2.3 in this manual

4.3.4 Station Inspection Procedure

4.3.4.1 Hydrogen Equipment

Compressed Gaseous Hydrogen Dispenser

Questions 1.0 – 1.5
Several Yes/No questions; email or call SH if out of compliance

Electrical Enclosure Area

Questions 2.0 – 2.4

Several Yes/No questions; data recording; action to check fire extinguisher; check cameras & SCADA

H2 Equipment Enclosure Area

Questions 3.0 – 3.7
3.0 Check fire extinguishers (2)

3.1 Check inlet skid HMI

3.2 Check S-150 compressor skid

3.5 Check S-700 compressor skid
3.6 Check O2 purifier unit

3.7 H2 tube trailer
Ordering Process:

1. Read gauge in H2 equipment area by trailer hook up area:
   - TT feed pcv-0-3000 psig gauge: order new trailer at 800 psig
     - Can be as low as 200 psig
   - TT feed pcv-0-300 psig gauge: if pressure is at 220 psig or higher, immediately call AP Service Desk to report as well as Shell Operations
2. To order trailer, call AP (800) 224-XXXX, option # X
3. Give ship to #: XXXXXX (Note: this will be a swap out of trailers)
4. Send email to Shell Operations.
5. Call Toyota security with delivery date: (310) 468-XXXX
6. MIST may be present to assist during trailer delivery (not required) due to potential S-150 compressor going off line. Coordinate with delivery or AP service desk.
7. S-150 compressor most likely will require resetting after delivery. Coordinate day activities to stop by and reset (if SCADA alarm received)
8. Note: Combination lock on delivery gate located behind site visitor center: XXXX

Toyota Site Contact:
XXXXXXXX, XXXXXXXX@toyota.com, (310) 468-XXXX

4.3.4.2 General Site

Questions 4.0 – 4.7: Several actions to confirm site appearance, evidence of intrusion, site office equipment, cameras.

4.3.4.3 Data to Shell Hydrogen

If there is any concern during the inspection, contact Shell Hydrogen. Blank forms will be maintained on site. Completed forms are filed in Site Inspection Log book inside site office.

Maintenance – Air Products is responsible for maintaining and servicing most hydrogen equipment. Other contractors may provide maintenance on systems. All work is documented on invoice and stored within site Maintenance Log binder.

Alarm Summary Log - If an alarm is received when on site, follow Alarm Response Procedures. Complete an Alarm Summary Log

4.3.4.4 Contact Information

- Shell – Rick Scott (281) XXX-XXXX, XXXXXX@shell.com
  Jim Martin (925) XXX-XXXX, XXXXXXXX@shell.com
- MIST: XXXXX, (310) 483-XXXX, XXXX@hydrogenics.com
  XXXXXX, (310) 295-XXXX, XXXX@hydrogenics.com
- Equipment Alarm Monitoring: (800) 482-XXXX
  - Fire detection systems: acct., FLB XXXXX, code XXX
  - Intrusion system: acct., line 90 XXXX, code XXX
- Air Products:
  - (800) 224-XXXX, ID XXXXXXX
  - XXXX XXXXX, OP's manager, o (253) 874-XXXX, c (253) 874-XXXX, dennisbj@airproducts.com
  - XXXXXXXXXXX, technician, c (805) 583-XXXX, XXXXXXX@airproducts.com
- Instrument Gas
  - Airgas – XXXXX (310) 523-XXXX, cell(562) 577-XXXX, XXXXX@airgas.com
  - SH account #: XXXXXXX
  - Part No.: 6-pack industrial grade nitrogen; NiC63
- Key Vehicle Operator:
  - Toyota: XXXXX, o (310) 468-XXXX, c (310) 292-XXXX, XXXXXX@toyota.com
  - GM: XXXXX, o (818) 953-XXXX, c (949) 241-XXXX, XXXXXX@gm.com
  - Daimler: XXXXX, o (310) 547-XXXX, c (916) 207-XXXX, XXXXXX@daimler.com
  - Honda: XX,o (310) 781-XXXX, c (714) 743-XXXX, XXXXXXXX@ahm.honda.com
  - Hyundai: XXXXXX, (714) 887-XXXX, XXXXXXX@hmausa.com
- Janitorial Service: GCA – XXXXXXXX, o (310) 387-XXXX, XXXX@gcaservices.com
- All combination locks: XXXX
- Hydrogen tube delivery gate entrance behind visitor center: XXXX
- Landscapping Company: XXXXXXX, (310) 398-XXXX

4

4.3.5 Station Inspection Checklist Form

Date ________________ Inspected by (signature) __________________________

Rev Apr 2015

- PPE for inside H2 equipment area: Flame retardant coat, safety glasses, H2 detector, ear protection as necessary
- PPE outside equipment area: Safety reflective vest
- Readings outside parameters: Report directly to AP & SH if readings are outside stated values unless H2 equipment maintenance company on site and confirms standard operating conditions changed
- Intrusion alarm set for both electrical & H2 equipment area as well as learning center. Key pads inside learning center & electrical equip. area inside panel.
- Gate & learning center door codes: #XXXX. Shell office & storage area door code: XXXX

CGH2 Dispenser (If dispensers requiring cleaning, contact janitorial service/XXXX)

1.0 Does the dispenser display read, "Turn Off And Prep Vehicle for Fill Enter PIN When Ready"

A / West H35: Yes______ No _____ A / West H70: Yes ______ No ______

B / West H35: Yes _____ No ______ B / East H70: Yes ______ No ______

ID & record alarm/alert message if present: ____

1.1 On separate form, record fill information: _______

1.2 All nozzles positioned in holder? Yes ___ No ___

1.3 Physical damage to the dispenser or hoses? ***(If YES, contact SH, note location)*** Yes___ No ___

Location (if found): ____

1.4 Dispenser & Nozzle Inspection (all)

- Hydrogen sweep of nozzle end & base connections with portable detector (% H_2):
  Calibration/detector reading: _________ Nozzle sweep: _________ ***(0)***
- Inspect communication cable for corrosion & nozzle for damage: _____
- Carefully inspect end of nozzle to confirm infra red communication is not cracked:_________

Location (if found): ____

Electrical Enclosure Area

2.0 Check fire extinguisher ________ (monthly MIST inspection; annual certification)

2.1 Nitrogen Gas

- Nitrogen Pressure (industrial grade): ______________psig (order new 6-pack when at 1000 psig)
- Check straps, equipment, leak check when changing to new tanks _______

Gas manifold system: Airgas (800) 224-XXXX, acct: 1XXXX (confirm TOR location when ordering)

2.2 Confirm SCADA is engaged. _________

2.5 Confirm cameras are working. ________

2.6 CO Calibration Gas

- Pressure IN: ____________psi
- Pressure OUT: __________psi

2.7 Air Compressor (for purge in CO analyzer cabinet)

- Hours operating _________
- Drain tank ___
- Drain coaleser & filter ___
- Air pressure ___________psi

page 1 of 3

SH TOR Operation Manual 2.0 2051 West 190th Street, Torrance, CA 90504

Hydrogen Equipment Area

3.0 Check fire extinguishers (2):monthly MIST inspection; annual certification)

By front gate: ___________ On Northwest wall: __________

3.1 Confirm spill kit contents ________

3.2 Inlet Skid:

OK green light: _____ Record trouble: _____________________________________

Run green light: _____ _____________________________________

Std. Screen:_____ (Shell Torrance Inlet Skid Pipeline Open)

Gauge, Left __________ (850 – xxx; < xxx call AP & SH); Right _____________ (300; <150>xxx call AP & SH)

Bottled Ni Pressure (gauge below/left of control panel): __________ psi (400 or less, switch btls.)

3.3 S-150 Compressor

OK green light: _____ Record trouble: ____________________________________

Run green light: _____ _____________________________________

Std. Screen:_______

Run Time (hrs.) _____________ (used to track Absorber run time)

Suction (PI 201) _____________ (100 – xxx lbs.)

Interstage (PI 206) ____________ (> 1,xxx call AP & SH)

Discharge (PI 202) ___________ (> 7,xxx call AP & SH)

1st stage leak detection (PI 204A) ___________ (0 – 1); 2nd stage (PI 204B) __________ (0 – 1)

Check for oil leaks& report to SH if Yes (oil on ground): _________

Press & hold F9 to record operating hrs. ____________

3.3.1 When the S-150 compressor is running:

Gauges PCV 3A: ________ psi ; PCV 3B:________psi (between 90 and xxx psi)

Note: If below 80, contact AP & report; 1 of the purifiers is off line, purging nitrogen, which can cause compressor failure

3.4 S-700 Compressor

OK green light: _____ Record trouble: _____________________________________

Run green light: _____ ______________________________________

Std. Screen: ________

'Hydrogen Booster Compressor System System in Standby or 'Hydrogen Booster Compressor Running'

Check for oil leaks & report to SH if Yes (oil on ground): ________

Press F6, scroll down, record operating hrs. ________________

3.5 Oxygen Purifier: inspect exterior casing of purifier for discoloration of the case or decal: ______ (indicates internal high temperature).

3.6 CO Analyzer:

- Current CO reading: ________ppm
- CO Alarms? ____
- Cabinet air pressure _____________ in/H2O

3.7 H2 Tube Trailer (when in use)

PCV-0-3000 psig gauge: ___________ psig (at 800 psig order new trailer; send email to Shell Operations)

PCV-0-300 psig gauge: if pressure is ever at 220 or greater call AP Service Desk to report immediately (800) 224-xxxx, site id xxxxxxx

General Site

4.0 Check site for intrusion. Report if evidence is found:______

4.1 Pickup and remove trash from area: _____

4.2 Inspect driveway access/walking surfaces (clean oil/repair as necessary): _________

4.3 Inspect walking & working surfaces (contact SH if broken/concern): _______

4.4 Confirm landscaping is OK, call for service as necessary: ________

Learning Center

5.0 Confirm learning center is clean, call service as necessary: _______

5.1 Confirm manuals present & forms (kitchen area):

- Emergency Response Plan ______
- MSDS _____
- Permit to Work _____ (copy the 3 PTW forms in manual for use by all contractors as needed)

5.2 Confirm safety equipment (Nomex jackets, reflective vest, safety glasses) _____

5.3 Check mail box. Open all mail and if it looks important call Shell Operations.

Shell Office

6.0 Confirm camera monitor is working (turn off when not in use) ______

All mechanical and/or equipment issues: Send e-mail to Rick Scott:

Any items sent? Yes_____ No_____

Hydrogen Status/Alarm Panel: If hydrogen status panel light is Yellow or Red, follow posted procedures. Note all information on Alarm Summary Form and contact SH

Confirm Intrusion alarm is on before leaving; confirm all gates closed, doors locked

Notes: ____

Contacts:

SH – Rick Scott (281) 794-xxxx, xxxxxxxt@shell.com; Jim Martin (925) 766-xxxx, xxxxxxx@shell.com

MIST: xxxxxxxx (310) 483-xxxx, xxxxxx@hydrogenics.com; xxxxxx (310) 295-xxxx, xxxxxxx@hydrogenics.com

Air Products:

- (800) 224-xxxx, ID xxxxxxxxx
- Op's Manager, xxxxxxxxx, o (253) 874-xxxx, c (253) 874-xxxx, xxxxxxx@airproducts.com
- Technician, xxxxxxxxxx, c (805) 583-xxxx , xxxxxxxxxx@airproducts.com

CO Monitor: Horiba Technical Service: (800) 446-xxxx ext xxxx

Commercial Controls Technician (security/SCADA) – xxxxxxxx (661) 317-xxxx

H2 Equipment Alarm Monitoring: (800) 482-xxxx

- Fire systems – line FLB xxxxxx, code xxx
- Intrusion - line xxxxxxxx, code xxx

Instrument Gas – email to Brad to order

- Airgas - (562) 577-xxxx, xxxxxxxxxx@airgas.com, acct. xxxxxxxx, 6-pk industrial Ni – NiC63

Key Vehicle Operator: (see separate contact list)

Janitorial Service: GCA – xxxxxxxxxxxxxx, o (310) 387-xxxx, xxxxxxxxx@gcaservices.com

Landscaping Company: xxxxxxxxxxx, (310) 398-xxxx

All combination locks have code xxxx

Ordering H2 Tube Trailer & CO calibration gas posted in site office

d) Equipment and Mechanical Integrity

The HRS from H2 Logic is a new fully standardized hydrogen fueling station product manufactured at the factory and shipped to site for installation. In the design of the HRS the risk assessment has been upgraded from a standard Failure Mode Effects Analysis (FMEA) process to a risk assessment in accordance with the IEC (International Electrotechnical Commission) standard to include a Hazard and Operability Study with Layer of Protection Analysis (HAZOP/LOPA). The HAZOP/LOPA process requires substantially more work, but with a standard product, it is possible to conduct this cumbersome process and achieve a product with a higher degree of structure and safety.

The HRS equipment will be serviced and maintained according to same principles within the installation process. The main modules have detailed preventative maintenance schedules including checklists and skill matrix, ensuring only qualified personnel will be supervising service.

<u>Materials Selection Process to Ensure Hydrogen Compatibility</u>

Prior to assembly, all components of importance, especially for hydrogen service are submitted to inbound inspection, ensuring that the delivered components are according to the Technical Purchase Specifications (TPS), i.e. a specification covering hydrogen embrittlement in the materials. Material documentation, such as component material certificate, declaration of Conformity and test reports, at the level of serial numbers/batch numbers, from the HRS are saved in SharePoint for tracking purpose of actual installed components within the HRS installed at site.

Equipment and installation will conform to all applicable federal, state and municipal laws, rules, codes, and regulations. Below is a partial list not limited to but includes the following codes and standards for design, fabrication, and construction of the Hydrogen Refueling Station:

ASME B31.3 Process Piping Code
NFPA 70 National Electric Code
ASME Boiler and Pressure Vessel Code section VIII, Appendix 22
NFPA 496 Purged Enclosures
NFPA 497M Classification of Gases, Vapors, Dusts for Electrical Equipment in Hazardous (classified) Locations
NFPA 55 Storage, Use and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks
NFPA 2 Hydrogen Technologies Code
SAE J2600
SAEJ2601_201407 (known as the SAEJ2601 (2014))
SAEJ2719_201511 (known as SAE J2719).
SAE J2799_201404 (known as SAE J2799 (2014))
California Building Code (2013)
California Fire Code (2013)
California Mechanical Code (2013)
California Department of Food and Agriculture Division of Measurement Services
California Code of Regulations (CCR)
Code of Federal Regulations (CFR)
CSA HGV 4.3

e) Management of Change (MOC) Procedures

The purpose of this MOC procedure is to:

- Ensure that all proposed changes, whether permanent, temporary or emergency changes, are fully checked to the required standards by the appropriate parties prior to implementation so that the workplace's ability to operate in a safe and environmentally sound manner is not compromised.

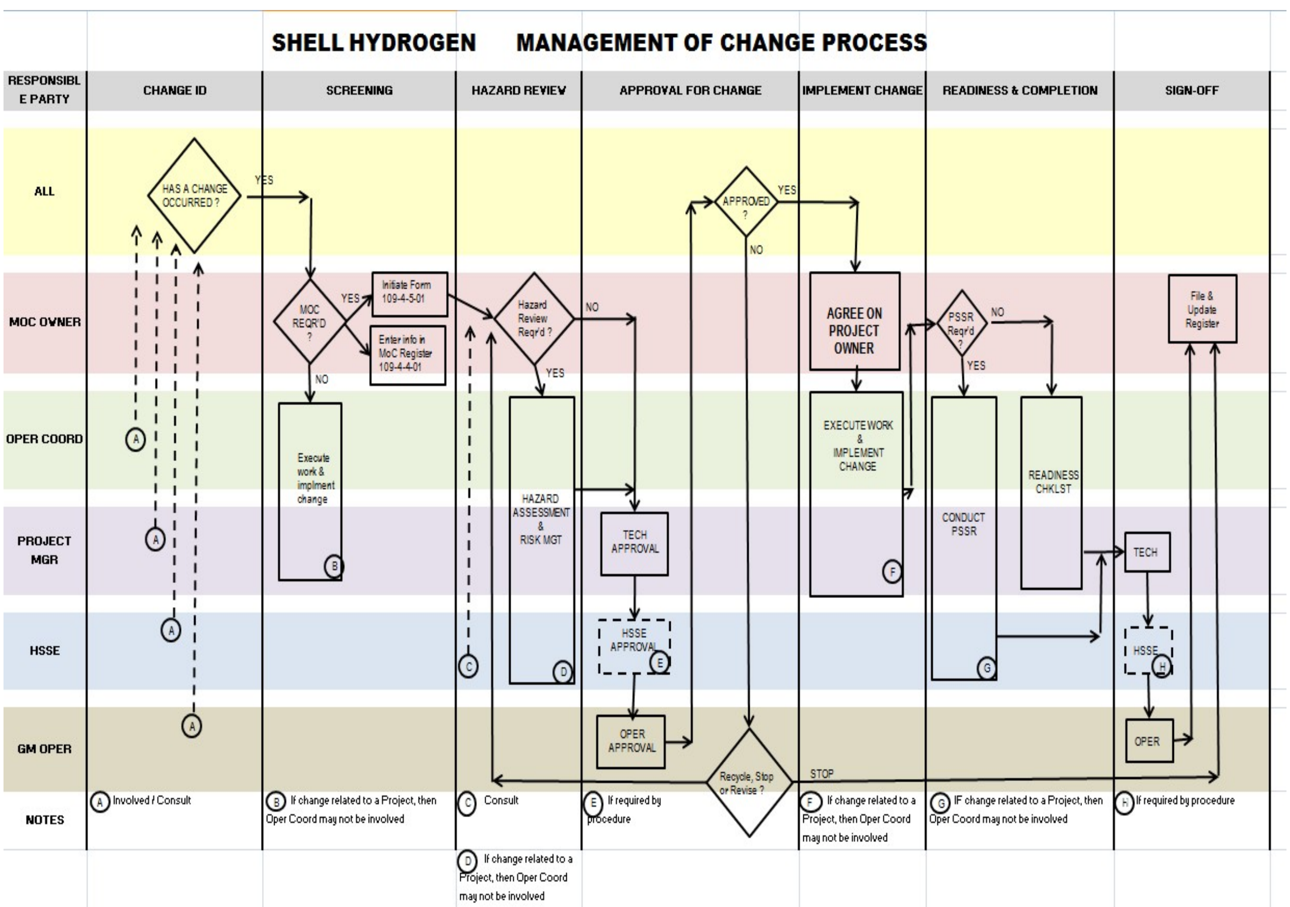
- Provide guidance to employees and management on how change or modifications within the workplace are safely managed.
- Ensure that all changes within the scope of this procedure are properly documented, the changes are fully discussed and communicated to the key stakeholders including operations personnel, project team members, contractors, office employees and other management, and that necessary training is successfully completed
- Provide a procedure that will comply with the requirements of the Group HSSE MS manual section on Management of Change

The adoption of this procedure will seek to ensure that any hazards associated with the proposed change is eliminated or controlled so that the risk is as low as reasonably practicable (ALARP). This is consistent with the requirements of Shell Control Framework Manual on Management of Change, & AE HSSE Management system

The MOC procedure consists of 7 phases:

1. Change Initiation
2. Screening
3. Hazard Review & Risk Analysis
4. Approval
5. Implementation
6. Readiness & Completion
7. Sign-off

The following spreadsheet provides a flowchart for the MoC Process.



f) Project Safety Documentation

Safety Plan documentation is maintained by Mr. Manfred Becker, Shell's Global Operations Manager. Documentation resides on a secured database using SharePoint software. Database access is restricted. Only Shell and operation personnel with proper credentials are permitted to access.

Manuals

A system of manuals will be established and maintained on a continual basis in support of the safety and reliability of all of Shell's proposed stations. Several manuals, especially the Operations manual, are updated almost weekly to ensure it accurately updates aspects of operations.

- Operations
- Emergency Response
- Permit to Work
- Safety Data Sheets
- Permits
- Waste Management Log
- Refrigeration Log
- Training Log
- Hydrogen Quality / Hydrogen Sampling Results
- Hazardous Material Business Plan
- Safety System Testing
- Permit to Work (completed sheets)

4) Communications Plan

a) Training

Shell will prepare safety manuals and training classes for Shell operations staff and First Responders. Shell will work with H2 Logic (Shell's equipment provider and maintenance contractor), the California Fuel Cell Partnership's Safety Officer, and other state and local fire officials familiar with hydrogen fueling, to conduct training sessions prior to full commissioning of each station. In order to ensure the maximum number of trained first responders, classes will be held at nearby fire stations, and an effort will be made to schedule site visits of each fueling station with as many first responders as possible, depending on their availability

Service and inspection contractor procedures are to ensure that personnel have passed all relevant safety courses before performing service work at site. These courses contain HSSE and safety procedure education. Changes to procedures and or components are to be performed according to Management of Change Procedures. All service and maintenance visits are documented.

Additionally:

- To build our safety culture we are focusing on compliance and tackling the cultural issues that can lead to unsafe behaviour. Our company-wide "Goal Zero" awareness programme captures the belief that we can operate with zero fatalities and zero significant incidents. To reach Goal Zero, we are developing the safety leadership skills of staff, rewarding successful performance and enforcing consequences for rule-breaking.
- We check that everyone responsible for tasks with a significant HSSE risk has the necessary training and skills. This includes people in leadership positions, HSSE professionals, those responsible for frontline operational HSSE critical activities, and those planning and supervising HSSE critical activities.
- Shell launched our 12 Life-Saving Rules across the company in 2009 to reinforce what staff and contractors must know and do to prevent serious injury or fatality. We expect our managers to create conditions that enable full compliance.
- Training is conducted through Shell Open University as the global 'one-stop-shop' for learning and

development solutions across Royal Dutch Shell. It is a gateway to abundance of learning resources enabling mandatory and developmental learning, as well as to obtain relevant certifications. Shell Open University offers easy access to e-learning, classroom courses, blended learning, and individual training history and certifications.

b) Safety Reviews

- Shell holds annual global safety days with our employees and contractors to help strengthen our safety culture. With over 250,000 participants, Safety Day in 2016 focused on achieving “Goal Zero”.
- The HSSE Manager develops and provides a periodic HSE Performance report to the leadership team. As a part of this process, the HSSE Manager holds reviews of Identification of Safety Vulnerabilities. These results are also documented in the HSE Performance reporting.
- The Shell New Energies (NE) leadership team members and line managers use the HSE Performance report to monitor and improve performance.
- Periodic HSSE Self-Assessment Reviews are to be commissioned by the site/project manager and conducted by site/project personnel.
- The business unit HSSE-Management System, and applicable state and local HSE regulations are be used as the Terms of Reference for these reviews. A process is in place to document that the review was conducted and actions taken to address and close all review findings.

c) Safety Events and Lessons Learned

Shell’s document, “Incident Notification, Reporting, and Investigation Process”, described below provides guidance on a systematic approach for classifying, investigating and reporting of incidents that result in injury or illness, vehicle incidents, damage to assets, damage to the environment, and/or damage to Shell’s reputation. It also addresses significant incidents that could have had an adverse outcome but did not, i.e. near miss or high potential incident.

This process is to apply to all HSSE incidents involving Shell Alternative Energies (AE) staff, contractors, assets and/or products that are Shell Owned and Operated (O/O), Under Operational Control (UOC) and Not Under Operational Control (NUOC).

Incident Management Tools

All incidents, near misses and potential incidents must be reported in accordance with this procedure and entered into one of the AE Incident Management Tools. AE currently utiltizes two incident management tools or reporting systems; which system is used depends on whether the incident occurs at a UOC or NUOC facility.

The Incident Management Tools are:
Fountain Incident Management (FIM), and
NUOC Incident Log

Type of Event to be reported	Incident Management Tool/ Reporting System to be used
• Near Misses • Potential Incidents • Incidents	Fountain Incident Management (FIM) – UOC or NUOC Incident Log

FOUNTAIN INCIDENT MANAGEMENT (FIM)

Fountain Incident Management (FIM) is used to collect/store data, facilitate incident notification and reporting, and manage HSSE incidents on O/O and UOC sites. All AE employees of owned/operated businesses and JV UOC businesses can enter a First Report into FIM.

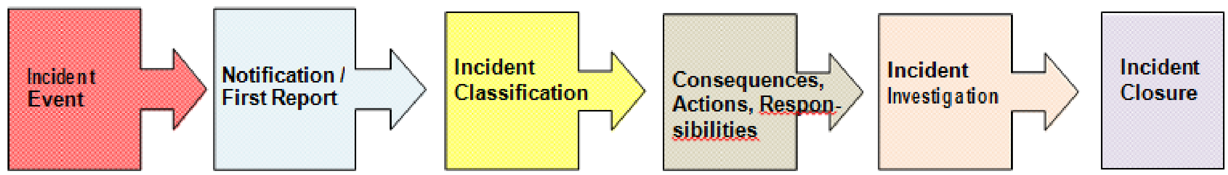
The reporting and notification requirements are based on the level of severity from the incident assessed using the

Group Risk Assessment Matrix (RAM).

NUOC INCIDENT LOG
The NUOC Incident Log is utilized for HSSE incidents at NUOC sites.

Only AE HSSE staff can enter NUOC incident information into the NUOC Incident Log.

Process
All incidents no matter how slight shall be reported. The process described below applies to all incidents including Near Misses and Potential Incidents; this process does not apply to HSSE Observations or Interventions.



NOTIFICATION & FIRST REPORT
Employees, Contractors and Sub-contractors that experience an injury, or witnesses an incident (for example a gas/liquid release, environmental excursions, etc.), no matter how slight, are required to notify their supervisor/manager, or Shell AE Representative, as soon as possible but no later than the end of the same working day or shift. Employees Contractors and Sub-contractors experiencing effects from an illness or a developing a chronic condition they believe is resulting from an exposure in their work environment, are also required to notify to their supervisor, or Shell Representative, as soon as they experience the symptoms or physical effects.

Upon notification by an employee or contractor of an incident event, the Supervisor/Manager /AE Representative will make notifications to other members of the AE organization as defined in the Incident Notification Process.

Note: Injury/Illness events of a Contract employee are the responsibility of the Contractor Company. However, the Contractor/Sub-Contractor is responsible for keeping the AE Line/Asset Manager apprised of any incidents and subsequent findings.

First Report of Incident - O/O and UOC Sites
In addition to notifying their supervisor/manager, the Employee, or his/her designee, will enter the First Report of the incident (hereafter referred to as the First Report) into the FIM. For Contractor/ Sub-contractor incidents, the notified AE representative or his/her designee will enter the First Report into FIM. The First Report should be entered into FIM as soon as possible but not later than:
Significant Incidents (RAM 4 & 4) - 12 hours from occurrence
Other Incidents (RAM 1, 2 or 3) - 24 hours from occurrence.

Note: when entering a First Report in FIM, a Responsible Supervisor must be assigned. For all AE incidents, the assigned Responsible Supervisor shall be a member of the AE HSSE staff, regardless of who is the employee's direct Supervisor/Manager. Generic details and training on the FIM system can be found on the Fountain website.
For specific details and steps refer to the FIM User manual or Quick Reference Cards.

First Report of Incident - NUOC Sites
For incidents at NUOC sites, AE HSSE FP shall be notified within 24 hours of any incident resulting in a TRC or significant LOPC, spill, fire or environmental impact. AE HSSE FP is responsible for entering all applicable NUOC incident data into the Incident Log.

INCIDENT CLASSIFICATION
The Responsible Supervisor (AE HSSE Dept) will classify all incidents based on their severity as identified on the

Severity/Consequence Matrix (Appendix D). Guidance for RAM rating is provided in Shell's Risk Assessment matrix (RAM) Guide and Risk Assessment Matrix Manual. The RAM Classification of the incident determines the extent and timing of the formal incident notification to the AE CoB.

Additionally, any work related injury or illness will be classified (e.g. restricted work, medical treatment, first aid, etc.) in accordance with Part 3 of Shell's Performance Monitoring and Reporting specifications.

Upon investigation, some incidents may require reclassification (e.g. remediation cost exceeds initial classification, injury initially classified as a medical treatment case becomes a lost time, etc.). The Incident Owner will be responsible for documenting the reclassification if applicable.

CONSEQUENCES, ACTIONS AND ROLE ASSIGNMENT
An Incident Owner is assigned after the incident is initially classified. Typically the Incident Owner is:
The Line/Asset Manager for Severity Rating 1-2
The HSSE Dept for Severity Rating 3-5

The Incident Owner will review the incident report and fill in missing data, if necessary; complete the Consequence Records, and assign responsibilities/roles, as deemed appropriate. Various roles/responsibilities that may be assigned include:

Pre-Action Approver
Post-Action Approver
Verifier
Investigation Approver *
Incident Classifier
Incident Approver
** In Alternative Energies, an Investigation Approver is mandatory for all Significant Incidents and Significant Potential Incidents. The Investigation Approver shall be the HSSE General Manager.*

Additionally, the Incident Owner will assigned action items, as necessary. Action items can be assigned both before, during and after the incident investigation.

Refer to the FIM User Manual and/or Quick Reference Cards for more detailed information on roles, action and the workflow process

INCIDENT INVESTIGATION
The Incident Owner is responsible for, or may delegate to another qualified staff person, the investigation of the circumstances and causal factors associated with the incident, according to the process defined in this document and using the appropriate investigation methodology.

Incident Severity Level	Type of Investigation
Severity Level 0	No investigation Required
Severity Levels 1-3	Root Cause Analysis (RCA)
Severity Levels 4-5 (Significant Incidents and Potential C5, D5 & E5 Incidents)	Root Cause Analysis (RCA) and Underlying Causes Analysis (i.e. Tripod, Tripod Beta, Causal Learning)

Investigation Team
For Severity Rating 4 and 5 incidents it is the HSSE Manager's responsibility to assure that the appropriate person is identified to lead the incident investigation. Team Leads for Severity Rating 1, 2 and 3 incidents are identified in the

table below.

The following table outlines the required and recommended team composition for the various Incident Levels:

Incident Level	Investigation Team Composition
Severity Ratings 4 and 5 (Significant Incidents and Potential C5, D5 & E5 Incidents) -	Sponsor – HSSE Manager Lead – Determined by sponsor * Participants – TRIPOD Investigation facilitator, Line Manager/ Department Manager, HSE subject matter expert(s), Technical specialist(s), Operations subject matter expert(s) -
Severity Ratings 3	Lead – HSSE Staff * Participants – Investigation facilitator, HSSE subject matter expert(s), First Line Supervisor, Technical specialist(s) (as required)
Severity Ratings 1 and 2	Lead – Incident Owner (Line Management) * Participants – Local operations/technical representative(s), H&S Representative (optional), Environmental Coordinator (optional)

Any person that leads an investigation shall have completed the AE HSE Incident Investigation Training Module.

Investigation process
The investigation should include the following activities:

- Conducting Interviews - Interview the affected persons and any witnesses
- Visit the incident scene – Inspect and gather physical evidence
  - note the layout of the geographical/physical area and of equipment
  - site Conditions - determine site conditions such as, time of day, lighting, weather, temp/humidity, wet/dry, slick/
  - evidence - collect debris or items that may pertain or contributed to the incidents' events such as permits, tools, cords, etc.

- Fact finding
- Reviewing records and procedures
- Conducting Specialist studies (if required)
- Resolving conflicts in evidence

AE reserves the right to participate in any investigation of an injury/illness case by a Contractor. AE may exercise this right mainly to gain any learning that may be considered for improving a HSSE management system.

Any member of the AE leadership team, a representative from one of the partners, or Shell HSSE may require a higher level of incident investigation than that provided for in the Incident & Investigation Process.

- Severity Rating 4 and 5 (Significant Incidents and Potential C5, D5 & E5 Incidents)
  - Legal consultation prior to beginning the investigation process.
  - Root Cause Analysis facilitated by an individual qualified in the RCA methodology selected
  - Underlying Cause Analysis - Tripod Tool - facilitated by an individual qualified in Tripod methodology

- Severity Rating 3
  - Root Cause Analysis facilitated by an individual qualified in the RCA methodology selected

- Severity Ratings 1 and 2
  - Informal investigation at the local level to identify causal events

Investigation record
In compliance with the Group Records Management Standard and Guidelines, all records regarding incident with consequences are to be kept in FIM. The records in FIM constitute the official documentation of incident related information.

For Significant and High Risk Incidents, a complete and detailed incident report is required following the Group specified content and including a Tripod analysis. Analysis of the incident should include action items to address all failed and missing barriers, and especially latent failures. Additionally, the investigation report must include an analysis of immediate and underlying causes and weaknesses in the HSSE & SP Management System. The report shall be attached in the FIM Investigation Record. Per the FIM User Manual, a link to a shared drive/livelink folder containing the investigation report can be attached rather than the actual documents. This decreases the size of the record and allows files to be added to the folder after the investigation has been closed.

For incidents not assessed as Significant or Potential, a complete and accurate FIM entry will suffice as the incident report. However, additional documentation may be attached to support special inquires and reviews.

The action items associated with all incidents must be Specific, Measurable, Achievable, Realistic and Time bound (SMART). Recommendations that are not directly related to the incident chain of events shall be stated in a separate paragraph/section.

If the potential exists for an incident report to be shared with external parties, legal advice will be obtained before beginning report preparation. Legal review is also required before the final report is issued.

For Contractor incidents, the Contractor representative will provide the Line/Asset Manager a copy of all injury/illness reports. The report, or a link to the report, will be attached to the record.

Closing the Investigation Record
All Investigation Records must be closed before an Incident Record can be closed. The Investigation Team Leader is responsible for closing the investigation record, unless an Investigation Approver is assigned. In Alternative Energies, an Investigation Approver is mandatory for all Significant Incidents and Significant Potential Incidents. The Investigation Approver shall be the HSSE General Manager. For all other incidents, an Investigation Approver is optional.

Before closing the Investigation record, the Investigation Team Leader or Approver shall verify that all necessary information has been completed.

<u>Closing the Incident Record</u>
The Incident Owner is responsible for closing an incident unless an Incident Classifier or Incident Approver is assigned. If an Incident Classifier or Approver has been assigned, then it is their role to close the Incident Record.

Before closing an incident record, the Incident Owner/Classifier/Approver must ensure that:
All required information has been correctly entered
All recommended or pending consequences records have been completed and closed
All Investigation records attached have been completed correctly and closed.

Note: Action items do not have to be closed before the Incident Record is closed.

For specific details and steps refer to the FIM User manual or Quick Reference Cards.

<u>Learning from Incidents</u>
An LFI document shall be produced and shared, in accordance with AE procedure “Learning from Incidents”, for all

Significant and Potential C5, D5 and E5 Incidents, as well as any other noteworthy incidents that have a useful learning for the AE organization.

LFIs shall be completed within two months of the date of the incident and shall be posted on the AE HSSE Sharepoint site for sharing within AE and the wider Downstream communities.

DOE H2 Tools

All reasonable efforts will be made to prepare an anonymous report of any incident without identifying any of the parties to the incident, and to voluntarily upload this information to the Department of Energy's H_2 Tools Lessons Learned web page at https://h2tools.org/lessons.

d) Emergency Response

Shell's stations will be continuously monitored using an online system to provide both operation monitoring and service response on a 24 hour basis. As explained above, H2 Logic handles operation monitoring and responding to any operation event, using the "H2Sta-tion® Instant Service Response" with predetermined Response Process Times.

As Shell has done for previous hydrogen fueling stations, we will prepare and maintain an Emergency Response Manual. This manual provides a framework for planning and implementing an emergency response at a hydrogen refueling station. Its aim is:

- To provide a system and resources to deal with emergencies to protect people, property and the environment
- To support the commitment to being a responsible corporate citizen

The objectives of this emergency response plan are:

- Minimize adverse effects on people, property and the environment
- Control or limit the effects of an emergency;
- Communicate vital information to all relevant persons as soon as possible;
- Provide for competency-based training so that the right level of preparedness can be continually maintained
- Provide a basis for updating and reviewing emergency procedures; and
- Provide a system to manage emergencies.

The Emergency Response Manual will ensure an efficient and consistent approach to any emergency. It covers H2 emergencies within the refueling station boundaries; response to neighbor's emergencies, and unintended H2 releases.

e) Self Audits

Periodic audits provide assurance to the Shell NE Group that NE is complying with applicable manual sections of the HSSE Control Framework. These audits will be scheduled and conducted by the HSE Risk, Audit and Assurance group.

5) Additional Information

Tables and Figures Referenced in Previous Sections

Table 1 – Sample of Hazards for Hazard Identification
Table 2 – Sample Olefins Plant Hazard Identification – Partial List
Figure 1 – Hazards and Effects Management Process
Figure 2 – The bowtie
Figure 3 – A Sample Process Gas Compressor Bowtie excerpt – Corrosion threat line
Figure 4 – A Sample Process Gas Compressor Bowtie – Vapour Cloud Explosion Consequence Line

Site Layouts

Site Layouts for all proposed stations are attached showing layouts for each location.

Table 1 – Sample of Hazards for Hazard Identification

No.	HAZARD DESCRIPTION
H-01	**Process Hydrocarbon Feed and Streams**
	Specific to process units streams
H-02	**Refined Hydrocarbons**
H-02.01	Lube and seal oil
H-02.02	Hydraulic oil
H-02.03	Diesel fuel
H-02.04	Gasoline
H-02.05	Hydrocarbons above auto ignition temp
H-02.06	Asphalt/Bitumen
H-03	**Other Flammable Materials**
H-03.01	Cellulosic materials
H-03.02	Pyrophoric materials
H-03.04	Carbon fibre reinforced material
H-03.04	Dry vegetation
H-03.05	Hydrogen
H-04	**Explosives**
H-04.01	Detonators
H-04.02	Conventional explosives
H-04.03	Perforating gun charges
H-04.04	Explosive gases
H-05	**Pressure Hazards**
H-05.01	Hydrocarbons under pressure
H-05.02	Bottled gases under pressure
H-05.03	Water under pressure
H-05.04	NonHC gas under pressure in pipeworks
H-05.05	Air under high pressure
H-05.06	Hyperbaric operations
H-05.07	Decompression
H-05.08	Trapped pressure in equipment
H-05.09	High pressure equipment
H-06	**Hazards associated with differences in height**
H-06.01,2	Personnel at height
H-06.03	Overhead equipment
H-06.04	Personnel under water
H-06.05	Personnel below grade
H-06.06	Falling ice/snow
H-07	**Objects under induced stress**
H-07.01	Objects under tension
H-07.02	Objects under compression
H-08	**Dynamic Situation Hazards**
H-08.01	On land transport (driving)
H-08.02	On water transport (boating)
H-08.03	In air transport (flying)
H-08.04	Boat collision /offshore structures
H-08.05	Equipment with moving/ rotating parts
H-08.06	Use of hazardous hand tools,,knives etc.
H-08.07	Transfer from boat to offshore platform
H-08.08	Slips, Trips and Falls
H-09	**Physical Environment Hazards**
H-09.01	Weather
H-09.02	Sea state/river currents
H-09.03	Tectonic activity (earthquakes)
H-10	**Hot Surfaces**
H-10.01	Process piping equipment 60-150°C
H-10.02	Piping equipment > 150°C
H-10.03	Engine & turbine exhaust systems
H-10.04	Steam piping
H-11	**Hot Fluids**
H-11.01	Temperatures 100-150 °C
H-11.02	Temperatures >150 °C
H-12	**Cold Surfaces**
H-12.01	Process piping -25 to -80°C
H-12.02	Piping equipment < -80°C
H-13	**Cold Fluids**
H-13.01	Oceans, seas,rivers & lakes < 10°C
H-14	**Open Flame**
H-14.01	Heaters with fire tube
H-14.02	Direct fired furnaces
H-14.03	Flares
H-15	**Electricity**
H-15.01	Voltage > 50 - 600V in cables
H-15.02	Voltage > 50- 600V in equipment
H-15.03	Voltage > 600V
H-15.04	Lightning discharge
H-15.05	Electrostatic energy
H-15.06	Batteries
H-15.07	Stared charge (e.g. capacitors)
H-16	**Electromagnetic Radiation**
H-16.01	Ultraviolet radiation
H-16.02	Infra red radiation (e.g. fired eqpt)
H-16.03	Microwaves
H-16.04	Lasers
H-16.05	E/M radiation: high voltage ac cables
H-17	**Ionizing Radiation - Open Source**
H-17.01	Alpha, Beta - open source
H-17.02	Gamma rays - open source
H-17.03	Neutron - open source
H-17.04	Naturally occurring ionizing radiation /NORM
H-18	**Ionizing Radiation - Closed Source**
H-18.01	Alpha, Beta - closed source
H-18.02	Gamma rays - closed source
H-18.03	Neutron - closed source
H-19	**Asphyxiates**
H-19.01	Insufficient oxygen atmospheres
H-19.02	Excessive CO_2
H-19.03	Drowning
H-19.04	Excessive N_2
H-19.05	Halon
H-19.06	Smoke
H-20	**Toxic Gas**
H-20.01	H_2S, sour gas
H-20.02	Exhaust fumes
H-20.03	Ethyl Chloride
H-20.04	SO_2
H-20.05	Ammonia
H-20.06	Chlorine
H-20.07	Welding fumes
H-20.08	Tobacco smoke
H-20.09	CFCs (Old Freons0
H-20.10	HCFCs (New Freons0
H-21	**Toxic Liquid**
H-21.01	Mercury
H-21.02	PCBs
H-21.03	Biocides
H-21.04	Methanol
H-21.05	Brines
H-21.06	Glycols
H-21.07	Degreasers/Solvents
H-21.08	Isocyanates
H-21.09	Sulphanol
H-21.10	Amines
H-21.11	Corrosion inhibitors
H-21.12	Scale inhibitors
H-21.13	Styrene
H-21.14	Odorant additives
H-21.15	Alcoholic beverages
H-21.16	Recreational drugs
H-21.17	Used engine oils
H-21.18	Carbon tetrachloride
H-21.19	Grey and/or black water
H-21.20	Polycyclic Aromatic Hydrocarbons
H-21.21	MTBE or MMT
H-21.22	BTEX
H-21.23	Hexane
H-21.24	Ethyl Benzene
H-21.25	MEK
H-22	**Toxic Solids**
H-22.01	Asbestos
H-22.02	Man made mineral fibre
H-22.03	Cement dust
H-22.04	Sodium hypochlorite
H-22.05	Powdered mud additives
H-22.06	Sulphur/Sulphur dust
H-22.07	Pig trash
H-22.08	Oil based muds
H-22.09	Pseudo oil based muds
H-22.10	Water based muds
H-22.11	Cement Slurries
H-22.12	Dusts
H-22.13	Cadmium compounds & other heavy Metals (eg. Lead etc.)
H-22.14	Oil based sludges
H-22.15	Catalysts (fresh)
H-22.16	Catalysts (spent)
H-23	**Corrosive Substances**
H-23.01	Hydrofluoric acid
H-23.02	Hydrochloric acid
H-23.03	Sulphuric acid
H-23.04	Caustic soda
H-23.05	Spent caustic
H-23.06	Others
H-24	**Biological Hazards**
H-24.01	Poisonous plants
H-24.02	Large animals
H-24.03	Small animals
H-24.04	Food borne bacteria
H-24.05	Water borne bacteria (e.g. Legionella)
H-24.06	Parasitic insects
H-24.07	Disease transmitting insects
H-24.08	Cold & flu virus
H-24.09	HIV
H-24.10	Other communicable diseases
H-25	**Ergonomic Hazards**
H-25.01	Manual materials handling
H-25.02	Damaging noise
H-25.02	Loud, steady noises >85dBA
H-25.03	Heat stress
H-25.04	Cold stress
H-25.05	High humidity
H-25.06	Vibration
H-25.07	Work stations
H-25.08	Lighting
H-25.09	Incompatible hand controls
H-25.10	Awkward location of workplaces and machinery
H-25.11	Mismatch of work to physical abilities
H-25.12	Mismatch of work to cognitive abilities
H-25.13	Long & irregular working hours/ shifts
H-25.14	Poor organization and job design
H-25.15	Work planning issues
H-25.16	Indoor climate
H-26	**Psychological Hazards**
H-26.01	Living on the job/away from family
H-26.02	Working and living on a live plant
H-26.03	Post traumatic stress
H-27	**Security Related Hazards**
H-27.01	Piracy
H-27.02	Assault
H-27.03	Sabotage
H-27.04	Crisis
H-27.05	Theft, pilferage
H-28	**Use of Natural Resources**
H-28.01	Land take/ Land Use
H-28.02	Surface/Ground Water Contamination
H-28.03	Air Emissions
H-28.04	Soil Issues (Gravel)
H-28.05	Habitat (trees, Veg.) and Wildlife
H-29	**Medical**
H-29.01	Medical unfitness
H-30	**Hazardous Goods**
H-30.01	Dangerous goods in transport activities

Table 2 - Sample Olefins Plant Hazard Identification – Partial List

Hazard #	Stream	Top Event	Consequence	Risk Assessment P	A	E	R
H-01.01	Fuel gas to furnace:	• Loss of containment • Explosive mixture in firebox	• Unignited release in open area (up to max 160 ppm H_2S in gas during start up) • Jet fire • Vapour cloud explosion (VCE, furnace re-ignition) • Explosion on relight	L H H	L M H H	L M H H	L M H H
H-01.02	Process Gas:	Loss of containment	• Fire or explosion • pump seal fire • flange fire • Vapour Cloud Explosion • Spills/Release (unignited release)	H	H M	H L	H L
H-01.03	Green oil overhead to guard dryers	Loss of containment Uncontrolled energy release	• Fire or explosion • flange fire • Vapour Cloud Explosion • Spills/Release (unignited release) • rupture, violent failure of equipment, mechanical damage, missile, pipe-work	H * H	H M H	H L	H L
H-01.04	Dilution steam system	Loss of containment	• Spills/Releases	*	M	L	L
H-01.05	Ethylene refrigeration compressor cooling system	Loss of containment	• Fire or explosion • Vapour Cloud Explosion • Spills/Releases (unignited release)	H *	H H	H H	H M
H-01.06	Ethylene to pipeline – product	Loss of containment. Exposure to Hazardous Decomposition in Pipeline	• Fire and Explosion • Pipeline explosion (detonation) • Spill release (unignited release) • Release to flare	H H * -	H H H -	H H H H	H H H H
H-01.07	Vents and drop outs to flare	Loss of Containment Smokey flare	• Liquid fire at the flare tip and ground. • Explosion in Flare line. • Unignited vapour cloud, liquid release Compliance incident (full unit relief to flare)	H H *	M H M	M H M M	H H M H

P – People, A – Assets, E – Environment, R - Reputation
H – High, M – Medium, L – Low

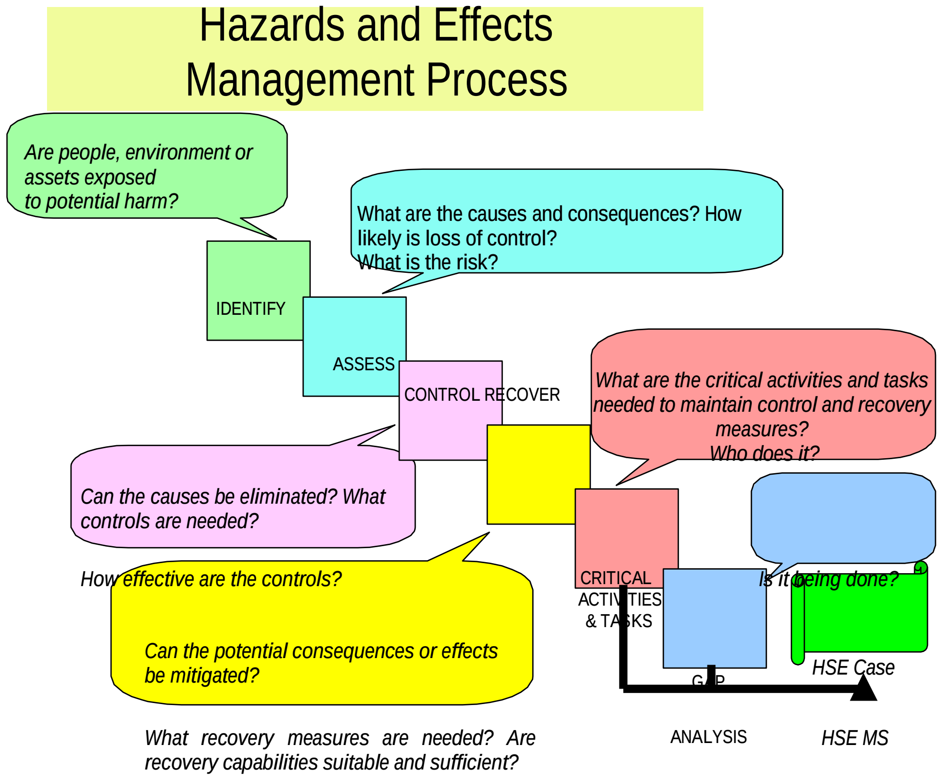


Figure 1 – Hazards and Effects Management Process

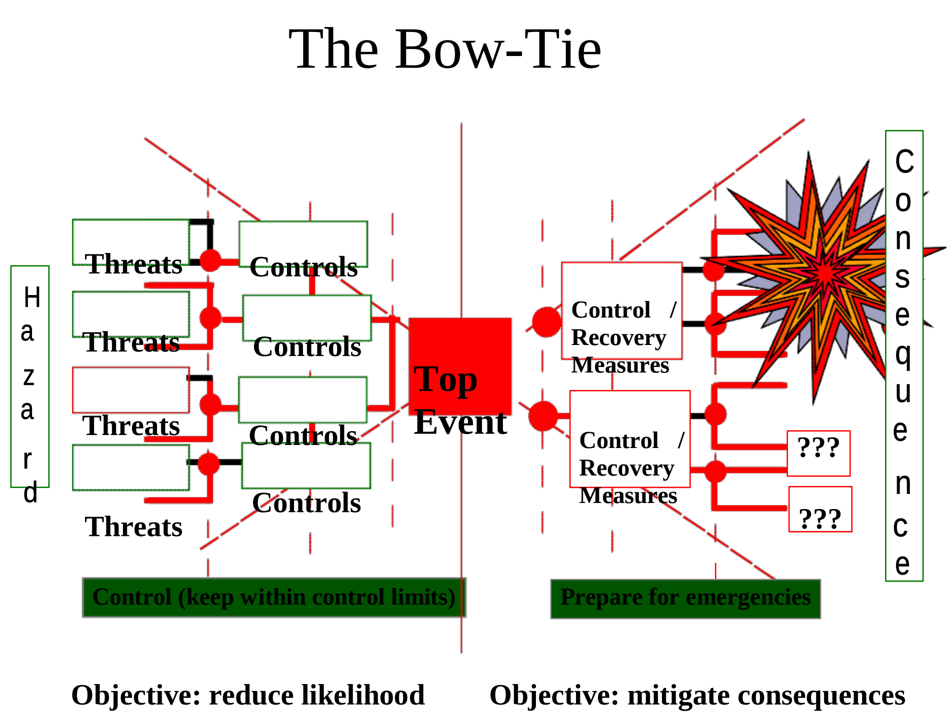


Figure 2 – The bowtie

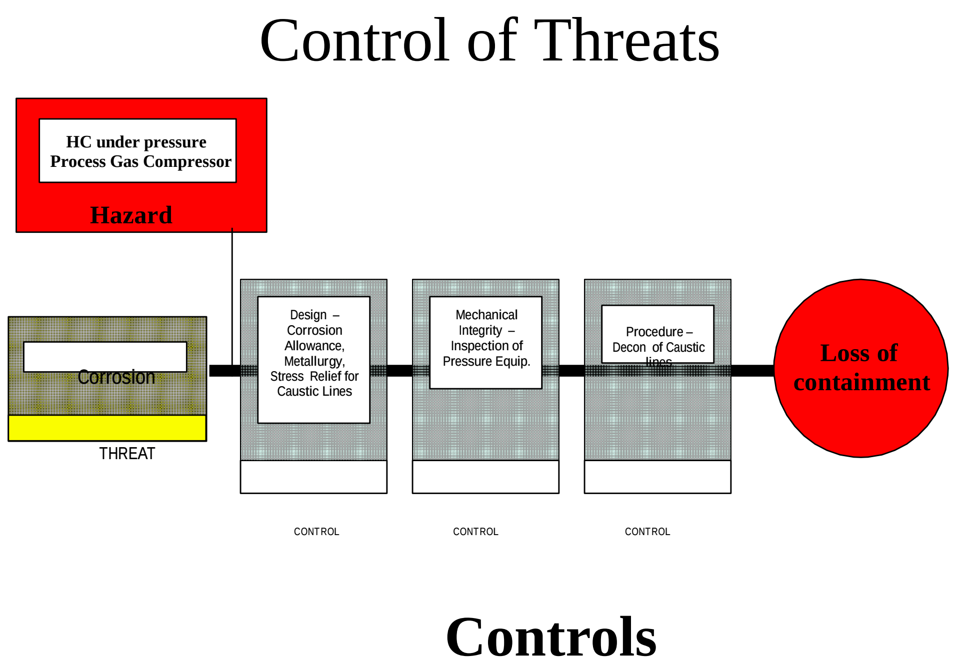


Figure 3 – A Sample Process Gas Compressor Bowtie excerpt – Corrosion threat line

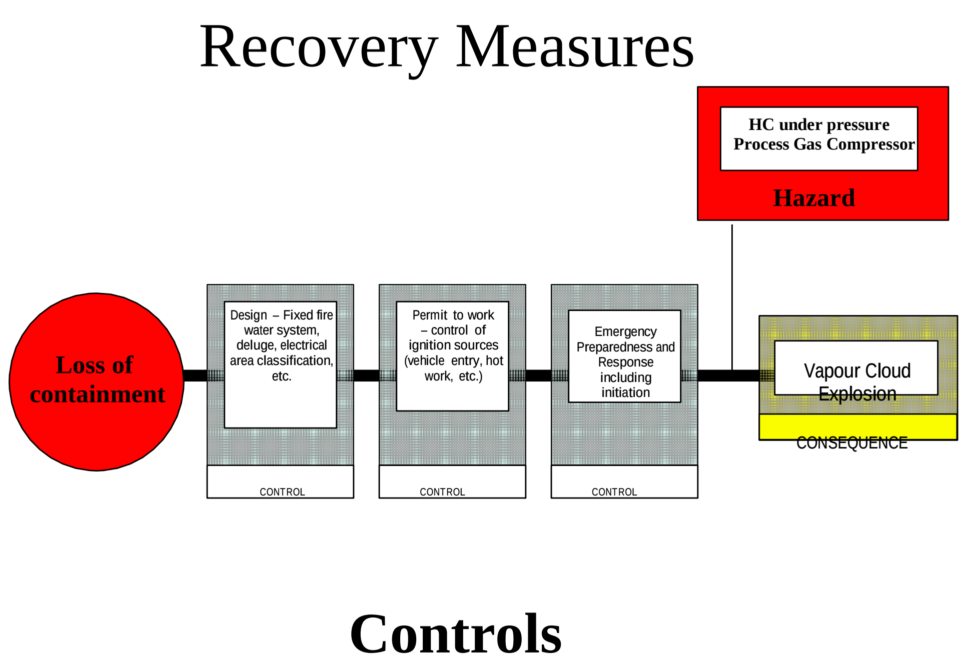
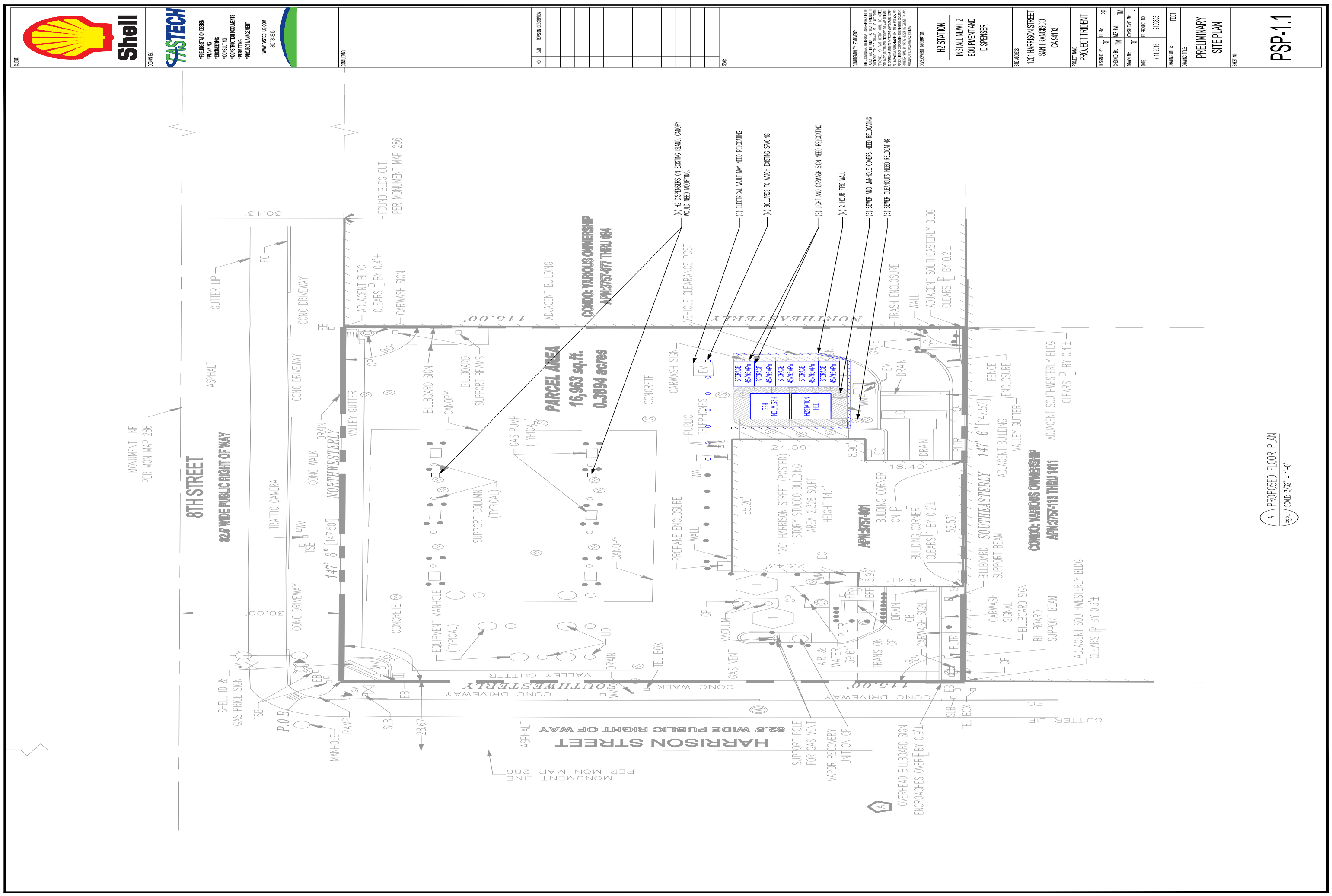
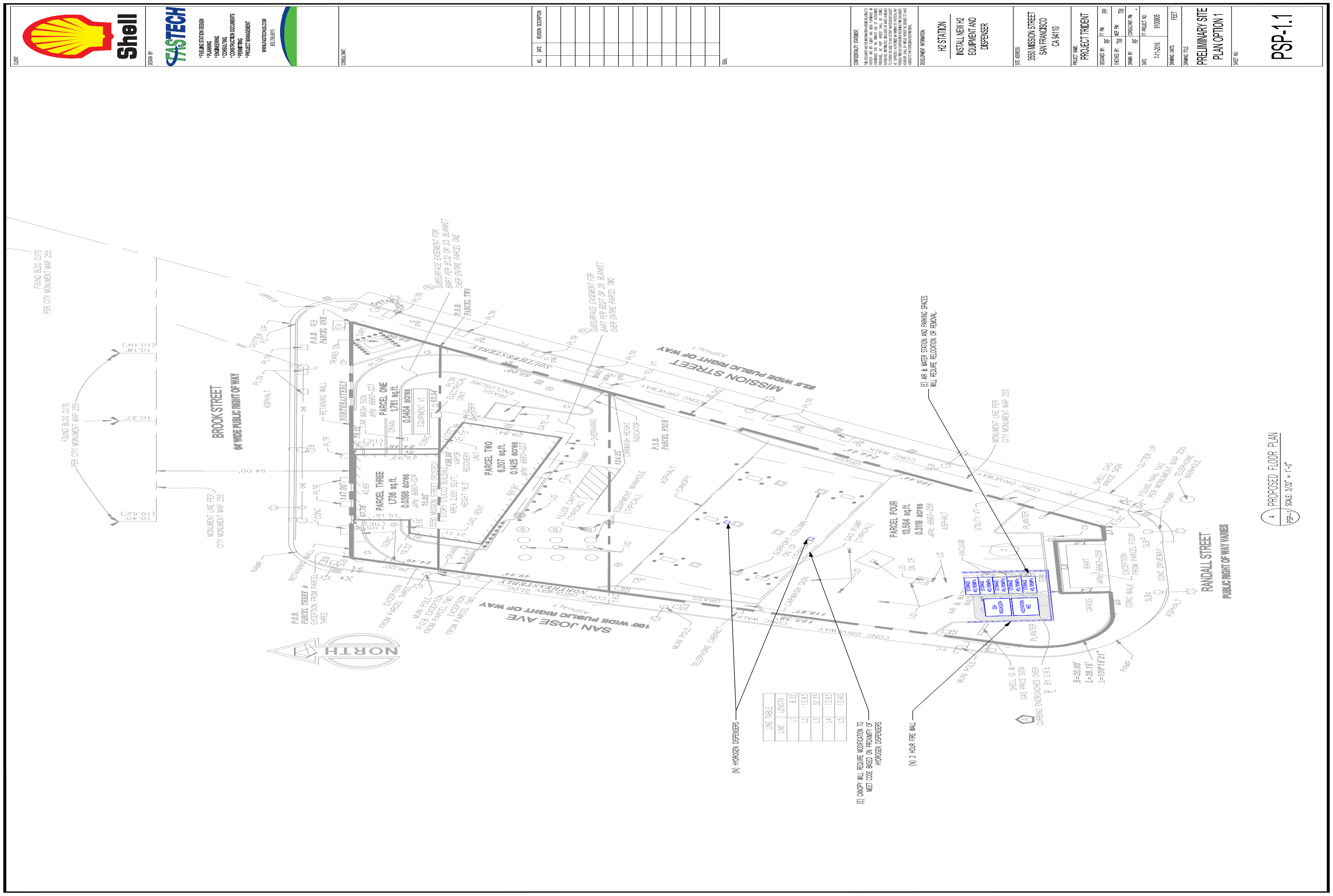


Figure 4 – A Sample Process Gas Compressor Bowtie – Vapour Cloud Explosion Consequence Line

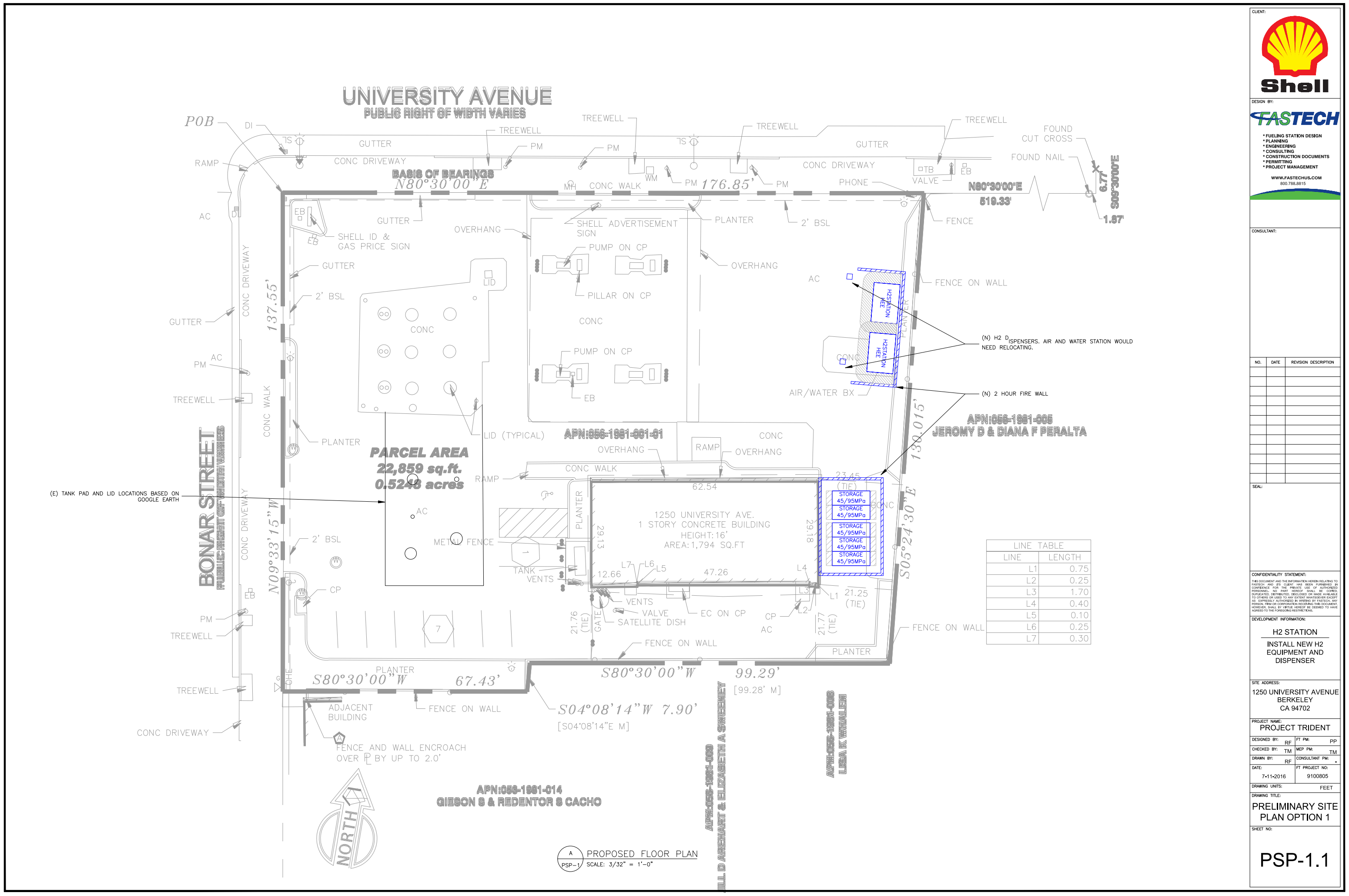
Site Layout for Station #1 – 1201 Harrison St. San Francisco, CA 94103



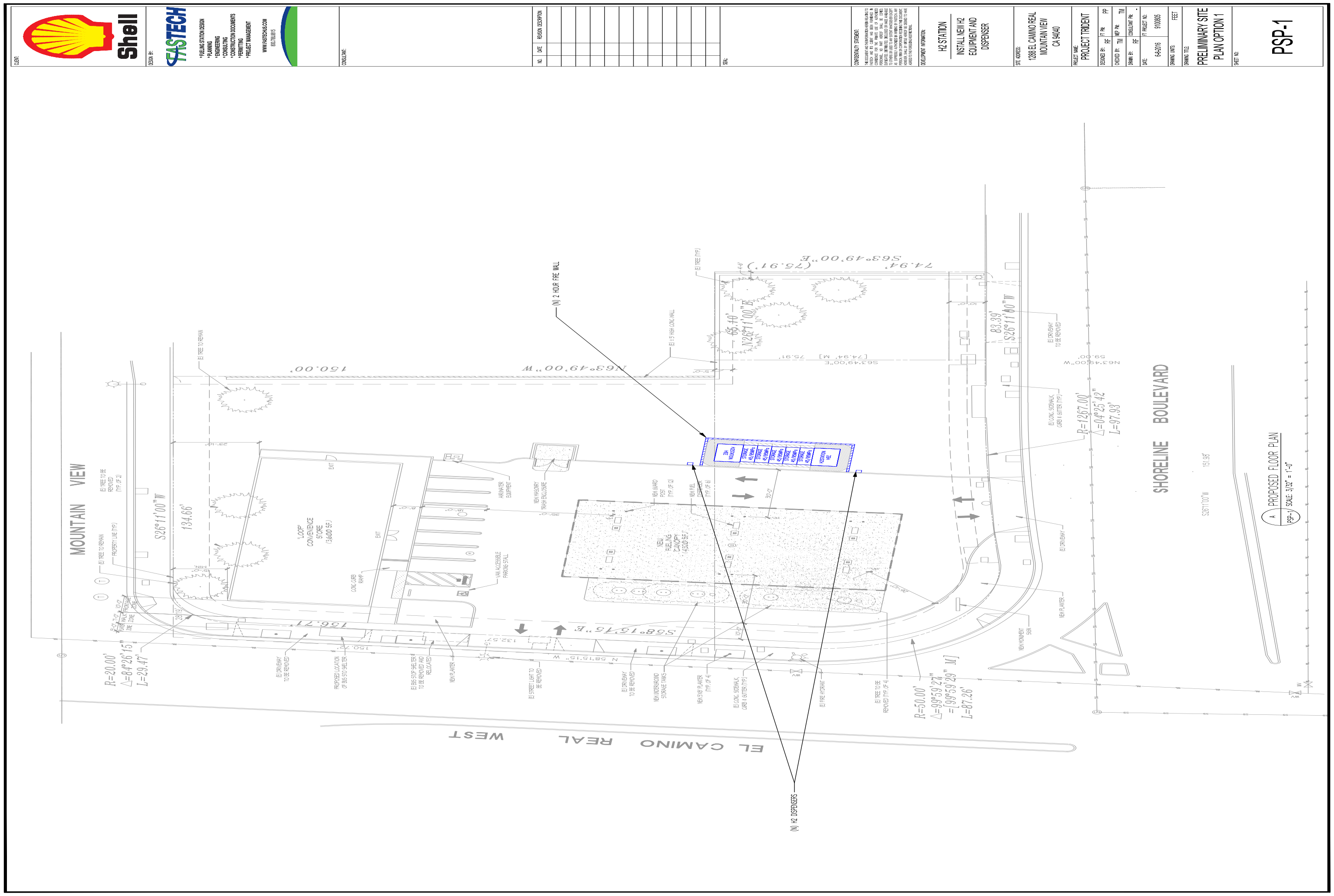
Site Layout for Station #2 –3550 Mission St. San Francisco, CA 94110



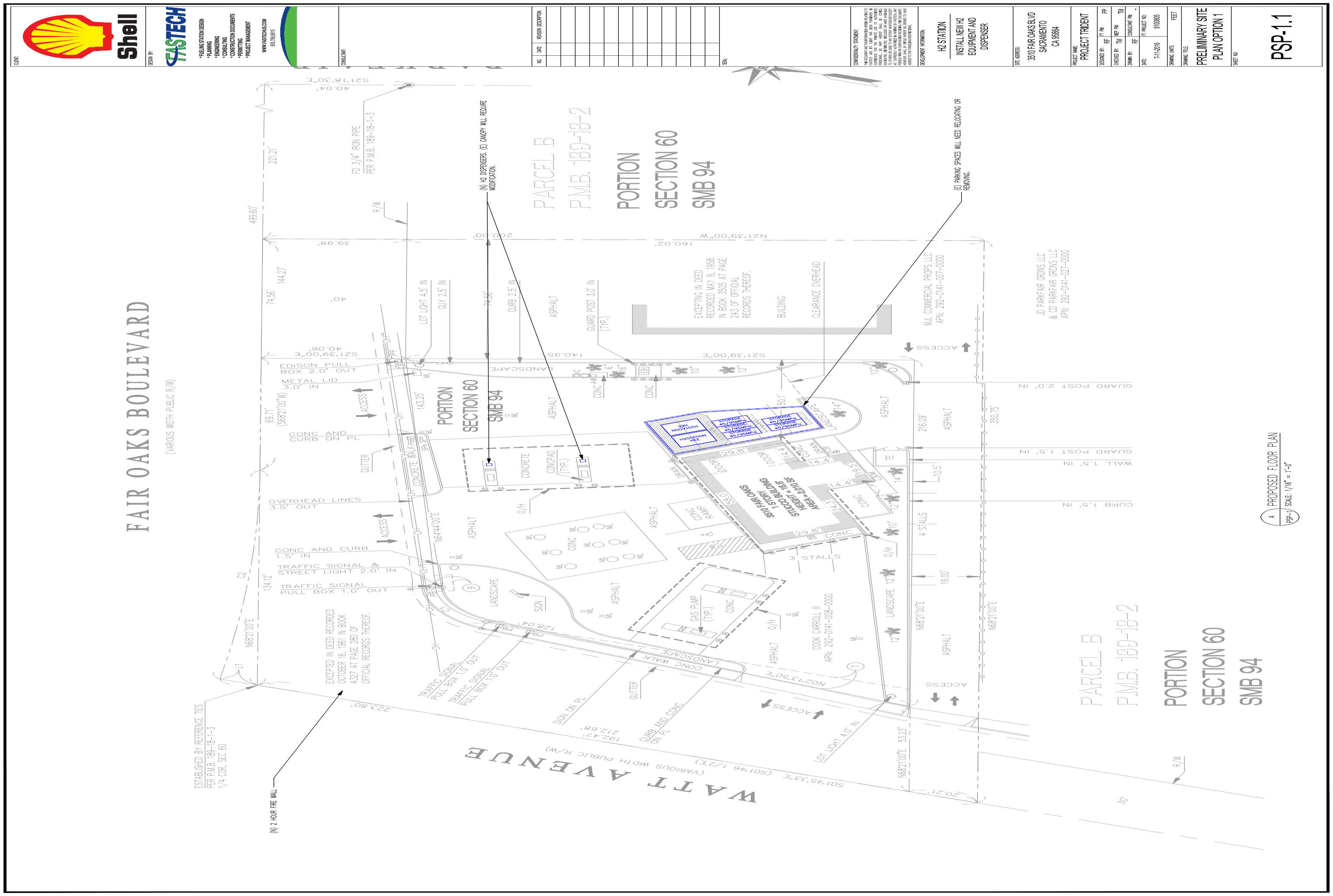
Site Layout for Station #3 – 1250 University Ave, Berkeley, CA 94702



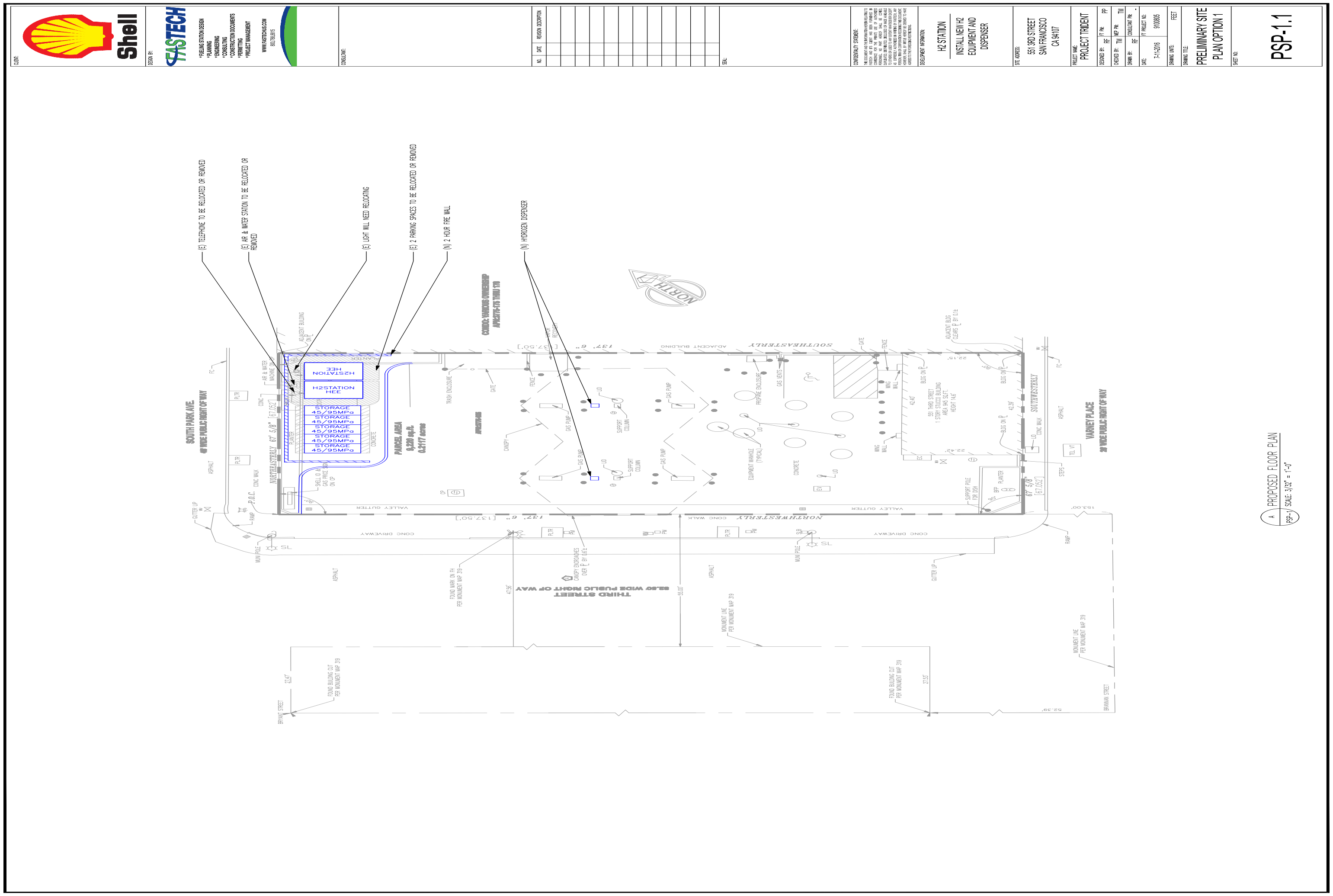
Site Layout for Station #4 – 1288 W. El Camino Real, Mountain View, CA 94040



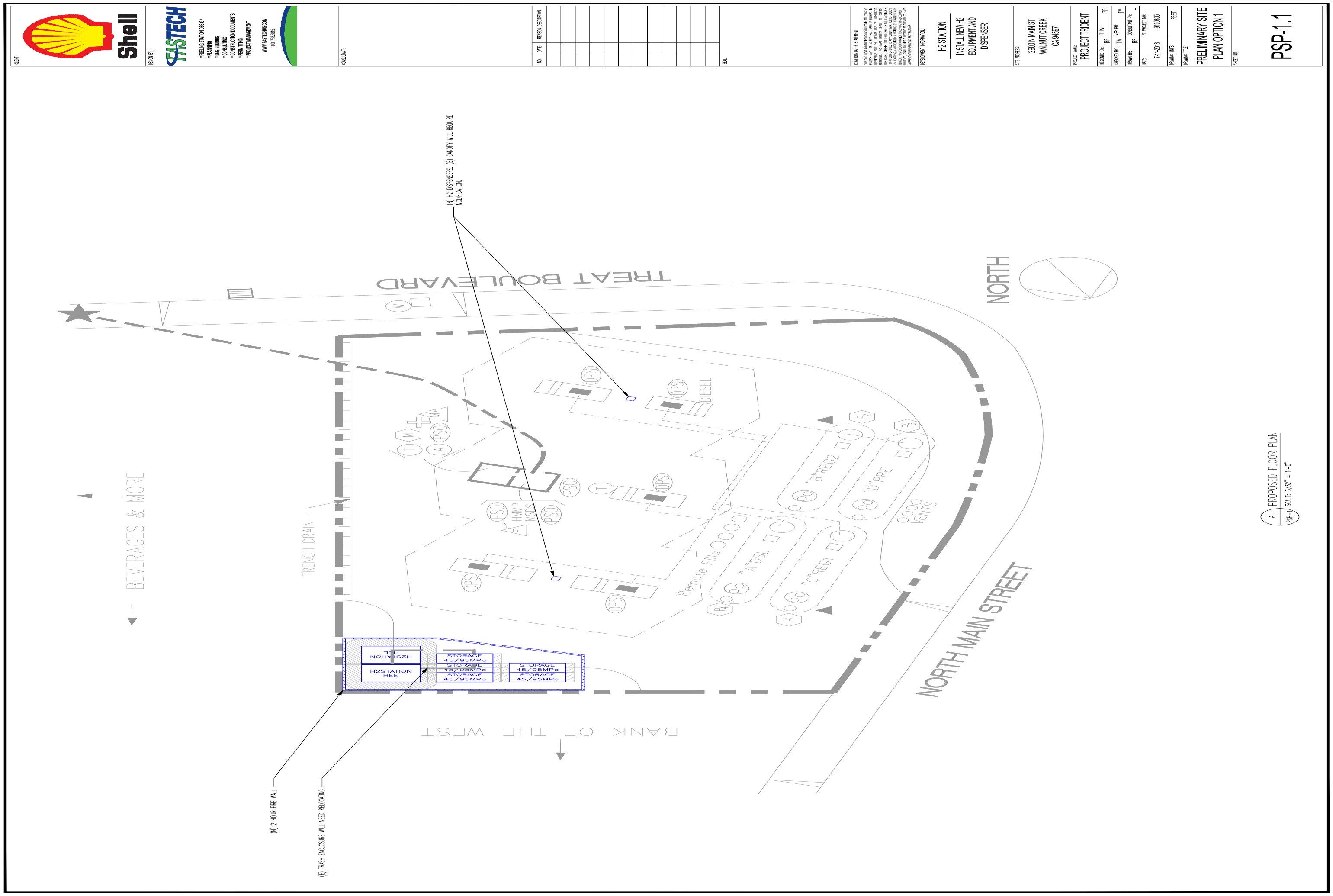
Site Layout for Station #5 – 3510 Fair Oaks Blvd. Sacramento, CA 95864



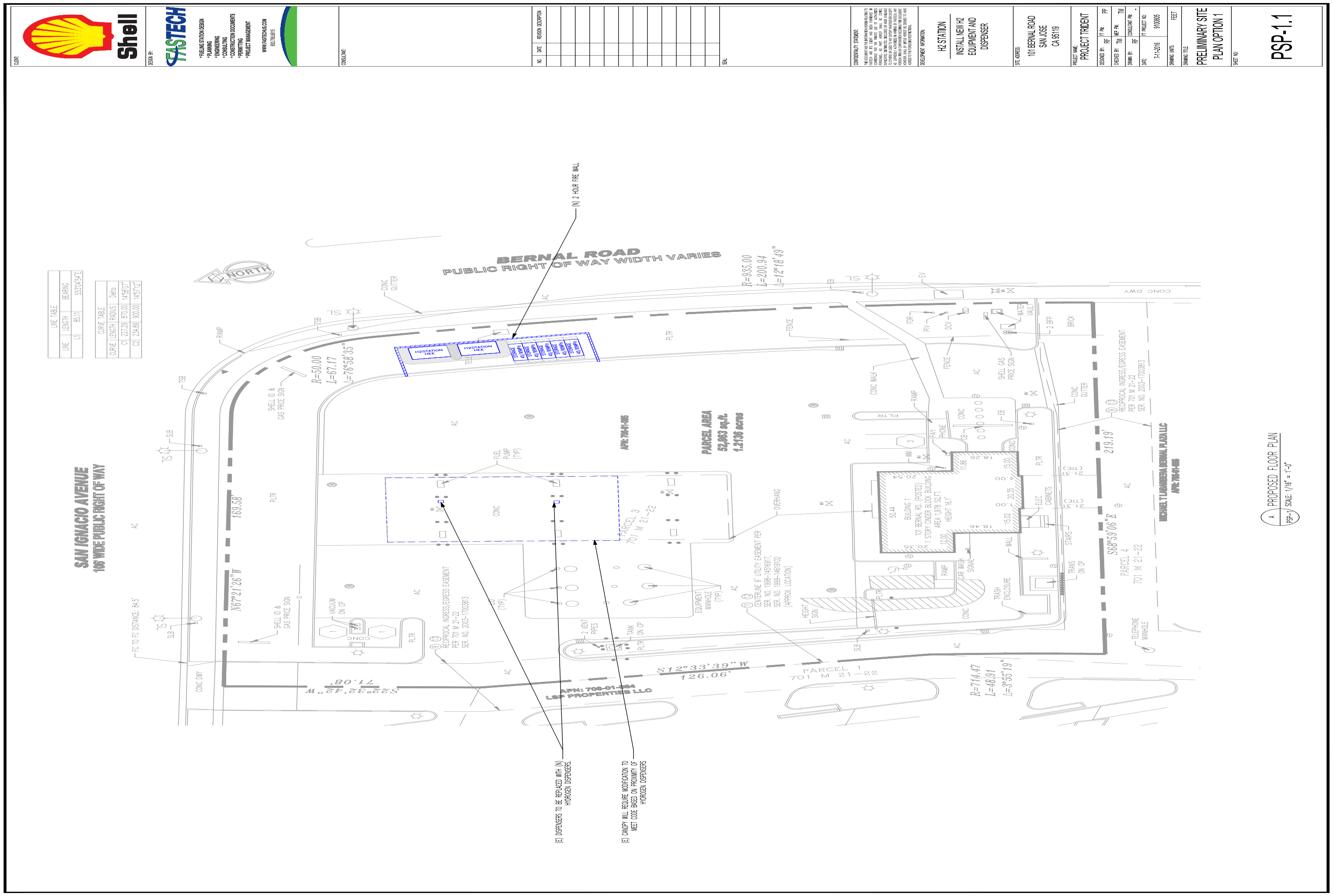
Site Layout for Station #6 – 551 3rd Street, San Francisco, CA 94107



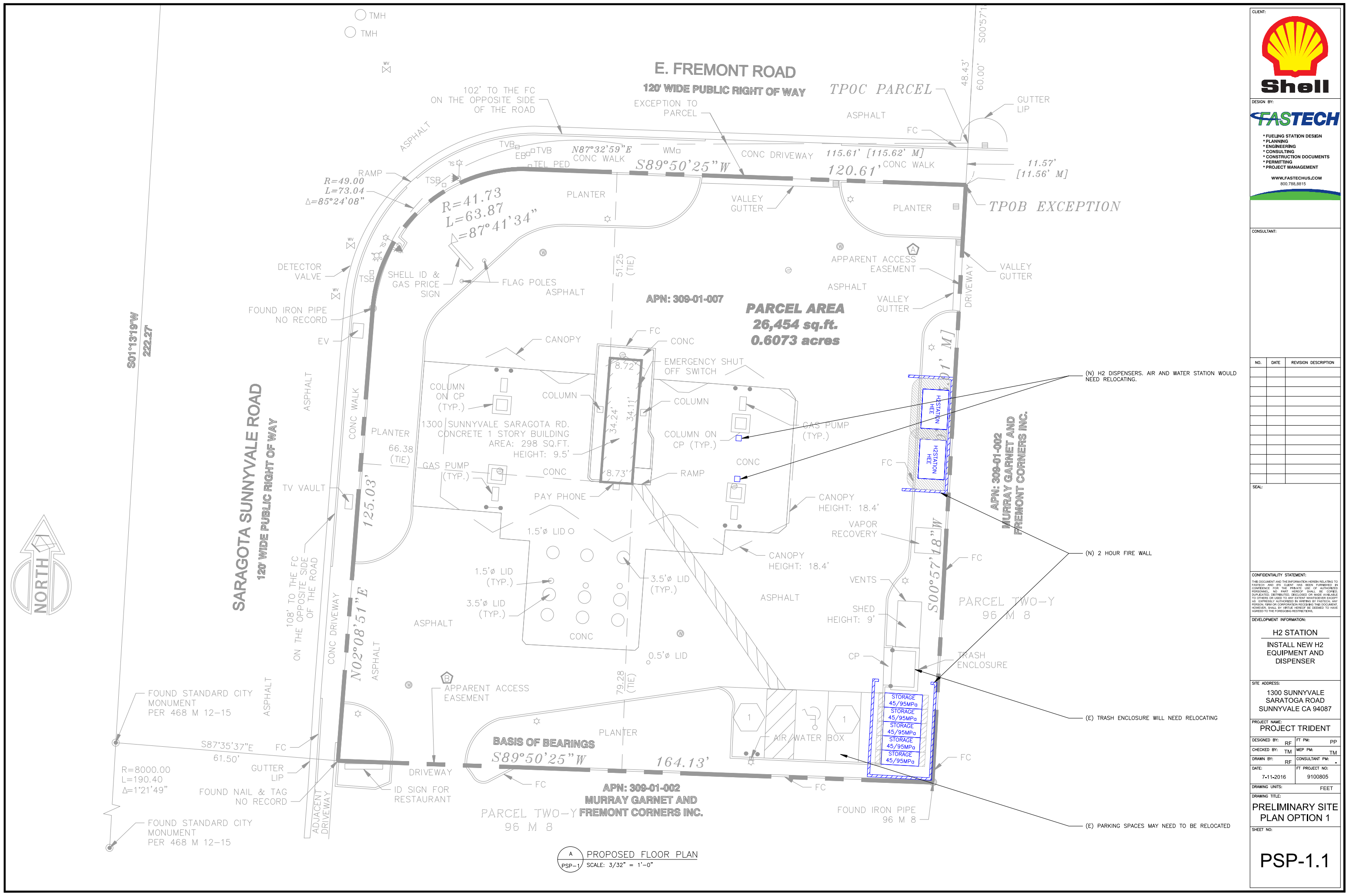
Site Layout for Station #7 – 2900 N. Main St. Walnut Creek CA 94597



Site Layout for Station #8 – 101 Bernal Road, San Jose, CA 95119



Site Layout for Station #9 – 1300 Sunnyvale Saratoga Rd. Sunnyvale, CA 94087



Site Layout for Station #10 – 6141 Greenback Lane. Citrus Heights, CA 95621