APPLICATION FOR THE ACCREDITATION OF SAFETY PROGRAMS ON THE PRINCIPLES OF BEHAVIOR

MARATHON PETROLEUM COMPANY
MICHIGAN REFINING DIVISION
DETROIT, MI
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IDENTIFYING INFORMATION

Name of Organization: Marathon Petroleum Company, Michigan Refining Division
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BACKGROUND CONDITIONS

Geographic & Physical Conditions

The Detroit, MI refinery has been in operation since 1930 when it was owned by Max Fisher and operated as the Aurora Gasoline Company. In 1959, Marathon Oil Company purchased the refinery and since then has continued to improve the facility. The plant occupies approximately 300 acres and is Michigan's only petroleum refining complex. The majority of the work is outdoors and is subject to the changing seasons of Michigan – hot, humid summers and cold, snowy winters.

Goods & Services / Physical & Machinery Hazards

Operationally, the Refinery is a fully integrated process. A steady stream exists from the moment raw materials enter the plant until finished products leave via truck, lake tanker, railroad car, or pipeline. This requires a seven day per week, 365 days per year operation. The Refinery currently processes 106,000 barrels per day of crude oil which is refined into a product mix of approximately 48% gasoline, 25% fuel Oil, 18% asphalt, and 9% other products. The makeup of this production will vary depending on the type of crude used as charge stocks. The refinery is currently undergoing an expansion and in 2012 will increase its heavy oil processing capacity by 80,000 barrels per day.

Operations include crude fractionation, catalytic cracking, hydrotreating, reforming, alkylation and sulfur recovery. The product mix is composed of gasoline, distillate, asphalt, slurry, propane, chemical grade propylene and sulfur. This requires the use of tanks, vessels, valves, compressors, blowers, pumps, fans, etc, which must be operated and maintained on a regular basis.

Recent Safety Initiatives

NPRA Distinguished Safety Award: In 2010, the Michigan Refining Division (MRD) was awarded one of the highest honors that the National Petrochemical and Refiners Association (NPRA) bestows in the Distinguished Safety Award. MRD was the only petroleum refinery in the United States recognized by the NPRA for this level of distinction.

MVPP: In 2010, MRD achieved the STAR status in the Michigan Voluntary Protection Program (MVPP) by the Michigan Occupational Safety and Health Administration. The STAR designation is the highest designation in the MVPP program. Its purpose is to recognize “the best of the best” in safety and health. In addition, MRD mentored Holly Construction in their endeavor to become the first construction company to be awarded VPP status in Michigan.
MPC President’s Award for Responsible Care®: In 2007, MRD was named as the most improved finalist in the running for the President’s Award and in 2008 MRD won this award for the first time. The President’s Award for Responsible Care is MPC's most distinguished award. It is granted annually to recognize excellence in health, environment, safety, security, product quality, diversity and business integrity. The winning organization is presented with an engraved crystal trophy, an award celebration ceremony and a $10,000 community outreach grant to be donated to a local non-profit organization of their choice. In developing the criteria for the President's Award, risks are assessed to pinpoint areas for establishing metrics. Each year, the criteria for the President’s Award change and evolve to drive further performance improvement in our company. Achieving success in the metrics associated with the President’s Award requires commitment to continual improvement from all levels of employees within the competing organizations. Each year performance is driven to new levels of success, but the bar never stops moving up. As the bar moves up, so does the performance of the company.

DRIVE Safety: DRIVE Safety is MRD’s structured safety process. The development of this program started in 2006, when a third party contractor was hired to assist Detroit in customizing a program to optimize employee involvement and ownership of the safety and health process. The customization process involved a three day plant assessment, employee interviews, and closed door meetings with employees to gauge refinery’s safety culture. The assessment and employee involvement drove the development of a program aimed at employees being directly involved in the safety and health management system. DRIVE Safety takes the most widely recognized tools used in our industry (Start of Shift Meetings, JSAs, What If Drills, Safety Inspections, Behavior Based Safety and Sequential Safety Meetings) and uses them to foster a high level of employee involvement and ownership of the safety and health process. See Exhibit A – DRIVE Safety Mission Statement.

Using an Operation’s Department shift as an example, DRIVE Safety creates involvement in the above listed industry tools through the program’s structure. The foreman assigns each operator on shift one of four tools (What If Drill, Start of Shift Meetings, JSA, Team Safety Inspection) to complete for a given month. The assignments are maintained on the Team Activity Plan, located in the shift’s DRIVE Safety manual, which is located in the area’s DRIVE Safety Information Center. Not only is the operator held accountable for completion of their assigned tool, it is expected to be of good quality. The assignments involve working with others, leading meetings and conducting training. This enhances employee’s ability to recognize hazards and they automatically become involved. For following months, foremen will assign operators to different tasks to provide them experience in other areas. The cornerstone tool, The Sequential Safety Meeting, is delivered to all employees every month. This meeting is an extremely powerful information sharing tool. This involvement spills into other areas of the safety and health management system, making for a vibrant and healthy safety culture.

After the program was implemented and its sustainability was proven, it has been continually reviewed by the DRIVE Safety Committee to ensure that it continues to engage employees.

Safety Steering Committee: This committee is comprised of Health, Environmental, Safety, and Security (HESS) Professionals, members of the Detroit Leadership Team (DLT), various supervisors, hourly employees and union stewards. In essence, this committee holds the entire refinery responsible for ensuring that all safety initiatives, procedure revisions, new procedures, etc., are appropriate and provide optimal effectiveness for ensuring employee safety. This committee meets once per month to address these items. The committee generates an action item list used to track an item to be addressed, date originated, responsible person, due date and progress. The action item list is available on the safety webpage and is e-mailed to every employee along with the meeting minutes on a monthly basis. This allows employees opportunities to witness the status and progress of these items and to create a sense of accountability for the responsible person and their supervisor (if applicable).
Contractor Safety: In 2009, MRD began conducting full program audits on contractors to complement the Contractor Safety Program and ensure its effectiveness. The audits are conducted on all Detroit Refinery nested contractors on a routine basis and take an in depth look at each contractor’s overall safety compliance and culture. The intent is to engage all employee levels of the contractor and focus on the following:

- Safety programs – Does the program cover all regulatory and best industry practice requirements?
- Recordkeeping – Is there documented proof of compliance?
- Training – Is employee training effective; can and do they apply specific safe behaviors?
- Field audit – Are the program requirements being met? Do they practice what they state in the safety programs?
- Employee interviews – Do the employees understand the safety policies and regulations?

OCIP: An Owner-Controlled Insurance Program is a very effective way for MRD to manage the care for an injured worker and control worker’s compensation costs associated with injuries that occur on the job. By purchasing an insurance policy for the site and assuming and managing the risk ourselves, Marathon stands to save a large sum of money by eliminating the contractors’ markup on their individual insurance policies. The OCIP is structured to use three main tools to help control injury-related costs on the project. Control of injury care, aggressive claims management, and thorough incident analysis will ensure that Marathon is successful in meeting the OCIP goals and objectives.

Machine Guarding: While preparing for the MVPP audit, opportunities for improvement to the Machine Guarding Program, especially the guarding of pump shafts and couplings and compressor belts, were recognized. In order to effectively address these opportunities, a cross functional Machine Guarding Task Force with representatives from Safety, Operations, Engineering, Maintenance, and Reliability was formed. This team was responsible for the coordination of corrective action and ensuring these actions were effective and comprehensive. The task force developed a charter and prioritized the 400+ pieces of equipment based on the potential injury risk. Those that presented the highest risk were corrected first and a plan was developed to address the remaining equipment. In 2009, the project was completed with 432 pieces of equipment addressed at a cost of over $400,000.

Training: Training is a very important part of MRD’s safety program. All employees receive safety training based on their job title, regulatory requirements, and Marathon requirements. A training matrix is maintained depicting which courses are required for each position. Training is either Computer Based Training (CBT) or facilitator led.

Training topics include:

- Arc Cutting and Welding
- Asbestos Awareness & Competent Person
- Benzene Awareness
- Confined Space Entry
- Confined Space Rescue
- CPR/AED/FA/Bloodborne Pathogens
- Electrical Safety
- Emergency Response Plan
- Energy Isolation
- Fall Protection
- H₂S Awareness
- Hazard Communication
- Hazard Recognition
- Hazwoper Awareness/Operations/Technician Level
- Hearing Conservation
- Hexavalent Chromium
- Hot Work
- Incident Command System
- Industrial Machine Rescue
- Ionizing Radiation
- Lab Safety
- Lead Safety & Competent Person
- Mobile Equipment - Aerial Lift
- Mobile Equipment - Carry Deck Crane
- Mobile Equipment - Cranes Overhead
- Mobile Equipment - Fork Lift
Recent Non-Safety Initiatives/ Organizational Changes

**DRIVE 2010:** In 2005, the DLT developed a program that encompasses all of the refinery’s improvement initiatives titled “DRIVE 2010”. DRIVE stands for Detroit Refinery’s Investment in the Value of its Employees. Under the DRIVE 2010 umbrella, many programs have been developed, such as DRIVE Safety. Each of the programs under DRIVE 2010 takes one aspect of our business and uses a continuous improvement strategy to drive the program to as close to perfection as possible. Upon its inception, the DLT delivered a presentation on the program to all employees. The face-to-face exposure helped to demonstrate management’s commitment to employees’ safety and their stake in the overall DRIVE 2010 program. In addition, the DLT delivers a series of employee meetings held every quarter. The employee meetings are used to communicate past activities and successes, current issues and future activity. The meetings heavily emphasize safety performance.

**Wellness Plan:** The Well ALL Ways Wellness Plan provides employees and their families with a variety of opportunities at the worksite to improve health. The program’s website features a personal wellness assessment, a comprehensive health library, a medical reference guide, exercise and nutrition logging system, nutrition database and food games, a virtual trainer, and healthy recipes. The Well All Ways program also offers 100% coverage of preventive services such as physical exams, screening tests, and immunizations, access to Nurse24, a 24hr nursing hotline, and healthy living programs such as tobacco cessation. By participating in Well All Ways event and activities, employees can earn wellness credits that translate into payments into a Marathon Health Reimbursement Account. 91% of the employees participated in the WellAllWays program in 2009.

The MRD Health & Wellness (H&W) Committee’s primary focus is to inspire others to lead a more healthful lifestyle. The cross-functional committee continues to raise the awareness of Health & Wellness both in the refinery and at home. The H&W Committee organizes awareness activities and events, such as on-site Weight Watcher meetings, lunch-n-learns, Health &Wellness Fairs, on-site Yoga and massages, wellness brochures, and various cancer and charity runs. The committee also orchestrated an outstanding deal with a nearby fitness facility to ensure employees have a low cost option for their fitness needs and coordinated a discount rate at a local vitamin retailer.

**New Division Manager:** In June of 2010, the Detroit Refinery’s Manager was promoted to new position and was replaced by Tracy Case, previously the Refinery Manager at Marathon’s Robinson, Illinois facility.

**Detroit Heavy Upgrade Project (DHOUP):** Construction began in June 2008 and is expected to be completed in 2012 on a $2.2 billion project that will help create jobs and a more stable supply of petroleum products for Michigan motorists. MPC will add new equipment at the Detroit refinery - Michigan's only refinery - to process heavy, more viscous crude oils delivered by the pipeline. Once completed, the Detroit refinery will increase its heavy oil processing capacity by 80,000 barrels per day and its crude refining capacity by 10%. Marathon also will add approximately 60 full time employees and 75 full time contractors.
The Workers & Work

Marathon Employees:
Marathon currently employs 421 hourly (237) and salaried (184) employees.

Age: The median age for Marathon employees is 45 years, with the range of ages being 19-70.

Length of Service: The average length of service for Marathon employees is 11.5 years, with the range being 0-41 years.

Union: Hourly employees are represented by Teamsters' Local #283.

Contractors: Currently, due to plant construction and maintenance, approximately 1,000 contractors are regularly on site.

SAFETY CONCERNS

Late in 1997, the Environmental and Safety Manager approached the Division Manager concerning a fairly new safety process known as Behavior Based Safety. Although the Detroit Refinery has been doing quite well in the area of safety, a plateau was reached and the OSHA Recordable Incident Rate had spiked to 4.74. MRD recognized that the behavior based safety process had the potential to help improve the safety performance and increase employee involvement. In 1999, MRD implemented its BBS process, “The Circle of Safety.”

THE DATA

Data Types

BBS Reports: The Circle of Safety uses the Rincon program to input data and reports. This program is provided and supported by Behavioral Science Technology. The reports are used in action planning and to raise awareness to behavior trends. The software has the ability to break down data to time (within a 4-hour block), day of the week, overtime or straight time, TAR or non-TAR, coached vs. non-coached, location, work group, etc. Therefore, nearly any type of report desired can be created with the data collected. Common reports used include:

- Area Reports: The Detroit refinery is broken into four areas. This report allows COS to address issues that may only be present in a particular area. See Exhibit B Example Reports.
- Work Group Report: Workers are separated into five groups, based on job title. Reports are created for these groups to raise awareness and give feedback specific to that group.
- Internal Reports: The Circle of Safety also tracks reports of the trained observers and the comments made during an observation. This is used to identify what areas need to be improved for data accuracy, and is a helpful tool in the action planning process.
% Safe: The COS process tracks and reports out the percent safe for all the Critical Behavior Indices. This measurement is a critical leading indicator and is used as follows:

- 100% Safe = Excellent safe work taking place
- 98% Safe = Good work, very few risks observed
- 95% Safe = May indicate a problem – need to look deeper at “what is going on”
- 90% Safe or lower = Very good indication of a problem or barrier to safe work
- However, for life-critical behaviors (Fall Protection, LOTO, Confined Space) 99% Safe may be undesirable, due to the critical nature of the behavior.

% Safe Enabled, Difficult, and non-Enabled: Percent Safe Data is further categorized into the following categories:

- Enabled – Easily in the control of the employee to do the job safely.
- Difficult – Job can be done safely, but takes some effort to generate safe conditions.
- Non-Enabled – It is not in the employee’s control to do the job safely.

Contact Rate: The COS process has a goal to contact each employee in the refinery at least one time per month with observation and feedback. This is a Contact Rate of 1.0, or the minimum amount of activity necessary to keep a safe-work culture alive. The Contact Rate goal is adjusted up (raised) with temporary increases in the workforce numbers, such as during construction or turnaround.

Contact Rate = \frac{\text{number of observations} \times \text{average number of people observed per each observation}}{\text{Total number of people working in the plant}}

Safety Statistics: MRD tracks a number of lagging indicators including:

- OSHA Recordable Incident Rate (ORIR): This rate is tracked monthly and is regularly communicated to employees in monthly safety meetings, on the safety website, and on the digital communication board. This rate is calculated for Marathon Employees only, contractors only, DHOUP only and all combined.
- Lost Time Incident Rate: This rate is also tracked monthly and communicated with our ORIR.
- ManHours Worked: This statistic is necessary in order to determine our ORIR and LTIR. It is also used to celebrate major milestones.
- In an effort to bring attention to the injuries that occurred at the facility, especially first aid incidents, a visual of the human body with injuries denoted as red dots on the appropriate body parts was introduced. This visually showed that the majority of injuries are hand injuries and led to the formation of the Hand Protection Action Team.

In 2009, MRD has displayed exemplary safety performance by achieving an ORIR well below the goal. MRD’s rate of 0.32 against a goal of 0.53 is the second lowest of the refineries and is the second lowest in history for MRD. In 2008, MRD achieved its lowest rate in history at 0.08. Currently the Detroit Heavy Oil Upgrade Project (DHOUP) has worked 2,500,000 man-hours without a lost time incident or a recordable injury.

Data Accuracy

Each COS observation is personally reviewed and entered into the database by a full time facilitator/coordinator. If anything seems out of the ordinary, such as the comment reveals that the observation was mismarked as the wrong category, they will follow up with the observer. The facilitator or coordinator will also review the observations to look for behaviors that they might have missed and other indicators that it was not a true observation. When BBS data is entered into the software system, it is graded.
on 5 categories, “while, what, aware, why, and try”. If a true risk is observed, this information would be completed on the observations sheet.

Data is trended at least monthly and diligently reviewed by the facilitator and steering committee who will consider the following:

- Are there any outliers in the data?
- Is data consistent with previous months?
- Are observer results consistent?

COS observers are “coached” to improve overall data collection and to ensure observations are being conducted in a consistent manner. Proper coaching allows us to have an accurate, knowledgeable, confident, and effective observer group. For the process to work, our observers must not only know what they are “looking at”, but they must also know how to give feedback. The observation books have a coaching sheet to ensure that it is being done properly. See Exhibit C – Interaction Skills Coaching Guide. The principles of coaching include:

- By building coaching into the role of an observer it establishes the expertise of the coach and the desire to foster relationships within the process.
- The observer will develop a higher level of performance in many areas (personal and professional) and allows for regular calibration of all observers.
- To improve observation skills.
- To have a contact person when problems with observations occur.
- To provide encouragement and support in getting in the field to do observations.

**Time Periods/Methods for Reporting Data**

Data is reported on at least a monthly basis. When necessary, such as during a turnaround, BBS data will be reported more often, usually daily. The data is shared in the monthly Sequential Safety Meetings with all employees as well as on a digital communication sign at the entrance of our facility.

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**DESCRIPTION OF BBS PROCESS**

*Circle of Safety:* MRD’s behavior based safety process is referred to as Circle of Safety (COS). The COS Committee chose this name to unify work groups: Contractors, Operations, Product Control, Maintenance and the Office. The logo was designed to depict all those groups working together in a circle as one. See Exhibit D – Circle of Safety Logo.

The mission of Circle of Safety is to “reduce at-risk behaviors and remove barriers to safe work thus improving our safety performance, benefiting and improving service to our customers, employees, and owners”.

The vision of the Circle of Safety process is “to promote industrial leadership in safety through participation in the BBS process at the Detroit Refinery”.

The COS process operates under the four elements of behavior based safety:
1. We have identified the critical behaviors that occur when injuries or risk exposures have been evident. These are listed on our observation sheets, and they are the things we “look for” and mark as “safe” or “at-risk”. Safe work in these areas is critical to worker safety. See Exhibit E – Critical Behavior Inventory Definitions.

2. We gather data through observations; simply by watching work get done and marking our data sheets. The data gets entered in a software program, so we can summarize, or measure, what’s going on in the plant in simple “safe” and “at-risk” percentages, as well as more detailed summaries.

3. We provide feedback at the time of the observation. This is a very skilled interaction, people confronting people, talking about safe work, and any risks that have been observed. Positive feedback is the key to continued success and guidance feedback is offered if any risks were present.

4. We then use the data to remove barriers to safe work. If the risk is a simple or “enabled” action, like lack of PPE for instance, we discuss it briefly, then ask the worker for safe work in the future. This interaction is immediate, occurring at the time of the observation. If the risk is “difficult” or “non-enabled”, we discuss a possible solution and then address or review the situation utilizing the “Barrier Removal Team” at a later date.

Observations & Feedback: The Circle of Safety process is voluntary; both becoming an observer and being observed are optional. We ask Observers for a one year commitment to help ensure accurate observations. The process also has a “No Name, No Blame” philosophy; observations are conducted and documented without names. The process does not induce discipline, it asks for safe work. Employees and Contractors are trained as observers to sample the behaviors or actions that are taking place in the plant. They are volunteers, not experts, trying to make a safer workplace, utilizing what they know and communicating with each other. Leaders are asked to engage this process and to lead with safety. It is believed that everybody working in this plant deserves to be observed and should be able to perform a good day’s work as safely as possible.

Each observer is given a COS observation booklet with Data Sheets. See Exhibit F – Data Sheet. Observations and feedback are conducted as follows:

Introduction:
1. Introduce yourself and explain why you are there and what will happen.
2. Explain recording both safe and at-risk behaviors.
3. Show the data sheet and explain “No Name-No Blame”.
4. Explain you will be out of the way and efficient.
5. Let them know you will discuss the observation and the data sheet with them.
6. Stick to the subject at hand – stay focused.
7. Be positive, smile, make eye contact, and be confident.
8. Ask if they have any questions.

Feedback after the observation:
1. Show the data sheet as you explain it.
2. Reinforce safe behaviors first, give positive feedback.
3. Discuss any risks next, these are areas of concern, not “wrong” or “caught”.
4. The Observer’s role is to observe openly and give feedback, not change behaviors.
5. Give specific examples of safe, then at-risk behaviors.
6. Ask about anything you don’t understand, don’t make assumptions.
7. Do not place blame, avoid igniting words.
8. Allow employees to ask questions, give comments, or talk. Listen to them, take good notes. Encourage ideas or suggestions for safer work, these are “suggestions”. Again take notes, be specific.

Roles & Responsibilities

The Observers are the face of the process; therefore it is vital that they diligently abide to their responsibilities to:

1. Learn the principles behavior based safety. Understand the CBI checklist and definitions and use them in observations.
2. Personally commit to be an active observer for at least one year after training.
3. Conduct a minimum of two observations per week or work cycle.
4. Protect anonymity and objectivity of the observation process. Be sure co-workers understand the confidential nature of the observation process.
5. Follow all guidelines learned in Observer Training. Give high quality, positive feedback immediately after observation. Get objective comments from your co-workers regarding at-risk notations. The comments are vital to the quality of your observations.
6. Be positive and professional during observations. Avoid arguments, confrontation or blame. Stress the “No Name, No Blame” nature of this process.
7. Suspend observations and intervene as a concerned co-worker if an accident is imminent.
8. Turn in the observation data sheet the same day you make the observation.
9. Promptly inform the Circle of Safety Steering Team regarding concerns or questions about the Circle of Safety Process.
10. Give input to the Circle of Safety steering team about changes, additions or corrections that could improve the Observation Data Sheet or Definitions.
11. Work with your supervisor to solve safety problems with the Behavioral Accident Prevention Process® technology data, tools and methods.
13. Help identify and recruit new Observers.

Although not all employees are observers, all employees have the following responsibilities to the process.

1. Seek to understand the Observation Data sheet and definitions.
2. Be open to observation and consider being trained as an observer. If further interested, inquire about becoming a committee member.
3. When given feedback, realize the safe work observed, and any at-risk behaviors that are within your power to correct. After the observation occurs, ask for feedback if it isn’t given.
4. Communicate unsafe conditions and inadequate management systems through work orders, suggestions, and the comments section of the Observation data sheets.
5. Actively participate in the COS Process by discussing the observation data, identifying problem areas, developing action plans, and helping to carry out the action plan.
6. Seek to understand the COS Process and ask questions.
7. Don’t ignore at-risk behaviors being performed by other people. Show concern about their safety and the potential for an accident by pointing out at-risk behaviors. Provide positive reinforcement for safe behaviors.
8. Be a safety role model by following safety rules and procedures, and wearing proper PPE for your protection.
9. Be supportive, cooperative, and open minded toward observers.
10. Don’t consider the observers as problem solvers; continue to use the refinery’s systems to resolve problems.

**Front line supervisors** are also critical to the process. Their responsibilities include:

1. Seek to attend Behavior Based Safety and Observer Training and actively participate in the learning.
2. Provide time and coverage for COS team members to attend training, meetings, and do other team business, including observations.
3. Provide time for observers to do observations. Meet with the observers to discuss issues they may have and determine ways to assist them.
4. Maintain anonymity of the observation process. For instance, seek to improve conditions by offering positive suggestions derived from our COS data.
5. Help manage resistance to change (get information about what is happening with this process to everyone). Discuss observer concerns with the crew and make sure the crew knows observations are part of everyone’s job.
6. Review the COS data reports, and use this data pro-actively in safety meetings. Follow up on any action items or suggestions to minimize at-risk situations or behaviors.
7. Do NOT give up safety responsibility. Continue to perform all of your normal safety related jobs, including holding people accountable for working safely.
8. Be a safety role model: wear proper protective equipment and continue to follow all safety policies. Lead with safety.
9. Understand the COS Process, learn the critical behavior definitions, know the steering committee members and seek them out regarding questions or concerns about the process.
10. Talk with each observer in your area personally at least once per week, encouraging the observer and offer help to achieve observation goals.
11. Provide consistent SC+ (soon, certain, positive) feedback for safe work or safety ideas when appropriate.

The Circle of Safety process is administered by a **COS facilitator**, elected by active observers for a two year term. This position is a full time position and responsible to:

1. Facilitate steering committee meetings and members in the development, implementation, and ongoing operations of the process.
2. Ensure communication about the process occurs with all employees.
3. Identify and remove (when possible) road blocks to the implementation of the process.
4. Attend all training offered and seek out proper training for members.
5. Be a safety role model.
6. Ensure positive recognition is provided for appropriate steering committee members, observers, supervisors, workers and managers.
7. Coach steering committee members, observers, supervisors, and managers where appropriate.
8. Provide encouragement to those actively participating in the process.
9. Conduct observations.
10. Provide feedback on the quality of observations, data, and action plans.
11. Act as a liaison between the steering committee and the management group.
12. Enter data and generate reports from software.
13. Prepare and improve training materials and methods.
15. Recruit and help train new steering committee members.
16. Meet with supervisors and other levels of management to discuss their involvement in the process and to discuss the process successes and issues confronting it.
17. Audit the critical-behaviors inventory and other process elements to determine if changes are needed.
18. Look for ways to integrate the process into other safety efforts (accident investigations, ergonomics, industrial hygiene, environmental, etc.)
19. Design and Update COS website.
20. Stay in contact with consultant, looking for advice and new ways to cultivate process health.

**Circle of Safety Steering Committee:** The committee is made up of hourly employees who are trained observers, who are in good standing. The committee is made up of employees from different areas and departments to guide the process. This committee meets monthly to review data, assess the process, and discuss action plans and goal. Their responsibilities are to:

1. Attend training
2. Attend all committee meetings, whenever possible.
3. Complete individual or sub-committee assignments when assigned.
4. Recruit observers.
5. Help conduct kick-off meetings or other presentations when asked.
6. Assist with training classes when asked.
7. Maintain observation skills by meeting observation goals.
8. Act as coach/mentor to all observers.
9. Oversee maintaining the Critical Behavior Inventory.
10. Organize and conduct observer network meetings.
11. Review observation data regularly and provide feedback to all observers.
12. Use data to form action plans or follow up items.
13. Promote and help sustain the Circle of Safety process.

The process also has **management sponsor**. This position is held by the HESS Manager. They are responsible to:
1. Assist committee members to obtain necessary resources, such as office space, supplies, additional training, manpower, etc.
2. Have regular contact with facilitator and committee.
3. Coach the facilitator as needed on such things as meeting management skills, department integration, etc.
4. Serve as liaison between management and the committee. Represent management’s point of view to committee, and vise versa. Bring committee concerns and views to other managers.
5. Support and advocate the process with managers.
6. Review committee progress relative to timeline. Assist in problem solving as needed to maintain progress and achieve process goals.

Special Initiatives:

March Madness. Each March, the COS committee sponsors a contest in which observers may win a set of Detroit Pistons tickets. For every observation an observer conducts, their name is put in a drawing.

Integration with Construction: With the DHoup expansion, the COS process has worked diligently to merge the existing Behavior Based Safety process into the new construction project. The Steering Committee has established a goal of a 1.25-2.0 contact rate on the construction site. To accomplish this, the committee will focus on communication, data use, training, continued activity, action, and engagement. COS meets with construction employees regularly, develops site-specific data reports to share with employees and leaders and actively participate in toolbox and shift starter meetings.

Weekly Observation Walk: The weekly walk is one method used to engage the construction site as well as providing a means for coaching. Every Tuesday after lunch the trained observers are allowed time to conduct observations. Observers can move around the construction project and observe different work groups. Since inception the walk has accounted for approximately 40 percent of the monthly total of observations conducted on the DHoup site. This walk is credited with improved awareness of the COS process, increased observations on the DHoup construction project, and coaching opportunities.

Turnaround/Shutdown Observation Activity: During plant turnarounds or shutdowns, the refinery’s maintenance activity is greatly increased, resulting in increased work and manpower. During this time, at least one observer per shift is dedicated to conducting observations and providing feedback. During this time, a Contact Rate Goal of 4.0 – 6.0 is established, depending on the scope of work. Data reports are generated daily and shared on each shift.

The Barrier Removal Team: If a barrier is encountered that cannot be solved at the Steering Committee level, The Barrier Removal Team will assist. This team has the following responsibilities.

1. Address organizational issues that come out of the process that are barriers to safe work (lack of supervisor support, ineffective work order system, trust issues, etc.)
2. Address at-risk work issues that are outside the span of control of employees: such as missing or broken equipment, non-enabled behaviors that require a system change; widespread, organizational difficult behaviors; cultural/organizational issues.
3. Examples include:
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- Non-enabled — no place for employees to tie off to — anchor points have to be installed
- Widespread difficult — tool requisition — the right tools might not be available.
- Culture — Enable observations, getting supervisors to perform their roles and responsibilities, assisting the COS steering committee to meet goals, etc.

Timeline:

1997 ------------------------ Behavior Based Safety idea introduced
1998 ............................ In an effort to improve a fairly steady injury trend, Behavior Based Safety is presented to Detroit employees.
1998 ------------------------ Steering Committee formed and trained by BST
September 1999 ................. Circle of Safety (COS) is formed, the Steering Committee (SC) trained, observers trained, and observations begin.
2002 ......................... 1 year’s worth of data lost, learned lesson: go to shared drive with automatic back-up. Observations continue.
2003 ------------------------ Dedicated observers deployed
2004 .......................... In an attempt to train and involve supervision- Committee holds Site Leadership training for 70 salaried employees.
2005 .......................... The Circle of Safety conducted dedicated observations for the March Tail Gas shutdown. The shutdown had zero OSHA recordable or first aids.
                           Daily data reports for T/A implemented
                           Plant wide T/A has full time observers.
                           Late in 2005 observations fall, injuries rise.
                           The Steering committee revised observer training material
                           On April 3 the COS had its first observer training class in 2 years.
                           On April 24th we will train 16 new observers.
2008 .......................... Salaried and Contractor observers trained for the first time
2008 .......................... Successful BBS Integration into DHOUP
2009 .......................... MRD’s Behavior Based Safety Process marked its 10 year anniversary in September of 2009. A 2009 perception survey revealed that the process is stronger than ever amongst employees. Salaried observers doubled in 2009, contributing to a 91% increase in observers from the previous year. However, COS needs to incorporate more office staff. This has been established as a goal for 2010. This year marked a new trend in action planning and collaboration with the safety department. Joint committee action plans were developed for fall protection, ascending and descending, pinch points, and gloves. These plans included multiple communications, a video, posters, slogans, and hard hat stickers. To help advance the process into the future, the COS facilitator and DHOUP coordinator completed advanced facilitator training through BST and committee members attended a BST conference.
The graph above shows the OSHA Recordable rates for Marathon Employees (in blue), for Contractors (in red), and for both groups combined (in green). After implementation of COS in 1999, MRD has observed a downward trend in injuries. Additional emphasis on COS and the implementation of DRIVE Safety helped to further reduce the injury rate.

This graph demonstrates the impact that behavior based safety has on an injury rate. In 2006, the number of observations completed was nearly the lowest ever while the OSHA Recordable Incident Rate had spiked. Over the next two years, the number of observations completed steadily increased as the ORIR decreased. In 2008, a record number of observations were completed and the refinery experienced the lowest ORIR in Marathon Refining’s history.
COS Top 7 At-Risk Behaviors
2010 Plantwide TAR

This graph shows how data is compiled and communicated during a turnaround. A number of employees and contractors serve as dedicated observers during this time and data is communicated daily and weekly.

ANALYSIS OF DATA

Methods for calculating effectiveness

Sustainability Index: Every six months, the Steering Committee and Management Sponsor conduct a Sustainability Index. This is a self-assessment tool used to rate the process in 18 key areas, including observer support, process indicator use, and observation targets. It also offers possible general actions to consider for improving scores. The committee will use the results of the sustainability index to set new goals and actions to address any identified areas for improvement.

COS Perception Survey: A periodic survey is sent out to all employees to help the Steering Committee assess how the process is doing and areas for improvement. The committee will use these results to set goals and actions for improvement. Some of the questions have included:

- Do you see data reports?
Do you understand data reports?
Do you believe the process is effective?
Does your supervisor support you in your observation efforts?

In addition to our internal reviews, MRD also benchmarks with other facilities. Within Marathon, the facilitators participate in a monthly conference call and an annual meeting. Here they discuss best practices, achievements, lessons learned, and opportunities for improvement. COS members also attend an annual BBS Conference where they develop their knowledge and refine the process as necessary.

BBS data is rigorously reviewed and analyzed by the COS Facilitator and Steering Committee. Trends from observation data is compared to other safety data, such as first aid reports, injuries, scantron, and team safety inspections.

**BBS TRAINING PROGRAM**

**Selecting and Defining Target Behaviors**

Critical Behavior Indices were initially established using a pareto analysis of injuries over the previous 10 years along with employee feedback. CBIs are reviewed annually and new ones are added as necessary.

**Training Methods**

COS training was developed by the COS Steering Committee and the Marathon training department. The class is given over two eight-hour days and is limited to sixteen individuals. Course content includes:

- History of Circle of Safety
- Conducting observations and giving feedback
- Roles and responsibilities for each group
- CBI definitions
- Behavioral Accident Prevention Process
- ABC Analysis
- Practice conducting observations in the field

Dates for training sessions are established at the beginning of the year and continually communicated through the refinery. All employees and contractors are highly encouraged to attend a class.

In addition to training for observers, the Steering Committee believes they must also continually develop their knowledge and skills. This is accomplished through:

- BBS conferences
- Marathon Facilitators conference calls and meetings to share best practices and barriers
- Benchmarking with other facilities
- Meetings with consultants
- BBS Newsletters
- BBS Advanced Training courses
Hazard Identification Methods

**Hazard Recognition Tools:**

**Safe Work Permit (SWP):** Of the most used hazard recognition/analysis tools used in the refinery is the Safe Work Permit. For nearly every job in the refinery, a Safe Work Permit is required. The permit begins by taking information on exact location the work is to take place, the contractor, craft or company performing the job and work descriptions to determine all precautions that need to be taken before work can begin. This includes a Joint Job Site Visit with the owning department and the servicing representative. The Owning Department representatives and servicing representatives visit the site where work described on the SWP is taking place to discuss all elements of the scope of work, equipment preparation, PPE, job task execution requirements, etc., to provide a mutual understanding of safety and health expectations. Items to be addressed on the Safe Work Permit include but are not limited to:

- Equipment Line/Valve Preparation
- Vessel/Tank Preparation
- Lockout/Tagout
- Electrical
- General Equipment Preparation
- Personal Protective Equipment
- Hot Work
- Confined Space
- Atmospheric Monitoring
- Required Signatures & Additional Signatures
- Return of Equipment/Work Area – Job Completeness

**Job Safety Analysis (JSA):** JSAs are a three step process. After selecting a job, employees go through that job step by step to: 1.) Identify steps of the job. 2.) Identify hazards associated with each step. 3.) Identify corrective action for each hazard identified. Ideally, JSAs will be performed for jobs performed frequently; jobs with a high frequency of accidents; jobs that have produced recordable injuries, fatalities, lost time injuries or environmental harm; jobs that have potential for causing serious injury or harm; new jobs or those in which equipment or procedures have changed. After completing the JSA, it is approved by the group’s supervision and then forwarded to the Safety Department. Safety provides the final approval to JSAs that are eligible to be posted in the JSA library, located on the safety webpage. The process is designed to identify requirements for new controls, additional PPE required, safe work practices, modifications to existing controls, environmental controls, etc. It may also highlight the need to further assess a specific step.

**Scantron Cards,** an auditing tool similar to a standardized test, were created to provide a simple means for employees and contractors to assess the risk associated with their jobs. In 2010, over 12,500 audits have been completed using the scantron system. Cards have been developed for the following topics:

- Breathing Air Checklist/Using a Compressor
- Confined Space
- Energy Audit
- Energy Isolation for Normal Operations
- Fall Protection
- Fire Watch
- Hole Watch
- Hot Work
- Incident Reporting
- Janitorial Services
Safety Equipment Inspections are performed by various groups throughout the refinery on a regular basis, typically weekly or monthly. These inspections include all of the refinery safety and emergency response equipment, both mobile and fixed, fire pumps and monitors, emergency lighting, first aid equipment, and many others. Deficiencies are noted on the inspection checklist and are appropriately addressed through a work order system, which includes categories for safety tracking purposes.

Manager’s Audits are conducted by the Detroit Leadership Team (DLT) and focus on compliance and PSM element items. The content of these audits change quarterly based on the needs of the refinery. The managers work with the area owners to address issues. If there are issues that are not addressed at the end of the area’s audit cycle (three months), the item is entered into the Knowledge Management System (KMS) where it is tracked to completion.

Team Safety Inspections are completed on a monthly basis by the property owners. The inspections are comprised of a variety of compliance topics and housekeeping and change based on the needs of the plant. Identified issues are corrected by the team.

Life Critical Safety Audits are monthly audits performed by safety professionals on hot work, safe work permits, confined space, energy isolation, and fall protection. The audits are conducted in the field and the results and recommendations are communicated monthly to refinery supervision, the DLT, and in the sequential safety meeting packet.

Owner’s Audits can be performed by any person in the refinery. Typically, they are completed by a person who has extensive knowledge in the area of interest. These audits can cover a variety of topics including rigging and lifting, lay-down yards, excavations, and life critical safety topics.

The DHOUP Weekly Walk is a construction auditing and inspection program in which contractors and Marathon employees (including managers) audit DHOUP work by walking and evaluating each construction project in the Greenfield, West Plant, East Plant, and other related work areas. 

Contractor Village Audits are completed monthly for each contractor area. The audits are lead by construction management and are designed to ensure compliance and communicate expectations with contractors. Findings are communicated to contract company supervision and are tracked to completion.

Quarterly Contractor Audits are an in-depth evaluation of a contract company’s safety systems and documentation. The audit takes place over the course of one week and is completed by members of the safety department, contract supervision, and contractor employees. Findings are tracked to completion. Approximately 20 man-days each quarter are designated for these audits.

HESS Critical Components Testing and Inspection includes industrial hygiene monitoring equipment calibration, testing and inspection, personal alarm monitors inspection and testing, and portable gas detection equipment calibration and inspection.

Industrial Hygiene: Detroit’s Industrial Hygiene Monitoring Program is designed to safeguard the health of employees by assuring that actions are taken to evaluate and control work place exposure to chemical substances and physical agents. An on-site Industrial Hygienist is responsible for developing and maintaining all aspects of the program.
Exposure assessments are conducted through surveys and personnel monitoring for all refinery job classifications utilizing a corporate-wide initiative called the EXAM process. Annual monitoring is conducted to ensure that no deviation from original baseline data has occurred. Comprehensive monitoring plans are developed each year. All monitoring is coordinated and conducted by the refinery’s industrial hygienist in accordance with NIOSH and OSHA analytical methods. The following examples illustrate various areas where industrial hygiene procedures or practices have been implemented.

- **Asbestos** – A plant-wide survey was used for qualitative and quantitative analysis. Based on this analysis, a scheduled monitoring program is produced.
- **Benzene** – Initially, area surveys were conducted and refinery process streams were analyzed for benzene concentrations. Personnel monitoring was conducted initially and is also part of our annual monitoring program.
- **Hydrogen Sulfide (H2S)** – H2S is a by-product of refinery processes. Potential for exposure may be experienced by employees performing specific tasks. Personnel monitoring is conducted for these tasks as part of the annual program.
- **Chemical** – No chemicals can be brought into the refinery until the material safety data sheet has been reviewed by the operating, maintenance, engineering and technical services managers in addition to the safety supervisor. This review allows for the indication of any potential safety and health hazards and necessary protective measures.
- **Noise** – Area noise surveys are conducted periodically to indicate levels of high noise in the refinery process units. All high noise areas are clearly marked and posted. Personnel assigned to these areas are monitored annually to determine exposure levels and undergo audiometric testing to determine any hearing shifts.
- **Turnaround activity** – Additional personnel are assigned to the safety department to assist the industrial hygienist in monitoring personnel and unit areas. Specific areas and personnel are monitored during shutdown, start-up, and maintenance activities. The results are evaluated to determine precautionary measures.
- **Hexavalent Chromium** – Task analysis and monitoring are conducted for employees working with stainless steel.
- **Lead** – Surveys are conducted before jobs are started using Niton XRF analysis and lead bulk samples. Exposure assessments are performed to contain exposures below both the action level and PEL.
- **All coatings and paints are assumed to be lead based unless proven otherwise by bulk analysis or other documentation. Safety is contacted prior to the start of work involving scraping, cutting, grinding, etc., to test the paint for lead content.**

**Tier I Management Audits** - MRD uses a third party to help accomplish our internal Tier I management system audits for the site; this currently exceeds the corporate requirement for conducting Tier I audits. The Tier I PSM audits were expanded to also include the RC14001® technical specification not covered in the Tier I PSM audit protocols.

**Process Safety Management Program:** This program has gained significant momentum in recent years. MRD’s HESS department includes a three member PSM group that is dedicated to Process Safety Management. KMS is an important tool that is maintained by this group. Critical elements of the PSM program are housed in KMS: incident investigation, MOC, PSSR, PHA, audit tracking and recommended actions. Additionally, the Detroit Refinery has a procedure or program to address the 14 elements of PSM.
Process Hazard Analysis (PHA): PHA uses the HAZOP technique. This step-by-step analysis focuses on human action, both routine and non-routine. The reviews look at issues such as temperature and pressure extremes, exposure to chemicals, awkward positioning, safety equipment, etc. PHAs are conducted on all existing units, substantial new capital projects or small projects with a significant process hazard impact, and all new or modified facilities which require a change in the process safety information. PHA teams are chaired by the Process Safety Management (PSM) coordinator. Other team representatives typically in attendance are technical services engineers, mechanical engineer, unit foreman, operator and safety (as needed). Upon completion of the PHA, the team’s recommendations are managed utilizing the Knowledge Management System. KMS helps to ensure that all requirements of recommendations are carried out.

Management of Change (MOC): MOC is a methodology to manage changes, except for “replacement in kind”, to process chemicals, technology, equipment and procedures; and changes to facilities that affect a covered process. Each proposed change is properly evaluated by ensuring that the following considerations are addressed prior to implementing the change:

- Define the technical basis for the change.
- Analyze the potential impact on safety, health and environment.
- Determine the necessary modifications to Operating/Maintenance procedures and update accordingly. This includes posting corrected procedures according to the applicable department’s guidelines before startup of the change.
- Establish the necessary time period for the change, i.e., permanent or temporary.
- Provide the necessary training to employees and contractors.
- Define and obtain the proper level of authorization.
- Update the Process Safety Information (PSI).
- Evaluate the off-site impact of the change and possible revisions to the Division’s Risk Management Plan.
- Ensure that all Marathon engineering specifications and standards have been adhered to.

Hazard Elimination Methods

Several avenues exist which afford employees the opportunity to notify management of potential health or safety hazards so that they may be addressed.

Through DRIVE Safety, employees are able to report hazards to be addressed in several ways. Mentioned several times throughout this application is the Sequential Safety Meeting. This meeting uses a strategy of flowing information from the ground level to management in sequence, ensuring employee concerns are addressed, not lost. Many of the systems in place for employees to report hazards are embedded in the SSM packet:

- Pass Up List – Employee questions and concerns about safety issues are tracked on this list until resolution is reached.
- Safety Work Orders – This system is available for all employees to use in an effort to get the work order and maintenance system in motion on any safety related repair or maintenance effort that is needed.
- Engineering Action Requests – If items require engineering and cannot be handled by a work order and maintenance, this tool is available to request the work.


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- Safety Opportunity to Share (S.O.S.) - This form enables employees to turn in safety suggestions, hazardous conditions, unsafe behaviors, injuries or near misses. This mechanism offers the option of anonymity.
- Safety Steering Committee Action Items – The joint union and management team has generated a healthy action item list, which is also tracked in the SSM.

The HESS Anonymous Feedback Form was created to allow employees to report issues anonymously. It is found on our internal website and issues submitted are addressed and communicated through the Pass-Up Concerns section of the Sequential Safety Meeting.

The HESS Help Line is a single phone number (313-843-HESS) employees can call to reach the Medical, Environmental, Safety, PSM, or Security Departments 24 hours a day.

Employees are also enabled to confide in their supervision for communicating any safety hazard to ensure it gets into the right system. Typically, after employees communicate hazards to their supervision, they would utilize one of the above mentioned systems to track and correct it if no immediate corrective action was available.

Engineering Controls

The amount of engineering controls that are implemented on a yearly basis to help eliminate or minimize hazards is staggering. The incentive for the Detroit Refinery to install these types of engineering controls is not only embedded in reducing hazards to employees but also to improve mechanical operability, making MRD a more efficient plant as well. Examples include:

- H$_2$S Mitigation Project: The number one priority for the refinery in 2010 was the H$_2$S Mitigation Project which focused on reducing employee exposure to hydrogen sulfide. As a result of this effort, many engineering and administrative controls were implemented as well as increased use of personal protective equipment as an interim control. Engineering controls include close loop sampling, side gauges on tanks, improved ventilation, tools and devices to aid in draining or purging product, and even redesign of equipment. Adminstrative controls included increased awareness and training, implementation of an exposure decision tree, communications, and improved H$_2$S personal monitors.

- Closed loop sampling – The refinery collects many samples on a daily basis to be analyzed by the refinery laboratory. Most of the samples are hazardous by nature (e.g., corrosive, flammable, toxic). To reduce employee exposure in the collection of some of these samples, engineers have designed closed loop sampling stations, virtually eliminating potential contact with a substance.

- Cooling Tower Platforms - Protecting employees while working on cooling tower fans and gearboxes in the past has proven extremely difficult. Employees had to tie off to anchor points that were not considered the most desirable locations. Also, planners and foremen frequently called on the services of our scaffold builders to lay planks within cooling tower fan shrouds. Despite these attempts to protect employees, the Detroit Refinery was not satisfied. Additionally, there were costs associated with building decks out of scaffold planks for many of these cooling tower entries. Detroit safety specialists used an idea from a maintenance craftsman to initiate the refinery’s relationship with LJB Inc. Several site visits, employee interviews, conceptual design packages and meetings with all affected parties led to the engineering and installation of grated platforms with guardrail in the cooling towers.
• Electrical Arc Flash – Electrical arc flash labels have been installed throughout the plant to provide guidance and direction to proper PPE requirements for potential energized or near energized work. These labels provide such information as arc flash incident energy, risk level associated with energized work, proper PPE, and arc flash boundaries. The qualified person can review these labels, learn of the risk associated with their proposed task and plan their work in the safest manner.

• Silver Strip Additive – Operator observations indicated that our practice of loading Silver Strip additive from 55 gallon drums exposed the operator to unnecessary hazards. As a result, a project was developed and implemented which moved the loading of this additive from drums with a high exposure potential to enclosed totes with piping and enclosed totes with pumps.

• DCS Upgrades – Several outdated servers in the DCS system were replaced with new state-of-the-art servers, which increases the reliability of the controls system. New alarm summary screens were also installed to improve reliability as the old alarm summary screen projectors were subject to failures. The new screens are 52” flat panel displays. The Alarm Management Project has completed the alarm rationalization process on all complexes. The rationalized alarm databases have begun implementation and will complete in early 2011. Also, the Control System Reliability project is in the process of redesigning the operator process graphics to allow the operator to more easily identify abnormal operating conditions requiring attention while reducing unnecessary distractions.

• Sour Water System (SWS) upgrades to minimize ammonia in effluent water – Most of the changes on the SWS were “soft” changes regarding operator awareness through lab sample flags, operating guidelines, increased sampling, emphasis in the daily orders and conversations with the process control operators. An emphasis on running controllers in “auto” has also improved operation. A new level instrument using a different design was installed on SWS A to improve reliability of the level indication. A winterization survey was conducted and recommendations were implemented. Reliability during the winter of 2007 was much improved after the winterization work. No high ammonia incidents were reported during the winter of 2007 or 2008 (unlike previous winters). Two projects in progress are an evaluation of the efficiency of the SWS and an overhead fin fan which affects capacity and response to high ammonia results. In addition, several other SWS instruments are on the action item list of a focus team, including overhead pressure controllers, SWAG flow indicators, and tower DP instruments.

• Outside of the SWS, the ability to generate ammonia in other process water was identified and is being controlled better. All water with the potential for ammonia that is sent to the water treatment system must be tested for ammonia before it is added to the refinery sewers. A success as a result of implementing this philosophy is discovering a new source of ammonia, debutanizer water wash, which was previously unknown. Because of this, it is now controlled and monitored.

Administrative Controls

Training: MRD has a robust training program. Commitment to this element is demonstrated by the expansion of this department from one Training Specialist to three employees, a Training Coordinator, Training Specialist and Administrative Assistant. In 2009, MRD has 230 Computer Based Training (CBT) and 540 non-CBT learning events with multiple discussions that affected 353 full time employees. Detroit’s state-of-the-art Learning & Development Center (LDC) demonstrates our commitment to continuous improvement with five classrooms, a computer lab and two meeting rooms. Additionally, there is a Great
Room which is well-used for large group meetings including the leadership team quarterly communication meetings. Full-time Operations Trainers, along with the rest of the Learning & Development staff develop and deliver training materials and manuals detailing operational, maintenance, environmental and safety information used in the training and certification of operations and products control employees.

There are numerous ways that The Detroit Refinery trains employees in hazard recognition, identification, and elimination.

- Every new employee is required to attend Detroit’s Advanced Safety Orientation, a 4 hour introduction to general refinery safety.
- New Operators attend one week of facilitator lead training on critical safety procedures.
- Safety professionals conduct life critical safety audits on Safe Work Permits, Confined Space Entry, LOTO, Hot Work and Fall Protection. Results of these audits are presented to Detroit refinery supervision and management. From there the information is passed down to foremen who cascade the information to their workers and is also presented in Sequential Safety Meetings.
- All employees are included on Detroit’s HESS training matrix. This matrix details all training that they must receive by way of computer based or facilitator led training.
- Employees are also involved in Detroit’s DRIVE Safety program. As mentioned, the process utilizes the most widely recognized tools used in our industry (Shift Starters, JSAs, What If Drills, Team Safety Inspections and Sequential Safety Meetings) to improve employees’ ability to recognize hazards.
- Detroit conducts facilitator led training periodically throughout the year. This is in effort to reduce reliance on computer based training and enhance employees’ knowledge of life critical and other safety procedures.
- Employees receive specialized training for their areas of expertise as needed (e.g., Electrical Qualified Person, Fall Protection Competent Person, Tank Entry Supervisor, ROCO Rescue, etc.).
- Hazard recognition training is also handled informally. Safety Professionals, operators, maintenance personnel, warehousemen, lab techs, Circle of Safety Observers, etc., often stop and consult with employees to discuss hazards and develop corrective action. This is part of a positive safety culture that has been established.
- Safety Bulletins are one of the more popular tools that are used to help employees recognize hazards. These are regular written communications designed to highlight or reinforce a particular issue.
- Safety videos are a recent addition to the safety department’s communications. Several in-house videos starring MRD employees have been developed on Self Retracting Lifelines, Safe Ladder Use, Pinch Point Awareness, and Hand Safety.

**Personal Protective Equipment**

The Detroit Refinery Personal Protective Equipment (PPE) requirements address specific hazards associated with materials and tasks occurring in the refinery. Employees entering anywhere in the refinery must wear proper clothing as detailed in the Safe Attire Guidelines procedure. Anyone working in a refinery process units and tank dikes must wear, at a minimum, eye protection, safety toe boots, FR clothing, head protection and a personal hydrogen sulfide monitor. Certain tasks within the process units may require additional
equipment, such as chemical protective clothing, personal fall arrest, goggles, face shields, personal single gas monitors for SO₂, etc. Non-routine tasks are evaluated by the Safety Department on a case-by-case basis. Some non-routine tasks (e.g., inert confined space entry) are covered by their own separate safety procedure.

The Emergency Response Team members are provided with protective gear for fire fighting operations. The protective gear includes bunker pants, bunker coat, helmet with face shield, boots, fire resistant hood, fire fighter gloves, respiratory protection and gas monitoring equipment.

Chemical resistant clothing is available to employees who handle chemicals. For example, protective coats, pants, hoods, gloves, respiratory protection and acid suits are available to employees. All employees who are required to wear PPE are provided training on its use, inspection and maintenance.

The refinery PPE policy is complete with PPE hazard assessments. PPE tables, customized to tasks performed in specific areas are provided as attachments to this policy and available to employees on MRD’s Safety website. This policy also contains PPE maps. These maps are color-coded to specify PPE requirements in specific plant locations.

The selection process for PPE has been designed to ensure employees have all of the necessary PPE that may be required of them for any given task. The process of selection is also based on guidance provided in Material Safety Data Sheets for chemicals used in the refinery. Selecting PPE is also based on recognizing opportunities to encourage / enable employees to use it. For example, to enhance the fall protection program and the use of personal fall arrest, a decision support package was approved to purchase new harnesses and lanyards for all employees whose job may require its use.

The proposition of any new PPE is typically initiated by Safety Professionals. New PPE proposals are vetted through the Safety Steering Committee prior to purchase. Detroit has recognized the importance of acknowledging suggestions made by those who will be affected by the use of new PPE. Any changes are communicated through CBT’s, Classroom or Hands-On Field Training. PPE is distributed through the Global Procurement – Warehouse department.
**Mission Statement**

**DRIVE Safety** takes the most widely recognized tools used in our industry (Start of Shift Meetings, JSAs, What Ifs, Safety Inspections, Behavior Based Safety and Sequential Safety Meetings) and uses them to foster a high level of employee involvement and ownership of the safety process.

**DRIVE Safety** maintains consistency. The process is applied consistently across the facility.

**DRIVE Safety** improves communication. The Sequential Safety Meeting uses a strategy of flowing information from the ground level to management in sequence, ensuring employee concerns are addressed, not lost.

**DRIVE Safety** holds employees accountable. The application of the process is measurable.

**DRIVE Safety** increases knowledge with regard to safety.

**DRIVE Safety** ensures employee involvement. Employee involvement in delivering safety meetings, conducting JSAs, conducting What If Drills and Team Safety Inspections breeds confidence in employees’ ability to recognize hazards.

**DRIVE Safety** enables all employees to become Champions within the safety process. Excelling within DRIVE Safety will help the Detroit Refinery maintain MVPP status by mastering the “Management Leadership and Employee Involvement” elements of MIOSHA’s Voluntary Protection Program.

**Ultimately, the goal of DRIVE Safety is to improve employee safety by eliminating at-risk behaviors and situations, injuries and accidents.**
The Area Report below was developed for the West Plant alone.

### C. O. S.
*CBI West Plant*
Query Applied: *CBI West Plant*

| Total # | 716 |
| Percent of Items Marked | 53.63 |

**10/1/2010 - 10/31/2010**

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Total: 8528, Marked: 6725
## Interaction Skills Coaching Guide

*Coach takes notes — Watches observer talk to worker*

### General Guidelines

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### Introduction

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### Feedback — Safes

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### Transition

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### Feedback — At-risks

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EXHIBIT D – CIRCLE OF SAFETY LOGO
1.0 Body Use and Position

1.1 Ascending/Descending

✓ Is the person using an accepted method of ascending or descending?
✓ Is the person in control of their motion and footing when they are changing elevations?
✓ Is the employee using handrails when using stairs to maintain a minimum of two-point contact and taking one step at a time?

Examples:
- When climbing on or off equipment and machinery, use the designed foot and handholds.
- When using a ladder, face the ladder and maintain a minimum of three-point contact.
- When using a ladder, avoid carrying objects in hands, such as tools, gloves, etc.
- When ascending or descending a scaffold, use an affixed ladder.
- When using an extension ladder, tie it off.
- When a problem exists, turn in a work order.

1.2 Eyes on Path

✓ Is the person looking in the direction of travel when walking, cycling or operating mobile equipment?
✓ Is the employee moving at a safe pace appropriate for the conditions?
✓ Is the employee looking for hazards in the path below, above and to the sides?
✓ Is the person’s vision unobstructed when in motion?

Examples:
- When walking, look out for holes in walkway and possible tripping and slipping hazards.
- When walking and carrying a large object, keep eyes on walkway.
- Before walking across road, look in both directions.
- When working, look above, below, and to each side to identify obstruction.

1.3 Eyes on Task/Work

✓ Does the person keep their eyes on the work being performed?
✓ Does the person have an unobstructed view of the work?
✓ Does the person ignore distractions while doing the task?

Examples:
- When operating a Hi-Lo, carry deck, Ross carrier or crane, keep eyes on work.
- When using a grinder-wire wheel, keep eyes on task at hand.
- When using a hammer, keep eyes on object to be struck.

1.4 Body Mechanics

✓ Does the employee use proper techniques for lifting and lowering, turning and pivoting and pushing and pulling?

Lifting and Lowering

✓ Is the load close to the body?
✓ Is the employee bending at the knees?
✓ Does the person use legs and keep the back straight?

Turning and Pivoting

✓ Does the person keep upper torso aligned with legs when performing standing tasks?
✓ Does the employee avoid any twisting of the spine while lifting/carrying by pivoting the feet?

Pushing and Pulling

✓ Does the person maintain a balanced body position while pushing/pulling?
✓ Are feet positioned square with shoulders and at shoulder width?
✓ Does the person push instead of pull when possible?
✓ Is the motion smooth and effort under control with a steady non-jerking motion?

Examples:
- When lifting pumps, valves, etc., keep load close to body.
- When lifting pumps, valves, etc., bend at the knees.
- When lifting pumps, valves, etc., use legs and keep back straight.
- When pushing or pulling forks on forklift, large valves requiring large valve wrench, etc., maintain balance body position and solid footing.
- When pushing or pulling, use smooth, non-jerky motion.
- When opening valves, push instead of pull when possible.
1.5 **Line of Fire**

- Is the person positioned in such a way so that if something falls, slips, sprays or moves suddenly, he or she will not be directly in its path?
- Is the person positioned to avoid being in the path of sudden release of energy (electrical, hydraulic, pneumatic, heat, etc)?

**Examples:**
- When cutting with a knife or other sharp instrument, cut away from you.
- When opening drains, keep body parts away from draining fluids.
- When sampling, venting, or draining stand upwind.
- When opening flanges, break the side away from you first.

1.6 **Pinch Point**

- Is the employee positioned in a manner to avoid contact with any moving equipment or machinery?
- Does the employee avoid being caught between any moving and stationary objects?
- Does the person keep all body parts clear of moving equipment surfaces that have the potential to intersect or converge?

**Examples:**
- When moving scissor-lift, keep hands and arms inside of the handrails.
- When closing doors, keep hands clear of door being closed.
- When operating valves with handles creating pinch points, use a valve wrench.
- When working on or using equipment with moving parts, keep body parts clear.
- When using hand tools, be aware of swing radius and possible pinch points.

1.7 **Assistance**

- Does employee get assistance or use lifting device when handling heavy or awkward object (crane, forklift, come-a-long, chain fall, etc)

**Examples:**
- When lifting large or awkward objects, get assistance from co-worker or use a mechanical device.
- When handling heavy objects, use carry-deck or crane.
- When placing pipe in pipe rack, use a crane, carry-deck, or chain fall.

2.0 **Environment**

2.1 **Housekeeping**

- Is the work area kept clear of debris and loose objects?
- Does the employee remove or dispose of trash, clutter or debris in the work area?
- Does the employee clean the work area upon completion of the task?
- Does the person place equipment, tools, supplies and materials in their proper place so as not to create clutter or obstructions?

**Examples:**
- When erecting or dismantling scaffold, place all pieces flat on ground or in racks, keep clear walkways.
- When completing a job, clean up work area, including spilled liquids.
- When you observe a tripping hazard like a hose in the walkway or a slip/trip hazard, remove or clean it up. Don’t wait for someone else to do it.
- Keep clear walkways and work areas on all jobsites.

2.2 **Walking/Working Surfaces**

- Is the surface from which a task is being performed structurally sound, stable, level, and does it provide good traction?
- Does the person make unstable surface dry and solid before walking, standing or working on them?
- Does the employee use walkway provided for access to working area and avoid short cuts, uneven and slippery surfaces?

**Examples:**
- When ice or snow conditions exist, clean and salt as soon as possible.
- Avoid icy areas and look for a clear path to walk.
- When working with scaffolds, make sure you have good footing and traction.
- When working on grating, check for signs of deterioration.
- On uneven ground make sure you have solid footing.
- When stepping over or around piping, make sure of your footing.
- When a problem exists, turn in a work order.
2.3 **Storage & Labeling**

- Are items not in use placed in designated areas clear of traffic areas, stacked squarely, not leaning and the larger items on the bottom?
- Are tools, equipment and materials not in use stored in racks, cabinets or other designated apparatus?

**Examples:**
- When in storage or while being transported, secure compressed gas cylinders.
- Flammable paints and solvents have M.S.D.S labels and are stored in lockers that are clearly marked “Flammable Material Only”.
- When pulling samples, affix proper label on the sample can.
- When storing gas cylinders, store only in approved racks and areas.
- When storing gas cylinder, store in upright position.

2.4 **Industrial Hygiene**

- Does the person take prompt action to remove any hazardous material contacting the body?
- Does the person wash hands after working with hazardous materials prior to smoking, eating, drinking or using the restroom?
- Does the person keep lunchroom, restroom, meeting and control room facilities free of equipment, tools and clothing that may have contracted hazardous materials?

**Examples:**
- Do not place dirty work gloves, hard-hats, tools, etc. on lunch tables.
- When chemicals come in contact with chemical resistant clothing, rinse off clothing outside before storing or entering control room.
- When product contaminates Nomex clothing, change clothing as soon as possible.

2.5 **Lighting**

- Is the lighting in area sufficient to safely perform the task?
- Is a portable light, including flash light, used while working in dark area?

**Examples:**
- When working at night or in low visibility, use accessory lights such as a flashlight or light bars.
- When unit lighting is inadequate, write a safety work order to fix the problem.

3.0 **Tools/Equipment**

3.1 **Tool Selection/Use/Condition**

- Has the right tool for the job been selected and is it being used for its intended purpose?
- Is it in good condition?

**Examples:**
- When prying tight flanges, use a flange spreader.
- When prying, select and use the proper pry bar for the job.
- When opening or closing valves, use a valve wrench.
- When using wrenches, never use a cheater bar for additional leverage

3.2 **Equipment Installation/Condition/Access**

- Does the equipment installation create any work hazards?
- Does the equipment free from obvious defects and in good working order?
- Is equipment in the original condition and free of non-approved modifications?
- Is equipment installed in a manner that allows safe access.

**Examples:**
- When a damaged piece of equipment is discovered, remove it from use immediately.
- Prior to returning equipment to service, repair or replace all broken or worn parts.
- Before operating hard to open or close valves, lubricate stem prior to work.
- Piping or a valve stem creates a hazard in the area.

3.3 **Vehicle/Selection/Use/Condition**

- Did the employee select the right vehicle for the job?
- Is the employee using the vehicle for the designated task?
- Is the vehicle in good operating condition?

**Examples:**
- While operating vehicle, employee wears seat belts.
- When operating vehicle, operator makes eye contact with pedestrians or other vehicle operators before proceeding.
- Before using any vehicle, do a safety inspection.
4.0 Personal Protective Equipment

4.1 Head Protection
✓ Is the appropriate head protection being worn for the task being performed?
✓ Is the head protection in good condition, being worn properly and appropriate for the risk?
✓ Is the head protection free of alterations or defects?

Examples:
- When wearing a hard-hat, be sure of the proper size and fit.
- When wearing hard-hat, make sure the bill is facing forward.
- When using a hard-hat, the hat should be clean and free of any noticeable damage.

4.2 Eye Protection
✓ Is eye protection in good condition, being worn properly, fitted well, and appropriate for the risk?
✓ Is eye protection free from scratches or other damage that could reduce vision?

Examples:
- When working in dusty or dirty areas, or in windy conditions, wear goggles.
- Where applicable, wear ANSI approved safety glasses with side shields.
- When entering areas within orange painted lines, wear goggles.
- For any special risks like corrosives or steam, wear goggles.

4.3 Face Protection
✓ Is face protection in good condition, worn properly, fitted well, and appropriate for the risk?
✓ Is face protection free from scratches or other damage that could reduce vision?

Examples:
- When pulling product samples, wear face shield and proper eye protection.
- When unplugging drain lines, wear face shield and proper eye protection.
- When disconnecting chemical lines, wear face shield and proper eye protection.
- For any special risks like corrosives or steam, wear face protection.

4.4 Hearing Protection
✓ Is the employee safer wearing hearing protection?
✓ Is hearing protection being worn in high noise areas?
✓ Is the employee wearing hearing protection when it is necessary to raise their voice in order to be heard?
✓ Is the hearing protection in good condition and being worn as designed?

Examples:
- When going in or out of units, wear hearing protection.
- When unsure of noise level, wear hearing protection.
- When working in areas with solid yellow lines, wear hearing protection.

4.5 Respiratory Protection
✓ Is the employee wearing the appropriate respiratory protection for the job?
✓ Is the respiratory protection appropriate for the risk?
✓ Is the respiratory equipment in good condition being worn properly, or carried, and adequate for the contaminants that are present or could be encountered in the area?
✓ Does the respirator have a proper fit; are the straps in place for a secure fit?

Examples:
- When working in areas where H2S is present, wear fresh air equipment.
- When cutting or welding on galvanized or stainless steel, wear respiratory protection, if needed.
- When steaming out process units during shutdowns, wear respiratory protection.

4.6 Body Protection
✓ Is the employee wearing body protection and/or clothing suitable for the task being performed?
✓ Is the body protection in good condition, being worn properly and appropriate for the risk?

Examples:
- When working on chemical lines, wear chemical resistant clothing.
- When welding or burning, wear fire resistant clothing.
- When wearing Nomex clothing, roll down sleeves and fasten shirts or coveralls.
4.7 Hand Protection
✓ Is the employee wearing the proper hand protection for the task being performed?
✓ Is the hand protection in good condition and appropriate for the risk?

Examples:
- Wear rubber gloves when taking acid or caustic samples.
- When checking equipment, using tools, operating valves, or working with steam tracing wear leather gloves.
- When leather gloves become saturated, replace and discard them.
- When gloves are to be used, inspect for damage prior to use.

4.8 Foot Protection
✓ Is the appropriate foot protection being worn for the task being performed?
✓ Is the foot protection in good condition, being worn properly and appropriate for the risk?

Examples:
- While walking on icy surfaces, wear non-slip over boots.
- While climbing ladders or stairs, remove mud and debris from shoes prior to climbing.

4.9 Fall Protection
✓ Is the employee safer wearing fall protection equipment?
✓ Is the fall protection equipment being worn properly, fitting snugly around thighs and shoulders?
✓ Is the lanyard and fall arrest in good condition and properly secured?

Examples:
- When working 6' above ground level, i.e. pipe rack or ladders, use a safety harness.
- When working on a scaffold, install handrails.
- When using a scissor-lift, J.L.G. or man bucket, wear fall protection.

4.10 Personal Monitor
✓ Does employee wear personal H2S monitor when in unit?
✓ Is the monitor in good condition, calibrated/verified properly, worn properly?

Examples:
- When working in unit, does each employee or member of workgroup have personal H2S monitor?
- Is it worn properly, in the breathing zone?
- Is it calibrated?
- Is it working?

5.0 Procedure

5.1 Lockout/Tagout - Energy Isolation
✓ Is the equipment being worked on at an energy free state?
✓ Has the stored energy been released or drained at all points?
✓ Are mechanical energy sources, such as springs, blocked and locked before working in the affected areas?
✓ Has the equipment been isolated at the main energy source?
✓ Has a lock/tag been placed on all energy isolating points?
✓ Has the employee pushed the start/stop button to ensure that the power is off?
✓ Does the lock have a tag on it identifying the employee’s name and department?

Examples:
- When working on rotation equipment that has the potential for rotating after energy isolation (i.e. fans, gearboxes), secure the shaft or blades.
- When isolation equipment, record all isolated equipment on the master isolation list, lock and chain and place “Do Not Operate” tags which have been dated and signed.
- When isolating equipment, isolate energy source, drain equipment and affix isolation tags.
- When isolation is complete, secure keys in approved lock box.
- When working on isolated equipment, affix personal lock to lock box.

5.2 Communication of Hazards
✓ Is the necessary information being passed between those to ensure the work is conducted safely?
✓ Can the employees involved see and/or hear each other?
✓ Do they communicate about the work being performed and the potential hazards?

Examples:
- When pulling samples using Strahman valves, open valves slowly.
- When working around welders, workers are to inform helpers of the hazards of this job.
- Before work begins, read and discuss MSDS sheets.
- When hot work is on going in area, workers must be advised of the taking of samples or draining of systems.
5.3 Barricade
✓ In doing the job, are the employees safer when barricades are used?
✓ Is the barricade in use adequate for the task?
✓ Is the type of barricade used; such as barrier tape, signs, guards or other forms of job isolation, visible and in open sight?

Examples:
- When removing insulation, tape off work area or barricade.
- When excavating, use barricade to alert others to danger.
- When leaving excavation open over night, use lighted barricade.

5.4 Pre-Post Job Inspection
✓ Does employee inspect equipment/area before beginning task?
✓ Does employee inspect equipment/area after completing task?

Examples:
- When returning equipment to service do a visual inspection of completed work to ensure all flanges, fittings, and couplings are tightened.
- When working on lines, check lines to ensure they are clean and depressurized.
- When working on steam tracing lines, install insulation.
- When working on or near a hot line, look for a safe route of entry and escape prior to beginning the job.
- When starting a steam turbine, drain condensate before opening steam-supply valves.

5.5 Work Permit
✓ Is the area free from fire hazards?
✓ Has the permit been issued and has it been displayed?
✓ Is the fire watch present? (See Item 5.7, Fire Watch)

Examples:
- When working on a hot work permit, get gas checks as often as needed, but at least every four hours.
- When working, make sure all applicable items on the permits Special Precaution Section are being followed.
- When working, keep hard copy of permit on job site or your person.
- When signing on permit, complete all sections of permit.
- When signing on permit, do the joint job-site visit.

5.6 Confined Space
✓ Has the confined space been prepared for entry according to the Confined Space Entry permit?
✓ Is entry equipment present and in good working condition?
✓ Is the Confined Space Attendant in place at point of entry and in communication with entrants?

Examples:
- When working in a confined space, is a rescue team available?
- When working in a confined space, attendant must maintain visual or audio communication.
- If marked or applicable, is continuous air monitor on site and working?
- When working in a confined space, all precautions will be completed prior to entry.
- When working as a confined space attendant, all precautions will be completed prior to entry.
- When working as a confined space attendant, have all entrants signed in and out on back of permits?
- When working as a confined space attendant, you must have a radio or emergency horn.

5.7 Fire Watch
✓ Does hot-work attended job have fire watch?
✓ Does he have proper equipment?

Examples:
- Does hot-work attended have fire watch on site?
- Is fire watch in effective location and attentive?
- Does he have red vest?
- Does he have extinguisher within grasp?
- Does he have radio or air horn?
- Are the sewers covered and wet?

9.0 Other Behaviors
9.1 Other
✓ Behaviors that do not fit the other five categories on the CBI® Data Sheet.
# EXHIBIT F – DATA SHEET

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<thead>
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<td>Complex</td>
<td>III V</td>
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<td>Day:</td>
<td>M T W T F S</td>
<td>Time: AM PM</td>
</tr>
<tr>
<td># People Observed</td>
<td>Observer:</td>
<td>Overtime: Y N</td>
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<table>
<thead>
<tr>
<th>1.0 Body Use and Position</th>
<th>Safe</th>
<th>At Risk</th>
<th>4.0 Personal Protection Equipment</th>
<th>Safe</th>
<th>At Risk</th>
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<tbody>
<tr>
<td>1.1 Ascending/Descending</td>
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<td>4.1 Head Protection</td>
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<tr>
<td>1.2 Eyes on Path</td>
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<td>4.2 Eye/Face Protection</td>
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<td>1.3 Eyes on Task/Work</td>
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<td>4.3 Hearing Protection</td>
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<td>1.4 Body Mechanics</td>
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<td>4.4 Respiratory Protection</td>
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<td>4.5 Body Protection</td>
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<td>1.6 Pinch Point</td>
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<td>4.6 Hand Protection</td>
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<td>1.7 Assistance</td>
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<td>4.7 Foot Protection</td>
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<td>2.0 Environment</td>
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<td>4.8 Fall Protection</td>
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<td>4.9 Personal Monitor</td>
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<td>2.2 Walking/Working Surfaces</td>
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<td>5.0 Procedure</td>
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<td>2.3 Storage &amp; Labeling</td>
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<td>5.1 Lockout/Tagout-Energy Isolation</td>
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<td>9.0 Other Behaviors</td>
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<td>9.1 Other</td>
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Observation Questions:
1. Aware – Was the EE aware he/she was possibly at-risk?
2. Agree – Did the EE agree he/she was at-risk.
3. Control – Was the behavior under the EE’s control to perform safely? (Enabled/Standard/Non-Enabled)
5. Try – Did the EE agree to try the safe behavior or follow up on the solution?

| Item | WHILE? (Doing Task):
|------|---------------------------|
| WHAT? (Was at-risk):
| AWARE OF RISK/BEHAVIOR? Y N | AGREES WITH RISK? Y N |
| TYPE OF BEHAVIOR
| Enabled
| Difficult
| Non-Enable
| WHY? (Reason work was done at-risk): SOLUTION: (discussed together): WILL EMPLOYEE TRY Y N | FOLLOW UP? Y N |