

LEVEL 4 ASSESSMENT SPECIFICATION

Student name:	JOAB REYNOLDS	Student ID number:	
Programme:	HNC Process Operations Engineering		
Module:	Process Safety Systems		
Module code:	PCPO4006	Contribution to Overall Module Assessment (%):	50%
Lecturer:	Yan Mills	Internal Verifier:	L. Rutherford
Assignment Title:	Process Safety Management	Word count (or equivalent):	2000
Submission deadline:	17/02/2022	Return date of provisional marks & written feedback:	10/03/2022
Submission method:	All written assessments, where practical and possible, must be submitted via Turnitin unless otherwise instructed by the Lecturer. (Please DO NOT put this assessment specification into Turnitin or it will match many similarities with other students' submissions.) Alternative submission method (if applicable): Late submission of the assessment will result in a late penalty mark. Penalties for late submission: Up to one week late, maximum mark of 40%. Over one week late, 0%. Only the Extenuating Circumstances Panel may approve a change to submission dates.		
Academic honesty / referencing:	Academic honesty is required. In the main body of your submission you must give credit to authors on whose research and ideas your work is based. Append to your submission a reference list that indicates the books, articles, etc. that you have used, cited or quoted in order to complete this assessment.		

Module Learning Outcomes (from module syllabus)

- Explain the elements required to ensure the safe operation of an industrial process.
- Explain the strategies and procedures required to ensure an industrial process meets legal and regulatory requirements, and how safe systems of work are established.

STUDENT FEEDBACK FORM

Generic Assessment Criteria	Marks available	Marks awarded
1. Engagement with Literature Skills		
Engagement with a wide range of literature, including sources retrieved independently. Selection of relevant and credible sources. Generally sound referencing.	15	9
2. Knowledge and Understanding Skills		
Competent knowledge of the basic underlying concepts and principles	35	22
3. Cognitive and Intellectual Skills		
Sound evaluation of the underlying concepts and principles. Can interpret qualitative and quantitative data accurately. Ability to devise arguments using evidence to make mostly appropriate and valid judgements.	30	19
4. Practical Application Skills		
A very good application of a range of basic methods, materials, tools and/or techniques. Very good consideration of the context of the application.	10	7
5. Transferable Skills for Life and Professional Practice		
Work is accurate, coherent, fluent, well-structured and organised. Can work effectively independently and/or as part of a team, with very good contribution to group activities. Demonstrates very good skills for employment requiring the exercise of some personal responsibility, with just occasional minor weakness	10	6

Assessment Mark (Assessment marks are subject to ratification at the Exam Board. These comments and marks are to give feedback on module work and are for guidance only until they are confirmed.)

Late Submission Penalties (tick if appropriate)

Up to 1 week late (40% Max)

Over 1 week late (0%)

63%

HNC Process Operations Engineering Year 2

Joab Reynolds

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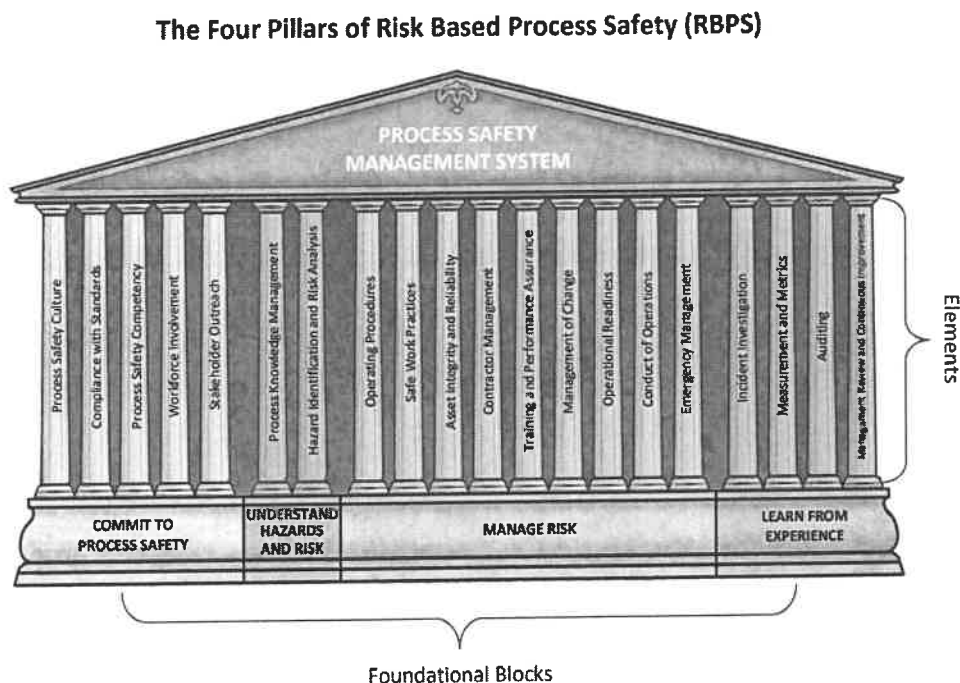
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Task 1

Process safety is carried out within a process environment, the aim of process safety is to protect the health, safety and wellbeing of the hazardous process which is taking place. Any activity taking place in a process environment could potentially lead to a catastrophic incident. The way to avoid these incidents taking place is follow the rules and regulations which are in place. These rules are there to help eliminate hazards which happen and occur in the process environment. Process safety management systems focus on keeping the running process as safe and efficient as possible and it also helps to protect the work force.

The key elements of a process safety management system involve the four pillars of process safety, shown in the image bellow.

figure 1



Courtesy of David Guss, Nexsen (A CNOOC Company)

On Pembroke refinery we have our own site policies and procedures which we must follow in order to help ensure process safety on the refinery. A lot of procedures which are in place on the refinery are not only there to protect the employees but the equipment to, this helps to ensure consistent process safety.

Some process safety procedures which we have in place are as follows:

- Loss Prevent Self-Assessment System. (LPSA)
- Permit system
- PSV audits
- Hazard hit tools
- Reporting incident procedure
- Stop work
- Hand safety specs
- PPE on site
- Unit specific PPE requirements
- Unit guidelines
- Level 1 and level 2 warning levels
- Venting procedures
- LOTO
- Entry tags and entry requests

All the procedures and requirements above are there to help ensure the safe and loss free running of the process system, in short, they are in place to maximize process safety.

If any of the safety systems above were to fail or become compromised it could lead to process safety failure on the refinery. This could result in personal injury or process failure.

When carrying out any task on the refinery safety is the primary and most important factor to consider. Before you begin a task on the refinery you must carry out a LPSA (lose prevention self-assessment). By doing this it allows you to determine any risks that will occur when carrying out the task. Once you are aware of the risks you can then go on to remove or limit them, this will allow you to carry out the task as safely as possible and mean it help to increase process safety. The LPSA system is in place to look after employee safety, as previously stated above process safety is also about looking after the equipment.

Safety system which looks after equipment are very important as they help to keep process systems running efficiently, systems such as PSV audits and maintenance procedures.

Process Safety Systems

On the permit it will also stipulate things like:

- How long you are aloud to work for under the permit issued
- PPE requirements
- What tasks can be undertaken
- The specific area you are working in
- The specific piece of equipment you are working on
- What tools you can use i.e., hand tools
- Are electrical tools aloud and if so, do you require a gas monitor
- Who issued the permit
- Who carried out the gas test
- Any other specific detail that is needed for the job

Audits are very important as it allows for personnel to know what position PSVs are in. When changing a PSV position there is lot of tasks to do prior to the job.

The job task to do when changing a PSV is to check its current position and ensure that it has been correctly recorded, this is important as it will mean the audit has been done correctly. Next task is to get the correct authorization to change the position of the PSV, this is done via getting and filling out a PSV movement form. The employee completing the job should complete the form and then the STL (Shift Team Leader) can then read the form and sign it to confirm he/she is happy. If the PSVs are not in the correct position it can mean that the vessel does not have the correct pressure protection this could cause a massive process upset and could be catastrophic if the vessel over pressures. The most important reason why audits are carried out is to check the stat inspection due date on the PSVs, if a PSV is due for stat it is very important it is removed and inspected and if needs be replaced. If process is running with a out of date PSV it could cause process safety to be at risk.

As an operator one of your main jobs is to keep the process conditions stable and to maintain a high level of process safety. One of the best ways to do this is to monitor process equipment and report problems when the occur. This is done via the work order request system. This system is vital to help maintain process safety. The work request system is used when a piece of process equipment is broke or not working correctly, you can report the issue and detail what it is. Maintenance can then come and inspect the problem and if needs be put plans into place to fix the problem.

In order for a piece of equipment to be worked on it first needs to be isolated and LOTO'ed. This is done to allow for the work to be carried out safely, the isolating of the equipment is carried out by operations. A LOTO pack is used to ensure the correct isolations are in place prior to handing the equipment over to maintenance. The LOTO pack is signed by the operator to say he is happy the equipment is isolated and safe to work on, LOTO tags are also hung on the valves to show the pack has been done correctly, vent tags are also hung to proof zero energy. Prior to maintenance working on the equipment they also need to collect a permit to work. This ensures operations are aware of what jobs are going on and to ensure maintenance are safe to work. All this is done to maximize process safety. The permits are issued by operations, before the permit is issued a gas test must be done to ensure the area is safe to work in this is done as it's a live plant. Gas testing requires training to ensure its carried out correctly.

Task 2

One of the biggest issues which causes a threat to process safety is the employees and more specifically human error. *“Human error is any mistake or action performed by a human which results in the thing they’re doing to be wrong.”* (Mulholland, 2018)

Human error is inevitable in any form of work, it can be as simple as misspelling something or more severe such as opening the incorrect valve in a process environment. Human error can be caused by many different factors, such as:

- Stress
- Fatigue
- Lack of knowledge
- Lack of skill
- Attitude

With these factors in mind there are lots of different control measures in place which are there to help eliminate and minimize these factors.

- To help reduce the stress of a job in process environment there are a few measures in place for example, a shift pattern is worked which allows for time off from work. Whilst working on a shift the correct staffing is done to ensure no employee gets over worked which can lead to stress and there for a mistake. There is also a supervisor on every shift which can monitor the behaviors of the employees and help them when required.
- Fatigue and stress can come hand in hand, being over work and stressed can lead to becoming tired and fatigue can set in. Measures in place to help minimize fatigue are things such as breaks which must be taken to ensure that the employee is rested throughout the day.
- Lack of knowledge is a very common factor which can lead to human error, there are lots of control measures in place which help to overcome this. For example, each employee should have the correct training prior to working on the refinery or in a process area. Before a worker enters the refinery he or she is required to take part in a site induction, this ensures they have a basic knowledge of the refinery rules and regulations. If the employee is going to be a permanent worker, they will also be

required to undergo a medical where their physical condition is tested, this is to ensure that the employee is fit to carry out the jobs he or she is tasked with. Every week toolbox talks are also carried out and given to all workers this is to ensure their knowledge is up to date and they are aware of any changes being made. Employees are also given CBTs (site-based training) to do these help employees keep learning on the job and keep their knowledge well intact.

- Lack of skill is also a very common reason that can lead to human error amongst employees. If an employee shows lack of skill it can mean they have not undergone the correct training needed to perform the job, control measures are in place to help avoid this problem. One of the main control measures in place is the training department which are there to help train employees. Their job is to keep the training procedures up to date and relevant so that staff are as qualified as possible. Performance reviews are also performed on employees to ensure that their skills aren't slipping and that they keep up to a high standard.
- A worker's attitude cannot just effect the workers safety but others around them, control measures such as procedure are in place as even if a work has a poor attitude they should still follow procedure which means they will perform there job safely.

Task 3

On the Butamer unit there are lots of different process safety measures in place to ensure safe operation of the plant. One of the main safety measures to help keep process conditions safe is PSV as previously spoke about.

PSV are pressure safety valves, their job is to let off pressure when the vessel or whatever the PSV is on hits a certain pressure. The PSVs are set to a pressure, once they lift the PSVs will either vent to a flare header or to atmosphere depending on the service of the PSV. *“Safety valves are designed to automatically pop open on pressure and stay open until there is a definite drop in pressure inside”.* (Power, 2017)

There are lots of different types of PSVs on the refinery on the Butamer the main type is *“Full bore safety valve - A safety valve having no protrusions in the bore, and wherein the valve lifts to an extent sufficient for the minimum area at any section, at or below the seat, to become the controlling orifice.”* (Limited., 2022)

One other type of PSV which is specific to the Butamer is pilot driven PSVs. *“The major relieving device is combined with, and is controlled by, a self-actuated auxiliary pressure relief device.”* (Sarco, 2022)

Process safety is spread across the whole refinery, a big measure which is in place is our hazard identification system. This allows for works to fix and identify problems before they occur. Each worker carries out a LPSA which helps to identify problems and solve them, this system spreads through the whole refinery from the admin staff to operator to scaffolders.

Conclusion

To conclude I believe I have answered all the questions correctly and to the best of my knowledge, I have shown my knowledge of process systems and also the safety around them. I have used prior knowledge and research to answer the questions.

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Table of figures

Figure 1 – 4 pillars (power point from Moodle)