



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:	Safe Systems of Work	Word count (or equivalent):	2000
Submission deadline:	05/05/2022	Return date of provisional marks & written feedback:	26/05/2022
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.	20	13
2. Knowledge and Understanding Skills		
Competent knowledge of the basic underlying concepts and principles	30	21
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	22
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	6
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)		66%
	Up to 1 week late (40% Max)		
	Over 1 week late (0%)		

Safe Systems of Work

Process Safety Systems

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Task 1

Process safety in a process environment is there to help protect the health and safety of all employees and also the plant itself, this could include equipment or even to protect the process i.e. not damaging or contaminating the product being made. Process safety is even more important when it comes to hazardous environments, as any action could end up leading to a catastrophic incident if rules and regulations are not followed correctly. In order to help eliminate and minimize hazards as much as possible layers of protection are put in place, these layers are there to help the plant run as efficiently and as safely when a problem occurs, they are also there to help protect the works from danger and also to help account for potential human error.

On Pembroke refinery we have lots of specific refinery safety systems which act as layers of protection to the process systems, these systems also help to protect the workers on the refinery as well. Some of these systems/layers are listed below.

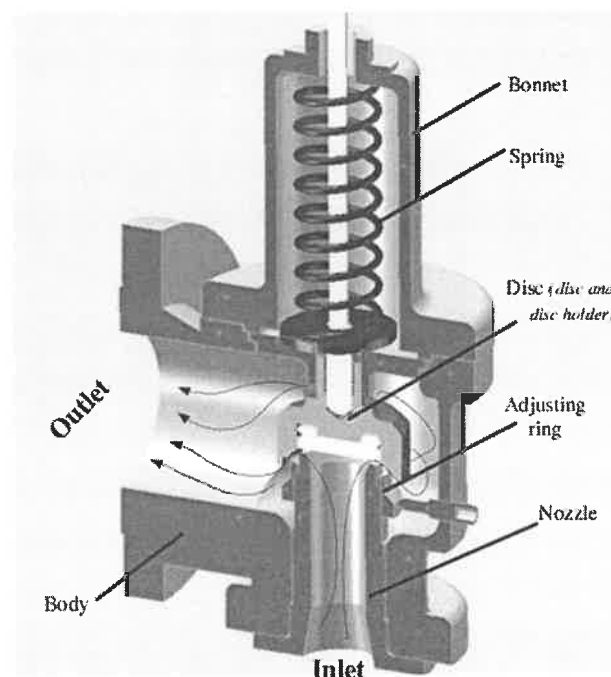
- PSV's (pressure safety valve) audits
- LPSA (Loss Prevent Self-Assessment) system
- OES (operations excellence system)
- Life savings rules
- HIT (hazard identification tool)
- LOTO (lock out tag out)
- Stop work authority
- Procedures
- Site specific procedures
- Emergency responders
- ESD's (emergency shutdown devices)

All these stated above are layers of protection to help safe running of the plant and there for to help ensure process safety.

A layer of protection such as a PSV audit is very important potential even one of the most important layers of protection on the refinery. A PSV audit is there to ensure that the condition of the valve is checked and also that the PSV is in the correct position. If a PSV was in the wrong position this would mean that the vessel that its protection would not have the correct vessel protection, so it would mean the protection layer has failed as if the vessel

was to over pressure the PSV would not lift so the pressure would have nowhere to go. The reason the PSV position may not be correct would be down to human error as whoever removed the PSV should update the book and fill out a movement form. Authorization now must be granted to move a isolation valve on a PSV, this is another layer of protection. This could go wrong again due to human error if the wrong isolation valve is closed, this would result in the PSV lifting light and mess around with the vessel pressures. The other reason for a PSV audit is to check the due dates on the PSV's. The due date on a PSV is like an expiry date, this means it is due a stat test, this requires the PSV to be removed and tested in a workshop to see if the PSV is working correctly. In some cases, the PSV is just too old and requires replacing all together. If a PSV is still in service past its due date this will mean, we are not compliant. The PSV will not be reliable if its due date has expired therefore it could fail to lift which could be catastrophic. Human error would be the only reason for a stat test to be missed on a PSV as whoever is carrying out the audit should take a note of the due date and report it, it is then up to the planners to put man power into getting the PSV removed and replaced if this is missed by them it would again be down to human error and would mean the PSV could potentially not lift. *"A pressure safety valve (PSV) is a valve used to protect pressure piping and pressure vessels from over pressuring. These valves are commonly used in the oil & gas industry and are required for safe design practices."* (oilgaspage, 2020)

Figure 1



Another layer of protection which is in place on Pembroke refinery is the seven life saving rules. These rules are there to

keep the workers safe and to guide them on what to do to ensure safe working practice is followed. The seven life saving rules are as follows,

- *Smoke in a designated area*
- *Always work with a valid permit*
- *Protect yourself while working at height*
- *Verify isolation before working*
- *Ensure correct PPE*
- *Gain authorisation before overriding/ bypassing equipment*
- *Gain authorisation before entering a confined space*

(dept, 2016)

If these rules are not followed, then that layer of protection is gone and can lead to serious health and safety issues. An example of this if you do not obtain the correct authorisation before overriding a safety system, if you decide to open up on a control valve bypass to clear a level and forget its open you could end up dropping all your level out of a vessel which could lead to unit having to come down or cause damage to other equipment, this would be down to human error for A forgetting and B not obtaining the correct authorisation.

Ensure you smoke in a designated area is a simple rule but very important as if this rule is not followed it could lead to a potential fire or even a explosion this would again be down to human error for not following the rules.

One other system which is used as a layer of protection is the LPS, loss prevention system. This includes but is not limited to LPSAs, which are carried out before every task or if conditions change. It involves using the operator hand book to help identify hazards, HIT tool,

- Assess risk- what could go wrong?
- Analyse - do I have the training?
- Act - follow procedure/ correct PPE/ ASK QUESTIONS!

They also use NLI, LI, LPOs, loss prevention observations. Where human factors are identified while carrying out tasks or target area tasks. Throughout this each hazard is document and good behaviors are identified and feedback given. Questionable items can be picked up and I feel the system works well with the 5 root cause questions to identify the issues and the learning aspect that comes with this.

Task 2

(a) safe working practices

On Pembroke refinery there are lots of different protocols and systems in place to help ensure and maintain safe working practice on the refinery, this helps to keep everyone safe and process running smoothly. The company does this by providing all its employees with the correct and necessary training to ensure they are fit and competent to do the job. All training provide is relevant to the individual and allows them to follow company guidelines correctly ensure that they keep a layer of protection over them.

Procedures also help to maintain a safe working practice on the refinery, a important procedure on the refinery which needs to be followed is the 0016 procedure, this is the LOTO procedure. This procedure is there to ensure the safety of personnel, process and also the equipment. The purpose of it is to ensure that a piece of equipment which requires work doing to it does not just energize and start. A good example of this is a pump as if a pump was just to start running is could pump set process which could cause lots of issues, it could realise toxic product into the environment and finally it could cause damage to workers nearby.

LOTO is a system that will ensure that equipment cannot be used by placing a physical barrier in the way of starting up equipment. These are in the forms of a red LOTO wire or coloured locks depending on the work being done, which are placed through a metal hasp inside of the substation.

Pembroke refinery has its own procedures for performing LOTO;

- Ensure all work has been assessed to identify hazardous energy sources during the maintenance/operations task.
- Ensure all work has been assessed to identify appropriate level of isolation. Such as electrical isolations inside of substations (Blue 1- up to 415v, Blue 2- 415v to 3.3Kv, Blue 3- anything up to 11Kv).
- Ensure all isolation lists are checked by at least one other person to avoid human error.
- Ensure information is included within the work pack to safely carry out the isolations (listed above).

- Ensure maintenance check all isolations to satisfy themselves before they undertake maintenance activities.

Even though a LOTO is done by operations personnel maintenance staff still have their part to play in the system to ensure safe working practice. The LOTO pack is made by the OMC (operations maintenance coordinator) it is then verified and handed down to the lead operator who then checks over it and gives it to the plant operator to complete. Once the operator has completed the pack and hung the LOTO they must then sign the pack to say they are happy with the isolations, and they have done what the pack has asked for. Once this is done maintenance can then work on the equipment, before they begin work maintenance should look over the job with operations so they are happy with the job and the isolations, they will then sign the pack and obtain the permit, work can then begin on the equipment.

(b) permit to work systems

The permit to work system is done electronically on a system called RAPNET on this system isolation you have done must be signed up and then can be moved across to the permit to work board. As an operator you must undergo RAP training to allow you to be confident on signing up your isolations and allowing you to have a good understanding of what you are doing. Maintenance build their own permits and then send them across to the OMC for them to be locked out, this means the OMC looks over the permit and is happy with the icons and with the job that is going on. A different job requires different icons, for example if the permit has vehicle entry on it this means the permit must have a vehicle entry icon or if a crane is required for the job a crane icon must be on the permit. Once all this is done the job can then be scheduled and maintenance can come and collect the permit from the lead operator on the day.

Before a permit is issued a gas test is required for that day, a gas test lasts two hours so if the permit is not collected by then a new gas test must be done, when gas testing anything up to a level 3 can be done by the outside operator as long as they have the required training. Anything above a level 3 for example a hot work or confined space entry must be carried out by the STL (shift team leader) this is due to the dangers of the job. A hot work could be something like live plant welding so a job like that would require extra precautions.

“A Permit to Work System is used to control and coordinate overall work activity in high risk working environments. It is part of an overall safe system of work in part of an overall safe system of work in determining how potentially dangerous jobs can be carried out safely. Regulations were introduced in the UK Offshore Oil and Gas Industry in 1976 (1) requiring the implementation of Permit to Work Systems for certain specified activities.” (S.R.Kyle, 1991)

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Table of figures

Figure 1 – PSV

Word count 1974

