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COMAH Competent Authority

[Redacted]

Health & Safety Executive
Belford House
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[Redacted]@hse.gov.uk

<http://www.hse.gov.uk/comah/index.htm>

HM Principal Inspector of Health & Safety

[Redacted]

Reference: SVC4302109
SVC4302111

Date: 19 July 2016

For the attention of: [Redacted] Operations and Maintenance Manager, Northern Systems and Plants

Dear Mr Baird

HEALTH & SAFETY AT WORK ETC ACT 1974

CONTROL OF MAJOR ACCIDENT HAZARDS REGULATIONS 2015 (COMAH)

I am writing to confirm the outcome of the mechanical engineering inspection carried out by [Redacted], Specialist Mechanical Engineering Inspector, at Mossmorran and Braefoot Bay on 23rd and 24th March 2016.

Details of the topics covered at the inspection are contained in the accompanying specialist report.

You should be aware that the CA has serious concerns regarding the failure of Shell's safety management system to ensure that the boil off compressor issues was progressed to an ALARP conclusion within a reasonable timescale. We will be requesting an update on progress on this matter.

Please note that surge protection issues at Braefoot Bay will be inspected further following the conclusion of the CA investigation into the gasoline loss of containment incident on 21st April 2016.

A single action legal has been identified at this stage, and is copied below for your information:

Action 1: Update the Written Scheme of examination for T3401 to include the rejection criteria for primary and secondary rim seals
(Reference: SHELL/MM/ME/270316/01)

End date: 30th August 2016

The site should update the WSE for T3401 to include the rejection criteria for primary and secondary rim seals. This will ensure that the inspector is fully aware of what they are supposed to be inspecting and when they identify a fault they can discuss this with the responsible person. The site should supply a copy of the updated WSE for T3401.

Information to employees

As required by Section 28 of the Health and Safety at Work etc Act 1974, I am required to provide relevant information to the employees. Please pass a copy of this letter to the employees' representatives.

Yours sincerely,

[Redacted signature]

[Redacted name]

HM Inspector of Health & Safety
COMAH Intervention Manager

[Redacted line]

CC by email: [Redacted], FNGL Plant Installation Manager; [Redacted] Acting Plant Manager;
[Redacted] Inspection TA2; [Redacted] TA2 Rotating Equipment; [Redacted] NSP HSE
Adviser; [Redacted] HSE Manager; [Redacted] SEPA; [Redacted] Energy Division



Environment Agency



Cyfoeth Naturiol Cymru
Natural Resources Wales



Office for Nuclear Regulation

COMAH Competent Authority Inspection Report

ESTABLISHMENT DETAILS			
Name of Operator:	Shell UK Ltd		
Establishment Address:	Mossmorran, Cowdenbeath, Fife, KY4 8EL	COIN Site Ref:	1023149 (Mossmorran) 1023054 (Braefoot Bay)
	Braefoot Bay Terminal, Bumtisland, Fife, KY3 0XR	Case No:	4063731 (Mossmorran) 4064958 (Braefoot Bay)
		Service order No:	SVC4302109 (Mossmorran) SVC4302111 (Braefoot Bay)

INSPECTION DETAILS			
Inspection Title:	Ageing Plant Inspection		
Report Discipline(s):	Mechanical Engineering		
Intervention Plan ref:		Inspection Date:*	22 nd – 23 rd Mar 2016
<p>*NOTE TO OPERATOR: Please ensure that you have updated the "date of the last site visit" field on the public information system following this planned inspection. The date above is the date of the last planned COMAH regulatory visit in line with the intervention plan for your establishment. You can select the relevant date from the system.</p> <p><i>[Delete this box if this is not a planned inspection from the Intervention Plan]</i></p>			

Visiting CA Staff:	Discipline:	CA Organisation, Unit & Team:
[REDACTED]	Regulatory Inspector	HSE HID CEMHD UNIT1A
[REDACTED]	Mechanical Specialist	HSE HID CEMHD UNIT1G

Persons seen:	Position:
[REDACTED]	Plant Manager (Acting)
[REDACTED]	HSE Manager
[REDACTED]	Health & Safety Advisor
[REDACTED]	Fabric Integrity TA1
[REDACTED]	Rotating Equipment TA2
[REDACTED]	NSP TA2 Inspection (UK & Eire)
[REDACTED]	Rotating Equipment Engineer

[REDACTED]	Process Safety Engineer
[REDACTED]	Technical Integrity Engineer
[REDACTED]	Braefoot Bay shift supervisor and Master Mariner

Relevant documentation seen

[List all documentation seen - include revisions and dates where possible. If appropriate, clarify the level of review within this section e.g. only parts of the document were reviewed]

Deviation Control Form 516129

Inspection report number 2015-192 (EP201603238040) for the inspection of T3401 secondary rim seal spring arms dated 19/10/2015

SUKEP-71.PR.1018 – Management of the temporary repair of piping systems

FRR Risk Assessment titled, K3201 A/B (Propane Boil Off Compressors) and K3301 A/B (Butane Boil Off Compressors). Risk of uncontrolled venting of produced hydrocarbons.

SAP maintenance plan 100484435

Inspection Summary:

[Provide high level summary - include the following: a brief summary of the purpose of the visit; brief overview of anything outstanding from previous interventions; a short summary of the key findings; a summary of actions to be addressed and timescales]

This was a planned inspection as per the sites intervention plans to follow-up on previously identified issues and address issues raised during the last review of the sites safety reports.

The inspection team at Mossmorran are inspecting T3401 rim seals in accordance with Deviation Control Form 516129. The site told me that they are now planning to replace the failed seal of T3401 in 2017. This will be followed up on future CA inspections.

The company is continuing to make good progress with fabric integrity rejuvenation project across the NSP sites at St Fergus, Mossmorran and Braefoot Bay

The rotating equipment engineers are working through the issues and risks on site and now require to be sufficiently supported to ensure that they can resolve these issues. The site are now reviewing existing items of equipment and upgrading existing equipment with modern technologies to ensure that they remain ALARP. The Mossmorran facility is in excess of 20 years old, what may have been considered ALARP 20 – 30 years ago, may not be considered ALARP today.

The CA is concerned that the Boil Off Compressor seal issue has not been progressed to an ALARP conclusion within a reasonable timescale, following the events in 2011. When the company took the decision not to replace the Boil Off compressors, another solution should have been identified at this time to mitigate the risk.

In light of the loss of containment incident on 21st April 2016 and the ongoing CA investigation, no actions have been raised in relation to the proposed changes to the bursting discs or the loading arms. Following completion of the CA investigation, the findings will be reviewed and the site's intervention plan updated accordingly.

Operator Performance Rating [where applicable]: <i>[Enter the topic being assessed (e.g. Strategic Priority) and type an X in the appropriate score box]</i>						
Topic	Rating					
	10	20	30	40	50	60
Ageing Plant – Topic 1 - Leadership			X			
Ageing Plant – Topic 2 – Asset Register		X				
Ageing Plant – Topic 3 – Integrity of the Primary Containment Boundary			X			
Ageing Plant – Topic 4 – Integrity of Mechanical Equipment			X			
Ageing Plant – Topic 7 - Resources		X				

Ageing Plant Update Summary:

Ageing Plant – Topic 1: Leadership topic has been updated and score has deteriorated to 30

Ageing Plant – Topic 2: The score has been retained at 20

Ageing Plant – Topic 3: Integrity of the primary containment boundary topic has been updated and score of 30 has been retained

Ageing Plant – Topic 4: The score has been set at 30

Ageing Plant – Topic 7: Resources topic has been updated and score of 20 has been retained.

Report author: [REDACTED]

CA Organisation, Unit & Team: HSE / HID / CEMHD / UNIT 1G

Date of report: 8th July 2016

Location: Bootle

Purpose of visit:

[Describe the purpose of the visit and how that purpose was met, and the approach taken e.g. site based inspection, presentations by site personnel, review of documentation etc. Any additional items addressed during the inspection should be noted and included in the Discussion and Conclusions section.]

This was a planned inspection as per the sites intervention plan to follow-up on some previously identified issues and address issues raised during the last review of the sites safety report.

The following agenda was sent through to the site in advance of the inspection.

Mechanical Engineering COMAH Inspection Shell UK Limited FNLG: Mossmorran and Braefoot Bay – 22nd & 23rd March 2016

Inspectors: [REDACTED], Specialist Mechanical inspector, and [REDACTED]

Day 1: Mossmorran - Tuesday, 22nd March

Start time: 9:00

1. Introductions and discussion of the agenda topics
2. Discussion with site inspection team to examine inspection activities in relation to gasoline tank roof seals
3. Update on structural steel condition survey and painting/repair plans
4. Update on temporary repairs
5. Management of Rotating Equipment:
 - Identification of rotating equipment on site
 - Function of equipment
 - Criticality
 - Appropriate design taking into account function and hazardous area classification
 - Assessment of risk
 - Remedial action
6. Follow up on improvement plans relating to mechanical issues, to include update on latest HBA for FNLG sites
7. Site visit to gasoline tanks; rotating equipment in hazardous areas; temporary repairs; examples of priority painting/repair work on structural steel.
8. Meeting with site safety reps, including contractor reps
9. Review of progress of inspection

Finish time: 17:00

Day 2: Braefoot Bay - Wednesday, 23rd March

Start time: 9:00

10. Any follow up to Day 1 inspection
11. Discussion of surge protection response
12. Update on fabric integrity maintenance programme, prioritisation of work, any associated deviations.
13. Site visit to jetty to see high priority steelwork painting/repair; loading arms; bursting discs and possible further sampling in line with Day 1 agenda.
14. CA discussion
15. Feedback to site

Finish time: 15:00

Please send electronic copies of the most recent HBAs for Mossmorran and Braefoot Bay in advance of the inspection

The inspection began with introductions followed by discussions in a meeting room. This was followed by a site inspection. Initial feedback was provided to the site at the end of the inspection by the Competent Authority.

Factual observations and findings:

[This section should describe what was inspected, what was found, benchmarks used by the company e.g. built to a standard. Include references to standards, guidance etc. listed in the glossary at the end of the report.]

Mossmorran – Tuesday 22nd March 2016**Introduction**

1. The site described how the Mossmorran site receives treated natural gas liquids from St Fergus, carries out further processing and then transfers products via pipeline to the ship loading jetty at Braefoot Bay. Both the Mossmorran and Braefoot Bay sites have the same management team.

T3401 Tank Inspection

2. The site provided me with an update of the status of T3401. T3401 had been discussed briefly at the previous mechanical engineering led CA inspection
3. The site had previously identified that the primary rim seal of T3401 had failed and are currently relying on the secondary rim seal. The consequences of continual operation of T3401 with only a secondary rim seal have been previously discussed and reviewed by a HSE Process Safety Specialist Inspector and detailed in the inspection report for the inspection visit dated 23rd – 24th September on SVC4302109 (Mossmorran) and SVC4302111 (Braefoot Bay).
4. The site told me that they have reviewed the written scheme of examination (WSE), and now complete an annual thorough inspection of the secondary seal. This is supplemented with an 6 monthly interim inspection. These inspections are scheduled via the site computerised maintenance management system (CMMS), SAP.
5. For each of these thorough and interim inspections, inspection reports are produced by the inspector where any adverse findings identified during the inspection are discussed and reviewed by the company's technical authority (TA2) for inspection.
6. Deviation Control Form 516129 states that, as per EEMUA 159, primary seals should not have a cumulative gap, of between 6.5mm and 38mm, covering more than 10% of the tank circumference, with no gap exceeding 38mm. From inspections, the site have identified that the primary seal has a cumulative gap greater than 10% of the tanks circumference, hence it is considered to have failed.
7. Deviation Control Form 516129 also states that the secondary rim seal is supported by 228 compression arms, where each arm contains 14 leaf springs. It further states that where all the leaf springs have failed on 5 consecutive arms, the arms should be repaired immediately. These compression arms require to be inspected every 6 months.
8. The rejection criteria detailed in 6 above is not detailed on the revised WSE for T3401.
9. Inspection report number 2015-192 (EP201603238040) for the inspection of T3401 secondary rim seal spring arms dated 19/10/2015 states that "with there not being 5 consecutive broken springs the rim seal is suitable for further service without the requirement to replace any of the rim seals."
10. The site told me that they are planning to replace the primary rim seals on T3401 in 2017.

The site are planning to replace the existing X/-X type primary rim seal with an X/-3X rim seal which has longer arms that will maintain a seal by accommodating the ovality of the tank.

Structures (Fabric Integrity)

11. I was told that both the Mossmorran and Braefoot Bay sites follow the same Fabric Integrity process as the site at St Fergus. The Fabric Integrity project that had been described to me at the St. Fergus site in October 2015 also included both the Mossmorran and Braefoot Bay sites.
12. The site described to me how an initial condition mapping assessment of Module 1 at Mossmorran realised that <5% of the structural steelwork had suffered >20% material loss.
13. Based upon the results of this condition mapping assessment and a tour of the site, the Fabric Integrity TA1 determined that it was not effective to complete a thorough condition mapping assessment of the entire Mossmorran site as the site was not suffering from extensive corrosion as found at St. Fergus.
14. The structural steelwork at Mossmorran receives a visual inspection every 12 months and a thorough inspection every 48 months.
15. I was told that the Jetty and the loading arm structures at Braefoot Bay had recently been refurbished as part of the Rejuvenation project.
16. The Jetty is now subjected to a visual inspection every 12 months and a thorough inspection every 48 months. These inspections are scheduled to coincide with low tides to allow more of the structure to be exposed during the inspection.
17. The site described to how they are now developing a procedure to manage the integrity of the marine piles. The development of this procedure is still in it's infancy, as the site are considering how each pile will be uniquely identified and sequenced through an inspection regime.
18. At both Mossmorran and Braefoot Bay, the 12 monthly visual inspections are completed by NSP's Inspection team. The site told me that any significant issues are reported to the Fabric Integrity TA for further consideration. The 48 monthly inspections are completed by a specialist structural inspector.

Recommendation

19. As the 12 monthly inspections are completed by inspectors whom are predominately inspecting static equipment (vessels, tanks and pipes), I recommended that the site develop an inspection guidance sheet. The inspection guidance sheet could contain numerous photographs of steelwork suffering from different levels of corrosion and graded accordingly. The inspectors could then use the guidance sheet to describe the severity of any corrosion identified in a consistent manner across a number of different inspectors.

Temporary Repairs

20. The site supplied me with a copy SUKEP-71.PR.1018 – Management of the temporary repair of piping systems.
21. The site suggested that it would be more beneficial to review temporary repairs on pipework at Braefoot Bay.

Management of Rotating Equipment

22. The Mossmorran site has a resident rotating equipment engineer, [REDACTED]. The Rotating Equipment Engineer is supported by a TA2 for rotating equipment, [REDACTED] who joined Shell in September 2014 having worked on pumps, compressors and turbines globally for 15 years.
23. The company has carried out a Hardware Barrier Assessment (HBA which identified and assessed the existing vulnerabilities presented by rotating equipment. The HBA includes risks posed by asset condition, obsolescence and maintenance and inspection scheduling from within the sites CMMS.
24. The engineers described to me how they currently review the performance of the machines on site and had developed a 'Bad Actor List'. The 'Bad Actor List' is used to prioritise the machines for engineering review.
25. The site told me that their top 5 concerns are:
 - The Boil Off compressors
 - Diesel Engines
 - Single Mechanical Seal pumps on Hydrocarbon duties
 - Refrigeration Compressors
 - Competence of the maintenance teams
26. The site described to me how they have a suite of high level maintenance procedures to cover each type of rotating equipment. The procedure for turbines had been reviewed against a turbine at St Fergus and found to be too generic due to the slight variations built into the machines by the manufacturers, so the site instigated an equipment specific FMECA study. The rotating equipment engineers now look at each item of rotating equipment on a case by case basis.
27. The site told me that they are currently reviewing the Butane Boil Off Compressors, K3301A and B.
28. The Boil Off Compressors are single stage Demag compressors fitted with single wet seals on the compressor shaft.
29. The site have identified that a failure of the wet seals on the compressor shaft can result in local venting of hydrocarbons local to the compressor's motor and gearbox.
30. The site told me how this issue had been reviewed a number of years ago. Replacement compressors were specified and projects cost estimates developed. As project costs spiralled, the proposed project was deemed to be too expensive at the time and the project was cancelled. When the compressor replacement project was cancelled, the site did not investigate other engineering solutions.
31. The site have installed a more permanent arrangement for the temporary vent hoses, originally fitted after a period of frequent seal failures, to exhaust any leaking hydrocarbon gas from the seals to a safe location away from the compressors motor and gearbox. The concern being that the motor and gearbox could act as potential ignition sources if a gas cloud accumulated in the area. This issue has been discussed on FRR Risk Assessment titled, "K3201 A/B (Propane Boil Off Compressors) and K3301 A/B (Butane Boil Off Compressors). Risk of uncontrolled venting of produced hydrocarbons".

32. The site is now investigating the feasibility of installing a modern efficient dry gas double sealing arrangement where any leaking hydrocarbon gases are vented to a safe location. The site anticipates that the design will be complete towards the end of 2016, ready for installation in 2017.
33. The site has instigated a programme to have double mechanical seals on all hydrocarbon pumps. The site have either re-engineered double seals onto existing pumps or replaced the entire pump / motor skid assembly as appropriate. 9 of the 12 duties have been upgraded to date and the site has plans for the remaining 3 duties.
34. The site described to me how they are routinely analysing the oil samples taken from rotating equipment and also completing vibration analysis to determine the condition of equipment.

Site Inspection.

35. On site I was shown the Boil Off Compressors. A vent hose was connected to the oil sump to direct any leaking hydrocarbons onto a stoned area away from potential ignition sources as required by
36. The site described to me how they were obtaining quotes to replace P3503 A/B as the existing pumps could not be modified from a single seal to a double seal arrangement due to physical constraints. Upon receipt of the quotes, the site intends to seek Capex funding from the 2017 Capex programme.

Braefoot Bay - Wednesday 23rd March 2016

Structures (Fabric Integrity)

37. See 15 – 19 above.

Ship Loading

38. The site load ships at their Jetty with either propane, butane or gasoline. This inspection focused on the butane and propane systems, the gasoline system was not discussed.
39. During 2015, 73 ships were loaded with butane and propane – 31 ships with propane, 31 ships with butane and 11 dual cargo ships.
40. Product is transferred from the tanks at Mossmorran via transfer mains at flowrates circa 450m³/hr. The fluid transfer mains are continuously operated. When ships are not being loaded, the fluid is recycled back via the process. This ensures that the fluid does not become stagnant in the pipe and remains refrigerated in the main.
41. The site described to me how the pipeline is protected from an over pressure scenario by a high pressure trip, a dump valve into a surge drum and a bursting disc. The site told me that the high pressure trip is set at 10Barg and the bursting disc rupture pressure at 7.9Barg
42. The site told me how they have historically suffered from numerous in-service bursting disc ruptures disrupting the loading activity. To minimise what are believed to be spurious bursting disc ruptures, the site operators have been isolating the bursting discs using valves during the start and end of loading for many years. The site confirmed that the isolation of the bursting disc has not been authorised and reviewed by the sites

management of change system.

43. The site stated that there have been 4 in-service bursting disc ruptures in 2015 on the butane and propane transfer mains, 1 on the Butane system and 3 on the propane system.
44. The site commissioned Hydraulic Analysis Ltd (HAL) to complete a surge study for the transfer mains. This surge study has identified that the pipelines will be subject to excessive pressures on start-up.
45. To enable bursting discs to remain online during the entire loading operation, the site have decided to replace the existing bursting discs (rupture pressure 7.9Barg) with new discs with an increased rupture pressure of 13Barg.
46. The site has identified the inlet manifold on the ship as having the lowest design pressure rating at 10Barg. The site has stated that the pipework on all of the ships that they fill is manufactured in accordance with ASME B31.3 piping standard. The site has then applied a 33% design allowance permitted for occasional excursions to determine a maximum pressure rating for the ships inlet manifold as 13.3Barg.

Site Inspection

47. The site demonstrated how they are following their procedure SUKEP-71.PR.1018 – Management of the temporary repair of piping systems.
48. I was given a copy of maintenance plan 100484435 from the SAP CMMS. This maintenance plan required an annual inspection of temporary repairs every 12 months. The maintenance plan required an inspection of all the site's live temporary repairs – MM011, MM013, MM020, MM024, MM025, MM039, MM040, MM054, MM110, MM111, MM115, MM116, MM120 AND MM130.
49. Whilst on site I viewed a number of these temporary repairs. They all appeared to be in good order.
50. On the Jetty, I could see a substantial amount of structural steelwork that had been refurbished as part of the rejuvenation project. (See 15 above)
51. I observed the loading arms. They appeared to be hydraulically operated and comprised of fixed lengths of pipe and swivel joints. The site told me that they had a maintenance regime in place for the loading arms. The site described how the swivel joints were routinely overhauled. I requested that a copy of the maintenance regime for the loading arm be forwarded onto myself post inspection, to allow me to review what maintenance was undertaken on the counter balance arm and the counterbalance weights. I did not receive a copy of the maintenance regime for the loading arm.
52. The site told me that they were about to undertake a programme of replacing each of the loading arms with a modern equivalent design as it was cheaper to buy new than to overhaul the existing loading arms.

Discussion and Conclusions:

[This section should focus on conclusions and compliance and risk gaps. Where appropriate make reference to the relevant Action reference number. Include other observations that may assist the operator's continuing compliance.]

Mossmorran – Tuesday 22nd March 2016

Introduction

53. The site were very receptive to this inspection and ensured that suitable resource was available to enable the inspection to progress.

T3401 Tank Inspection

54. The site had included detailed the rejection criteria for both the primary and secondary rim seal within Deviation Control Form 516129. This information has not been included on the revised WSE for T3401.
55. Inspection report number 2015-192 (EP201603238040) for the inspection of T3401 secondary rim seal spring arms dated 19/10/2015 states that "with there not being 5 consecutive broken springs the rim seal is suitable for further service without the requirement to replace any of the rim seals."
56. This indicates that the inspector is aware of the rejection criteria for the Secondary Rim Seal detailed in 6 above. The inspector is an employee of NSP who predominantly inspects the assets within the Fife area and has previously inspected T3401 before and assumed to be knowledgeable of the assets.
57. Albeit this inspector is familiar with T3401, another inspector may not be, therefore it is imperative that the written scheme of examination identifies what needs to be inspected and how it is to be inspected. To enable the inspector to interpret their findings and act appropriately, the rejection criteria should also be detailed on the WSE.

Action 1: The site should update the WSE for T3401 to include the rejection criteria for primary and secondary rim seals. This will ensure that the inspector is fully aware of what they are supposed to be inspecting and when they identify a fault they can discuss this with the responsible person. The site should supply a copy of the updated WSE for T3401.

Rotating Equipment

58. The rotating equipment engineers are working through the issues and risks on site and now require to be sufficiently supported to ensure that they can resolve these issues. The site are reviewing existing items of equipment and upgrading existing equipment with modern technologies to ensure that they represent ALARP. The Mossmorran facility is in excess of 20 years old, what may have been considered ALARP 20 – 30 years ago, may not be considered ALARP today.
59. I am extremely concerned with how the site / business have managed the Boil Off Compressor issue described in 30 above. When the site decided not to replace the Boil Off compressors, then should have identified another solution.
60. Having identified an issue, a proposal for replacement compressors was developed but was not approved by the business. The site continued to operate the Boil Off Compressors for a number of years until the arrival of [REDACTED], who initiated the current design review to retrofit the existing compressors with a double seal arrangement.
61. When the replacement compressor project was not approved by the business, the business should have been asking what next, rather maintaining the status quo. This does not reflect a business that is well focussed on managing risks.

Braefoot Bay

Ship Loading - Bursting Discs

62. The site described to me how the ships manifold had the lowest design pressure rating of 10Barg that had an excursion allowance to 13.3Barg.
63. The site told me that they were going to replace the existing 7.9Barg bursting discs with 13Barg bursting disc to prevent spurious ruptures.
64. The change of bursting disc that the site was planning to instigate was based on design work alone. The management team had not consulted the operating team during their assessment of the system.
65. I asked the Braefoot Bay shift supervisor and Master Mariner, Captain [REDACTED] how often the 10Barg high pressure trip had activated. Captain [REDACTED] stated that he did not recall the high pressure trip ever activating during his time on site.
66. I also asked the site if they had considered installing a temporary data logger to the pipeline to record the actual pressures that were being exerted upon the system during normal operation (both recycle and loading). The site stated that they had not considered this option.
67. I am concerned that the site have in excess of 30 years operational experience of loading ships from the Jetty at Braefoot Bay, yet have failed to consider this operational experience when making significant changes to the protective devices of the system.
68. Again I expressed my concern at the sites decision to increase the bursting disc rupture pressure from 7.9Barg to 13Barg. To me, this seems excessive, the site could have selected a new bursting disc rupture pressure just above the high pressure trip setting of 10Barg which would have offered the ships manifold more protection.
69. In light of the loss of containment incident on 21st April and the ongoing CA investigation, I have not raised any actions against the site associated with the proposed changes to the bursting discs or the loading arms. Following completion of the CA investigation, I will review the findings of the investigators and update the site's intervention plan accordingly.

Actions Legal

[Where appropriate Actions should be grouped e.g. by lifecycle phase etc. Each action must be numbered and state clearly what the operator must do to close the risk or compliance gap. The relevant regulations should be referenced, including any useful guidance that may assist the operator to comply with the law.]

Action 1: Update the Written Scheme of examination for T3401 to include the rejection criteria for primary and secondary rim seals

(Reference: SHELL/MM/ME/270316/01)

End date: 30th August 2016

The site should update the WSE for T3401 to include the rejection criteria for primary and secondary rim seals. This will ensure that the inspector is fully aware of what they are supposed to be inspecting and when they identify a fault they can discuss this with the responsible person. The site should supply a copy of the updated WSE for T3401.

Glossary

ALARP – As low as reasonably practicable
API – American Petroleum Institute
CA – COMAH Competent Authority
CMMS – Computer Maintenance Management System
COMAH – Control of Major Accident Hazards
FMECA - Failure Mode Effect Criticality Analysis
HSE – Health & Safety Executive
LOC – Loss of containment
MCDR - Material, corrosion and damage repair sheets
MOC – Management of Change
ME – Mechanical Engineer
PSSR – Pressure Safety Systems Regulations
PUWER – Provision and use of work equipment regulations
SEPA – Scottish Environment Protection Agency
TA – Technical Authority
UT - Ultrasonic Test
WSE – Written Scheme of Examination

References

Energy Institute:

www.energypublicing.org/publication/ei-technical-publications/installation-integrity

Guidelines for the management of flexible hose assemblies
Guidelines for the avoidance of vibration induced fatigue failure in process pipework
Guidelines for the management of the integrity of bolted joints on pressurised systems
Guidelines for the management of coating for external corrosion protection
Guidelines for the design, installation and management of thermal insulation systems
Guidelines for the design, installation and management of small bore tubing

SAFed:

www.safed.co.uk/technical-guides/pressure-equipment

IMG01 – The mechanical integrity of plant containing hazardous substances – A guide to periodic examination and testing

CDOIF:

<http://www.hse.gov.uk/aboutus/meetings/committees/cif/resources.htm>

<http://www.hse.gov.uk/aboutus/meetings/committees/cif/cdoif-external-contractors-managing-ageing-plant-230315.pdf>

Key Performance Indicators:

http://www.oecd-ilibrary.org/environment/oecd-guidance-on-safety-performance-indicators_9789264019119-en
(Maintenance Section A3.6)

HSE Guidance

RBI:

http://www.hse.gov.uk/research/crr_hm/2001/crr01363.htm
<http://www.hse.gov.uk/research/rrpdf/rr304.pdf>
http://www.hse.gov.uk/foi/internalops/hid_circs/technical_general/spc_tech_gen_46.htm

Managing Contractors:

<http://www.hse.gov.uk/pubns/books/hsg159.htm>
<http://www.hse.gov.uk/pubns/indg368.pdf>

Ageing Plant:

www.hse.gov.uk/comah/ca-guides.htm
<http://www.hse.gov.uk/comah/guidance/ageing-plant-app5.pdf>
<http://www.hse.gov.uk/research/rrpdf/rr509.pdf>
<http://www.hse.gov.uk/research/rrpdf/rr823-summary-guide.pdf>
<http://www.hse.gov.uk/research/rrhtm/rr823.htm>
<http://www.hse.gov.uk/comah/guidance/mechanical.pdf>

General:

HSG176 (2nd ed.) – The storage of flammable liquids in tanks -
<http://www.hse.gov.uk/pubns/priced/hsg176.pdf>

L122 - Safety of pressure systems - Pressure Systems Safety Regulations 2000 -
<http://www.hse.gov.uk/pubns/books/l122.htm>

L22 – Safe use of work equipment - Provision and Use of Work Equipment Regulations 1998 -
<http://www.hse.gov.uk/pubns/priced/puwer.pdf>

L111 – Control of Major Accident Hazards Regulations (COMAH) 1999 (as amended) -
<http://www.hse.gov.uk/pubns/books/l111.htm>

HSG190 – Preparing safety reports: Control of Major Accident Hazards Regulations 1999 (COMAH)
<http://www.hse.gov.uk/pubns/books/hsg190.htm>