(6)

COMAH

Competent Authority

COMAH Competent Authority

[redacted]

Health & Safety Executive
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http://www.hse.gov.uk/comah/index.htm

HM Principal Inspector of Health & Safety

[redacted]

Shell U.K. Limited
1 Altens Farm Rd,
Nigg
Aberdeen
AB12 3FY

Reference: SVC4320196

12th August 2016

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

Dear [redacted]

PROCESS SAFETY INSPECTION – FNGL - 31ST MAY & 1ST JUNE 2016

HEALTH & SAFETY AT WORK ETC ACT 1974

CONTROL OF MAJOR ACCIDENT HAZARDS REGULATIONS 2015 (COMAH)

I am writing to confirm the outcome of the process safety led inspection on 31st May and 1st June 2016, carried out by [redacted] Process Safety, and [redacted] Human Factors, Specialist Inspectors.

We noted that staff were well prepared for this inspection and were able to demonstrate substantial progress in relation to alarm prioritisation. Two legal actions were identified; details are provided in the accompanying specialist report.

Please note that HSE's concerns regarding the implementation of the Shell corporate Variable Table process for other sites will be taken forward by HSE's coordinating inspector for Shell, Derek Evans.

Legal Actions

Action 1: Alarm classification/ prioritisation of improvements
(Ref: SHELL/MM/PS/010616/1)

The company should report the findings of its internal review of Critical Alarms to the CA.
The report should include –

1) For the 84 SR alarms, identification of the time available for operator response, consequence of failure to correctly respond, SIL rating of any potential trip functions.

2) Proposals for installing, where appropriate, additional layers of protection (i.e. trips, relief etc), in addition to operator intervention. The proposals should be prioritised based on the information in point 1).

[Target Date: 30/09/16; COMAH 5(1) & 5(2)]

Action 2: C3/ C4 bursting discs technical demonstration
(Ref: SHELL/BB/PS/010616/2)

The company should prepare a technical report justifying the selected set pressure for bursting discs and trip functions on the C3 and C4 loading lines. The report should reference the relevant standards.

[Target Date: 30/09/16; COMAH 5(2)]

Information to employees
As required by Section 28 of the Health and Safety at Work etc Act 1974, I am required to provide information to the employees concerning the visit. Please ensure that a copy of this letter is passed to the employees' representatives.

Yours sincerely,

[redacted]
HM Inspector of Health & Safety
COMAH Intervention Manager

For and on behalf of the COMAH Competent Authority

CC by email: [redacted] Onshore Asset Manager; [redacted] Plant Installation Manager; [redacted] Acting Plant Manager; [redacted] HSE Manager; [redacted] St Fergus Plant Manager; [redacted] NSP HSE Adviser; [redacted] SEPA; [redacted] Energy Division

COMAH Competent Authority Inspection Report

ESTABLISHMENT DETAILS			
Name of Operator:	Shell UK Ltd FNGL		
Establishment Address:	FNGL Mossmorran Cowdenbeath Fife KY4 8EL	**COIN Site Ref:**	1023149
		Case No:	4063731
		Service order No:	SVC4320196

INSPECTION DETAILS			
Inspection Title:	Alarm management and follow up to outstanding issues.		
Report Discipline(s):	Process Safety		
Intervention Plan ref:	SVC4302109 & SVC4302111 Follow up	**Inspection Date:***	31 May – 01 June 2016

NOTE TO OPERATOR:** ***If you have been given access to the public information system **please ensure that you have updated the "date of the last site visit" field on the 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.**

[Delete this box if this is not a planned inspection from the Intervention Plan]

Visiting CA Staff:	Discipline:	CA Organisation, Unit & Team:
[redacted]	HM Inspector of Health and Safety	CEMHD 1A
[redacted]	HM Specialist Inspector (Human Factors)	CEMHD 3I
[redacted]	HM Specialist Inspector (Process Safety)	CEMHD 6A

Persons seen:	Position:
[redacted]	Plant Manager
[redacted]	HSE Officer
[redacted]	NSP HSE Manager
[redacted]	Technical Authority (TA) Technical Safety
[redacted]	TA Process Automation and Control Operation (PACO)
[redacted]	PACO Engineer
[redacted]	PACO Engineer
[redacted]	Production Coordinator
[redacted]	Process Engineer

[redacted]	Process Engineer
[redacted]	TA Process Engineering
[redacted]	TA Mechanical Engineering (by phone for C3/C4 surge discussion).
[redacted]	Control Room Operator
[redacted]	Control Room Operator

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]

Prior to Inspection

- Document: "Deviation Control Form – 568737. DCS Alarm Priority Distribution not Meeting DEP 32.80.10.14-Gen Alarm Management", Feb 10, 2016.
- Document: "MOC Request Form. Identify and implement SR and MAH alarms". March 18, 2016.
- Document: "Variable Entity Report – 110L001.DACA".
- Document: "Hydraulic Study of the Propane and Butane Loading System for Shell". Prepared by hydraulic analysis limited. Ref 12255D01R1. 10-02-16.
- Document: "Fife NGL Plant DSEAR Review". A02. 18th February 2016.

During Inspection

- Document: "FNGL SR and MAH Alarm Review". A01. 25/03/2016.
- Document: "Variable Table Details for: 115P009MAHL.DCA"
- Document: "Variable Table Details for: 110T105"
- Document: "Variable Table Details for: 110T105SRH"

Post Inspection

- SIL assessment: "SIS Requirements Specification GB.ZMB.B02.3503 Propane loading pressure high high". Revision 12.
- SIL assessment : "SIS Requirements Specification GB.ZMB.B02.3507 Butane loading pressure high high". Revision 12.
- SIL assessment: "GB.ZMM.B02-3401 Gasoline tank level high high". Revision 12.
- Diagram: "GB-ZMB-B02-3503 Propane loading pressure high high Risk Graph".
- Diagram: "GB-ZMB-B02-3507 Butane loading pressure high high Risk Graph".
- Diagram: "GB-ZMB-B02-3401 T-3401 Gasoline tank level high high Risk Graph"

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 2 day inspection covering a number of topics. On alarm management, the company had reviewed their alarm classification introducing two new classifications of alarms – Major Accident Hazard Critical (MAH) and Safety Related (SR). During the inspection, it was confirmed that the frequency and number of standing "critical" alarms had been significantly reduced. There is still substantial concern that for some identified major accident hazards there were no trips or relief beyond the requirement for the operator to take action. An Action Legal has been raised for the company to assess the various scenarios, prioritise the scenarios based on scale of hazard and time available to respond. The company should also produce proposals to install trips or relief devices (i.e. additional engineered layers of protection) where appropriate.

The company were progressing a project to replace the bursting discs on the C3 and C4 loading lines at Braefoot Bay with higher rated discs. This was to address a long standing issue relating to surge overpressure. The rationale behind the company's proposed settings was discussed. An action legal has been raised for the company to produce a technical note justifying the proposed settings.

The company were in the process of revising the hazardous area classifications for the Mossmorran, St.Fergus, and Braefoot Bay Sites. The results of this revision (along with the underpinning risk assessment document) are to be included in the upcoming 5 year safety report revision.

The company were progressing the relocation of foam stock and firefighting equipment closer to the gasoline tanks to reduce the time taken to respond to an incident. On fire risk assessment, the company were revising the assessment s for the Mossmorran site to the same standard as previously seen for the gasoline tank area. The results of this revision would again be included in the 5 year safety report review.

Report author: [redacted]

CA Organisation, Unit & Team: HSE, CEMHD 6A

Date of report: 11 August 2016

Location: Edinburgh

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.]

The purpose of this visit was to review the company's progress on the issue of process alarms and alarm handling at Mossmorran. Other issues that were also covered include:

- Response to over pressurisation incident at gasoline loading point at Braefoot Bay
- Surge overpressure protection for C3 and C4 loading lines at Braefoot Bay
- DSEAR
- Fire risk assessment

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.]

Background

1. This inspection visit was to an upper-tier site located at Mossmorran, operated by Shell UK Limited. The site receives NGL from the St. Fergus terminal via pipeline which is then passed through a series of columns to separate out the component parts. Ethane is transferred to the adjacent Exxon Mobile site for further processing. Propane, butane and gasoline are transferred via pipeline to the Braefoot Bay marine terminal for export via ship. Propane and Butane are also exported via pipeline to the adjacent Avanti gas site.

2. The primary aim of this inspection was to review the company's approach to process alarm classification and handling. Additional topics also covered included: the ongoing investigation into a gasoline loss of containment incident at Braefoot Bay; the company's plans to modify surge protection on the propane and butane loading lines at Braefoot Bay; the company's approach to DSEAR risk assessment; and the company's approach to fire risk assessment.

3. The inspection took the form of office based discussion and a visit to the site control room. Although issues relevant to the Braefoot Bay site were discussed, the inspection did not include a visit to that site.

Braefoot Bay loading arm incident

4. The inspection included discussion on the gasoline loss of containment incident at Braefoot Bay. This related to the company's proposals to address the two improvement notices served in relation to the incident. This discussion is not covered in this report, but in a separate investigation report.

Mossmorran alarm classification and handling

5. Process plant on site is controlled via a distributed control system (DCS). Control room operators (CROs) supervise from a single, central control room. The DCS is configured to provide alarms, visually and audibly, for the operators if the process parameters exceed certain levels or move away from set points. The purpose of the alarm being that the operator can take action to correct the situation. In addition to the DCS control system, a number of trip functions had been identified as critical and therefore had originally been installed as hard wired trip functions separate to the DCS. Staffing includes 2 CROs and 3 "outside" operators.

6. Site operations are split between 3 production "trains" which contain similar equipment/ processes and operate in parallel, in addition, storage is available for propane, butane and gasoline. The process is continuous and the ultimate response to a trip or upset condition would be to stop the feed into and out of the plant.

7. During a Human Factors inspection (02 – 03 February 2016), concern was raised about the number of standing "critical" alarms in the DCS and the frequency of alarm activation. This raised concerns about the possibility of an operator missing a critical alarm, failing to respond in sufficient time, or being unable to prioritise response in a situation where a large number of critical alarms are received. In addition to this concern, there was a question of did any of these alarms link to Major Accident Hazards. Some 2,000 alarms had been identified as critical, but the number of "embedded" alarms within this total with major accident potential was not clear.

8. At the time of the human factors inspection, the company were in the process of reclassifying the existing process alarms as part of a Field Operations Integrity Project (FOIP). This reclassification appeared to have resulted in a significant increase in the quantity and frequency of "critical" alarms. Following the human factors inspection, the company agreed to pause the alarm changes required as part of the FOIP project and look again at prioritisation.

9. The intention of this inspection was to review the company's progress in these areas and also to understand if failure to respond to any of the alarms could lead to a major accident hazard – with no additional protection level (i.e. a trip or relief device).

10. The company described the rational and approach behind the original FOIP changes. The company were at the end of a 4 year migration process of the Honeywell DCS system. As part of this project, the categorisation of all alarms had been reviewed and rationalised. The changes made had been based on a Shell DEP internal standard. This standard was reported as referencing EEMUA 191 and ISA (International Society of Automation) standards. The basis for this work was a "variable table" (VT) which had been used to review the relevant process variables assigning priorities.

11. The link between the Shell DEP standard and EEMUA 191 was reviewed in detail in the Human Factors inspection report following the previous inspection (date 18

April 2016) and is not repeated in this report.

12. The categorisation system used in the VT had two levels of alarm Critical (Red): requiring "immediate action" within 15 minutes. Standard (Yellow): requiring action within 4 hours. There was no classification of "low". Approximately 60% of the alarms which had been assessed in this way had been identified as critical with 40% as standard.

13. In practical terms this meant that the majority of migrated process alarms the operators were seeing were critical/ red. Some of these would have had major accident potential and in some cases the operator would be the final control point prior to a major accident. This distinction would not have been clear as all the alarms would have the same "critical" designation.

14. In addition to the dynamic response to alarms, the control system had a "standing alarm" function. This covered alarms which had been acknowledged, but the variable was still in the alarm range and therefore had not been cleared. This was displayed on a control mimic. In practical terms, the majority were shown as critical/ red, therefore it would be difficult to distinguish which had MAH potential.

15. The company report that they were aware of issues at the time of the human factors inspection (too many critical/ red alarms were being raised and the operators were flagging up the issue). The company's intention was to complete the FOIP changes and then review the overall effect. This approach was changed following the inspection.

16. To address these issues, the site had introduced new alarm categories – MAH Critical (MAH) and Safety Related (SR). Both MAH and SR alarms have major accident consequences. MAH alarms are where if the operator failed to take action, a trip or relief device would still be available as an additional layer of protection. SR alarms are where if the operator fails to act there is no further trip or relief device. Operator action is therefore the final prevention measure.

17. This approach had been developed by the Mossmorran site and had involved a technical safety engineer reviewing the relevant HAZOP line by line. This involved looking at 106 scenarios which had the potential to escalate to major accidents where a process alarm was taken as a mitigating factor. Each scenario was subjected to a sense check to confirm if it was credible, then the function assessed using a flow chart (NSP ISU R03) developed by the company which assigned a level of criticality to the alarm.

18. This review process had resulted in 84 alarms being identified as SR and 88 identified as MAH. Both categories were coded red in the DCS, but a suffix was used to distinguish between the two categories. Of the 84 SR alarms, 36 related to the separation columns and there would be a level of interlinking between the alarms (i.e. a process upset would cascade along the train resulting in several linked alarms). The figures of 84 and 88 represent a significant reduction on the 2,000 previously identified as "critical".

19. Of the remaining alarms, anything which had previously been identified as

"critical" not covered by SR or MAH had been defined as "medium" and colour coded yellow (2,901 alarms). The remaining alarms were categorised as "standard" and coded in white (2,732). Of the standard alarms, it was noted that 24% were related to fire and gas detection, and 24% were related to tank base heating.

20. At the time of this inspection, the company was completing the re-classification of the alarms in the DCS system. Alarm sheets had been revised in line with the changes, and a series of training sessions had been held to brief the operators. (See comments under control room heading).

21. The company described that where SR alarms had been identified, "Pre-alarms" had been configured to give additional time. The example given by the company was that on level. Where 95% was the SR alarm, a process alarm had been configured at 75%. The response action at 75% involved process changes (e.g. reducing feed rate) while the response to the SR/ 95% alarm would be immediate shutdown.

22. The company had initiated a weekly alarm review meeting which was assessing the effectiveness of the classification changes. Additionally, if a SR alarm had been generated, the instruction to the operators was that this should be raised as an incident so it could be suitably investigated. The company described using Key Performance Indicators (KPIs) as a means of monitoring alarm volume, response and as a means to identify any "bad actors". The company were looking at revised KPIs.

23. For some of the 84 SR alarms, at the time of this inspection, the company were not in a position of knowing: the length of time available for response; the scale of the MAH; or whether the response would be assessed as a SIL loop if a safety instrumented function were provided.

24. The company described its aim was to eliminate the SR alarm category by ensuring there is an additional layer of protection beyond operator intervention – i.e. ensuring that where a process deviation could result in a MAH there is an installed trip or relief to prevent the scenario. The company state that approximately 40% of the SR alarms identified would be addressed by projects which were currently planned. The company described an ongoing review process which would look at the 84 alarms and determine the priority for any improvements. Factors considered in this review would include the available time to respond and the SIL rating of any proposed trip system.

25. In terms of the company's other NSP sites, work on a similar alarm classification project at St. Fergus had been put on hold until the issues at Mossmorran had been rectified. Due to the lower level of processes and available automation, Braefoot Bay has not yet been considered for changes in this way.

Control room

26. The site control room was visited on the first day of the inspection for familiarisation purposes and on the second day to explore in more detail the

impact of alarm categorisation changes on the CROs.

27. The process is controlled from two main DCS stations within the central control room. The central console included Emergency Shutdown (ESD) and Emergency Depressurisation (EDP) buttons. Gas detection was shown in a wall mounted panel. Hardwired trips were originally shown on a panel on the control room wall. These trips were being transferred to a large Honeywell display screen to one side of the room. The migration of signals to the new system was largely complete at the time of this inspection with a few tags remaining to be copied across.

28. The control room operators described how briefing sessions were held on the revised classification system, and that the changes had been closely supported by the PACO Engineers. Feedback on the revised classification was positive, and the operators were able to clearly explain the meaning of the classification levels. The number of "standing alarms" was viewed and there were relatively few alarms.

29. On the night of the 01 June (i.e. overnight between the two days of inspection), there had been a process upset associated with Butane storage tank 3. Feedback was that the alarm prioritisation had assisted with the response to the upset.

30. The VT alarm browser could be opened in a separate screen – allowing the operator to check the required response to the alarm. At the time of the inspection, it was necessary to zoom in/ adjust the display to get to the relevant information within the document. The company were working to resolve this issue.

31. The audible alarm tones for the different categories were the same, however the company reported looking at whether this could be changed to further differentiate SR/ high priority alarms.

Braefoot Bay C3/ C4 surge study

32. Propane and Butane are transferred from Mossmorran to the Braefoot Bay site via pipeline and loaded onto ships. There are dedicated lines for each product, but the basic design is the same. There has been an ongoing concern from the CA relating to surge protection for these lines which had been discussed during previous inspections.

33. Both transfer lines are provided with individual surge tanks at the jetty. In the event of high pressure in the line, a valve will open relieving pressure into the surge tank. In addition to the valve, a bursting disc is installed, which would rupture on high pressure, again relieving pressure into the surge tank. The bursting disc arrangement includes an installed spare in an on-line/ off-line configuration. The current setting are 6.9 $bar_{(g)}$ for the trip and 7.9 $bar_{(g)}$ for the bursting disc.

34. The company had issues with this system in the early days of operation of the plant with discs bursting during the start of transfers (i.e. during an initial unsteady state). In this event, the transfer is stopped and the surge tank has to be pumped out prior to restart. To counter this, instructions had been issued to isolate (i.e. valve in) the bursting discs at the start of a transfer. The trip remains active.

35. Isolating pressure relief equipment is not good practice which the company acknowledge. The company have therefore been reviewing the design with the intention of increasing the rating of the trip and bursting disc to a point at which they would not activate under normal loading conditions, but would still be set sufficiently low to protect the pipework in the event of a genuine surge overpressure event. It would therefore be possible to keep the disc on line, without the risk of inadvertent bursting. The company had carried out a surge study to identify potential overpressures in a number of scenarios (i.e. the sudden closure of a valve in the transfer line) and compared this against potential set points and the rating of both shore and ship pipework.

36. Following the review, the company's proposal was to set the pressure trip at 10 $bar_{(g)}$ with a new bursting disc at 13 $bar_{(g)}$. The project to implement the change was in progress (in detailed design), with installation expected by the end of the year.

37. The company described how the onshore pipework and loading arm had design ratings significantly in excess of the 13 $bar_{(g)}$ selected for the bursting disc – i.e. 300lb flanges on pipework and 40 $bar_{(g)}$ design pressure of loading arm.

38. The pipework on the ship could also be affected. The company had determined that 10 $bar_{(g)}$ was the lowest design rating for the ships which could potentially visit Braefoot Bay.

39. The company had reviewed two design standards – ASME B31.3 and the IGC Code (International Gas Carriers Code) – to justify the setting of the disc at 13 bar(g) with respect to the ships pipework. A copy of this code was obtained pre-inspection (see references). Paragraph 5.2.3.3 states "the design pressure is not to be less than 10 bar gauge except for open ended lines where it is not to be less than 5 bar gauge". Paragraph states 5.5.2 "After assembly, all cargo and process piping are to be subjected to a hydrostatic test to at least 1.5 times the design pressure". The ASME code makes allowances for pipework to exceed the design pressure in transient conditions.

40. Simulation carried out by the company indicates that the pressure at the ships manifold will not exceed 13.3 $bar_{(g)}$, and this would only be for a short duration (3 seconds).

41. In addition to the bursting disc work, the company had also reviewed the SIL assessment for the pressure trip and the high level trip on the surge tank. This review determined that pressure trip should be SIL 2 rated, and the level in the surge drum should be SIL 3 rated.

DSEAR

42. The safety reports for the company's three onshore Scotland sites (St.Fergus, Mossmorran and Braefoot Bay) are due for 5 year revision in November 2015. As part of the review the company described how the relevant hazardous area classification drawings and the underpinning schedules were being reviewed. This

review was being carried out in house based on the Energy Institute standard EI15.

43. The company had prepared "DSEAR review documents" for all three sites to a similar standard to the Mossmorran document prepared following the previous inspection/ action and this would be included in the Safety Report revision.

Fire risk assessment

44. At the previous inspection in September 2015, the company's approach to fire risk assessment and response in the event of an incident were discussed, focussing on the gasoline floating roof storage tanks. The company had prepared a document covering the consequences of various fire scenarios associated with the tanks and the planned response. Part of this work included modelling of the thermal effects of the potential fire which could be used to determine safe positions to tackle the fire from and safe areas to store equipment.

45. During the previous inspection the location of firefighting foam (in IBCs) and equipment (foam cannon) was viewed in a yard area some distance from the floating roof tanks. There was discussion on the length of time it would take to move the IBCs and equipment in the event of a fire.

46. In light of the modelling of thermal effects, the company had concluded that the foam and equipment could be moved to a position closer to the gasoline tanks/ bunds, therefore reducing set up time in the event of an incident. The company had identified a suitable location and planned to put down slabs in the area prior to moving the IBCs and equipment. The company anticipated this would be completed by the end of 2016.

47. The "satellite" storage of firefighting foam (located on the other side of the plant), is unaffected by this change.

48. In terms of fire risk assessment for other sections of the plant, the company was in the process of reviewing and updating the existing documents as part of the overall COMAH safety report update. The company described using the same approach for the documents as the document covering the gasoline tanks. The target date for the revised Safety Report is November 2016.

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.]

Alarm management

49. Since the Human Factors inspection in February, the company had taken appropriate steps to reduce the number of critical alarms and to provide differentiation based on the consequences of the process deviation. This work was nearly complete at the time of this inspection and represented a significant improvement on the previous situation. The company should complete this work.

50. How the company arrived at the situation in February 2016 is however of concern. The company described an internal DEP standard which had been used to categorise alarms. The ratio of "critical" to "standard" alarms (60:40) should have raised concern at the design stage and leads to questions about the appropriateness and/ or applicability of the DEP standard. The company did receive feedback indicating a problem during the migration, but had decided to follow the project through to completion and then assess the issues identified rather than pausing the changeover.

51. The company has in effect produced a "site" review procedure which superseded (and corrected) the company procedure in response to the concerns raised by the CA. The company should consider if the DEP standard is fit for purpose for other sites in the Shell group – i.e. St. Fergus, offshore etc.

52. While the approach taken to reviewing alarm classification is positive, there remains an issue where 84 process deviations with the potential for MAH rely on operator intervention as the final protection. At the time of this inspection, the company were reviewing this issue, but were unable to define (for all 84 scenarios), what time was available to respond, the level of consequence, and whether any trip function (assuming one were installed), would require a SIL rating.

53. It was clear that the CROs spoken to during the inspection had a good understanding of the process and alarm categorisation. However, relying on operator response to prevent a MAH is unlikely to represent ALARP and the company needs to address this as a matter of urgency.

54. At the time of the inspection, the company were in the process of reviewing this issue. An Action Legal has been raised for the company to report the results of this review to the CA along with, where appropriate, proposals and timescales to rectify identified issues (i.e. provide trips or relief as additional layers of protection). The company's proposals should be prioritised based on: the time available to respond; the consequences of not responding or responding incorrectly; and whether any proposed trips would require a SIL rating.

Action 1: SHELL/MM/PS/010616/1

55. It is noted that the process itself and associated risk have not changed during the alarm classification exercise, but rather the alarm changes have identified the issue of operator-only response to process deviations with MAH potential.

C3/ C4 surge protection

56. The company had used a British Standard and an IGC code as a means of determining what the onshore pipework, loading arm, and ships pipework could withstand in the event of a surge overpressure event.

57. As the IGC code does not fully cover the situation described, there is an element of interpretation and engineering judgement in the company's approach. The company should record the justification of the set point of the trip and the bursting disc in a technical note. The note should reference the relevant standards, and the qualifications and competence of those involved in the decision. Where decisions have been taken to apply and interpret engineering standards, the note should be clear on this. An Action Legal has been raised for the company to produce this justification.

Action 2: SHELL/BB/PS/010616/2

58. Once the relevant study and design work is complete, the company should progress the modification to the trip and bursting disc. The proposed completion date is by the end of 2016.

DSEAR

59. The company had progressed DSEAR risk assessment documents for all three sites following the template of the previous Mossmorran document. These documents are to be included in the sites revised Safety Reports which are due in November.

60. Following the completion of these underpinning assessment documents, the CA inspection approach will likely move onto verification of measures in place on the sites (i.e. does the equipment meet the requirements of relevant zoning in terms of design, maintenance etc.)

Fire risk assessment

61. The company's overall approach to assessing the consequences, and the planned actions in the event of a fire on site was reviewed both during this inspection and the previous inspection in September 2015. The approach presented in the document covering the gasoline tanks is reasonable and the company are planning to adopt a similar approach in documents covering the remainder of the site in the revised Safety Report. The proposal of relocating the stocks of foam and equipment to an area closer to where they would be needed is appropriate and the company are progressing this as an action.

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: SHELL/MM/PS/010616/1

Alarm classification/ prioritisation of improvements

The company should report the findings of its internal review of Critical Alarms to the CA. The report should include –

1) For the 84 SR alarms, identification of the time available for operator response, consequence of failure to correctly respond, SIL rating of any potential trip functions.
2) Proposals for installing, where appropriate, additional layers of protection (i.e. trips, relief etc), in addition to operator intervention. The proposals should be prioritised based on the information in point 1).

Target Date: 30/09/16

COMAH Regulation 5(1)
COMAH Regulation 5(2)

Action 2: SHELL/BB/PS/010616/2

C3/ C4 bursting discs technical demonstration

The company should prepare a technical report justifying the selected set pressure for bursting discs and trip functions on the C3 and C4 loading lines. The report should reference the relevant standards.

Target Date: 30/09/16

COMAH Regulation 5(2)

References

1. L111 "The Control of Major Accident Hazards Regulations 2015. Guidance on Regulation". (3rd Edition, 2015).

2. EMMUA Publication 191 "Alarm systems. A guide to design, management and procurement". (3rd Edition, 2013)

3. IGC Code published by the GL group: Section 5 "Process Pressure Vessels and

Liquid, Vapour and Pressure Piping Systems." Chapter 6. Page 5 –

http://www.gl-group.com/infoServices/rules/pdfs/gl_i-1-6_e.pdf

4. EI 15 "Area classification for installations handling flammable liquids". (4th Edition, 2015).