Occidental

CONFIDENTIAL

Memorandum

To	G.E. Grogan	From	T.L. Hull
Date	29th March, 1984	Copies	
Subject	PIPER EXPLOSION, 24TH MARCH, 1984		

The immediate cause of the subject explosion and subsequent fire is now becoming apparent and I understand the Board of Inquiry is now preparing its initial findings report.

I am cognizant that you will now be deciding the extent and depth of the follow-up work of the Inquiry team and/or by others outside of or subsequent to, the Inquiry. With this in mind, I have noted down some of the questions that might be addressed by the Board. I'm sure most, perhaps all, have already been voiced and may already be under consideration, but the attached list might possibly include some new ones that are relevant.

T.L. Hull

Att.

DESIGN

Did the design meet the original Design Basis?

. . . . Design Philosophy?

Did it meet the procurement specifications?

. . . applicable codes?

. . . applicable regulations?

. . . accepted practice at the time?

. . . Oxy standards, if any, or intentions?

Does it meet current codes, standards, practices?

Would a hazop study have identified the problem?

Should one be done in future?

new projects?

existing facilities?

PROCUREMENT

What was the purchase specifications?

for the initial unit?

for the failed unit?

for the replacement?

Did the item meet the procurement specifications?

If not, what was the level of quality control?

Is it adequate? appropriate?

Did the tight procurement schedule of the original unit adversely influence either its design or the quality of material selection?

Has there been any history of inadequate relay performance? Is this an isolated failure or is there a pattern?

If persistent, what changes are required to our specification - or our quality control. Or should we have a prescribed replacement period - rather than wait for failures?

Is there adequate maintenance of this relay? all relays? Can the reliability of relays be improved? How?

Was the heater itself adequately designed and fabricated? Was our philosophy of accepting heaters in such a module appriopriate? Was there any option? Is there any option now?

UPSET DETECTION

Was the imminent failure detected/detectable?

Is the monitoring of our process conditions adequate?

Could it have been avoided by different monitoring?
Automated? Manual?

What other areas of the platform are exposed to similar circuimstances, both in detail and in philosophy?

Did the detection systems (manual, automatic) detectd and alarm properly?

FIRE FIGHTING

Was our fire fighting systems adequate?

Passive
Fixed
Portable
Supply
Pressure
Isolation

Was Tharos fire fighting helpful?

Would other systems be more useful?

RESCUE

Helicopters obviously good.

Was there any tendency to use lifeboats?

Would there have been if weather was more favourable and/or the fire more severe?

Did the OIM feel he had adequate control over their use? Would this also be the case in more marginal conditions?

Is there a case of demobing lifeboats - (as more of a potential hazard) given the experience of this event?

Or conversely, do we need to improve their operability?

What if helicopters had not been so readily available?

Did our emergency teams work to best advantage?

Should we make provision for keeping more men on board, recognising the benefit of the extra, voluntary help.

Did we respond with medical assistance appropriately?

Can this be improved?

COMMUNICATIONS

Were they adequate?

Enough hand portables? Were the all functional?

Was there enough back-up?

What if the radio room had suffered more damage?

Can Tharos or other vessel, be used as back-up?

How would the link be established?

THE BOTTOM LINE

Do we accept the exposure that has now been demonstrated?

OR

Do we reduce it? How? At what cost?

POST INCIDENT REVIEW MEETING - FILE NOTE 27TH MARCH, 1984

1. A. MCDONALD - COMMUNICATIONS/CALL OUT

- Call out successful. Received initial call at 13.05 and by 13.24 had contacted someone from each group.
- Tannoy announcement will be made in the event of an offshore emergency during normal office hours; members of the emergency team would however go immediately to reception and sign-in as per normal procedures.
- It was noted that London office still use procedures indicating category 1, 2 and 3 emergencies instead of minor, serious & major. TLH will request that the procedures in question be amended to be compatible with Aberdeen procedures.

2. K. GRAHAM - PRESS ROOM/P.R.

- Very pleased with the way things went and coverage by press was fair.
- Received calls from London Legal Department and DLJ which were strictly speaking outwith procedures and blocked 'phone lines intended for press calls.
- Suggested that press releases be brought forward 15 minutes before each hour. This will help newspapers etc. meet deadlines.

3. J. S. FARQUHARSON - EMPLOYEE RELATIONS

- Call out was very smooth and effective; police representatives arrived on-site very quickly.
- Our main problem was that of obtaining POB and next-of-kin lists (about 2½ hours after office was set up). It was recognized that this was a high priority item and it was further suggested that it be the discussion of a separate meeting. Also to be included would be Heliport manifests for in-bound passengers and Tharos Piper reconciliation.
- Another problem was that of contacting contractors to advise of the incident and though it was suggested that the address listing be updated more frequently it was recognized that due to the vast number of companies involved, this should perhaps receive further attention and thought. GN suggested that a working group be set up to remedy the situation.
- It is recognized that the resources of the E.R. department might be stretched in the event of an emergency that extended over a long period of time and they may therefore have to call upon the services of other non-technical departments such as accounts or purchasing. It was recognized that Accounts should be notified of any such emergency as a matter of course and JFS will add this department to his call out.
- The Skeandhu Hotel were highly commended for their assistance during the incident.

4. D. CHRISTIE - HELIPORT

- There were no real problems, other than the POB lists which have already been mentioned.

5. - It was pointed out that though elaborate procedures have been set up for dealing with the actual emergency it was recognized that no formal instructions had been developed for winding down the emergency. TLH will look at this and incorporate procedures in the manual concerned.

- It was also agreed that there was a potential problem in people calling the office from offshore and vice-versa. A suggestion was made that perhaps an additional tannoy message be made asking that people do not call the platforms.

- A. McDonald suggested that the secretarial post in the Emergency Control Room be changed to a more central point.

6. T. REYNOLDS - OFFICE SERVICES

- No major problems other than knowing when to serve food; have therefore established guidelines.
- Have also ordered in/out cards in an effort to keep track of who is in the office at any given time.

7. T. L. HULL - LOSS PREVENTION

- Contact with Yellow Sector coordinators had been made by E. A. Lowe by the time I came into the office.
- Have plans to use a PC to track vessels in the North Sea for better coordination with Yellow Sector Club - perhaps POB listings could also be coordinated and equipment could be set up in conference room with an operator available to extract information as and when required.
- Received a couple of calls from DLJ and JEB which I feel should possibly have been directed to JFS.
- P. MacNab added that he too received a call from AGHD requesting photographs of the incident. PM referred him to TLH but he did not make contact.

8. R. M. BAXTER - LEGAL DEPARTMENT

- When I arrived at the office I began to answer 'phones for those persons who were otherwise engaged. It might be worth considering the positioning of status boards so that those persons who join the team "cold" could appraise themselves from the boards without having to disturb those already heavily involved in the operation. As it was, E. A. Lowe was continually interrupted to appraise team members.

9. R. THOMPSON - DATA PROCESSING

- I felt that DP should be moved up slightly in the call out to ensure that there support function was activated on a timely basis.
- All other aspects, ie. POB, next of kin listings etc will be discussed at a separate meeting.

10. J. TWEEDY - PRODUCTION

11. J. TWEEDY - PRODUCTION

- No real problems here
- London also caused confusion by calling Claymore for information on the incident (JEB and DLJ?)

12. A. D. MCREYNOLDS - OFFSHORE OPERATIONS

- Suggested that perhaps KG consult with London as to how they felt the incident was handled, ie. flow of information etc.
- It was agreed that they did not follow procedures as to communication but also recognized that they were anxious to hear news of the event. Further discussion is perhaps desirable in this regard.
- It was also suggested that the Accounts Department be mobilized in order to provide advances to in-bound passengers.

SUMMARY OF PIPER INCIDENT OF 24TH MARCH 1984

Cold, wet and windy weather was being experienced on Piper at noon on March 24th. The wind speed was 60 knots and waves were 45 to 50 ft. Oil and gas production rates were normal, being 200,000 B/D and 70 MMCFD respectively. At 1205 hours the main oil line pumps went down and by 1215 hours the separators, gas processing plant, and all wells had shutdown.

These kinds of shutdowns happen occasionally for various operating reasons and are not considered particularly abnormal. During the next 45 minutes production was partially reinstated with both separators and one main line oil pump on line when an explosion occurred in the Gas Conservation Module at 1300 hours. The control room operator immediately implemented an emergency shutdown and by 1303 hours all systems and wells were shut in. After brief investigation the OIM sounded the "General Alarm" and notified Aberdeen of the emergency situation at 1305. Water and airborne rescue craft were called and the MSV Tharos which was standing off a few hundred yards began to move in with fire monitors on but pointed away from the platform. A helicopter overhead landed on the Tharos, discharged its passengers and at 1310 hours the OIM ordered evacuation of non essential personnel by helicopter; due to weather no serious consideration was given to use of lifeboats. One hundred and eighty people were removed in 38 minutes between 1312 and 1350 hours - 55 of them to Aberdeen with a Chinook which was in the area. Sixty-one people were left on board with fifty of them being directly involved in firefighting. Initially, one man was knocked down by the blast and was subsequently treated for shock and minor irritation due to smoke inhalation. One man lost his toenail getting out of his bunk and another suffered a bruised calf muscle while seeking cover on the deck. Three firefighters suffered irritation from smoke inhalation.

In the Gas Conservation Module, separator gas is processed through a molecular sieve dryer before leaving the platform. The "mole sieves" are regenerated by hot gas from four electric heaters. One of the four heaters exploded and gas bleeding from the system fed a small fire for about two hours following the explosion. Initial findings indicate that the heater did not cut off when gas flow stopped and the vessel failed due to overheating. A faulty relay was found stuck closed in the control circuit of the heater.

The initial blast blew the doors off the Gas Conservation Module and sent a shockwave through the air vents of the adjoining utility module, destroying some of the vents. Fire damage was very limited and very localized with some pipes, valves, wiring and insulation affected.

Production of about 85,000 BOPD has been restored pending repairs to the Gas Conservation Module which should be completed by mid June.

GEG/NM
12.4.84

HEREWITH LIST OF PERSONNEL REMAINING ON PIPER:-

OXY (48)

J BARNES ✗
G RICHARDS
R SNEDDON ✗
G THOMAS
W HARDIE
A FAIRBAIRN
I DONNELLUY
R BANNIGAN
R MUSTARD
G GARDNER
G BENNET
E DUNCAN
R DENSLOW
A BNREEE A BREMNER
R HUSKIE
R PRICE
M GROVES
R VERNON
A ROBERTSON ✗
M LESTER
C PHILIPSON
T HENDERSON
J PIRRIE
R GRAY ✗
A MCKAY
JEARRETT
J EDWARDS
A BREWER
G BAGNALL
L BROWN
J FERGUSON
I BINGHAM
A BARR
B CROWDEN
J SAVAGE
G FOWLER
I LAWSON
S BTEACEEE TEA ✗
J HUNTLEY
A POTTER
J STAINTON
J MCSEVENEY
M OGG
H NARMBATH
J WELCH ✗
A CLARK
J MEIKLEJOHN
C KNAGGS

BANDEN 10

G WILHELM
F BUSBY
P GREGORY
L YEOMAN
J JONES

✗ Persons interviewed on platform by Enquiry Team

BAWDEN 10

G WILHELM
F BUSBY
P GREGORY
L YEOMAN
J JONES
D FINDLAY
R PATERSON
N WEAVER
I PIPER
R DUGUID

ECL

G BARTRAM
A DUNCAN ✗

GROUOP FOUR 1

G BRUCE

TOTAL 61 (SIX ONE)

RECOMMENDATIONS :

1) Firefighting

Following the explosion and fire on Piper on 24.3.84, comments were expressed by members of the firefighting teams describing a lack of availability of hydrants in the Pipedeck/Skid Deck area. In fact, such was the non-availability of hydrants adjacent to the fire source that it was found necessary to adapt the Pipedeck monitors to hydrants by fitting suitable hose connections to their nozzles. In addition, the nearest hydrants could only be reached by using more than the normal two hoses provided per hydrant. The situation was marginally compounded by the hydrant on the S. side of the Skid Deck being unavailable, due to its isolation for construction purposes.

It was stressed in the comments made that in terms of the above incident, the lack of adjacent hydrants manifested as an inconvenience, and did not impair the firefighting. In the case of a more serious fire, however, where many hose outlets may have been required to provide both control and cooling, it was believed that the efficiency of the firefighting could have been seriously disadvantaged by this factor.

A similar finding concerning a lack of hydrants in the Pipedeck area was made by Loss Prevention following a study in January 84 in relation to the siting of the Workover Rig. A proposal was subsequently put forward suggesting two additional hydrants on the Pipedeck at S.E. and S.W. corners immediately adjacent to the monitors. At the time of the incident, this proposal was under joint review by Loss Prevention and Facilities Engineering.

Recommend number

It is our recommendation that the number of hydrants in the Pipedeck and Skid Deck areas should be increased using as a basis the above proposal, and that this should be implemented as soon as possible.

2) Platform General Alarm

Amongst the contract personnel interviewed after the incident, six persons said that just after the explosion, break glass fire alarms were operated but no subsequent General Alarm (GA) was heard. This apparently led to some confusion, since it had been commonly understood that the GA is automatically initiated immediately a break glass fire alarm is operated. It may be noted that the GA on Piper 'A' is a synthesised warble sound conveyed to all platform alarm speakers, and is the signal for all personnel to muster at their emergency stations at the lifeboats.

In principle, the GA should have operated immediately as described above, but was prevented from doing so at the time of the incident because a 30 sec. time delay was in circuit. This delay is on/off switch operated from the platform control room and is switched into circuit to prevent nuisance interruptions to operations and people sleeping when it is anticipated that spurious operation of the GA may occur during specific major construction or preventive maintenance work. A GA cancel button is also sited in the control room.

/... cont.

On Piper 'A', there are three alarms that separately initiate the GA. These are, break glass fire alarms, water deluge operation, and fixed halon system operation. Each of these is also annunciated, audibly and visually, at the control room fire panel showing the operator the location and type of alarm. Thus, whilst the delay does not reduce the alarm information relayed to the control room operator, it does invest in him ultimate control over the GA sounding and allow him time to assess whether the alarm is real or spurious.

The GA delay was installed in September 1979 as a result of a history of spurious GA soundings mainly attributable to spurious water deluge release operations.

In the light of the above comments, we have reviewed the situation as it presently stands. We find that the frequency of spurious GA initiations has decreased considerably since 1979, mainly as a result of improvements in the water deluge systems. Given the amount of alarm information conveyed to the control room, we can also find no present realistic philosophy for having our fixed extinguishing systems coupled to an automatic sounding of the GA. We therefore recommend that both the water deluge and fixed halon system initiation of the GA be removed and that the 30 sec. delay be taken out of the GA circuit. This we believe will remove any possibility of future confusion, and it will also make the Piper GA alarm initiation exactly compatible with the Claymore 'A' system.

3. Hazard and Operability Studies (HAZOP)

Essentially, HAZOP is a systematic method for identifying hazards, and is based on the suggestion that a problem can only arise when there is a deviation from what is normally expected. It differs from conventional hazard analysis which is a full quantitative analysis carried out to determine whether the proposed system is safe within the limits which are considered to be acceptable.

We believe that the application of a method for identifying hazards is crucial to the safe operation of offshore plant, and we recommend that in the light of the Piper incident, all future plant systems should be systematically examined by HAZOP so that individual items of equipment can be pre-assessed and accounted for on terms of the system as a whole.

We particularly wish to emphasise any electrical control and safety in the system since these may tend to be neglected in an overall examination of the system. Such features as the electrical working level of the equipment in relation to failure rate, and the effects of operating in a corrosive working environment should be standard to the HAZOP study.

We also feel that the provision for maintenance of all items of plant equipment should be carefully considered in any HAZOP study, since regular periods between inspection and maintenance of equipment may well qualify an identified hazard for a reduced level of hazard potential.

4. Evacuation

It is generally recognised that circumstances were favourable for the evacuation by helicopter of personnel from the Piper Platform. It is also recognised that given the sea state at the time of the incident, and less favourable deployment of helicopters, the situation regarding evacuation could have been entirely different, requiring a totally different

/... cont.

approach (see attached summary of conditions and options for evacuation by P.G. Clayson, Appendix 1).

We recommend that the whole business of evacuation from our offshore platforms be examined in detail, with particular attention to the following :

1) The role of lifeboats in evacuation.

2) The use of other appliances for transferring personnel to the sea or to standby vessels.

3) The use of helicopters for evacuation.

4) The possible requirement for written emergency procedures to aid OIM's in deciding the best course of action under various sets of conditions.

We also recommend that emergency clothing kits be stored at the Heliport for people evacuated by helicopter.

5. Reporting

We note that the faulty relay CR-7 had manifested a history of maloperational contacts in the platform maintenance reports. We believe that had this been highlighted and reported to appropriate personnel onshore, the final malfunction of the heater may have been anticipated and avoided by suitable modification of the circuit design.

We therefore recommend that some formal procedure be set in hand where consistent abnormalities or failures in items of offshore equipment be highlighted and reported to suitable people onshore.

6. Emergency procedure.

We understand that there has been some response from Coastguard and Police on the effectiveness of our emergency procedures.

We recommend that our emergency procedures be reviewed to study the ~~call-out~~ call-out and

Ted

Brief chronological report with injuries etc

Brian

Chronological events prior to, during and after the gas explosion on Piper 'A' on 24th March 1984 as ascertained from several witnesses

Weather Conditions : Wind ESE, 50-60 knots
Wave Height 45-50'

Events :

1205 - Single MOL pump tripped and 'A' separator automatically shut-in. System re-established very soon after.

1215 - Two MOL pumps tripped. 'A' and 'B' separators shut-in and all wells shut down. Gas plant automatically closed in.

1259 - Gas Conservation Module low LEL gas alarm (15% alarm level) came up at Control Room Panel - accepted by Ops Supt. (Bob Sneddon) who then tried to contact Mike Groves in field to investigate. Failed to contact.

At this time operators were in process of making ready to start MOL's in order to restart production. Gas plant still shut-in.

1259+ 30 secs - 'A' Centrif. low gas alarm came up at Control Room Panel. Bob Sneddon sent George Bagnall out to investigate.

NOTE : Believe this alarm has no connection with incident; purely coincidental.

1300 - Explosion; felt by virtually everybody on platform, and one operator in Radio Room thrown to floor by the violence of the shake.

Some people apparently heard double blast noise.

At instant of blast, OIM J. Barnes came out through door of 'A' level ERQ to investigate and observed smoke in vicinity of Gas Conservation Module.

1302 - OIM met Sandy Robertson (Prod Op.) at ERQ E entrance, and told him to contact Control Room to intitiate platform ESD using radio Sandy was carrying. Short while later, Sandy told to tell Control Room to sound GA - at this time several people in Accom. area who had felt shake and observed smoke across Pipedeck had also operated GA breakglass alarms.

MSV Tharos and standby boat 'Dawn Flight' asked to close in by Air Traffic Controller (ATC) Alan Duncan.

1303 - Platform ESD and Gas Plant shut down separately activated from Control Room.

Gas Conservation Module water deluge system manually activated from Control Room and diesel fire pump and foam pump all started from Control Room Panel by Inst. Tech., Dave Tea - foam pump subsequently stopped approx. ½ hour later since foam not needed.

/... cont.

NOTE : Deluge systems in modules B & C Prod Deck also manually activated from Control Room at this time because of incidence of low level gas alarm in 'A' Centrif.

1304 - General alarm sounds, and personnel commence to muster at boat stations.

1305 - Major emergency declared via Oxy Offices, Bridge of Don - by OIM.

1306 - 'Dawn Flight' in close by the Platform on standby.

1307 - Tharos close in, all monitors operational (on spray setting) jetting onto fire area - later told to put nozzles down to avoid wetting fire fighters, since monitors not achieving anything.

1310 - Decision now taken by OIM to remove all non-essential people by helicopter and PA made for all personnel at boat stations to remuster at helideck reception area.

Only two boats, Oxy boats 4 & 5, Had reported as fully mustered at this time. Camp Boss had reported all Accom. clear of personnel.

S61 landed on Tharos to discharge formal passenger load. This aircraft had been locally contacted at 1303 approximately by ATC whilst en route to SEDCO 707. Immediately responded. Chinook on return empty flight from Beryl 'B' also contacted locally at approximately same time, and thence went to M.G. Hulme (3½ miles from Piper) on standby basis.

By this time, fire team had been established under Lead Safety, John Welch, and were fighting main fire jetting from door on top of Gas Cons Module, traversing major part of Pipedeck. Fire Team had been supplemented by several Bawden and Oxy personnel at this time, and 1 monitor and 2 hand held hoses were in use. Major worry was adjacency of Methanol storage tank and Schlumberger explosives box to fire outlet, and some spraying of these being carried out.

1312 - S61 landed on Piper from Tharos for first of 5 transfer flights of personnel to Tharos, each involving 23 persons - total transferred by this S61 was <u>115</u> persons.

During this phase HLO Name ? and Sandy Bremner, Prod Op were in charge of personnel routing.

1337 - By this time S61 had received copious salt water in engine due to spray breaking over Tharos helideck, and thence retired to Claymore 'A' on low engine power.

Immediately following retiral of S61, Chinook from M.G. Hulme landed on Piper. Loaded up 55 people and transferred them to Aberdeen, since Chinook not able to land on Tharos.

At this time fire was largely under control and being fought with 4 hand held hoses. All superficial fires in Pipedeck area and Sack Store had been quenched and flame from upper door outlet had diminished appreciably. Large effort still being made to cool Methanol and Explosive storage and also Demethaniser tank upper portion at Pipedeck level - cladding getting badly burnt.

Fire teams had split; H. Warmbath (Safety Op.) now in charge of upper party, and J. Welch with Tony Potter had commenced tackling fire from E door of Gas Cons Module.

Decision now made to contain fire and provide basic cooling whilst Prod. personnel attempted to isolated source of fuel.

1350 - Another S61 landed (source unknown) and took up 9 people and transferred to Tharos. Evacuation now ended with total of 179 people being removed.

1400 - Fire fighting teams very wet and cold and rota now started for people to dry off and don survival suits for weather protection during their fire fighting tour.

1515 - Fire out. Slightly prior to this, valve 50V closed off - this valve separates Mole Sieve Drier from vessel 4-C-807 - but reports on whether this valve shut off fire source are completely opposed.

Carried on with water spray over sensitive areas - this continued all night.

1600 - All personnel now accounted for.

Incident stabilised and clearing up and investigation began.

Attached also find :

a) List of POB Piper during major part of fire fighting.

b) Casualties.

c) Relevant logs from MSV Tharos.

Own Remarks (BLS)

Explosion resulted from rupture of gas regeneration heater vessel at mid-upper level of Gas Cons module (vessel 808C) adjacent to E door. Pressure inside vessel approx 250 psi at time of rupture and no gas flow through vessel. Gas in vessel and adjacent lines almost entirely methane, and subsequent ignition after rupture either from light fittings fractured by rupture blast (one directly above vessel) or by heating elements blown out with rupture.

We were very lucky. At time of explosion, most people still at lunch and very few people on site. Nobody present in Gas Conservation module or adjacent Utility module which was fairly badly affected by blast pressure wave travelling back through HVAC ducting (Gas Cons HVAC fed from annexe in Utility mod).

Explosion took relief doors off on E side of Module and lifted Utility Mod E door off base. Door into Sack Store also blown open. Nobody on E side of Platform at time due to force and direction of wind. Person in Sack Store slightly injured. Total injured during incident were six persons, all minor injuries - three of these were through subsequent fire fighting.

Legal Department Memo

Occidental STRICTLY CONFIDENTIAL

RECEIVED
29 MAR 1984
G. E. GROGAN

Memorandum

To: Gene Grogan From: pp Robin Baxter

Date: 29 March 1984 Copies: See below

Subject:

Piper Incident : Explosion 24 March 1984

I refer to memo yesterday and would advise of the following:-

1. The Health and Safety at Work Act 1974 Section 6(3) imposes a duty on the person who "installs any article for use at work . . . . . so far as is reasonably practicable, that nothing about the way in which it is installed makes it unsafe or a risk to health when properly used."

2. S.I. No. 1312, 1908, Factory and Workshop, Dangerous and Unhealthy Industries (made under the Factory and Workshop Acts 1901 and 1907). Scope extended by S.I. No. 739, 1944, Factories (made under Section 60 of the Factories Act 1937) to include:

"generation, transformation, conversion, switching, controlling, regulating, distributing and use of electrical energy in any factory and in any premises, place, process, operation or work to which the provisions of Part IV of the Factories Act 1937 with respect to special regulations for safety and health are applied by that Act."

The Factories Act 1937 consolidated into The Factories Act 1961. Section 13(2) "Efficient devices or appliances shall be provided and maintained in every room or place where work is carried on by which the power can promptly be cut off from the transmission machinery in that room or place."

Section 16 "Safeguards (to) be of substantial construction and constantly maintained and kept in position while the parts required to be . . . . . safeguarded are in . . . . . use."

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Cont.....

3. S.I. No. 289, 1974, Offshore Installations, Part VIII

"Equipment

shall be so installed and disposed, both individually and in relation to other items of equipment on the installations as to reduce to a minimum any potential danger to the installation and its personnel."

4. S.I. No. 1019, 1976, Offshore Installations, Part I

"(2) electrical equipment . . . . . designed for the generation, conversion, storage, transmission, transformation or utilisation of electricity."

Section 5(2) "a scheme providing for their systematic examination, maintenance and where appropriate testing."

Section 5(4) "Where any examination or test shows that any equipment cannot be safely used until repaired, the person who made the examination or test shall immediately report the fact in writing to the installation manager."

"any scheme . . . shall specify the intervals . . . of examination . . . . nature of examination and testing to be carried out."

Construction of electrical equipment -
"Section 11 . All electrical equipment shall be . . . . . so constructed, installed, protected, worked and maintained as to prevent danger so far as practicable."

"Section 30. There shall be provided . . . . a sufficient number of competent persons . . . to be . . . responsible for the control and safety of :-

(b) the electrical equipment of the installation."

Schedule 2 - Written Instructions - Electrical Procedures

"(C) Precautions to be taken before and during the operation and

maintenance of electrical equipment."

5. The Electricity Regulations 1908.

Note to Regulation 2:

"3. Every switch, switch fuse, circuit breaker and isolating link shall be (a) so . . . . . protected as to prevent danger, (b) so constructed and adjusted as accurately to make and to maintain good contact, (d) so constructed or arranged that it cannot accidentally . . . . move into contact when left out of contact.

4. Every switch intended to be used for breaking a circuit and every circuit-breaker shall be so constructed that it cannot with proper care be left in partial contact. This applies to each pole of double-pole or multiple switches or circuit-breakers. Every switch intended to be used for breaking a circuit and every circuit-breaker shall be so constructed tht an arc cannot accidentally be maintained.

5. Every fuse and every automatic circuit-breaker used instead thereof shall be so constructed and arranged as effectively to interrupt the current before it so exceeds the working rate as to involve danger. It shall be of such construction or be so guarded or placed as to prevent danger from over-heating, or from arcing or the scattering of hot metal or other substance when it comes into operation. Every fuse shall be either of such construction or so protected by a switch that the fusible metal may be readily renewed without danger.

6. Every electrical joint and connection shall be of proper construction as regards conductivity, insulation, mechanical strength (a) and protection."

6. I.P. Model Code of Safe Practice in the Petroleum Industry, Part 1, Electrical Safety Code, 5th Revised Edition, 1965, reprinted 1974.

7. B.S. 5345 : 1977, Parts 1-12.

and

8. Section 9.16.5, Oxy Procedures Manual :

"The general condition of all apparatus should be noted periodically, i.e. . . . . operation and setting of protection devices checked, with readings recorded and appropriate remedial measures taken where necessary. Replacement parts should be in accordance with the condition of certification."

Section 9.16.6:

"No alteration that might invalidate the certificate or other document relating to the safety of apparatus should be made to any apparatus without appropriate written approval."

Section 9.16.7:

"All apparatus should be regularly treated with an appropriate protective paint or other compound as a precaution against corrosion."

Section 9.31.1:

"All electrical faults and breakdowns must be reported to an Authorised Electrical Person or Shift Supervisor/Control Room."

Please note that this is not intended as an exhaustive list.

I would confirm that I consider there is significant exposure here and that prosecution is possible. I would therefore respectfully suggest tht we proceed with care, particularly in our dealings with the Department of Energy. I would also suggest that staff be reminded not to discuss the detail of the incident itself or follow-up investigation.

STRICTLY CONFIDENTIAL

5.

Piper Incident : Explosion 24 March 1984

Distribution List

J.F. Snape

A.D. McReynolds

T. Hull

M.R. David

G.M. Stern

L.D. Trapnell

RMB/SES

MESSAGE MESSAGE MESSAGE MESSAGE

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PP AGACC
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3. 4. 1984 REF. NO. 4187

ATTN: DR. BRIAN SMITH, OCCIDENTAL (CALEDONIA), LTD.

SUBJECT: ELECTRICAL CONTACT CORROSION

FURTHER TO BAILEY TELECOM ON 2.4.84, WE CONFIRM OUR CAPABILITY TO PERFORM AN INDEPENDENT AND CONFIDENTIAL INVESTIGATION INTO CORROSION ASPECTS OF ELECTRICAL CONTACT FAILURE AND OUTLINE BELOW OUR CURRENT CHARGES FOR CAPCIS PERSONNEL AND LIKELY APPROPRIATE ANALYTICAL EQUIPMENT. THE MAIN PURPOSE OF THIS INVESTIGATION WOULD BE TO ESTABLISH THE SOURCE OF CORRODENT BY ANALYSIS OF SURFACE DEPOSITS AND/OR ANY DEGRADED POLYMERIC MATERIAL.

IF REQUIRED THIS WORK CAN BE PERFORMED ON AN URGENT BASIS SUBJECT TO WRITTEN CONFIRMATION TO PROCEED.

OUR PERSONNEL CHARGES AT PRESENT RANGE FROM 175 TO 300 POUNDS STERLING PER MAN DAY. THE UPPER END OF THIS COST BAND IS APPLICABLE TO SENIOR CONSULTANT INVOLVEMENT. ANALYTICAL EQUIPMENT IS CHARGED OUT AT AN HOURLY RATE. TYPICAL COSTS ARE AS FOLLOWS:

SEM-EDAX	65 POUNDS STERLING
EPMA	15 TO 25 POUNDS STERLING PER ELEMENT (SPOT OR LINE SCAN)
AUGER	100 POUNDS STERLING
XRD	45 POUNDS STERLING PER TRACE PLUS INTERPRETATION.
AA SPECTROSCOPY	15 POUNDS STERLING PER ELEMENT
TGA	20 POUNDS STERLING PER TRACE
ATR-IR SPECTROSCOPY	30 POUNDS STERLING PER TRACE PLUS INTERPRETATION.

PREVIOUS EXPERIENCE OF STUDIES IN ELECTRICAL EQUIPMENT FAILURE CONCERNED CORROSION OF COPPER AND BRASS COMPONENTS DUE TO INGRESS OF CONTAMINANTS, E.G. SALT WATER, H2S CORROSION OF FLAMEPROOF ENCLOSURES AND CORROSION INDUCED BY DECOMPOSITION OF POLYMERIC INSULATING MATERIALS (CONTACT AND VAPOUR CORROSION).

WE ARE PRESENTLY UNAWARE OF THIS PARTICULAR PROBLEM AND WE HOPE

END OF PAGE 1

1434030484 NBA566/PAGE 2

TO HAVE THE OPPORTUNITY TO DISCUSS WITH WITH YOU IN THE NEAR FUTURE.

REGARDS,
JIM BREAKELL,
PROJECT OFFICER,
CAPCIS/UMIST.
668810 CAPCIS G

1434030484 +++ 2 PAGE(S)
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MESSAGE MESSAGE MESSAGE MESSAGE

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668810 CAPCIS G
ATTN: OF DR. BRIAN SMITH, OCCIDENTAL (CALEDONIA) LTD.

---

3. 4. 1984 REF. 4189

CORRECTION TO OUR TELEX REF. NO. 4188

LAST PARAGRAPH SHOULD READ:

WE ARE PRESENTLY UNAWARE OF THE PRECISE NATURE OF THIS PARTICULAR PROBLEM AND WE HOPE TO HAVE THE OPPORTUNITY TO DISCUSS WITH WITH YOU IN THE NEAR FUTURE.

REGARDS,
JIM BREAKELL.
CAPCIS/UMIST.

1458030484 +++ 1 PAGE(S)
NNNN

Occidental

Memorandum

To	A. D. McReynolds	From:	Brian Smith
Date	24th October 1984	Copies:	G. Grogan/T. Hull

Subject: Gas Explosion on Piper Alpha on 24th March 1984

Attached please find rough draft of reply to McQuarrie as requested. I appreciate this will be only one of many responses, and, as such, I have tried to convey four main points :

1) A response to the incorrect allegations in the letter, i.e. 'Gas Plant blown up', 'No Safety Gas Alarm Systems', by conveying the true situation, without any criticism of the poor research that must have been applied.

2) A deliberate non-response to 'steps taken', since this is directed at lack of Gas Alarms and Auto s/d's which is answered by above.

   We could elaborate on review of evacuation, modified controls added, extra explosion relief added and depressurisation installed, but I believe this would only open a can of worms.

3) The regulatory legislation by which we have to abide.

4) Reference to DoE investigation, since this should alternatively answer all he requires.

Hope there is sufficient to extract rough basis.

Regards,

BLS/dh

P.S. I am copying this to G. Grogan, since I understand he is also formulating response.

Occidental
Petroleum (Caledonia) Limited

Registered office: 16 Palace Street · London SW1E 5BQ Telephone (01) 828 5600 Telex 918318 Telegrams Oxyoil Londc
** 1 Claymore Drive · Bridge of Don · Aberdeen AB2 8GB · Scotland. Telephone (0224) 574588 Telex 739851
Flotta Terminal · Flotta · Stromness · Orkney KW16 3NP. Telephone (085670) 341 Telex 75212
Thistle Road · Dyce Heliport · Aberdeen AB2 ONN Telephone (0224) 770484 Telex 739851
Dales Industrial Estate · Peterhead · Aberdeenshire AB4 7JF Telephone (0779) 5201 Telex 73258
Please reply t

House of Commons,
LONDON.
SW1A OAA

BLS/dh

23rd October 1984

For the attention of Mr Albert McQuarrie M.P.

Dear Sir,

Gas Explosion on Piper Alpha on 24th March 1984

I refer to your letter of the 17th October 1984, requesting details of the safety standards applicable to the above incident.

The explosion occurred within a gas treatment plant on the platform, and the platform was later evacuated of non-essential personnel as a normal part of Occidental's Emergency Procedures programme.

Damage due to the explosion was confined to a relatively small area of the gas treatment plant, inclusive of some ancilliary equipment, and automatic fire extinguishing systems within the area were quickly operational.

As a requirement of the Offshore Installation Regulations 1978, S.I. No. 611, the Piper Alpha Platform is fully equipped with permanently installed flammable gas detection equipment. Within the gas treatment plant there are a total of fourteen fixed gas detection units spaced throughout the area, each relaying, as standard, gas level and alarm information back to the control point of the Platform. A very small gas leak did occur immediately prior to the explosion, and this was detected by the gas detection system, although not within sufficient time to allow any control over the event.

Automatic shutdown of wellhead and process plant due to fire or process upset, is a standard part of Piper Alpha's operational safety policy, as for any other fixed Platform in the North Sea. At the time of the incident, the gas

/... cont.

23rd October 1984

treatment plant was, in fact, shutdown due to the prior malfunction of an export pump, the explosion occurring within a line isolated as part of the automatic shutdown process consequent on the malfunction.

We hope the above answers the queries you have expressed, but if you wish for any further information please do not hesitate to contact us. Alternatively, you may wish to get in touch with the Department of Energy who have carried out a full investigation into the matter.

Yours faithfully,

Occidental

Memorandum

To	L.L. Bergeron	From	J.F. Snape
Date	30th April, 1984	Copies:	

Subject: SAFETY ASSESSMENT REPORT - OCCIDENTAL'S OIL AND GAS FACILITIES IN THE UK AND NORTH SEA

The Safety Assessment Report for our North Sea facilities has been reviewed and all recommendations are being implemented as indicated on the attached schedule.

The time constraints for the audit caused by the air traffic controller strike were unfortunate. However, we will endeavour to assure any additional time required for future audits is made available.

We were pleased to note that the general safety posture at all facilities was found to be good and that a dramatic reduction in lost time accidents had occurred in the first 10 months of the year. This trend continued in the remaining months of 1983. At year end the rate of lost time accidents was 30% below 1982 and the number of lost work days was down to one fifth of 1982. The overall incident rate (including medical treatment cases) was down to 1.03, 10% below 1982. Continuing improvement is evident in 1984 to date.

J.F. Snape

Distribution

T.D. Jenkins
D.R Martin
E.L. Daniel
C. Elam
F. Friedman
D.A. Giannotti
W.S. King
J. Wilkenfeld
E. Metcalf
J. Brading
D.L. John
A. Ward
A.D. McReynolds
G.E. Grogan/A.R. Harley
T.L. Hull
K. Hollamby

Comments on Recommendations

	Target Completion Date
Piper Production Platform	
1. A survey should be performed to define a means to allow easy determination of status of the firewater loop isolation valves located near the top of the production modules. Agreed.	Survey completed. Implementation - August, 1984
2. Consider installation of wire seals on the firewater pump diesel driven fuel line valves to seal the valve in the open position. We have considered this recommendation and are providing seals on the valve operators.	- Completed.
3. Establish a schedule for tests of the platform firewater system including pump flow test and loop tests to ensure design requirements can be met. Agreed.	Schedule Completed. Subject to attendance dates to be agreed with F.B. Hall
Claymore Production Platform	
1. A survey should be performed to define a means to allow easy determination of the status of the firewater loop isolation valves located near the top of the production modules. Agreed.	Survey Completed. Implementation - August, 1984
2. Consider installation of wire seals on the firewater pump diesel driven fuel line valves to seal the valve in the open position. We have considered this recommendation and are providing seals on the valve operators.	Completed.
3. Establish a schedule for tests of the platform firewater system including pump flow tests and loop tests to ensure design requirements can be met. Agreed.	Schedule Completed. Subject to attendance dates to be agreed with F.B. Hall

Flotta Terminal	Target Completion Date
1. Schedule a series of tests to verify proper pump flow characteristics for all pumps and firewater loop capability to withstand design operating pressure while delivering water through various facility loops. (Ref. IIE). Agreed.	August, 1984
2. Modify the piping for the halon system in the switch room to extend two halon discharge points into the below floor cable trays. (Ref.II E). Agreed.	July, 1984
3. Modify the piping for the halon system in the turbine room to extend one or more of the halon discharge points into the below floor cable trays. (Ref. II E). Agreed.	July, 1984
4. Assess possible modifications to the outer structural walls of the control room to reduce the possibility of gas entering the void between this brick wall and the original metallic outer wall of the control room. (Ref. II E). Agreed.	December, 1984 Subject to firm scope definition
5. Modify the laboratory liquids storage building to increase the ventilation. (Ref. II E). Agreed.	Completed.

Occidental
Petroleum (Caledonia) Limited

Registered office 16 Palace Street London SW1E 5BQ Telephone (01) 828 5600 Telex 918818 Telegrams Oxyoil London
1 Claymore Drive Bridge of Don Aberdeen AB2 8GB Scotland. Telephone (0224) 574588 Telex 739851
Flotta Terminal Flotta Stromness Orkney KW16 3NP. Telephone (085670) 341 Telex 75212
Thistle Road Dyce Heliport Aberdeen AB2 ONN Telephone (0224) 770484 Telex 739851
Dales Industrial Estate Peterhead Aberdeenshire AB4 7JF Telephone (0779) 5201 Telex 73258

Please reply to

30th April, 1984

Frank B. Hall & Co.,
Overseas Division,
3200 Wilshire Boulevard,
Los Angeles,
California 90010,
U.S.A.

Dear Sir,

CLAYMORE AND PIPER

Thank you for your report dated 10th November, 1983 on the inspections carried out at Occidental's Claymore and Piper platforms by G.S. Nelson and R.D. Lindsay.

I am pleased that you have found a high standard of housekeeping and generally well maintained facilities.

CLAYMORE

We agree with your recommendations.

Recommendation 83-11-2 has been completed with the installation of seals on the fuel shut-off valve to the diesel fire pump. The modifications necessary to implement recommendations 83-11-1 and 83-11-3 have been initiated.

PIPER

We agree with recommendations 83-11-1 and 83-11-2 and have initiated implementation of the necessary modifications. We also agree with the intention of recommendation 83-11-3. However, the necessary check valve already exists and we believe the existing system already satisfies the specifics and the overall intention of the recommendation.

..../over

We are presently designing the repairs to the gas con. module subsequent to the explosion damage that was recently incurred. We are designing lightweight panels in the East and South walls and in the roof which will release at low pressures. The panels, providing about 1100 - 1200 sq. ft. of surface area, will be attached to the main module framing with shear connectors to provide controlled release of internal pressure in accordance with the various studies that have been previously conducted.

A programme of fire pump and deluge system tests is being developed. We are now in receipt of your letter of 16th April offering to witness or conduct certain of these tests. T.L. Hull will liaise directly with you to arrange mutually satisfactory dates.

It is unfortunate that time available for the Claymore inspection was so limited. We have appreciated the high standard of assistance that was provided for the inspection and hope that an even more valuable inspection can be conducted in the future when we hope time constraints will be less restrictive.

J.F. Snape
Vice President & General Manager
North Sea Operations

cc G.E. Grogan
A.D. McReynolds
E. Wall
A.R. Harley
T.L. Hull
C. Stalvies
L. Bergeron
C. Elam
D. Lindsay
S. Nelson

MEMO

2000 POST OAK BOULEVARD
P. O. BOX 3666
HOUSTON, TEXAS 77001

OCCIDENTAL OIL AND GAS COMPANY

To: Ted Hull

Date: 1/9/84

From: Ed Metcalf Ed

Subject: Safety Assessment Report
Oxy North Sea Facilities 1983

Enclosed is a draft of the subject report defining the November 1983 Safety Assessment and resulting recommendations. Please review and provide comments identifying any discrepancies or disagreements and indicating, if possible, a time frame for implementing the recommendations.

I would like to take the opportunity to express my thanks for the hospitality and support by the U.K. personnel during the visit.

EM:pc
Enclosure

cc: L. Bergeron
S. Bensky
B. Ostermeir

DRAFT

SAFETY ASSESSMENT REPORT
for
PIPER PLATFORM
CLAYMORE PLATFORM
PETERHEAD WAREHOUSE
and
FLOTTA TERMINAL

November 1983

Prepared by

Ed Metcalf

Senior Safety Administrator

Occidental Oil & Gas Company

Houston, Texas

Executive Summary

On-site safety assessments of Occidental's oil and gas facilities are performed on a periodic basis to assist local management in identifying and eliminating potentially hazardous conditions which may exist. The assessment off the Oxy North Sea facilities was performed for that purpose and consisted of visual observations and discussions with on-site personnel at the following locations:

Aberdeen Office Complex
Piper Production Platform
Claymore Production Platform
Peterhead Warehouse
Flotta Terminal

The assessments were performed during the period November 4 through 11, 1983 concurrent with the annual Frank B. Hall Loss Prevention inspection. The recommendations provided in this report have been discussed with appropriate Management, Operations, Engineering and Safety personnel. These recommendations are directed at improving the safety and accident prevention posture by the reduction/elimination of potential hazards through hardware and/or procedural methods.

Because of an air controllers strike at the Aberdeen airport, the scheduling of flights to and from the production platforms and Flotta was difficult. This problem resulted in a reduction in the time allowed to perform the assessment activities at these locations. To perform proper safety assessments, additional time should be available. This was discussed at each of the facilities and at the exit meeting in hopes that the next assessment can be of an adequate duration.

The general safety posture of all facilities was good. No major areas of safety hazards were identified outside the fire detection and suppression systems. Minor items not included in this report were discussed on-site and those areas corrected prior to the exit meeting in Aberdeen.

Major recommendations resulting from the assessment were related to:

Firewater Loop Valve Status Determination

Firewater System Testing

Modification to Flotta's Switch Room and Turbine Rooms Halon Discharge System.

Modification to the outer wall of the Control Room at Flotta.

Increased ventilation for the Flotta Laboratory storage building.

AGREE - BUT, NOT CONSIDERED MAJOR SUGGEST DELETION

Implementation of the recommendations should be initiated as soon as possible. The status of each recommendation should be provided no less than quarterly until each is completed, or a satisfactory alternative is implemented.

A detailed discussion of the assessment is provided in the following report.

It should be noted that the safety statistics for the North Sea operations indicate a dramatic reduction in lost time accidents and lost time due to accidents during the first ten months of 1983 as compared with the same period of 1982. It is also appropriate to note that the accident incidence rate for that period is only 50% of the 1982 API exploration and production accident rate.

Table of Contents

I. Introduction

On-site safety assessments of the Oxy North Sea facilities were conducted November 4 through 11. Facilities included in the assessment were:

Aberdeen Office Complex
Piper Production Platform
Claymore Production Platform
Peterhead Warehouse
Flotta Terminal

The OOG assessment was performed concurrent with the annual Frank B. Hall Loss Prevention inspection. The assessment/inspection team consisted of E. Metcalf, OOG Senior Safety Administrator; S. Nelson, F. B. Hall Assistant Vice President and D. Lindsay, F. B. Hall, Loss Prevention Consultant. The following Oxy U.K. Operations and Engineering personnel provided support to the team:

C. Seaton - Safety Superintendent (acting)
K. Wottge - Chief Facilities Engineer
G. Gavin - Loss Prevention Training Administrator
B. Ramsdale - Safety Services Superintendent, Flotta
K. Hollamby - Base Manager, Peterhead

Discussions were held with the facilities top management both before and after the assessment of each facility. The discussions included the purpose and approach of the assessment/inspection and the findings/recommendations. Management at each of the facilities was as follows:

J. Barnes -- OIM, Piper
B. Short -- OIM, Claymore
K. Hollamby -- Base Manager, Peterhead
T. Ward -- Terminal Manager, Flotta

Additionally, a formal exit meeting was held in Aberdeen following the completion of all on site assessments. Attendees at this meeting included Operations, Production, Drilling, and Materials Management, Engineering, and Loss Prevention Personnel.

II. Assessment Discussion

The following paragraphs provide a narrative description of the assessment/inspection of each facility. The areas listed below were considered as part of the overall assessment of the North Sea Facilities. Primary emphasis was placed on the evaluation of the fire detection and suppression systems:

Safety Related Procedures
Life Saving Applicances
Facilities Structures
Fire Detection and Suppression
Personnel Protection Equipment
Mechanical Systems
Electrical Systems
Safety Statistics

These items were evaluated by discussion with supporting and on-site personnel and by visual observation. On-site personnel with whom discussions were held included those in the areas of:

Safety
Operations (Control Room)
Maintenance
Medical Support
Laboratories
Helicopter Support
Material Handling

A. Aberdeen Office Complex

The complex consists of the office building, the sports club and a support building containing a carpenter shop and auxiliary diesel generator.

It is understood that the Oxy computers located in Antwerp, Belgium will be relocated in Aberdeen. No firm decision had been made as to the exact location of the computer equipment. Discussions were held with the facilities personnel responsible for installation of the computers to assure proper fire and environmental protection. The concern with respect to the computer is based on the desire to eliminate problems similar to those encountered in the computer facility in Antwerp. Frank B. Hall will provide additional information to Aberdeen personnel on this subject.

No areas of major concern were identified. Minor items related to housekeeping in storage areas and under computer room raised flooring were discussed with on-site personnel.

B. Piper Production Platform

The assessment/inspection of the Piper Platform was accomplished in a manner similar to the 1982 assessment. Discussions were held with various personnel during two complete tours of the facility. As stated previously, the prime emphasis was on fire detection and suppression systems.

It must be pointed out at this time that all recommendations resulting from the 1982 assessment had been implemented or were in progress at the time of this assessment. The recommendation not yet completed referred to the replacement of fire fighting and evacuation plans (facility drawings) at various locations on the platform. Those signs have recently been received on-shore and will be installed as soon as possible. Samples of the signs were viewed and appear to be well designed to withstand the environment which caused problems with the previous signs.

A modification in procedures, implemented since the 1982 assessment, provided for the distribution of individual safety handbooks and the presentation of a safety film at the Aberdeen Heliport prior to departure for the platforms.

Safety related procedures, evacuation plans and drills were discussed with no areas of concern identified.

The overall safety posture of the platform was good. There were no major areas of concern identified and no recommendations made outside the areas of fire detection and suppression. Several minor items, which could be corrected without expenditure of funds and which required minimum time to correct, were discussed. Those items were corrected prior to the exit meeting in Aberdeen.

Items in the area of the fire detection and suppression systems were in two categories:

1. Valve position identification and confirmation.
2. Firewater system testing.

The valve position question was mainly directed at the isolation valves for the platform firewater loops. A majority of these valves are located at a position near the top of production modules making it extremely difficult, if not impossible, to determine the valve position from the working level. It was agreed that a survey of these valves would be made to determine a means to allow identification of their status.

The second area involving valve position was related to a valves installed in the diesel fuel line from the daytanks to the fire water pump drivers. This valve was installed at the direction of the U.K. Department of Trade to allow cut off of a fuel source in the event of a fire in the pump driver area. A problem exists if the valve is closed either intentionally or inadvertently and the fire pump is started to combat a fire elsewhere on the platform. With the valve closed, the diesel engine would start and run until the fuel in the line down stream of the valve is exhausted.

When a diesel engine stops because of fuel starvation it is almost impossible to start it again without the engine being "opened up" for maintenance. Therefore, in the event of a fire with the valve closed the firewater pump would start automatically; it would soon stall because of fuel starvation and could not be restarted even if the valve were then placed in its proper configuration. The firewater pump would not be available to combat the fire. Valve position indicators and identification tags were placed at these valves. Additional consideration should be given to placing wire seals on the valves (in the open position) to reduce the possibility of inadvertent operation (closure).

Tests of the fire water pumps are performed weekly to ensure proper starting and function. As a part of the F. B. Hall fire system checks at Oxy facility other than in the North Sea, a flow test is performed at maximum pump flow and a test of all piping loops is performed to ensure adequate water supply by all designed routes. These tests have not been performed on either Piper or Claymore.

It was recommended that time be allocated either during or before the next Loss Prevention Inspection to allow these tests to be performed. The F. B. Hall personnel can perform the tests or they can act as observers.

BASIS UP TO DESIGN POINT RATING WITH WATER DUMPED OVERBOARD WITHOUT NECESSARILY GOING THROUGH THE TOTAL RING MAIN SYSTEM. PORTIONS OF THE SPRINKLER DISTRIBUTION SYSTEM ARE ROUTINELY TESTED TO ASSURE DISTRIBUTION NOZZLES ARE NOT BLOCKED.

Subsequent to the 1982 assessment, an in-house audit program was established by the Aberdeen office to cover both Piper and Claymore platforms. This program provides for periodic audits of specific safety related systems performed by on-shore personnel. Based on discussions with Aberdeen personnel and the results of this safety assessment, the program appears to be extremely successful. The Aberdeen personnel are to be commended for the implementation of such a program.

C. Claymore Production Platform

The time allowed for the assessment/inspection of the Claymore Platform was extremely brief (less than 8 hours). Discussions were held both on the Platform and at the exit meeting related to the necessity to make the time on the platforms longer for the next assessment.

On this assessment only one complete tour of the platform was performed. During that time discussions were held with on-site personnel regarding items relating to safety and fire systems. On Claymore, as at the other locations visited, primary emphasis was placed on the fire detection and suppression systems.

As was the case on Piper, the general safety posture of Claymore was good. All recommendations made as a result of the 1982 assessment have been implemented. Several minor items were discussed with the OIM and these were corrected prior to the exit meeting in Aberdeen.

Items relating to the fire detection and suppression system on Claymore were generally identical to the items discussed for Piper in Paragraph II B; valve position identification and system testing. The agreements described under that paragraph apply to Claymore as well.

D. Peterhead Warehouse

The facilities at Peterhead were clean, well maintained and represented no major safety concern.

Here as at the other North Sea Locations primary emphasis in the assessment/inspection was on fire detection and suppression. The major discussions were in the category of normal valve positions and the frequency with which those valves are checked to ensure proper configuration.

Discussions were also held concerning the diesel powered auxiliary generator and the need to provide a small empound wall around the unit to retain diesel fuel or lubricating oil in the event of a leak.

E. Flotta Terminal

The assessment/inspection of the Flotta facilities involved visual observation of all areas and discussions with personnel from the various operations including:

Management
Safety Services
~~Firefighting~~ PROCESS (INCLUDES CONTROL ROOM)
~~Control Room~~
Laboratory
Maintenance
Services and Utilities

The general safety outlook for the terminal was good. Personnel were observed using proper protective equipment in areas where such was required.

Each area of the facility was visited with primary emphasis on fire detection and suppression systems. Here, as on the platforms, periodic testing is performed to check the function of the fire water pumps and application devices. These tests are not directed at verifying the proper flow characteristics of the pumps or of the various sections of firewater mains.

It is recommended that a series of tests be scheduled either before or concurrent with the next assessment/inspection to verify flow characteristics of the pumps and the ability of the water loops to withstand the operating pressure and provide the design flow to all areas of the facility through the various loops provided.

These tests should be performed for both primary and auxiliary firewater pumps.

During the discussions relating to the firewater systems it was stated that plans are being developed to provide piping to allow fire tugs to pump water into the fire mains TO PROVIDE A BACK-UP SYSTEM IN THE EVENT OF A FIRE PUMP FAILURE. ~~providing an increased flow and pressure capability.~~ This appears to be an excellent concept. Detailed study and engineering should be performed on such a system to ensure proper line size and proper valve configuration for the system.

During the assessment performed by OPC personnel in 1981. Discussions were held concerning the necessity to provide halon to the electrical cable trays under the floor in the switch room. Subsequent to that time it was determined that openings in the floor to the cable runs were adequate to allow the halon to penetrate the below floor area and therefore an additional halon system was not necessary for that purpose. During this assessment discussions were again held on this subject. It was recommended that because of the large number of halon discharge points in the switch room and more than adequate amount of halon available, two of the lines from the halon discharge pipes should be extended into the below floor cable trays. This will ensure penetration of the halon. This approach is inexpensive and will provide greater protection against a fire in the cable trays.

In the turbine rooms the below floor cable trays have an additional potential for fire in that gas lines run through the trays as well as electrical wiring. It was recommended that the same approach to halon injection be utilized here as discussed above for the switch room. It was agreed that action would be taken in both areas.

Two other areas of concern were discussed with the on-site management and at the formal exit meeting. Those discussions related to the process area control room and a laboratory chemicals storage building.

The process area control room is located in the center of the process area and was, a few years ago, modified to include ~~brick~~ outer walls ~~which will~~ withstand a gas cloud explosion. The ~~north~~ outer wall ~~appears to have been left in an unfinished condition. Although the other walls have been grouted and are solid, the north wall has no grout between the bricks.~~ If a gas cloud were to develop due to a tank leak and the cloud drift to the control room it would be able to enter the large space between the ~~north~~ structural walls and the inner wall. Detonation of the cloud would result in severe damage to the control room. ~~It was recommended that action be taken to seal the walls to prohibit gas flow into the space between the walls. This will require modification to the outer door as well as the brick wall~~. It was agreed that action would be taken to determine the proper approach to eliminate this problem.

BLAST PROOF [redacted] CONSTRUCTED = HEAVY STEEL FRAMING AND PRECAST CONCRETE SLABS TO WAS DESIGNED TO FACILITATE EASY REMOVAL FOR MAJOR EQUIPMENT MAINTENANCE AND THE WALLS ARE THEREFORE NOT SEALED. ED RECOMMENDED AND

Outside the east door of the laboratory at Flotta there is a storage building which houses the liquids used in the laboratory. Some of these liquids are flammable and should be stored in a well ventilated facility. From the strong odor observed upon entering the storage building it appears that adequate ventilation is not provided. This could lead to an explosion should the conditions develop and an ignition source be introduced into the environment. It was recommended that additional ventilation be provided for the storage building. It was agreed that this would be studied by appropriate personnel and proper action taken.

F. Safety Status

A review of the year-to-date safety statistics indicate a major reduction in the number of lost work days resulting from accidents. As of the end of October 1983, the number of lost work days was down 80.5% from the same period in 1982. The number of lost work day accidents was reduced by 25.6%. These are excellent statistical improvements. There is one area where statistics indicate an adverse change in safety. For the same time period, the accident incidence rate increased from 1.14 to 1.29 or 13.1%. Although the major accidents obviously decreased, the increase in the incidence rate is an concern since any accident has potential for being worse. Only fate determines the severity of the result.

It should be noted that a comparison of the Oxy North Sea statistics with the 1982 API exploration and production statistics indicates the accident incidence rate for Oxy is only 50% of the API rate.

III. Summary of Recommendations

The following is a list of the recommendations resulting from the 1983 safety assessment. The paragraph reference identifes the location of a detailed discussion of the recommendation.

A. Aberdeen Office Complex

No recommendations were made related to the Aberdeen office complex.

B. Piper Production Platform

1. A survey should be performed to define a means to allow easy determination of the status of the firewater loop isolation valves located near the top of production modules. (Ref. II A).

2. Consider installation of wire seals on the firewater pump diesel driver fuel line valves to seal the valve in the open position. (Ref. II A)

3. Establish a schedule for tests of the platform firewater system including pump flow test and loop tests to ensure design requirements can be met. (Ref. II A)

C. Claymore Production Platform

1. A survey should be performed to define a means to allow easy determination of the status of the firewater loop isolation valves located near the top of production modules. (Ref. II A).

2. Consider installation of wire seals on the firewater pump diesel driver fuel line valves to seal the valve in the open position. (Ref. II A)

3. Establish a schedule for tests of the platform firewater system including pump flow test and loop tests to ensure design requirements can be met. (Ref. II A)

D. Peterhead Warehouse

No recommendations were made related to the Peterhead warehouse complex.

E. Flotta Terminal

1. Schedule a series of tests to verify proper pump flow characteristics for all pumps and firewater loop capability to withstand design operating pressure while delivering water through various facility loops. (Ref. II E).

2. Modify the piping for the halon system in the switch room to extend two halon discharge points into the below floor cable trays. (Ref. II E).

3. Modify the piping for the halon system in the turbine room to extend one or more of the halon discharge points into the below floor floor cable trays. (Ref. II E).

REVIEW POSSIBLE MODIFICATIONS

4. ~~Complete construction (add grouting)~~ of the ~~north~~ outer structural walls of the control room to reduce the possibility of gas entering the void between this brick wall and the original metallic outer wall of the control room (Ref. II E).

5. Modify the laboratory liquids storage building to increase the ventilation. (Ref. II E).