BUNCEFIELD OIL STORAGE DISASTER

Client Briefing Note

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Objective

To provide insurer client networks with opinion and facts regarding the cause and effect of the explosion and fire at the Buncefield Storage facility on Sunday 11/12/05.

Overview

The Hertfordshire Oil Storage Terminal (HOSL) on the outskirts of Hemel Hempstead forms part of a terminal distribution facility to the north of London. This terminal is the 5th largest in the UK and loads approximately 400 road tankers per day on a 24 hour basis. The terminal is supplied by solid pipe lines which also supply Heathrow & Luton airports.

The system is controlled by a SCADA system (***supervisory control and data collection*****).** This system is designed to monitor the system and detect any problems that may materialise and is manned on a 24 hour basis. The site comprises of HOSL East & West which occupy 22 acres of the 100 acre site.

There is a common duty of care to ensure that all employees are suitably inducted to site health and safety policies.

Permanent site personnel may be required to undertake fire safety training

Fire suppressant systems include a pressurised water and foam system supplied by firewater lagoon located in the north corner of the west site. This lagoon holds 1.4 million litres of water which is enough to drench all 19 tanks for a period of 40 minutes. The nearest fire brigade operation is 3 miles away 10 minutes journey time.

The HOSL sites are designated as a COMAH (Upper Tier) notified site.

COMAH stands for ***control of major accidents and hazards,*** which is legislation introduced in 1999. The legislation requires the operators of sites which use or store hazardous materials to assess the hazards and risks, and where possible to remove, control or mitigate those risks and make note of all recommendations and data.

John Prescott the Deputy Prime Minister said in Parliament on Monday 12th December that the site had been subjected to a site audit and or exercise just 3 months ago.

Following the blast a smoke plume was seen to rise to several thousand feet, no doubt powered by stack effects. The plume which developed travelled in a southerly direction, however the ground wind speed was below 10Km per hour and wind direction could be expected to change.

Hypothesis

From the reported facts made publicly available, the explosion and resultant damage were not accidental but appear to be a disaster waiting to happen. The roll out of emergency responders shows some lack of training and serious flaws in the pre-planning management or assessments of potential disasters.

Diary of reported events

1. Site safety training

A driver employed by Total was waiting to load his tanker from the distribution filler head minutes before the explosion. He made the following statement:

“I saw smoke and vapours escaping form the storage tank he was about to load from. I have only worked here for 6 months so I didn’t know if it was dangerous, so I asked some Tesco drivers who were also waiting to load what they thought. They walked over to the office to report the circumstances and suddenly the tank exploded”.

Opinion

This is a remarkable admission of ignorance from a man employed to deliver 20 ton loads of fuel around the Home Counties. If he didn't know that smoke or vapour seen leaking from fuel storage tank was a possible danger, had he had sufficient training? Why didn't the Tesco drivers also show a little more urgency?

2. Site Alarm Systems

The explosion and resultant fire occurred without any alarms being raised. Just prior to explosion the drivers said that the lights and all switches turned off.

Opinion

The site should have had an adequate alarm system which would be expected to provide early warning of possible pressure increase, smoke or fire or indeed heat. This may have enabled the control and mitigation of the event and certainly a safe evacuation.

It appears that the site did not have a working alarm system and this is of great concern especially as the site was audited just 3 months ago and that as a SCADA system was utilised, it should have had a fail safe alarm system.

3. Site Escape Procedures

The drivers who had to run for their lives said that they found it difficult to find escape routes as the perimeter is secure with no emergency exits.

Opinion

This shows a failure to train, or comply with legislation which requires ample provision of information and signage to show people the quickest escape route in an emergency.

4. Site Fire Fighting Capabilities

There were reported to be 7-10 people present on the site at the time of the incident. Several of these were known to be drivers.

Opinion

Although the site must by law have trained fire fighting personnel and site facilities available, how many of the 7-10 individuals there were trained in or capable of tackling events which could have been controlled before escalation?

5. Police Preparedness

Following the explosion, the police arrived at the site to initiate evacuation and initiate a cordon.

Opinion

The police were seen to be poorly equipped and prepared to attend a COMAH site emergency event. They wore paper masks which could not be expected to provide any respiratory protection for this type of event. The explosions seen and heard could be expected to result in metal and debris falling and Police had no head protection. Considering the facts surrounding this site which include pre-planning and safety preparedness to deal with such disasters, this lack of equipment, and or training shows a gross disregard to safety of Police employees and a serious breach of Health and Safety legislation.

6. Ambulance Evacuation

Within four hours of the initial explosion 16 police officers were transferred to hospital after concerns about respiratory dysfunction.

Opinion

The first rule at any disaster scene is the protection of emergency responders. These officers were clearly not provided with adequate protection and their employers may face prosecution under the Health & Safety at Work Regulations 1974. During the later part of the day Police officers were seen to be wearing adequate respiratory protection however no head protection was seen at any time. Considering this was an area affected by large scale explosions and clear devastation, the risk of falling debris appeared to have been ignored with regards to safety. The failure to protect first responders with either adequate respiratory or head protection shows an alarming disregard for safety, public order and legislation.

7. Casualty Evacuation Failures

The casualties were evacuated to local hospitals at Hemel Hempstead General only 3 miles away and back up hospital capacity was identified in Watford.

Opinion

The low wind speed coupled with the amount of smoke developing made the down wind area a significant risk. Both these hospitals were downwind from the scene and TV pictures showed the plume above the hospitals. The evacuation of the hospital should have been considered and the use as an emergency centre was in my opinion an unacceptable and more importantly unnecessary risk.

8. Planning

John Prescott, the Deputy Prime Minister, said in Parliament on Monday 12th December that the site had been subjected to a site audit and/or exercise just 3 months ago.

Opinion

Considering the circumstances of the response as described in points 1-6 it seems incredible that these areas were not picked up in any form of exercise. It may point to unrealistic scenario planning objectives and in any event did not take account of the possibility of a major site event encompassing all storage tanks as the Local Fire Chief said in a statement “We only ever planned or exercised for a one tank event, not all twenty”.

9. Pollution Control

Fire suppressant systems include a pressurised water and foam system supplied by a firewater lagoon located in the north corner of the west site. This lagoon holds 1.4 million litres of water which is enough to drench all 19 tanks for a period of 40 minutes.

Opinion

These facilities were seen to be adequate, and as the tanks were adequately protected by Bund walls capable of holding the tank contents no criticism can be made.

However, with the need for the use of 15 million litres of water and 250,000 litres of foaming agent it can be seen that the lake would have been useless for two reasons. Firstly the lake was used to supply fresh water to be mixed with foaming agent; therefore I would be surprised if used water was pumped back into the lake. This is because the foam would have to be killed by anti foam agents and would therefore prevent new foam being created. The second point is that the overall run off from different sources would have flooded the reservoir. Therefore some ground water flooding may have occurred which could have environmental consequences apart from Brown field contamination. As the priority was to extinguish the fire, any consequence may have been felt to be acceptable.

10. Fuel supply & Throughput

The site directly feeds Heathrow & Luton airports via pipelines and has 400 road tanker deliveries per day. Fuel is delivered into Buncefield via fixed pipe lines directly from external distribution refineries.

Opinion

Based on eye witness reports, the fuel supply pipes were getting hot as the fuel was still warm from the refinery due to speed & efficiency of supply. There is a possibility that the tanks became warm but not warm enough to trigger alarms. Vents required to balance air in & out as tanks fill and empty could have vented warm vapour which when in contact with cold surfaces or air condensed and fell to ground level. These vapours may have been volatile and capable of producing vapours which were easily ignited.

11. Driver Truck ignition

It is reported that a vehicle that was switched off early may have caused the ignition of vapours which led to the explosion.

Opinion

Two points must be considered here. Firstly no vapours should be at ground level in sufficient quantities to explode a storage tank and therefore this could not be considered as a cause but as a result.

Secondly, all vehicles and procedures used in any flammable workplace must be intrinsically safe. This means they cannot at any time produce sparks or have heat sources which may cause ignition to flammable substances or vapours.

Damage Evaluation

Damage to property will range from obvious to hidden and this can be in the form of contamination or structural damage. Many of the buildings destroyed will have contained asbestos and this may now be friable and become airborne at the damage scene and therefore adequate assessments are essential.

This type of smoke will carry oxides of nitrogen and sulphur and contact with moisture will be expected to transform them into sulphuric and nitric acids.

These components are normally expected in this type of fire and may cause latent damage and intermittent faults in low voltage electronic equipment especially IT systems. Corrosion of bright metallic finishes is also likely.

Conclusions

The personnel of the emergency services provided the country with professional services and competence as well as displaying courage which must be the envy of the world. These emergency responders working at the local level had the task of putting out the fire and assisting the public.

The overall response in the form of Silver (tactical) and Bronze (operational) duties followed the direct instruction of Gold, the strategic planners, and this was seen to work exceptionally well.

Gold & Silver required and should have had adequate information on which to base their judgements with which Bronze would be expected to comply.

It appears that Bronze and Silver provided first class support and logistical control in all sectors of the response following the set up of the Gold-Silver-Bronze management system. There is however great concern regarding local management and planning before the event. The failures to identify wide area issues must be seen as a major concern regarding contingency planning.

The failure of government agencies to provide assessments of the potential risk from explosion and spread which engulfed the entire site is an obvious failure. Equally the failure to adequately protect the first responders properly and provide any information regarding the plume route, height and content or health risk of the contamination is alarming. The press and public relied on unauthorised and sometimes misguiding opinion to base their personal response and action.

While government agencies provided information and local support 36 hours after the initial event this should be seen as far too late and perhaps agencies should be developed which will provide guidance information in future events.

This site is a COMAH site under the control of the HSE and the Environment Agency. Both should have been fully aware of the potential failures which have now materialised. The use of the HSE to evaluate the cause of this disaster may therefore be seen to be biased.

This report, produced before the fire was extinguished, must be accepted as a broad based observation and has relied upon generic and unsupported data.

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