ATTACHMENT F4.

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URS

A RISK ASSESSMENT
TO DETERMINE IF A FIRE WATER
RETENTION FACILITY IS REQUIRED

On Behalf of:

ATLAS ENVIRONMENTAL IRELAND LIMITED

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FINAL REPORT

1.0 INTRODUCTION

URS Dames & Moore (URS) was commissioned by Atlas Environmental Ireland Limited (Atlas Ireland) to carry out a risk assessment to determine if the facility should have a fire water retention facility. The requirement to carry out this risk assessment is specified in Atlas Irelands IPC Licence, Register number 472.

The scope of work consists of:

- Site reconnaissance (including meeting with the Chief Fire Officer for Portlaoise Fire Services);
- Data and information assessment;
- Reporting.

2.0 PRELIMINARY ASSESSMENT

Atlas Irelands main on-site activity is in the production of an oil product from waste oil through blending and heating at Clonminam Industrial Estate, Portlaoise, Co. Laois. The company also runs a soil remediation facility at the site. A sister company, EMO Oil Services Limited, rents and maintains 9 storage tanks and a gantry on the site.

Atlas Ireland converts waste oil materials from a number of sources into a useful end product on the site. The waste oil and finished product is stored in a number of vertical cylindrical tanks in two tank farms in the centre of the site.

The EPA Guidance Note (draft, 1995) on Fire Water Retention Facilities was consulted to determine if the Atlas Ireland facility is listed In Appendix A to the Guidance Note.

At the Atlas Ireland site, there is the capacity to store dangerous substances with a Risk Phrase of R52 (Harmful to Aquatic Organisms) in excess of the Appendix A(i) threshold of 100 tonnes contained in the EPA Guidance Note.

This implies that the Atlas Ireland site would generally require a fire water retention facility. However, a more detailed risk assessment is presented here, including an assessment of the existing and available water retention capacity, in order to determine if:

1. The existing capacity is sufficient;

2. If additional retention capacity is required; or

3. If a completely new and dedicated fire water retention facility should be considered.

3.0 LIMITATIONS

URS has prepared this report for the sole use of Atlas Ireland and for submission to the EPA in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Unless otherwise stated in this report, the assessment assumes that the site and facilities continue to be used for their purpose without significant change.

The conclusions and recommendations contained in this report are based upon information provided by others and the assumption that all relevant information has been provided by those relevant bodies from whom it has been requested.

4.0 DRAINAGE SYSTEMS AND SPILL CONTAINMENT

4.1 SURFACE WATER DRAINAGE

There are two distinct areas of surface water drainage on the site.

1. In the first system, the main area of the site, i.e., the central and south areas of the site, surface water drains to yard gullies and drains to a 58 tonne capacity, 4 chamber interceptor located between the Process building and the old tank farm. This interceptor typically has 30 tonnes of spare capacity. Water and trace oil are separated and the oil free water is pumped under level control from a post separation pump chamber to a new 30 tonne interceptor located near the west border of the site. There is no available retention in the 30 tonne interceptor. This drainage system is indicated on Figure 1.

2. In the second system, surface water from the north end of the site, i.e., around the new tank farm and the soil remediation area, passes through a 30 tonne capacity interceptor mentioned above.

The 58 tonne interceptor has spare capacity (approximately 30 tonnes) and the discharge is pumped (mechanical control). The design of this interceptor also allows the pumping of water from each chamber directly into the old tank farm bund in the case of run-off in excess of the spare capacity.

Atlas Ireland also maintains an Interceptor Inspection Sheet. This inspection procedure ensures the proper operation of the 58 tonne capacity interceptor.

4.2 PROCESS EFFLUENT DRAINAGE

There are a number of sumps in the soil remediation area and a separator in the new tank farm that feed, under level control, a batch effluent treatment system. The treatment system is located within and outside the existing warehouse. Treated effluent is pumped under controlled circumstances through a monitoring station to a final process effluent drain. This drain runs separately and parallel to the final surface water drain and joins the main industrial park foul sewer system to the west of the site.

It is noted that the process effluent drainage system is separate to the surface water drainage system at all points and thus is not considered to have any bearing on fire water retention assessment. There are no main process drains in the yard area or in the process room.

4.3 SPILL CONTAINMENT

All storage tanks that contain hazardous substances, particularly oils and oil/water mixtures, are provided with secondary containment. There is one large bund that services all of the bulk oil and oily wastewater storage at Atlas Ireland and this bund is located in the centre of the site. Refer to Figure 1 (Site Layout Map) for the location of this bund. The total maximum oil storage capacity is calculated at 6 million litres in total volume. The largest tank in the tank farm can store a maximum of 2 million litres and is designed to hold the recovered oil product. The bund operational retention capacity is estimated at 3.3 million litres. Applying the provisions of Condition 9.4.1 of IPC licence register number 472 to this situation is summarised as follows:

- 25% of the total volume material store: 0.25 x 6 mL = 1.5 million litres
- 110% of the largest tank storage capacity in the bund: 1.1 x 2 mL = 2.2 million litres

Therefore, the minimum bund capacity required is 2.2 million litres. There is thus 3.3 - 2.2 = 1.1 million litres spare capacity (i.e., capacity on excess of the minimum required spill retention containment) in the bund.

The above bund has been significantly upgraded to a satisfactory engineering standard over the final quarter 2001 and first quarter 2002.

Atlas Ireland maintains a fully equipped Emergency Response Van on the site operated by the Oil Spill Response team. This unit is capable of dealing quickly with any large spills of potentially hazardous materials.

Atlas Ireland also maintains an "Emergency Preparedness" standard operating procedure which also details what should happen in the event of a major spill on the site.

There are also four spill kits located at strategic points around the site to deal with smaller spills of potentially hazardous substances. These spill kits contain:

- Absorbent granules;
- Damuit to plug truck and tank leaks;
- Absorbent pads;
- Safety booms.

5.0 SITE CHARACTERISTICS

The Atlas Ireland site is located in an industrial park on the southern outskirts of Portlaoise. The site is largely covered in a concrete surface and therefore there is no perceived risk of release of significant quantities of contaminated fire water to ground on the site. However, there are areas of unmade ground nearby the main processing site.

The site is generally flat in topography, with perhaps a slight gradient away from the site boundary towards the centre of the site where the bulk of the oil and oil/water mixtures are stored. This affords limited retention of fire water on the site in the event of a fir. The retention capacity has been approximated to be 4,000 litres.

6.0 FIRE SAFETY SYSTEMS

6.1 FACILITIES ON THE SITE

Atlas Ireland maintains the following fire safety systems at the site:

1. Fire Alarm System: - there are break glass fire points located at strategic locations around the site including the factory/process area, portacabins (administration), main building, unloading areas. These are linked to a fire alarm system maintained in the reception area;
2. Fire Extinguishers: - There are a total of 26 fire extinguishers of varying capacities and varying extinguishing media (carbon dioxide, halon, foam) on the site.
3. Equipotential bonding: - oil bearing pipelines are bonded to earth with sheathed copper wiring to prevent the accumulation of static electricity.
4. Fire Detection: - there is currently one ultra-violet (UV) signature detection system that sights the main section of the old tank farm. In the event of a fire flash, the detection system will set off a general fire alarm and will auto dial the external fire services (through Dublin). Site management plans to install a second similar system on the EMO fuel storage section of the old tank farm as a result of the significant storage of concentrated fuels in this area.

5. Flameproof equipment: - electrical equipment in the process room to the south east of the site is appropriately protected against spark generation.

6. Fire-fighting water: - there is a 110 tonne cylindrical storage tank that contains water for fire fighting purposes. The tank is located to the east of the site and between the two tank farms. It is connected to the mains supply.

7. Fire fighting foam supplies: - Atlas Ireland stores a number of 5 litre drums of concentrated foam solution next to the old tank farm. The foam is intended for use as a back-up supply for the fire services. The foam system has been tested by the fire services within the past 12 months and found to be suitable. Portlaoise Fire Services maintains a volume of approximately 2,500 litres of concentrated low expansion foam in order to deal with oil product fires.

8. Hydrants: - there are three fire hydrants connected to the mains water supply. These hydrants are positioned to form a triangle around the two tank farms. These hydrants were tested within the previous 12 months by the fire services and found to be satisfactory.

Atlas Ireland maintains a service contract on the fire break points and fire extinguishers with an external fire supplies and assessment company. Under this contract, the break points and extinguishers are regularly inspected.

6.2 OFF-SITE FIRE SERVICES

The site is located within the area covered by Portlaoise Fire Centre. This centre is located approximately 1.5 miles from the site, on the other side of Portlaoise town. The centre operates one Class B appliance and one spare appliance. The Class B appliance, with an 8 strong crew, contains 400 gallons (approximately 1,800 litres) of fire fighting water. In the event of a fire at Atlas Ireland, it is likely that this water would only be used in a small fire situation with foam.

In the event of a fire alarm being raised, Portlaoise Fire Centre would get the call through a call centre in Dublin. Once the call is received, the response time to the point of departure from the centre is less than 5 minutes. However, the time to traverse Portlaoise town to the site is not certain and is dependent on traffic.

7.0 SITE ACCESS AND SITE SECURITY

The Clonminam Industrial Estate is located adjacent to the old Portlaoise Dublin Road. The Atlas Ireland site is located at the end of the main Industrial Estate access road (approximately 500 metres in length). There are two entrances to the site. The main entrance is on the south west border. From this entrance, there is adequate access to the south and centre of the site. This facilitates access to two fire hydrants, although access to the fire hydrant to the west of the site may be restricted by the position of the fire water tank (refer to Figure 1). The second entrance is located approximately 50 metres further north along the west border. This entrance, coupled with the main entrance, facilitates easy access to the two

tank farms and the main buildings by a fire appliance. One of the fire hydrants is located directly inside the northern entrance. However, the yard area surrounding the hydrant was observed to be quite cluttered.

The site is surrounded by a 2.2 metre tall security fence. The site is also protected by closed circuit TV and beam intruder alarming. It was indicated to URS that there have been no break-ins to the site since the installation of the CCTV system. There is no history of vandalism.

8.0 EMERGENCY RESPONSE & PERMIT TO WORK SYSTEM

8.1 EMERGENCY RESPONSE

Atlas Ireland maintains a comprehensive "Emergency Preparedness" procedure. The draft plan addresses the following:

- Responsibilities – including an Incident Co-ordinator.
- Raising the Alarm;
- Evacuation procedures;
- Emergency call-out procedures;
- Bomb threat procedures.

The procedure contains a site layout drawing indicating the fire fighting systems, hydrant positions and drainage system and chemicals inventory. Appendices include emergency phone numbers and an Incident Report Form.

Those with specific responsibilities are provided with adequate training (e.g., Incident Co-ordinator).

8.2 PERMIT TO WORK SYSTEM

Atlas Ireland maintains a permit-to-work system for all hot work. In this procedure, site employees and contractors must have a hot work permit before hot work can commence. The Health & Safety Manager must first inspect the permit and then the permit is signed off by an authorised manager. The permit stipulates that an appropriate fire extinguisher must be maintained in close proximity to the area where the hot work is being carried out.

9.0 ENVIRONMENTAL & FIRE LOAD AND RISK ASSESSMENTS

9.1 ASSESSMENT APPROACH

Five areas have been identified for assessment. These areas are as follows:

1. Tank Farm;
2. Oil Segregation station;
3. Process Room;
4. EMO Unloading Gantry;
5. Existing Warehouse (termed a Factory on site drawings);

New warehousing planned for the north end of the site has not been included in this assessment. When details area available as to the final design and use of the new warehouses have been determined, then this report should be reviewed to include for the new warehousing.

The areas are identified in Figure 1.

To carry out the assessments, four classification criteria are used:

- Fire Load
- Fire Risk
- Environmental Load
- Environmental Risk

Where required, previous discussion in Sections 2.0 to 4.0 have been incorporated into the risk ratings assigned.

9.2 FIRE LOAD ASSESSMENT

Fire Load is considered a function of the quantities of flammable, combustible and oxidising materials being stored in the assessment area. The following fire risk ratings are considered:

- Low: - Aqueous solutions of combustible or flammable substances or insignificant quantities of each;
- Medium: - Significant quantities of combustible of flammable substances;
- High : - Substantial (here in excess of 100 tonnes) of combustible or flammable substances.

A Fire Load assessment of each of the areas is presented in Table 1.

9.3 FIRE RISK ASSESSMENT

Fire Risk refers to the likelihood of fire occurring in the assessment area and involves factors such potential for ignition, ignition sources, fire-fighting

equipment, emergency response and fire detection. The load ratings are as follows:

- Low: - fire regarded as unlikely;
- Medium: - fire is possible under abnormal circumstances;
- High: - fire is likely under abnormal circumstances or as a result of uncontrolled events that will result in ignition.

The assessment of the five areas under the heading Fire Risk is presented in Table 2.

Table 1 – Fire Load Assessment

Area	Description	Quantities of hazardous substances and Details of storage (*)	Fire Load Rating	Reason for Fire Load Rating
1	Tank Farm	• 250 m³ of distillate raw material (gas oil or kerosene or transformer oil mix) at flashpoint (FP) 38 to 45°C in 50 and 100 tonne storage tanks. The transformer oil has an FP of >100 °C. • 750 m³ of 'wet ship' raw material (diesel and lub oil mix) with FP > 60 °C in 50 or 100 tonnes storage tanks. The wet ship oil is approximately 40% water. • 750 m³ of product with an FP > 60 °C in 50, 100 or 140 tonnes storage tanks. This material is not considered flammable or volatile but is considered combustible. • 250 m³ of 'wet ship' undergoing water removal under heat in 100 tonne storage tanks fitted with steam coils. • EMO Storage tanks: 150 m³ kerosene in 50 tonne storage tanks. 200 m³ gas oil in 4 x 50 tonne and 1 x 100 tonnes storage tanks • 1,650 m³ of 'wet ship' raw material undergoing settling for water removal in 2 x 940 tonne storage tanks • 2,000 m³ of finished product in 1 x 2,300 tonne storage tank	High	Significant storage of 'neat' oil, kerosine and finished product
2	Oil Segregation Tanks	76,000 litres in 4000 and 6000 litre square tanks. These tanks are rarely used	Low	Low quantities of relatively dilute oil
3	Process Room	Approx. 100 litres of heated oil undergoing processing	Low	Low quantities of relatively dilute oil
4	EMO unloading gantry	None	Low	Not in continuous use.
5	Existing Warehouse	Cardboard, plastics, woven materials	Low	Storage of dry combustible materials but not in very

Area	Description	Quantities of hazardous substances and Details of storage (*)	Fire Load Rating	Reason for Fire Load Rating
				large quantities

(*) – The quantities refer to the maximum available storage capacity.

Table 2 – Fire Risk Assessment

Area	Description	Fire Risk Rating	Reasons for the Fire Risk Rating Assigned
1	Tank Farm	Medium	The flash points of most materials stored in this tank farm are considered high with the exception of kerosene and distillate (considered flammable). Heat is applied to just three of the tanks in the farm (not including pure kerosene) and under controlled conditions such that the flash point of the oil mixes in the tanks are note exceeded. However, there is small risk for loss of control of the steam heating system or air flashing system which could lead to temperatures exceeding the flash point. There are strict permit procedures concerning hot-work etc. therefore, only if the permit system should fail and even then, only when a source of ignition, oxygen and an ignitable mixture is present, will there then be the risk of fire as a result. The large reclaimed mineral oil product stored in the large 2300 tonne storage tank has a high flashpoint (considered to be >66 C), very low vapour pressure and very high boiling point. Therefore, a significant amount of energy from an external source is required to ignite this material. There is heating in the two large "wet ship" oil/water solution storage tanks. However, this is used only to facilitate settling out of water. The material heated is a relatively dilute solution (with a correspondingly high flash point), **Fire control measures in place** • Fire Extinguishers (and trolley mounted foam extinguisher) • Foam supply for external fire services • Fire alarms • UV signature reader type fire detection looking north onto EMO area and another planned for the EMO area itself.
2	Oil Segregation Tanks	Low	Again, the flash points of the oil mixtures placed in these tanks are high (generally in excess of 60 °C) and thus are considered combustible rather than flammable. Furthermore, no heating is applied here and the tanks are stored in the open. Furthermore, the tanks are used only occasionally. **Fire control measures in place**

Area	Description	Fire Risk Rating	Reasons for the Fire Risk Rating Assigned
			• Fire Extinguishers (and trolley mounted foam extinguisher) FOAM SUPPLY FOR EXTERNAL FIRE SERVICES FIRE ALARMS
3	Process Room	Medium	Heated oil is pumped from storage in the old tank farm where it undergoes separation. There is a low risk of ignition from sparks or naked flames as the electrical equipment in the room is properly rated. However there is no continuous extraction in the room and it is not clear what level of oil vapour is continuously present in the room during processing. The main door to the room is open to atmosphere, thereby introducing an oxygen source. Therefore, there is a perceived risk of fire in the situation where an ignitable fuel mix is present and when an abnormal event occurs that introduces an ignition source. Fire control measures in place • Ex. Rated equipment • Equipotential anti-static bonding
4	EMO unloading gantry	Low	The gantry oil transfer station is designed to appropriate engineering standards and includes several safety devices (some listed below). The loading/unloading process is not continuous and is well managed. There are no externally applied heating processes beyond marginal heat input from pumping that may result in the elevation of the oils being pumped to exceed their respective flash points. Fire control measures in place • Equipotential anti-static bonding, fire alarms, pump interlocks, signage, fire extinguishers.
5	Existing Warehouse	MEDIUM	IN THE EVENT THAT AN ELECTRICAL FAULT OCCURS THAT CAN PRODUCE SPARK OR FLAME, THEN THERE IS A SIGNIFICANT RISK THAT COMBUSTIBLE SOLIDS, SUCH AS CARDBOARD, WILL IGNITE. HOWEVER, ADDITIONAL FIRE DETECTION MEASURES ARE BEING IMPLEMENTED IN THIS AREA.

Area	Description	Fire Risk Rating	Reasons for the Fire Risk Rating Assigned
			FIRE CONTROL MEASURES IN PLACE FIRE EXTINGUISHERS • Fire alarms

9.4 ENVIRONMENTAL LOAD ASSESSMENT

Environmental Load refers to the properties of the substances stored in the assessment area as it relates to the potential for adverse impact on the environment (soil, groundwater, surface water, flora and fauna, human health). The environmental load depends on the quantities of materials with the potential to damage the environment and the degree to which the materials or substances can damage the environment (properties of the substances as they relate to the environment).

- Low: - little potential to cause environmental damage;
- Medium: - potential to cause minor environmental damage;
- High: - potential to cause major environmental damage and/or with long-term effects.

All areas where oil is handled present a high risk relating to Environmental Load. The material safety data sheets for gas oil and kerosene were consulted. Both are considered harmful to aquatic organisms and may cause long-term adverse effects in the aquatic environment.

Only area 5, the warehouse, is not assigned a high risk relating to environmental load of fire water run-off in the event of a fire. This is because this warehouse does not store any materials with the potential to create serious pollution or long term adverse effects on the receiving surface water bodies. Furthermore, it is not envisaged that foam would be deployed in fighting a fire in this area.

9.5 ENVIRONMENTAL RISK ASSESSMENT

9.5.1 Definition

Environmental Risk refers to the likelihood of there being an adverse effect on the environment during or following an event. The event in this situation is a fire and the likelihood of adverse effect will depend on circumstances such as the pathway(s) taken by the released substances, the estimated volumes of fire water involved, the provisions for containing released substances and the receptors of the released substances. For the purposes of this context (fire water release):

- Low: - no significant risk (low receptor sensitivity and/or no risk of significant loss of containment);
- Medium: - where there is a possibility of a significant release to a sensitive receptor;
- High: - where there is the strong likelihood of significant release to a sensitive receptor.

9.5.2 Sensitive Receptor

Surface water bodies are considered the sensitive receptor in the event of unconfined or uncontrolled loss of oil or oil/water mixtures from Atlas Ireland, especially the River Barrow. The surface water sewer system discharges ultimately to the River Triogue, located approximately 1.5 miles north east of the site. This river flows through Portlaoise and flows on for approximately 5 miles to the River Barrow. An EPA River Quality database for 1997 indicates that the River Triogue has a biotic index of Q2 (seriously polluted) as it passes through Portlaoise and only improves to Q3 (moderately polluted) as it nears the confluence with the River Barrow. The River Barrow is only slightly polluted to unpolluted (Q4 and Q5 respectively) between Portlaoise to Portarlington and is home to a number of protected fish species. The Triogue River has shown a slight improvement in water quality between years 1997 and 2000 (reference: EPA Interim Report 2000 on Water Quality).

Given the above discussion, it is concluded that any oil bearing run-off and perhaps fire water with elevated biochemical oxygen demand (derived from high concentrations of fire fighting foam) would need to be contained on the site in the event of a fire.

9.5.3 Fire Run-off Calculations

It is noted that the oil fires (Class B fires) are most efficiently dealt with using foam. It is not recommended to fight oil fires directly with water jets as this in fact enhances the risk of fire spread. This minimises the actual volume of fire water used for fire-fighting purposes and instead much fire-fighting water would be directed to nearby tanks for cooling purposes.

Appropriate guidelines[1] were used to calculate the fire water run-off that may be expected in a fire events at the Atlas Ireland site. Portlaoise Fire Services were also consulted in this regard. Each of the five areas and appropriate combinations are considered in turn relating to fire water run-off and containment. Figure 1 provides a schematic of the site and each of the five areas are clearly identified. Appendix A1 provides a sample calculation of fire water –run-off (Area 1 – Tank Farm – scenario EMO Oil tanks). Appendix A2 to A9 contains the calculation of fire water run-off for a scenario where fire develops in each area separately or in selected combinations of areas. Each appendix also provides a summary of the assumptions made and an analysis of the tank cooling required where appropriate. In each assessment, the volume of water run-off calculated is a sum

[1] Her Majesty's Fire Inspectorate, Fire Service Manual, Volume 2, "Fire Service Operations – Fire Fighting Foams"

of the fire-fighting water estimated to be developed plus rainfall based on a 1 year, 24 hour rainfall event for the Portlaoise area of 24 mm [ref: 2].

It is noted that hydrant capacity is considered adequate for all oil fire events. In the event of a foam attack, it is likely that the hydrant flows would be regulated to match the foam branch capacities of the fire hoses.

Firewater runoff calculations for two credible scenarios within the tank bund (Area 1) area are presented:

1. Fire in the EMO oil storage tanks;

2. Fire in the 2000 m^3 storage tank.

Tank Farm - EMO Oil Storage Fire

The calculation for the fire water run-off expected in the case of a fire across all EMO Oil Storage Tanks (involving kerosene and diesel oil) is presented in Appendix A2. Refer to Appendix A1 for a detailed calculation for this scenario, noting the assumptions in that Appendix. The volume calculated is 605 m^3 (605,000 litres).

EPA guidelines indicate that the spare capacity in bunds for fire water retention should only be that capacity beyond the minimum design capacity for materials storage in the bunds. There is an estimated spare capacity of 1.1 million litres in the bund over and above that required for spill retention (refer to Section 4.3). This volume is significantly greater that the estimated volume of 605,000 of fire water run-off estimated and thus the bund can be used to retain this volume.

Environmental Risk: Low.

Tank Farm – Large Storage Tank Fire

The fire water run-off volume calculations for a scenario where a fire occurs in the 2,300 tonne product storage tank is presented in Appendix A3. The volume of fire water run-off calculated is 842 m^3 (840,000 litres) In this scenario, it is recognised that most of the fire water used would be directed at tanks in the adjacent old tank farm in order to keep the adjacent tanks cool. However, foam and oil product from the 2,300 tonne tank is likely to migrate in a foam attack on the fire, thus contaminating the cooling water. Hence, all fire water run-off should be contained.

Similar reasoning may be applied regarding the available retention volume for a fire in this scenario as presented above for a fire in the EMO Oil Storage area. The

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[2] Data provided by Met Eireann by telephone.

spare retention capacity in the bund of 1.1 million litres is also significantly greater that the volume of fire water run-off estimated of 840,000 litres.

Calculations were also carried on for a scenario involving a pool fire in the new tank farm as a result of the collapse of the 2,300 tonne storage tank. The total run-off volume generated here would be of the order 1280 m³. However, given the high flashpoint of the oil product stored and the high structural integrity of the tank (the tank is new), such a scenario is considered an unlikely event and thus discounted for the purposes of this exercise.

Environmental Risk: Low (tank fire only

Area 2 – Oil Segregation Tanks

The calculation of the fire water run-off volume is presented in Appendix A4. The volume estimated is 362 m³. However, only 20% of this volume is estimated as fire water from fire fighting activities. The remainder of the volume is calculated as rainwater that could be generated in a simultaneous rainfall event of a maximum 1 year 24 hour value (24 mm for Portlaoise). However this rainwater could be contaminated with oil and fire residue (including foam) in the event of a fire in this area. In the event of a fire run-off would migrate southward and westward to nearby surface water drains. These drains migrate to the 58 m³ interceptor. Given what has been presented on this interceptor (see Section 3.1), up to 30 m³ of the run-off can be contained within the interceptor. The balance of the fire water, approximately 280 m³, whilst it could be treated in the oil interceptors, could contain foam that can disperse oil droplets and so render the interceptors ineffective in removing oil from a high flow rate of fire water run-off. Therefore, this fire water volume should be contained on site.

Environmental Risk: Medium

Area 3 –Process Room

The estimation calculation of fire water run-off for a scenario where fire is started in this area is presented in Appendix A5. The volume calculated is 221 m³, divided between fire fighting water and storm water from simultaneous rain fall as above (segregation tanks). Given the proximity of the process room to the oil segregation tanks, the fire water run-off pathway is considered similar and thus the same conclusions are reached.

Environmental Risk: Medium

Area 4 – Gantry

The estimation calculation of fire water run-off for a scenario where fire is started in this area is presented in Appendix A6. The volume calculated is 286m³, divided between fire fighting water and storm water from simultaneous rain fall as above (Process Room). Fire water generated in the gantry area is likely to

migrate nearby surface water drains which lead to the 58 m³ interceptor directly. The concrete yard surface in this area is also slightly banked away from the site borders, thus directing water to surface water drains feeding the interceptor. Again, the same conclusions regarding Areas 3 and 4 also apply here.

Environmental Risk : Medium

Area 5 – Existing Warehouse

The estimation of the fire water run-off in the event of a fire in this area is calculated as 600 m³. This assumes:

- 4 hours fire fighting time;
- 6 litres per minute per m² of warehouse area of fire water;
- 300 m² of warehouse area;
- including simultaneous rainfall over the yard area.

Given the nature of the combustible materials in the warehouse, reliance on water to fight the fire rather than foam would be anticipated. This water is likely to be contaminated with mainly suspended solids and some organic matter.

Fire water run-off will flow to nearby surface water drains. Surface water drains around this building migrate to the combined interceptor system. Atlas Ireland is also designing a concrete lip to surround the inside of the warehouse which will offer some form of retention capacity.

There are two factors therefore to consider - the potential sensitivity of the River Barrow to short term damage and the low dilution offered by the River Triogue in the event of a major fire and the fact that the River Triogue water quality is poor.

Whilst there are no significant quantities of substances with a known potential for long-term damage to the aquatic environment stored in the warehouse, given the estimated volume and fact that it will contain contaminants likely to create shot term pollution, it is preferable to retain this water on site or discharge the water in a controlled fashion to the foul sewer rather than to the surface water system.

Environmental Risk: Medium

9.6 COMBINED AREA ASSESSMENTS

It is recognised that fire may not be contained to one of the five areas identified in previous assessment discussion. Given relative area proximity's, interconnections

(e.g. pipelines) and oil storage capacities involved, it is considered possible that a fire involving the following area combinations could occur:

Combination 1. Area 1 Tank Farm - EMO Oil Storage Tanks) and Area 4 (Gantry) - Here there is a connection (via pipelines) between the gantry and the old tank farm particularly with the EMO tanks.

Combination 2. Area 1, Area 3 (Process Room) - Here there is a pipe bridge that connects the process room to the old tank farm.

The fire water calculations are presented in Appendices A8 and A9 respectively.

For each combination scenario, the fire water run-off estimated is between 347 m^3 and 391 m^3, including simultaneous rainfall.

The retention of all fire water is required in a combination scenario, due to the contamination with foam and oil product. Similar conclusions regarding the retention of this rainwater as presented for individual area assessments holds also for the two combined area scenarios presented here.

Environmental Risk: medium.

9.7 SUMMARY OF RISK ASSESSMENT AND CONCLUSIONS

9.7.1 Summary of Risk Assessment

Table 3 provides a summary of the risk assessment presented under the headings Fire Load, Fire Risk, Environmental Load and Environmental Risk. An overall risk rating is assigned to each area assessed.

Table 3 – Risk Assessment Summary Table

	Risk Ratings				
Area	Fire Load	Fire Risk	Environmental Load	Environmental Risk	Overall
1 –Tank Farm	High	Medium	High	Low	Medium
2 - Oil Segregation	Low	Low	High	Medium	Medium
3 – Process Room	Low	Medium	High	Medium	Medium
4 - EMO Gantry	Low	Low	High	Medium	Medium
5 – Existing Warehouse	Low	Medium	Low	Medium	Medium
Combined Area Fire	High	Low	High	Medium	Medium

9.7.2 Conclusion

Based on the above table and previous discussion, the overall risk assessment rating relating to fire water run-off for the Atlas Ireland site is considered medium. This overall risk rating is dominated by the Environmental Risk of a migration of oil contaminated fire water from the site. In this regard, the largest calculated volume is that for a tank fire in the 2,300 tonne storage tank of final product in Area 1, the tank farm. The total volume estimated is 842 m^3 to include a simultaneous major rainfall event. This volume is coupled with a medium risk of a fire occurring in the EMO Oil storage tanks which are located in the same area. However, there is adequate retention volume in the bund surrounding the tank farm to take the estimated volume of fire water runoff.

Regarding other fire scenarios, whilst the risk of fire in Areas 2 to 5 (process room, segregation tanks, unloading gantry and warehouse) is generally low, the potential volume of runoff of fire water will be in excess of any immediately available retention (notably the main oil interceptor). Therefore, additional engineering steps should be considered to prevent the migration of contaminated fire water from these areas to the surface water system beyond the site boundary (refer to Section 9.7.3).

9.7.3 Recommendations

While there is sufficient firewater retention available in the tank farm bund, measures need to be taken to direct firewater to this bund in the event of firewater run-off from areas 2 – 5. Some suggested recommendations for possible consideration are also presented which may:

- reduce further the risk of either a fire starting or the spreading of fire from one area to another;
- Assist in the prevention of discharge of contaminated fire water to the surface water system beyond the site boundary.

1. Provide fire water run off diversion from around the warehouse and outside the tank farm bund to discharge to the main tank farm bund in the event of a fire outside the tank farm bund. In the case of the warehouse, considering the relatively light contamination levels expected in the fire water, it may be possible to engineer a discharge to the on-site treatment plant such that this water can then be discharged to foul sewer once the discharge is within IPC licence limits.

2. Ensure that the fire-fighting services are fully aware of the available on-site fire fighting and detection systems. It is noted in the Emergency Preparedness Operating Procedures that the Incident Co-ordinator would be required to give the fire services a copy of the emergency plan in the event of a fire. However, the fire services should be made aware of the plan and know it well on the outset so that valuable time would not be lost in trying to understand the plan at the site in a fire situation;

3. Assess the feasibility of on-site fire fighting using the on-site fire water storage tanks and the available foam supply (particularly for the smaller areas such as the gantry, the process room and the oil segregation tanks). This would probably reduce the volume of fire water run-off and would significantly reduce the risk of a combined area scenario fire;

4. Consider the introduction of appropriate shut-down of key pumps on the site during a fire situation. For example, should the process room go on fire, then the oil feed pump from the old tank storage farm should be interlocked with the fire alarm break glass unit in addition to remote manual shut-off. Another key pump is the 58 tonne interceptor final treated water discharge pump.

5. Consider the installation of firewater pumps in the 58 tonne interceptor to facilitate the return of contaminated firewater to the tank farm bund.

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URS would like to thank Atlas Ireland for the opportunity to participate in this project and hope it fulfils your requirements. Should you have any queries regarding this project please do not hesitate to contact the undersigned.

Yours sincerely,

for URS DAMES & MOORE

pp

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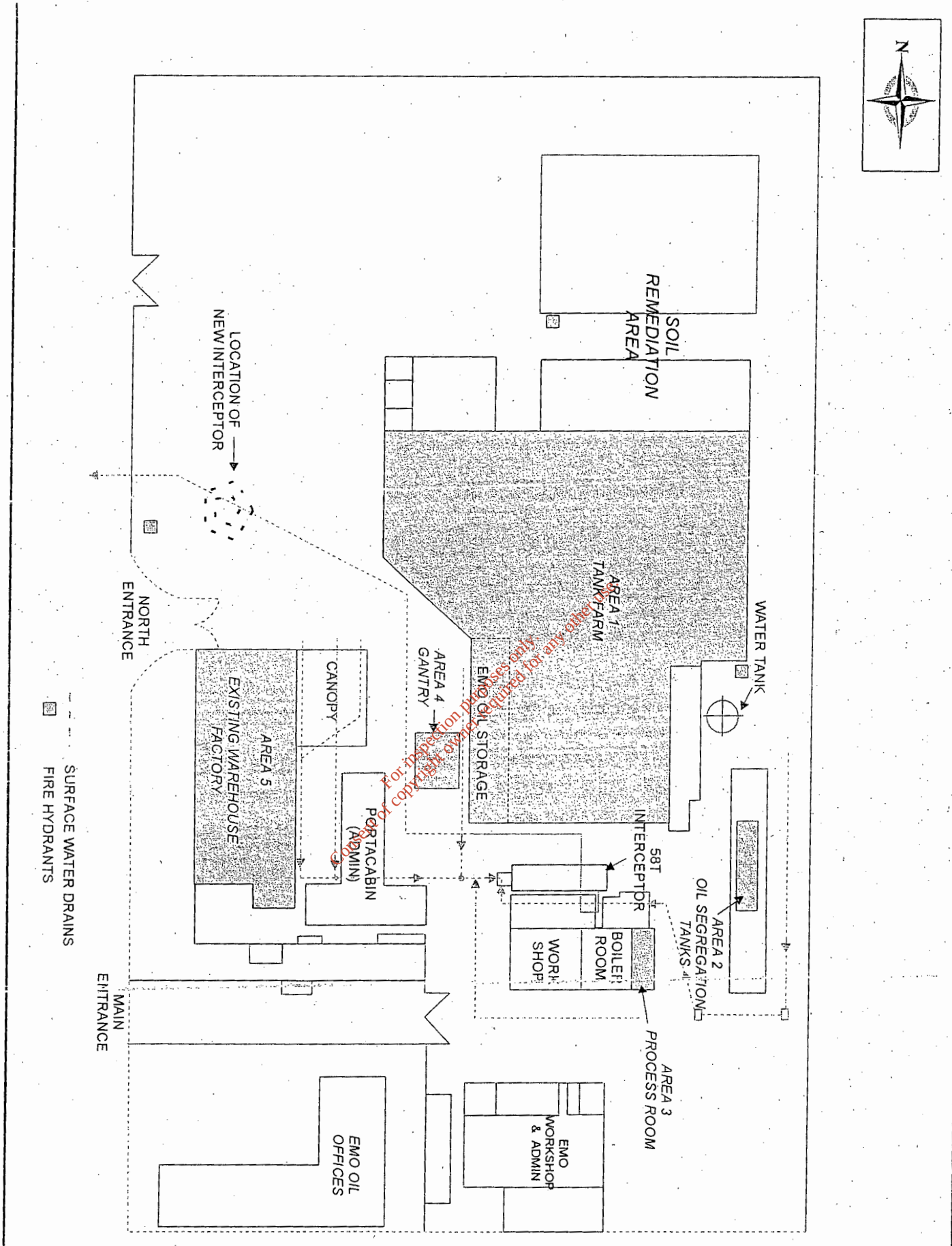

Title	SITE LAYOUT MAP		
Project	FIREWATER RISK ASSESSMENT		
Location	CLONMINAM INDUSTRIAL ESTATE, PORTLAOISE		
Client	ATLAS OIL		

App'd	Reference PH/DB/DUB	Date FEB 2002
TI App'd DB	Job No. 46605-003-447	Scale NTS

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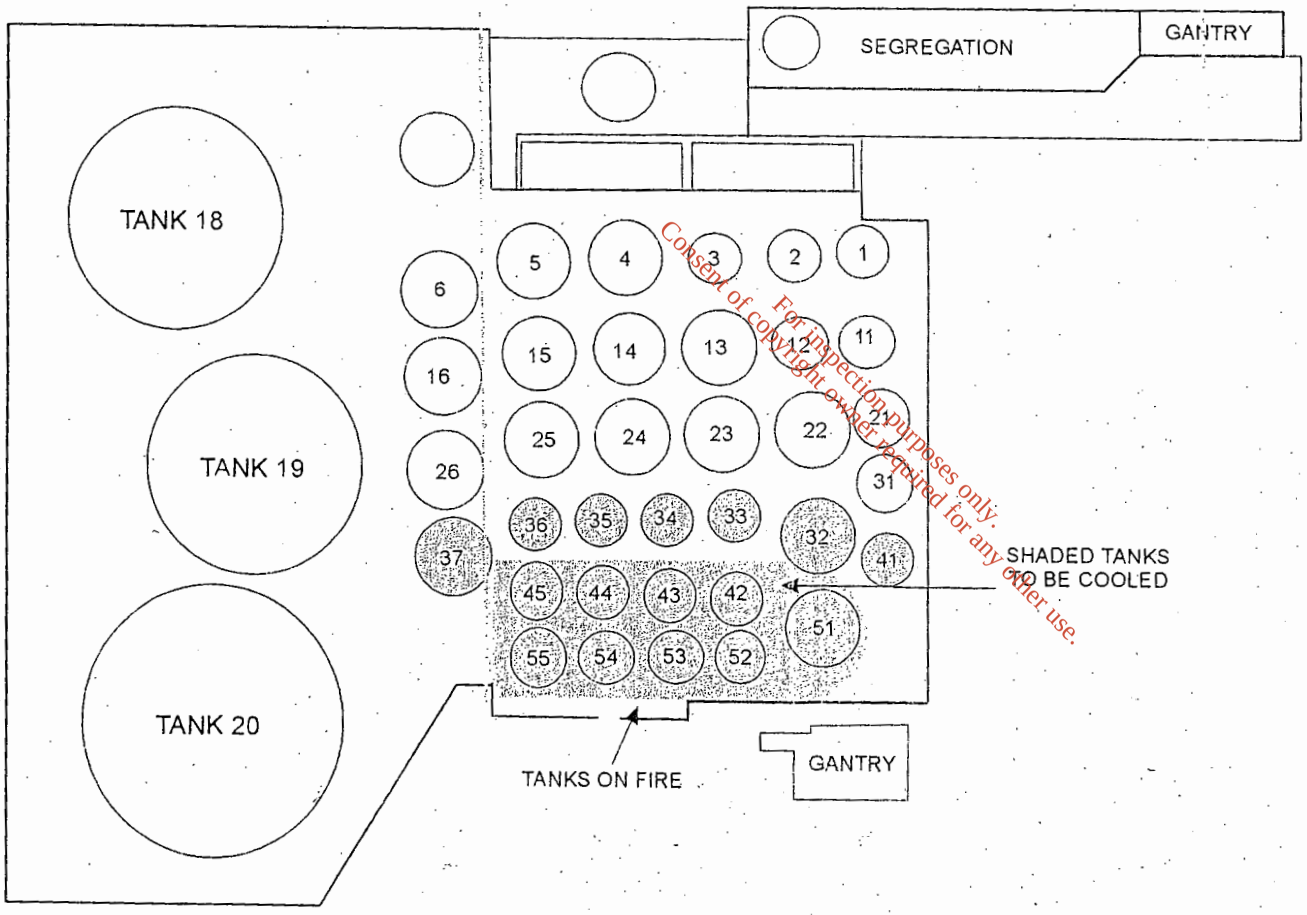
FIGURE 1



Title	AREA 1 SCENARIO - TANKS FARM FIRE - EMO OIL
Location	CLONMINAM IND ESTATE, PORTLAOISE
Client	ATLAS ENVIRONMENTAL LTD

URS
Dames & Moore
O'Brien Kreitzberg
Thornburn Colquhoun

App'd:	Drawn:	Date:
	DB	FEBRUARY '02
		Ref: PH/DB/DUB
Scale: NTS		Job No: 46605-003-447
Drg. Size: A4		FIGURE A1

APPENDIX A1 – SAMPLE CALCULATION

FIRE IN AREA 1 – TANK FARM

Scenario: - Fire in EMO Oil storage area of the Tank Farm

Fire Fighting Foam Run-off

For the purposes of this sample calculation, it is assumed that the EMO oil storage tanks are on fire. Kerosene (considered flammable) and diesel oil are contained in these tanks. Referring to Figure A1, the row of tanks assumed to be on fire is indicated. It is also assumed that the fire is from the top of the tanks where there has been loss of the tank roof. This is a typical situation regarding hydrocarbon fires in tank farms. Therefore, the foam attack is concentrated on the surface area of the top of the tanks.

National Fire Protection Agency (International) guidelines[1] values for dilute foam application using a safety margin of 50% were used to estimate the low expansion foam application volume expected to quench a fire in the EMO tanks. Thus:

Total surface area of the tops of tanks on fire: 65 m^2
NFPA minimum foam application rate (at 3% foam): 6.5 litres per minute per m^2
Apply a safety factor: 6.5 x 1.5 = 9.75 litres per minute per m^2
NFPA guideline fire fighting time (flashpoint < 40° C): 60 minutes

Therefore – total foam solution volume estimated:

9.75 x 65 x 60 = 38,030 litres (or 38.03 m^3)

This is Sub Total A in Appendix A2

Cooling water run-off

The largest volume of run-off water in the event of a hydrocarbon fire, particularly in tank storage areas is the cooling water required to keep adjacent tanks, to those on fire, from igniting. NFPA guidelines indicate that tanks within 1.5 times the diameter of the tanks on fire should be cooled. However, this is just a guideline and other factors may be relevant, such as blanket effects, contents of the adjacent tanks (for example, many of the tanks at Atlas oils contain a high fraction of water with resulting insignificant risk of ignition) and prevailing wind direction.

Applying the above reasoning, the tanks to be cooled in this fire scenario are indicated in Figure A1.

[1] Her Majesty's Fire Inspectorate, Fire Service Manual, Volume 2, "Fire Service Operations – Fire Fighting Foams"

The tabulated NFPA guideline value for the application of cooling water for cooling hydrocarbon tanks is 10.2 litres per minute per m^2 applied over 4 hours fighting time. However, the main text of the same guidance note indicates that this value is more applicable for pressurised liquefied petroleum gas storage and that a more practical value of 2 litres per minute per m^2 is often used for hydrocarbon storage tanks at atmospheric conditions. Portlaoise Fire Services indicated that the larger value is still the official guideline but that an actual value somewhat less than that would be used. Therefore, an average of the two values was used for this report: 6 litres per minute per m^2 over 4 hours fighting time.

Calculations are as follows (using NFPA guidelines):

Cooling water application rate: 6 litres per minute per m^2

NFPA guideline: on average 33% of surface area of target tanks to be cooled therefore:

275 m^2 of tank surface area to be cooled

NFPA cooling time guideline: 240 minutes

Therefore, total estimated cooling water run-off:

275 x 240 x 6 = 396,000 litres

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396 m^3

Simultaneous rainfall

The one hour, 20 year return rainfall event value (in mm) for the Portlaoise area was obtained from Met Eirearn. The value obtained was 24 mm.

The yard area used for this calculation has been assumed to be the total plan area of the site where all oil activities take place (7150 m^2).

Thus, the volume generated during a simultaneous rainfall event is:

7150 x 24 x 1/1000 (mm/m) = 171.6 m^3

Thus, the total estimated volume of run-off from a fire in this scenario is:

38.03+ 396+ 171.6 = 605.63 m^3

APPENDIX A2

CALCULATION OF FIRE WATER RETENTION REQUIREMENTS FOR ATLAS OILS
Area 1
Tank Farm - EMO Oils Storage

Foam Fighting Runoff

Basis : 9.75 lpm/m2 1.5 times minimum of application (NFPA Guideline)
65 Total Surface Area (m2) on fire
60 minutes fire fighting time (NFPA Guideline)

Sub total 38.03 m3 A

Assumptions
50% of the number of EMO tanks ignite (outer row from 52 to 55)

3% by volume FPPP foam (low expansion)

Tank Cooling Runoff

Basis : 6 lpm/m2 See NOTE
275.00 Total Surface Area (m2) to be cooled
240 minutes cooling time (NFPA Guideline)

Sub total 396.00 m3 B

Assumptions
one third surface area tanks cooled (NFPA guideline)

Simultanous Rainfall

Maximum 20 year 1 hour rainfall event 24 mm

Area of the yard 7150 m2

Therefore expected volume runoff: 171.6 m3 C

TOTAL 605.63 m3 A+B+C

Assumptions
1 - Area for runoff calculation is yard indicated on Figure 1

NOTE
NFPA Guideline is 10.2 lps for LPG storage and estimated 2 lps for atm. HC tanks - therefore average

APPENDIX A3

CALCULATION OF FIRE WATER RETENTION REQUIREMENTS FOR ATLAS OILS
Area 1
Tank Farm - 2,000 m3 tank fire

Foam Fighting Runoff

Basis : 9.75 lpm/m2 1.5 times minimum of application (NFPA Guideline)
177 Total Surface Area (m2) on fire
45 minutes fire fighting time (NFPA Guideline)

Sub total 77.66 m3 A

Assumptions
The large LS product tank on fire

3% by volume FPPP foam (low expansion)

Tank Cooling Runoff

Basis : 6 lpm/m2 See NOTE
412.00 Total Surface Area (m2) to be cooled
240 minutes cooling time (NFPA Guideline)

Sub total 593.28 m3 B

Assumptions
one third surface area tanks cooled (NFPA guideline)

Simultanous Rainfall

Maximum 20 year 1 hour rainfall event 24 mm

Area of the yard 7150 m2

Therefore expected volume runoff: 171.6 m3 C

TOTAL 842.54 m3 A+B+C

Assumptions
1 - Area for runoff calculation is indicated in Figure 1

NOTE
NFPA Guideline is 10.2 lps for LPG storage and estimated 2 lps for atm. HC tanks - therefore average

APPENDIX A4

CALCULATION OF FIRE WATER RETENTION REQUIREMENTS FOR ATLAS OILS
Area 2
Oil segragation tanks

Foam Fighting Runoff

Basis : 9.75 lpm/m2 1.5 times minimum of application (NFPA Guideline)
80 Total Surface Area (m2) on fire
60 minutes fire fighting time (NFPA Guideline)

Sub total 46.80 m3 A

Assumptions
Top of oil segregation tanks on fire

3% by volume FPPP foam (low expansion)

Tank Cooling Runoff

Basis : 6 lpm/m2 See NOTE
100.00 Total Surface Area (m2) to be cooled
240 minutes cooling time (NFPA Guideline)

Sub total 144.00 m3 B

Assumptions
nearest row of tanks in tank farm cooled and also process room

Simultanous Rainfall

Maximum 20 year 1 hour rainfall event 24 mm

Area of the yard 7150 m2

Therefore expected volume runoff: 171.6 m3 C

TOTAL 362.40 m3 A+B+C

Assumptions
1 - Area of runoff is indicated in Figure 1

NOTE
NFPA Guideline is 10.2 lps for LPG storage and estimated 2 lps for atm. HC tanks - therefore average

APPENDIX A5

CALCULATION OF FIRE WATER RETENTION REQUIREMENTS FOR ATLAS OILS
Area 3
Process Room

Foam Fighting Runoff

Basis : 9.75 lpm/m2 1.5 times minimum of application (NFPA Guideline)
36 Total Surface Area (m2) on fire
60 minutes fire fighting time (NFPA Guideline)

Sub total 21.06 m3 A

Assumptions
Process room internals on fire

3% by volume FPPP foam (low expansion)

Tank Cooling Runoff

Basis : 6 lpm/m2 See NOTE
20.00 Total Surface Area (m2) to be cooled
240 minutes cooling time (NFPA Guideline)

Sub total 28.80 m3 B

Assumptions
Radiant heat to segregation tanks - small area

Simultanous Rainfall

Maximum 20 year 1 hour rainfall event	24	mm	
Area of the yard	7150	m2	
Therefore expected volume runoff:	171.6	m3	C
TOTAL	221.46	m3	A+B+C

Assumptions
1 - Area of runoff is indicated in Figure 1

NOTE
NFPA Guideline is 10.2 lps for LPG storage and estimated 2 lps for atm. HC tanks - therefore average

APPENDIX A6

CALCULATION OF FIRE WATER RETENTION REQUIREMENTS FOR ATLAS OILS
Area 4
Gantry

Foam Fighting Runoff

Basis : 9.75 lpm/m2 1.5 times minimum of application (NFPA Guideline)
24 Total Surface Area (m2) on fire
60 minutes fire fighting time (NFPA Guideline)

Sub total 14.04 m3 A

Assumptions
Gantry on fire

3% by volume FPPP foam (low expansion)

Tank Cooling Runoff

Basis : 6 lpm/m2 See NOTE
70.00 Total Surface Area (m2) to be cooled
240 minutes cooling time (NFPA Guideline)

Sub total 100.80 m3 B

Assumptions
Radiant heat to EMO tanks - front row

Simultanous Rainfall

Maximum 20 year 1 hour rainfall event 24 mm

Area of the yard 7150 m2

Therefore expected volume runoff: 171.6 m3 C

TOTAL 286.44 m3 A+B+C

Assumptions
1 - Area of runoff is indicated in Figure 1

NOTE
NFPA Guideline is 10.2 lps for LPG storage and estimated 2 lps for atm. HC tanks - therefore average

APPENDIX A7

CALCULATION OF FIRE WATER RETENTION REQUIREMENTS FOR ATLAS OILS

Area 1 (pool fire - 2000 litre tank collapse)

Foam Fighting Runoff

Basis : 9.75 lpm/m2 1.5 times minimum of application (NFPA Guideline)
854 Total Surface Area (m2) on fire
60 minutes fire fighting time (NFPA Guideline)

Sub total 499.59 m3 A

Assumptions
Tank 20 collapsed and resulting pool fire

3% by volume FPPP foam (low expansion)

Tank Cooling Runoff

Basis : 6 lpm/m2 See NOTE
421.00 Total Surface Area (m2) to be cooled
240 minutes cooling time (NFPA Guideline)

Sub total 606.24 m3 B

Assumptions
Radiant heat to EMO tanks - front row

Simultanous Rainfall

Maximum 20 year 1 hour rainfall event 24 mm

Area of the yard 7150 m2

Therefore expected volume runoff: 171.6 m3 C

TOTAL 1277.43 m3 A+B+C

Assumptions
1 - Area of runoff is indicated in Figure 1

NOTE
NFPA Guideline is 10.2 lps for LPG storage and estimated 2 lps for atm. HC tanks - therefore average

APPENDIX A8

CALCULATION OF FIRE WATER RETENTION REQUIREMENTS FOR ATLAS OILS

Combination 1 - Area 1 (tank farm - EMO Oil storage) and Area 4 (gantry)

Foam Fighting Runoff

Basis : 9.75 lpm/m2 ' 1.5 times minimum of application (NFPA Guideline)
54 Total Surface Area (m2) on fire
60 minutes fire fighting time (NFPA Guideline)

Sub total 31.59 m3 A

Assumptions
Gantry on fire - spreading to EMO tanks

3% by volume FPPP foam (low expansion)

Tank Cooling Runoff

Basis : 6 lpm/m2 See NOTE
131.00 Total Surface Area (m2) to be cooled
240 minutes cooling time (NFPA Guideline)

Sub total 188.64 m3 B

Assumptions

Simultanous Rainfall

Maximum 20 year 1 hour rainfall event 24 mm

Area of the yard 7150 m2

Therefore expected volume runoff: 171.6 m3 C

TOTAL 391.83 m3 A+B+C

Assumptions
1 - Area of runoff is indicated in Figure 1

NOTE
NFPA Guideline is 10.2 lps for LPG storage and estimated 2 lps for atm. HC tanks - therefore average

APPENDIX A9

CALCULATION OF FIRE WATER RETENTION REQUIREMENTS FOR ATLAS OILS

Combination 2- Process room and Area 1

Foam Fighting Runoff

Basis : 9.75 lpm/m2 1.5 times minimum of application (NFPA Guideline)
87 Total Surface Area (m2) on fire
60 minutes fire fighting time (NFPA Guideline)

Sub total 50.90 m3 A

Assumptions
Process rooms on fire, spreading to distillate tanks (1,2 and 3)

3% by volume FPPP foam (low expansion)

Tank Cooling Runoff

Basis : 6 lpm/m2 See NOTE
106.00 Total Surface Area (m2) to be cooled
240 minutes cooling time (NFPA Guideline)

Sub total 152.64 m3 B

Assumptions

Simultanous Rainfall

Maximum 20 year 1 hour rainfall event	24 mm	
Area of the yard	7150 m2	
Therefore expected volume runoff:	171.6 m3	C
TOTAL	375.14 m3	A+B+C

Assumptions
1 - Area of runoff is indicated in Figure 1

NOTE
NFPA Guideline is 10.2 lps for LPG storage and estimated 2 lps for atm. HC tanks - therefore average