Impact Assessment Overview of risks from proposed Spectator Events and Education Zone

13/12/2007

FINAL 13 DECEMBER 2007

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1. Introduction

1.1 This report has been prepared to address the interface between the proposed Spectator Events and Education Zone (including the proposed multi-purpose stadium) and the hazardous facility operations in the adjacent area.

1.2 The facilities identified include:

a. The Liquigas Depot on the dead end extension of Fryatt Street from the intersection of Wickliffe Street

b. The New Zealand Oil Services (NZOSL) facility (BP Depot; corner of Parry Street;

c. Bitumix (Works Infrastructure) Depot, corner; Parry Street / SH 88.

d. Chevron (Caltex) and Shell Depots, corner: Fryatt Street / Wickliffe Street

e. Port Otago Oil Wharf and Oil Industry Pipeline, Fryatt Street - Wickliffe Street – Leith Rail Bridge – Magnet Street

f. Bitumen Sales (Fulton Hogan) Depot, Fryatt Street.

g. Palmers / Logan Point Quarry, corner: Ravensbourne Road / Butts Road

1.3 With the exception of Palmers Quarry which stores and uses explosives on a limited and intermittent basis, the other depots store and/or distribute petroleum based products.

1.4 In preparing this report I have consulted widely across the spectrum of hazardous substance, emergency management and land use management fields and personnel. The replies from recognised experts within New Zealand in these areas have largely confirmed the thinking and approach taken in this document.

1. Effects of Proposed Zone on Neighbouring Facilities

1.5 Consideration has been given to potential effects under the following scenarios:

a. Day to day occupancy of the site (Stadium and University teaching facility complex).

b. Occupancy during major events when there are potentially up to a maximum of 35,000 people occupying the Stadium or in transit to or from.

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Day to Day Operations

1.6 Under normal operating conditions, that is the day to day occupancy identified above and at other times when limited additional numbers of people are present i.e. small events such as seminars and exhibitions there is no impact from the Stadium on the operations of any of the major hazard facilities identified including the Liquigas Depot.

1.7 In my assessment it makes no difference whether the a number of permanent occupants are introduced by virtue of a rezoning or an intermittent number of people are introduced as a result of a new or increased industrial activity.

1.8 Rather the issue for determination is at what point (if any) does an increase in numbers of people in the area begin to have an effect on the operations of the neighbouring hazardous facility operations.

1.9 It is my assessment that provided the number of vehicles belonging to the staff, patrons or attendees can be accommodated within the Zone carpark (which I understand accommodates all but the most significant spectator events) there is no adverse effect on the neighbouring facilities.

1.10 However as the numbers of patrons increases to the point where significant parking is required off site the severity of impact increases pro-rata up to the major planned events discussed below.

Major Events

1.11 During times of major events with high patronage there is the potential for adverse effects on neighbouring facilities unless these matters are appropriately managed via roading layout and traffic management plans. In my assessment the new road layout and traffic management plan proposed in the Beca Traffic Assessment are adequate to address these issues.

1.12 Traffic and pedestrians will be required to be managed in the area of the Liquigas Depot and other critical facilities with parking prohibitions in a number of areas:

a. Parking should be prohibited towards the end of the dead-end extension of Fryatt Street and at the intersection of Wickliffe and Fryatt Streets due to the Chevron foam injection and control point. Unrestricted New Zealand Fire Service (NZFS) access is needed to the foam store adjacent to this control centre. Parking should also be precluded from the depot sides of all streets bounding the Chevron Depot i.e. Fryatt Street / Akaroa Street / Jutland Street / Wickliffe Street

b. Parking should be precluded on the Shell Depot side of Wickliffe Street and around the Jutland Street/Wickliffe Street intersection due to the presence of grouped fire hydrants for depot fire fighting.

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c. Restrictions should apply to the roadway outside the Bitumen Sales Fulton Hogan Depot on Fryatt Street and in the area of the Oil Wharf to ensure tankwagons have unrestricted access to the premises.

d. Restrictions are required for the New Zealand Oil Services Ltd (NZOSL) Depot / Bitumix and the Logan Point Quarry. Parking along the Parry Street extension and Magnet Street could well impact on the NZOSL Depot and for the same reasons as the Liquigas Depot should be discouraged although it is noted that there is currently staff and other vehicle parking along these designated roads. The key issues are that any Emergency Services access cannot be impaired and vehicle access to and from the depots remains unrestricted.

1.13 Compliance with the Hazardous Substances and New Organisms legislation requires consideration for security in emergency planning. I and the companies I have consulted with have given consideration to the effects of large numbers of people in the area pre and post event should an emergency occur at one of the facilities. This is a crowd management issue that should be well able to be addressed in terms of event and traffic management.

1.14 All depots other than the two bitumen plants are 24 hour per day 7 day per week operations. Concern was expressed by some of the neighbouring depots regarding the security of the lone drivers' and the fact that they use heavily laden trucks often with trailers. As such they are not easily stopped or manoeuvred in the high density traffic expected post a large event. These are all issues that can and must be addressed in traffic management planning prior to events. It is important that in developing such traffic management plans that the affected depots are fully consulted.

1.15 During the approximately monthly marine tanker discharges the Wharf Pipeline is patrolled continuously by both contracted security staff and oil industry staff. Should a Stadium event coincide with a liquid fuels tanker discharge, some additional constraints may be required on access requiring extra consideration in terms of traffic management and/or additional security at the request of the Oil Industry Management.

1.16 During the tanker discharge, patrols are required to ensure the safety of equipment and all persons in the area. With a Stadium event the numbers of persons will be higher than would usually be expected and will need to be managed.

1.17 With an LPG tanker discharge there is a potential increase in the possibility of a gas leak. The LPG tank ship wharf and all associated pipework and equipment are contained within the bounds of the Liquigas property. This scenario requires no additional security or traffic management consideration but does marginally increase the risk profile of the Liquigas Depot.

Summary

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1.18 In my professional opinion there is nothing in the day to day operation of activities in the proposed zone or for events at the Stadium up to and including capacity crowds that cannot be resolved by inclusive consultation and careful planning.

2. Effects of Neighbouring Facilities on Proposed Zone

2.1 Consideration has been given to two scenarios where the major hazard facilities' operations could potentially impact on the Zone:

a. Normal operations; and

b. Emergencies.

Normal Operations

2.2 Under normal operations it is difficult to envisage situations where the day to day operations of the various depots would impact on the Zone. Given adequate traffic and event management, and with agreement on the layout of the road changes, the tankwagons entering and leaving the sites will cause little disruption to patrons; any inconvenience may be the other way around but should be able to be managed with minimal inconvenience.

2.3 Traffic numbers accessing the depots are very low and include tankwagons, staff, security patrols, contractors and occasionally emergency service vehicles on familiarisation visits. Given adequate access to the State Highway system, tankwagons are then no different to any other traffic. Such vehicles and the hazards they carry pass major population centres including hospitals and the like on a regular daily, even hourly basis. Where possible, route scheduling limits this potential but in many cases, (Dunedin Hospital on the one-way north being a prime example), these self imposed industry limits are unworkable.

2.4 In my professional opinion there is nothing in the day to day running of the depots that cannot be resolved by inclusive consultation and careful planning.

3. Emergencies

Liquigas Depot:

3.1 The New Zealand Fire Service Tactical Plan number L24 dated 23.06.1998 (with revisions to be included in the next intended up-date handwritten on the attached Appendix 1) identify two leak scenarios:

a. Minor leak: evacuation radius 50 metres

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b. Major leak: evacuation radius 1km.

3.2 It is noted that the plan does not include extensive provisions on fire scenarios because with LPG the potential risk is greater with a leak than with a leak that is already on fire. LPG has a relatively narrow range of explosive limits: Lower Explosive Limit (LEL – too lean to burn) and Upper Explosive Limit (UEL – too rich to burn). The effect of this narrow range is that any gas leak from, for example a failed fitting on a pump, cannot burn back into the pipework, pump or tank – the gas / air mixture with LPG is too rich. The gas will burn safely from the leak site (following a flash fire covering the extent of the original leak) unless the flame is impinging on another gas filled vessel, piece of plant or pipe that is under pressure.

3.3 The resulting heat from the flame impingement may cause failure of the steel resulting in an escalation of the fire. This escalation is limited by the quantity of gas available to the leak and that is controlled mechanically by designed-in safety features.

3.4 Consideration has been given to the potential for a serious leak to extend for some distance in the direction of the Zone. Given prevailing wind directions on Dunedin Harbour this is not a very likely scenario especially with the channel of the Leith River in between. However, once the gas / air mix finds a source of ignition the fire will flash back to source, and it is that flash fire that is a cause for concern.

3.5 The quantity of gas available to feed such a leak or fire is that contained in any aboveground contiguous pipework i.e. with no valves etc to limit the availability. Because much of the pipework is valved off for operational reasons it is not the total capacity of aboveground pipework that is available unless other sections of pipe are compromised by flame impingement as mentioned above. The capacity of gas contained in the mounded tanks is not available to feed the leak due to the well maintained safety features.

3.6 To put this in perspective, the quantity of liquefied gas in the aboveground pipework at Liquigas is less than that contained in an aboveground LPG tank that can be approved and installed under the District Plan as a Controlled Activity. Such tanks have been installed in many locations in Dunedin in residential, commercial and industrial zones with separation distances no greater than those specified in the Dangerous Goods (Class 2 – Gases) Regulations and now the HSNO Controls in Gazette Notice Number 35.

3.7 The scenarios that I have considered below based on the information discussed above and New Zealand Fire Service plans have all been the subject of Hazard and Operability (HAZOP) Studies at the time of the design and construction of these types of facilities and at any time changes are proposed for plant and equipment.

3.8 The objective in considering the appropriate response to these scenarios is always to ensure that at all times the plant is protected by fixed fire fighting equipment, augmented by NZ Fire Service mobile equipment and crews, capable of ensuring cooling water is directed onto exposed plant. The

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intention is that the fire will only be extinguished when it becomes possible and safe to shut off the gas supply to the leak.

3.9 Because the tanks are protected by mounding there is no potential for flame impingement on the storage vessels; only on the pipework. Of that pipework, the most (frequently) at risk facility is the loading bay for the LPG tankwagons. For that reason loading is done under a spray cage where the water flow is activated by loss of air pressure in the pneumatic air tube clipped to the cage water pipes and LPG load out pipework. A fire anywhere within this facility will activate the water spray. As noted the intention is to keep plant cool and well under the designed failure temperatures of the steel, and not to extinguish the fire. Activation automatically triggers a NZ Fire Service callout, notification to the security company and to on-call staff.

3.10 The other at-risk time (less frequently) is when a tanker is alongside the wharf. Again the fire protections in place are well able to cope, as are the protections in place to limit the extent of a gas leak that could potentially lead to fire.

3.11 In summary, fire is not in my opinion a significant issue. The potential for fire to impact on the Zone is negligible; the risk is from anything other than a minor leak, the potential though for such a leak is similarly negligible and limited in capacity.

3.12 The Liquigas Depot storage consisting of mounded tanks are controlled under HSNO by AS/NZS 1596 which document the separation distances stipulated do not alter with the capacity of gas stored.

3.13 To put that in perspective should there be a need for the Stadium or Tertiary Buildings to have an LPG tank installed to satisfy the energy needs of the facility, a belowground or mounded LPG tank could be placed with exposed pipework in the turret on top of the tank 6 metres from the proposed building and 3 metres from any Low Intensity Land Use – the carpark - under the HSNO Gazetted Control requirements in AS/NZS 1596. This would be compliant with the relevant HSNO legislation. The capacity of the tank would be irrelevant – provided it was underground or mounded and covered by sand or other approved fill.

3.14 Those same separation distances equally apply to the Liquigas Depot today in terms of HSNO compliance. It is noted that the distance from the nearest Liquigas Depot boundary to the Stadium is 70 metres, with the closest tank located 125 metres inside the Liquigas boundary and therefore the distance from the closest tank to the closest proposed building in the Zone is estimated by Liquigas at 195 metres.

3.15 Under the RMA, Rule 17 of the DCC District Plan identifies the relevant matters in: Issue; 17.1.6, Objective; 17.2.2, Policy; 17.3.8 and Methods; in 17.4 mainly 17.4.6 with the end result outlined in 17.7 Anticipated Environmental Results. The Plan allows the use of Codes of Practice and other documentation in consideration of any application, specifically the

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Ministry for the Environment sponsored Hazardous Facilities Screening Procedure (HFSP) of which I was a peer reviewer.

3.16 The major control on mounded tanks storing LPG is contained in:
Rule 17.5.2 Controlled Activities

3.17 The following activities are controlled activities:

- Single vessel tank storage of LPG and *the storage of petroleum fuels* (including LPG) *in underground storage tanks* (my italics and identification) are controlled in respect of:

a. Location and design of storage tanks.
b. Monitoring systems.
c. Emergency response plans.
d. Site security and containment.

3.18 Unless there are circumstances that would suggest there is an increased risk due to the design or layout of a facility, the assessment matters required to be looked at under Rule 17.5.2 can be deemed to have been met through compliance with the HSNO Controls by way of the AS/NZS 1596 separation distances.

3.19 In discussions with Liquigas it was agreed that the capacity of the aboveground pipework constituted the majority of the risk not the capacity of the mounded storage. If the facility stored LPG in mounded tanks for the purpose of reticulating gas to the city, for example, with little in the way of aboveground equipment containing gas (liquid or gaseous phase) the risk profile would be reduced to the point where the separation distances in AS/NZS 1596 could be appropriately applied.

3.20 The Liquigas facility was prior to 1st April 2004 monitored by the Dunedin City Council through the Dangerous Goods Licensing regime. The Facility on commencement of HSNO has been subject to the requirements of the Environmental Risk Management Authority (ERMA) for certification (see Appendix 2 for further details). The Dunedin City Council has access to the ERMA database to continue to monitor the safety of the facility.

LP gas / LPG liquid leak

3.21 Given that there is no difference between petrol vapour and LPG vapour to a gas detector; a gas leak of the same order of magnitude as a petrol tanker filling an underground tank on a service station forecourt (by displacing vapour with liquid petrol) and even the filling of a car displacing approximately 60 litres of petrol vapour from the fill point of the car would trigger the gas detectors and an emergency alarm at the Liquigas Depot.

3.22 That alarm would necessitate an evacuation radius of 50 metres – well able to be contained within the property boundaries and with no impact on the Zone other than perhaps the smell from the Methyl Mercaptan stenching agent.

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3.23 It can be seen from the above example that the gas detection controls in place at Liquigas are particularly sensitive set well below what would constitute a serious risk. The difference is that a service station is what is termed an open system where vapour discharge is acceptable. The Liquigas gas management system is a closed circuit where small leaks are required to be detected to ensure they do not presage a developing problem.

Major LP gas / LPG liquid leak

3.24 Given the extensive safeguards required for facilities of this nature it is difficult to foresee a major gas or liquid leak scenario ever being an issue. Not only are the protections in place and operate automatically, they can be manipulated through the Control Room computerised system. They are regularly and professionally maintained to a standard no less than the specifications when new, indeed in most cases offering a far greater degree of control than the original specifications.

3.25 In the unlikely event that such an event did occur, it could only happen as a result of the catastrophic failure of one or more of the pressure vessels. In such an event, the planned evacuation (or at least consideration area) radius for a major leak is one kilometre. This evacuation distance is illustrated quite dramatically in the attached NZFS Tactical Plan. Not only would the proposed new zone be affected but most of the industrial area on the seaward side of the railway line, the Railway Station, Logan Park High School, the Teachers College, many of the University Faculty buildings and University Student Halls of Residence. As a significant life risk in the area, only the Hospital escapes, although it is noted that it is right on the boundary of the evacuation area.

3.26 Such an event is a scenario on the scale of a significant Civil Defence Emergency. The original risk assessments for the facility done as part of the application to Council prior to installation of the plant identified such a failure as being well within acceptable parameters for an extremely low likelihood but catastrophic consequence event. It is however accepted that the methodology for such risk assessments has evolved over the intervening 20 years and accordingly it may be appropriate for such an assessment to be updated.

3.27 Recent discussions with the NZ Fire Service at senior management level indicate that should such an untoward event take place it would be usual to consider “evacuation in place". That is any patrons in the Zone would be asked to remain – with suitable entertainment provided – for the duration of the emergency. It is noted that this has already happened at Carisbrook during a serious petrol vapour incident at a local service station which the report author was involved as part of the Hazardous Substances Technical Liaison Committee (HSTLC) and Emergency Services Coordinating Committee (ESCC) response. The practice follows standard operational procedures developed internationally by Fire Services for the control of large crowds.

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Emergencies Involving:

a. The New Zealand Oil Services (NZOSL) facility (BP Depot; corner of Parry Street; and the adjacent;

b. Bitumix (Works Infrastructure) Depot, corner; Parry Street / SH 88;

c. Chevron (Caltex) and Shell Depots, corner: Fryatt Street / Wickliffe Street; and

d. Bitumen Sales (Fulton Hogan) Depot, Fryatt Street.

3.28 It is considered that the potential effects on the Zone from a serious fire or spillage at either the NZOSL Depot or the Chevron / Shell complex would be minimal. The effects would be limited to a smoke plume. This is however not to downplay the seriousness of smoke on a large crowd but the situation is manageable through normal NZ Fire Service Standard Operation Procedures and the Stadium's Approved Evacuation Scheme.

3.29 During a HAZOP Study at the NZOSL Depot at Mt Maunganui 18th October 2007 I had the opportunity to discuss the Buncefield disaster with BP's Australasian Engineer Wolfgang Peters who is responsible for risk management at BP sites in the region. The Buncefield fire occurred when a high level alarm in a depot fuel tank failed to identify the tank as being full, the filling was not monitored by staff, a vapour cloud ensued that on ignition resulted in a major fire. It was his considered opinion that the 'engineered in' safeguards and hands-on product management in New Zealand liquid fuel facilities as well as the composition of petrol having a lesser butane component than in the UK rules out a similar transition to detonation and conflagration as occurred at Buncefield. From my international studies into these phenomena I would concur with that view.

3.30 The discussions with the operational and compliance management personnel at Bitumix and Bitumen Sales identified no emergency scenarios that would impact on the Zone other than again the potential for a smoke plume impingement.

4. Further Investigations

4.1 Although I am satisfied that there is sufficient understanding and knowledge of the risks to be able to conclude that an increase in the number of person in the area due to the Stadium patronage is acceptable, discussions with Albert de Geest CEO Liquigas Limited and consultants employed by that company have resulted in an agreement between the Carisbrook Stadium Trust and Liquigas to proceed with a more formal investigation to obtain a quantification of the likely risk. An assessment team will be set up comprising the persons outlined in Appendix 3 with the aim of updating the risk scenarios using modern risk calculation methodologies against the background of current and proposed changes to New Zealand Fire Service Standard Operation Procedures (SOPs) and the interaction of modern legislation.

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5. **Overall Conclusion:**

5.1 Although an agreement has been reached to undertake a formal risk calculation based on modern methodologies inevitably such assessments are founded on professional opinion and experience.

5.2 From the perspective of my involvement with all of these facilities over some 27 years in various capacities it is my considered professional opinion that the integrity of design, commitment to maintenance and improvement programs together with the competence of staff at all of these facilities leads me to believe that the risk is an acceptable one. The weighting factors to be taken into account in arriving at any calculation should be at the end of the scale favouring the safe and well managed facilities that they are.

5.3 It is my considered professional opinion that a Zone change to allow the placement of a stadium and educational facilities in the proposed location is appropriate considering the activities being proposed and the surrounding land use.

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Appendix 1

The New Zealand Fire Service Tactical Plan number L24 dated 23.06.1998

TACTICAL PLAN

PLAN NO. L24

NEW ZEALAND FIRE SERVICE
OTAGO AREA - DUNEDIN

1. NAME AND LOCATION

Liquigas Ltd
254 Fryatt Street
DUNEDIN

REVIEWED
DATE: 23.6.98
SIGNATURE:

2. RESPONSE

	Structure Fire	Gas Leak
1st Alarm:	4 Pumps Ladder	Green Alert 2 Pumps
2nd Alarm:	5 Pumps Ladder Command Unit	Yellow Alert 4 Pumps Command Unit Hazmat Unit Advice HSTLC Civil Defence
3rd Alarm:	7 Pumps Ladder Command Unit	Red Alert 6 Pumps Hazmat Unit Command Unit HSTLC Civil Defence

3. ROAD ACCESS

(1) From South - Fryatt Street

(2) From West - Wickliffe Street

4. WATER SUPPLIES

(1) Fryatt Street - 38 l/s

(2) Wickliffe Street - 51 l/s

(3) Static Water - Waters of Leith and Otago Harbour

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5. OPERATIONAL TACTICS

(1) SOP32 LPG Procedure confirm leak or fire and wind direction.

(2) Command Point at Shell Oil to rear over bridge.

(3) Initially two pumps to Fryatt Street entrance.

(4) Further pump to Leith wharf pump house.

(5) First arriving officer detail one man to standby wharf monitor control panel

(6) Officers proceed with further man to plant controlroom to liaise with plant supervisor. Control room contains full plant schematics and drawings

(7) Ensure multi inlet ground monitors available for dispatch to incident.

(8) When ship alongside, activate wharf deluge monitors from the control room. The ship will be actioning emergency procedures to leave the berth if possible

NB: In easterly conditions appliances approach upwind from Leith wharf.

6. SAFETY AND HEALTH

(1) Appoint Safety Officer.

(2) Personnel not to use brigade UHF or VHF radios within compound. Use only liquigas intrinsically safe communications equipment. Situated in control room

(3) No electronic equipment (~~including~~ ex watches) to be taken into compound.

(4) Identify hazards to personnel and public.

7. DESCRIPTION OF COMPLEX

13 x 100 LPG storage tanks buried in 3 mounds. Administration Block 2 storied timber framed structure.

8. LIAISON PROCEDURE

(1) Liaise with Liquigas personnel (20 minute response time after hours)

(2) Liaise with other emergency services and depending on the situation HSTLC and Civil Defence.

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9. EVACUATION / IN PLACE PROTECTION

(1) Extensive Gas detection and water spray protection with booster pumps on site. 18 x 70hoses on site NZFS certified.

(2) Evacuation for minor leak is 50m and for major leak is 1km.

10. AUTOMATIC ALARM / ALERT UPGRADING

No automatic upgrading in place. Upgrading of incidents must be registered.

11. ATTACHMENTS

Risk Plan
Evacuation Maps.

PLAN APPROVED

CHIEF FIRE OFFICER _____ DATE _____

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LPG INSTALLATION

LIQUIGAS
FRYATT ST
DUNEDIN

L24

EVACUATION AREA

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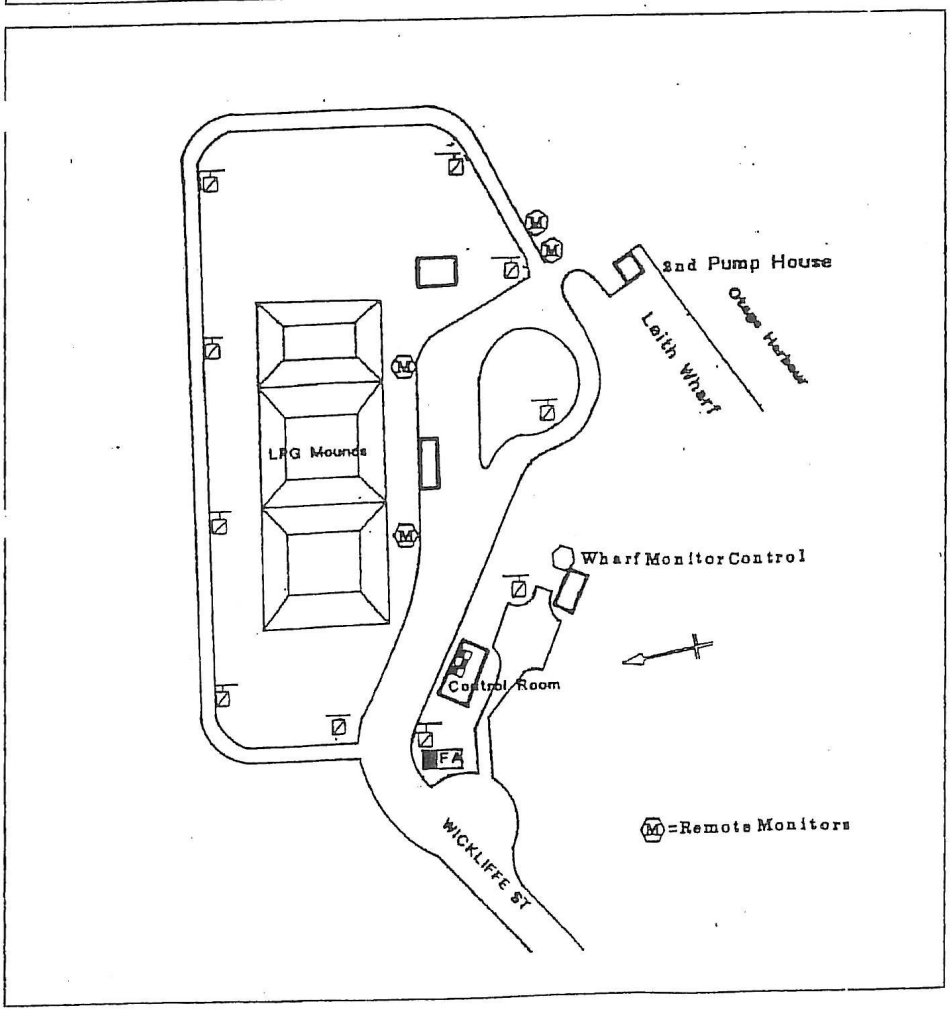
ZONE 2116	PFA No. 610294, 610221	PLAN No. L24

PREMISES AND ADDRESS	LIQUIGAS LOWER FRYATT STREET DUNEDIN
USED FOR	BULK STORAGE AND DISTRIBUTION OF LPG
ALTERNATIVE TACTICS	REFER TACTICAL PLAN



FSC360

RISK PLAN

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LOCATION OF THE FOLLOWING:

SWITCHBOARD	GAS	WATER	VENTILATION
Control Room - ~~Wickliffe St~~ 254 Fryatt St	See Hazards	Page 3/11	Natural

DISABLED PERSONS	None Reported ✓
EVACUATION SCHEME	Evacuation map attached - consider early implementation
OCCUPANCY	3 ± Staff - unless other persons on premises for maintenance ; these will be noted in the visitors book in the foyer
EXPOSURE RISKS	Wide area of exposure risk during incident - especially if LPG tanker is at berth
BUILDING CONSTRUCTION	2 storied Concrete and Timber Construction Budget + Iron Roof
PRIMARY WATER SUPPLIES	Fryatt Street - 50 l/s

SECONDARY WATER SUPPLIES

Supplementary:	Wickliffe (o/s Europa) - 43l/s
Alternative:	Liquigas Pumps on Oil Wharf boost from Harbour
Static:	N/A

HAZARDS

(1) 13 x 100T tanks
(2) Early securing and evacuation a priority in any leak or fire situation
(3) No ignition sources - including ~~watches~~ phones, radios, etc - consider entire area sensitive
(4) LPG Tanker an added hazard if berthed during incident
(5) Wind direction significant

REVIEWED BY DATE REVIEWED

ACTION REQUIRED

APPROVED DATE: 23-6-98

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Appendix 2

Liquigas

Constructed early 1980's on reclaimed land. Port Otago Lots 2,3,& 6 DP 17945 Street address 254 Fryatt Street.

Original risk assessment for application to the Dunedin City Council under the Town and Country Planning Act indicated no effects off site and a likely risk of catastrophic failure identified by the applicant's engineer as within acceptable parameters.

Installation consists of 13 x 100 tonne vessels in three mounds: 5 tanks in mounds 1 & 2 and 3 tanks in mound 3. Tanks are at ground level with 1 metre of sand cover and surfaced with a decorative (only) rock cover.

Tanks measure 3.6 metres diameter x 20 metres length with 2 domes and 1 x manway accessed from the walkways on top of the mounds.

The tanks and high pressure pipework are subject to annual audit and inspection with 10 yearly internal inspection in accordance with the Health and Safety in Employment (Pressure Equipment, Cranes and Passenger Ropeways) Regulations 1999.

They are additionally subject to an annual Location Test Certificate in accordance with the Hazardous Substances and New Organisms (HSNO) Act 1996; pursuant Regulations and Controls Gazetted in Gazette Notice Number 35 – Environmental Risk Management Authority; Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004 (as amended 8th August 2006).

Also in accordance with the above HSNO legislation each of the 13 x 100 tonne tanks shall be issued with a Stationary Container Systems Certificate (SCSC).

These current controls replaced the Dangerous Goods Act 1974 Licensing Fees Regulations and Class 2 – Gases Regulations 1980 through transition periods dating from 1st April 2004.

The original approval for construction and licensing was issued by the Chief Adviser to the Chief Inspector OSH Explosive and Dangerous Goods Department of Labour in accordance with s. 15 of the above Act; and from then till repeal, licensed by the Dunedin City Council. Through the transition period the DCC file DG licenses were rolled over by the Environmental Risk Management Authority (ERMA)

The vessels and pipework are protected by active and monitored cathodic protection. The pipework from the top of the mounds to and including the water spray protected road tanker loadout cage, and the marine tanker wharf and pipework are pneumatically monitored for fire condition with pressurised, low melting point air hose run parallel to, and clipped to the pipework. Any failure caused by fire, mechanical damage or leak automatically triggers a fire condition and callout by the NZ Fire Service.

As well as the spray cage identified above, the facility including the tanker wharf are protected by fixed, remotely controlled monitors fed from 2 x Diesel fire pumps

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delivering 135 l/s and 1 x secondary fire pumphouse on the wharf delivering 270 l/s at 10.5 Bar. The system feeds aboveground hydrants spaced at 60 metre intervals.

The DCC issues the Building Warrant of Fitness (BWoF) from the IQP's report on the fire systems, the thermal, smoke, gas and manual alarms, emergency lighting, escape signs, handheld extinguishers and backflow preventers.

The NZ Fire Service operational crews conduct exercises using their own and as part of the equipment checks; the Liquigas fixed fire fighting installations regularly.

There is a requirement under the Hazardous Substances (Emergency Management) Regulations 2001 for an annual exercise covering all reasonably likely potential emergency scenarios. The records of the exercise(s) shall be kept for 2 years and are able to be audited by the Department of Labour (DoL) s.97 warranted HSNO Enforcement Officers and the Ministry of Commerce Energy Safety Services (ESS) Department also a HSNO s.97 Enforcement Agency.

The DCC monitors by way of their enforcement officer Peter Woods who is dual warranted under HSNO and the Resource Management Act 1992.

The facility was subject to a Hazard and Operability Study (HAZOP) attended by the author 21st May 1992 to assess any potential impact of the depot becoming a 24 hour operation. The changeover occurred on October 1992.

The depot is manned by a staff of 3 during the day, and the intention was to automate the system such that tankwagon drivers could access the facility at any time with swipe cards and fill their load tanks under the spray cage. There is a deadman switch fitted and linked to the alarm system. The loadout is computer controlled to fill the wagons to 89% - temperature dependent; at <5ºC the load is limited automatically to 87% to allow for sufficient ullage space to accommodate travelling through Central Otago on a hot day after loading at night in cold conditions. The final check is by way of a weighbridge.

The facility is regularly patrolled by a security firm who also monitor the alarm conditions.

Discharge of gas to air – the practical aspects of which are detailed in the enclosed correspondence – include the following:

From relief valves:	0.05 litres of gas / month
Roadtanker drybreak couplings:	0.1 litres per loading; 4 x / day
MOT Tank test:	0.5m³ / year at 1 x tank test / year

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Appendix 3

The assessment team agreed to includes:

George Hewitt
ERMA New Zealand
P O Box 131
WELLINGTON

Ph: 04-9184806
Email: george.hewitt@ermanz.govt.nz

It is proposed George will review the risk calculations done originally at the time of the Liquigas plant proposal. It is appreciated that the methodologies for arriving at these assessments have evolved in the last 20 years. It needs to be shown that the risks today remain acceptable in view of proposed extensions to the Liquigas plant and the impact of the Stadium proposal with the introduction of a significant population centre.

Norbert Schaffoener
Resources - Hazardous Substance and Resource Management Consulting
P. O. Box 60 342,
Titirangi
AUCKLAND 0642,

ph: 09-818 4950
fax: 09-818 4951
email: norbert@resources.co.nz

It is proposed Norbert will address Landuse Planning issues including the interaction between the RMA and HSNO. This will be looked at from the perspective of issues surrounding a District Plan change to allow the Stadium on this site in such proximity to the Liquigas facility and the Oil Industry Depots in the area including the issues of societal risks from having a significant public use facility close to major hazard facilities.

Daryn Glasgow M.I. Fire E
Fire Engineering Unit
National Headquarters
New Zealand Fire Service
P O Box 2133
WELLINGTON

Daryn will review operational matters of relevance to emergency services operations including potential evacuations and risks to all facilities and population concentrations adjacent to the Liquigas site having regard to increases proposed by Liquigas Limited to the quantity of LPG on site in both mounded tanks and a cylinder fill installation with cylinder storage either on or off site.

John Herd
Test Certifier
Haz Subs Certification Limited
1695 Main South Road
Wakefield
NELSON

ph: 03 5418859
cell: 027 6888200

John is a Test Certifier and ex Senior Inspector OSH E&DG with Chief Inspector's delegation and the only person with such background not currently involved in the Test Certification of Liquigas assets. John will address the matters relevant to HSNO today against the historical background of the original s.15 Chief Inspector's approval dating from the now repealed Dangerous Goods Act 1974.

Appendix 4

Qualifications and experience

- Director of Envirocom (NZ) Limited, a company Incorporated 30.10.2002 for the purpose of offering test certification and compliance training under the Hazardous Substances and Organisms Act 1996 and for general consultancy relating to hazardous substance consenting and compliance under the Resource Management Act and Building Act.

- Approved test certifier under the Hazardous Substances and Organisms Act 1996 relating to all hazardous substance classes in common use in New Zealand (except explosives). Approved for the issue of Location Test Certificates, Stationary Container Test Certificates, and Approved Handler Test Certificates.

- Training provider to Department of Labour and Ministry of Health

- Contracted to Department of Labour as a HSNO warranted enforcement officer

- Auditor and member of Ministry for the Environment review for the disposal of agrichemicals

- Advisor to the Minister for the Environment (The Hon Marian Hobbs) on HSNO related matters 2002 - 2004

- Senior-Dangerous Goods Inspector with Dunedin City Council 1991- 2004

- New Zealand Fire Service 1974 - 1985 rising to rank of qualified Station Officer 1985

- Royal New Zealand Naval Volunteer Reserve 1973 - 1975.

- New Zealand Army 1968 - 1972 with active service Republic of South Vietnam with bomb disposal, medical and diving qualifications.

Professional Memberships

- Member of the Institution of Fire Engineers. Past NZ Branch Councillor

- Otago/Southland Hazardous Substance Technical Liaison Committee.

- Emergency Services Coordinating Committee.

- Adviser to University of Otago Board of Studies.

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- Member NZ Institute of Hazardous Substance Management I. P. President
- Member NZ Institute of Safety Management (by peer review)

Professional Qualifications/Courses Completed

- HAZX405 Basic Toxicology A+ 2003 (Otago)
- CHEM477 Management of Chemical Hazards A+ 2001 (Otago)
- Man and the Environment B- 1977 (Otago)
- Institution of Fire Engineers; Preliminary Certificate 1974, Graduate 1978, Member 1981. Membership optional papers in Fixed Installations, Aero Fire Studies and Building constructions 1993
- Shell Oil NZ Limited / NZ Local Government Association Study Award 1995 UK and Europe; included attendance at Coastguard Agency Marine Pollution Control Unit Course. Masters level credits for University of Leeds Course "Explosion Prediction and Mitigation in Congested Volumes."
- Certificate of Attainment Christchurch Polytechnic in Building Control Cross Skill Inspection 1998 with distinction.
- Growsafe Introductory: Agriculture ITO 2003 and 2006

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