Alistair McNab

Extract of first statement for ease of reference paragraphs 65-88

65. The law required ICL to have competent advice. A competent risk assessment should have identified LPG as a major hazard and the ageing pipework as needing further assessment, particularly given the amount of HSE advice on the subject. ICL knew about our advice on the pipework, and had they managed health and safety as Mr Stott promised me, then they should have dealt with the pipe at the necessary time after 1992, based on Competent Person advice.

66. I understand the Calor Gas tanks were later replaced by a single two tonne and gas supplied by another gas company. It is not clear to me why ICL and the new supplier reinstated a single 2 tonne tank, given John Ives letter of 8/9/88 **[ICL11444 - 11445]** and all the HSE concerns about LPG. This should have triggered risk assessment, pre-commissioning checks and a maintenance scheme per HSG 34 **[ICL/01272 – 01312].** Discussion between supplier and user about the condition of the pipework to which the gas tank would be connected would be logical and good practice, but also there are legal duties on gas suppliers via HSWA S6 **[ICL/04618 – 04691]** and S3 as well as on ICL (depending on the ownership of the pipework).

67. As explained in my CV attached to this statement, since my 1992 inspection, I have gained more detailed knowledge and experience of major accident hazards, including LPG and pipework than I had in 1992. In particular BP Grangemouth investigations and related work, has given me insight into pipework maintenance problems which suggest that ICL was by no means unique in failing to maintain pipework infrastructure. My opinion is that there is also important context to help explain why HSE Inspectors did not fully recognise the pipework issues compared to the BLEVE potential from the tanks.

68. ACDS (Advisory Committee on Dangerous Substances) **[ICL/03834-03855]** annual fire and explosion statistics for 1991/92 (approved by ACDS in

1993 and sent to Inspectors in May 1994) stated in paragraph 12 **[ICL/03835]** that there was a 10% fall in fires and explosion notified. LPG was 6% of total incident with three fatalities out of 18. Other flammable gases (mainly natural gas for home use) was 24% and flammable liquids 33%. The conclusion was "ACDS is invited to note these data and agree that they do not indicate the need for any new initiatives".

69. By 1992 there was little national evidence of problems arising from LPG pipework, compared to natural gas. This was probably due to the larger mileage of natural gas pipelines and pipework and that LPG pipework was relatively newer, vapour pressures were generally relatively low, pipe corrosion was generally a slow process and in any case a high proportion of LPG pipework was not buried underground.

70. The HSE investigation by John Powell of the Lightweight Body Armour, Daventry, explosion in 1987 (which I only found out about around a year ago) involved corroded underground pipe, albeit at a higher pressure than typical vapour pipes. This was a real missed opportunity by the LPG industry, and relevant HSE headquarter sections (such as Safety Unit) in my opinion. Other HSE witnesses will be able to explain the relevant "HQ" sections dealing with LPG, and their liaison role with LPGA. Lessons learned should have resulted in a review of underground pipework strategy and an alert via LPGA to other companies **[Lightweight Body Armour Ltd report: ICL/9409- 9423].**

71. Had I and other front line Inspectors been informed about the incident then there is a possibility we may well, collectively and individually have taken a different line with the ICL pipework, based on Alan's original recommendation to enforce excavation and replacement if ICL or Calor could not properly demonstrate its safe condition. HSE in that era used to regularly send out this sort of information to Inspectors following incidents. The line to take on u/g pipework should have been clarified to the operational Inspectors, by the relevant HQ sections which John had copied his report to. Personally I did take note of such HQ communications and professionally would apply them at relevant inspections.

72. In my opinion, and with hindsight (based on my greater knowledge now of pipework arising from my COMAH work), the multiplicity of LPG guidance, industry standards, Codes of Practice and internal HSE guidance hindered not helped Inspectors. Allied with this was confused and, at times, contradictory messages between different pieces of guidance about pipework examination and resting. HSE moved control of the guidance to industry after HSG 34 **[ICL/01272 – 01312]** and Inspectors had to rely on the industry Codes, but with less clear HSE commentary and enforcement line to take. It can only be speculation that clearer guidance would have resulted in different action by Inspectors, but HSE now has issued clearer guidance for a reason.

73. I am aware that HSE has critiqued all of the external LPG guidance from 1959 to 2004, thus I assume that other HSE specialist policy and safety unit witnesses will explain in detail this extensive history of external guidance on LPG and the clarity of relevant internal HSE guidance they generated for Inspectors. I would point to the documents listed below, in particular, to back up my opinion regarding confused and unclear messages about liquid and vapour pipework examination and testing. Messaging on pipework in basements is unclear also.

1. FIC 286/43 (revised) "Underground steel pipes conveying LPG as a liquid" dates 10 November 1983 **[ICL/1041-1043]**

2. HSG 34 paragraphs 74 onwards and 182 – 191 **[ICL/1293-1312]**

3. OC 286/14 dated 22 November 1995 "Pipelines for conveying LPG liquid and vapour" **[ICL/ 9424-9428]**

4. OM 1998/114 "Guidance on the storage of LPG" dated 4 December 1998 **[ICL/9430-9433]**

5. Code of Practice 1 Bulk LPG storage at Fixed Installations, Part 3: 2006" "Examination and Inspection" (first printed May 1988, revised November 2000 then September 2006 **[ICL/9434-9479]**

74. My position is best summed up by contrasting earlier guidance listed above with the greater clarity of the 2004 guidance for Inspectors **[HID SLC/2004/26 dated 23 November 2004 "Developing an inspection strategy to ensure the ongoing external integrity of buried metallic LPG pipework": ICL/9480-9489]**. The SLC was aimed at HID Inspectors although FOD Inspectors are on the circulation list.

75. Paragraph 3 **[ICL/3558]** refers to the LPG explosion at the Daventry firing range (December 1987) rather than ICL as ICL was sub judice at time of issue. Paragraphs 19 and 20 **[ICL/3562-3563]** are akin to the ICL situation. Paragraph 26 **[ICL/3564]** states it is not considered good practice to excavate a live pipe. The advice rightly recommends the use of a competent person to risk assess the pipe installation history and the test and examination regime to conclude if it needs replaced or not. The 1990 agreement on pipework was in line with this current guidance by seeking competent person advice from Calor, riser condition check and pressure testing.

76. The major accident hazard from LPG did not change at ICL, but the HSE inspection strategy for LPG as a major hazard at non – COMAH sites did sometime after my 1992 visit. The LPG hazard had been inspected frequently up to 1993, then not for the next 10 years, which meant that the ICL/Calor assertions that the pipe was safe in 1990 – 1992 was not re-checked. Other HSE witnesses will be able to explain how and why the Revitalising Health and Safety strategy changed prioritisation in FOD, as I had moved to HID during that period.

77. Revitalising was a necessary refocusing of scarce resource in FOD onto the most statistically significant causes of death, injury and ill-health, while retaining Inspector ability to intervene on matters of evident concern.

"Revitalising" also had a target for HSE to prevent major incidents with catastrophic consequences in the major hazard industries, but I do not know why HSE applied the target to HID but not FOD.

78. HID continued to inspect LPG at both COMAH and sub-COMAH sites, and dealt with the gas companies at national levels.

79. Irrespective of any changed strategy from HSE, the legal duty remained on ICL and the gas suppliers.

80. Since my return to FOD in April 2006 as Head of Operations the national "Fine Tuning" review has reported. The approach to LPG and other matters of potential concern such as legionella (legionnaires disease) has been reviewed, clear instructions on LPG pipework have been issued and refresher training will be given to Inspectors.

81. In March 2006 **[Checking Industrial and Commercial LPG pipework:ICL/9490-9509]** HSE issued the pamphlet to commercial and industrial users and emailed senior operational and industrial managers, publicising the leaflet and the problems with ownership of LPG pipework. It also refers to the LPGA being in the process of finalising a Technical Memorandum covering risk based inspection strategies for LPG pipework.

82. HSE had increased focus on pipework prior to the ICL explosion, and increased awareness starting with a speech I gave at the US Process Safety Conference in 2001 **[ICL/9510-9516]** to which UK companies such as BP attended. The article in part 6 **[ICL/9514]** explained that Revitalising Health and Safety includes a target for HSE to "prevent major incidents with catastrophic consequences occurring in the high hazard industries". Part 5 refers to pipework **[ICL/9513].**

83. Industry creates the risk, and legally has to manage it. From my experience with major hazards since 1999, the evidence is that pipework had been largely forgotten about by industry – out of sight – and out of mind. It

had not featured properly in maintenance schemes and often had not been included in Pressure Systems Regulations W.S.E., particularly lower pressure pipework. That was the published conclusion in my BP Grangemouth Report of 2003 **[ICL/9430-9433]** which could be considered as the UK onshore date of knowledge for the onshore chemical industry of HSE concerns. From the lessons of BP and other major incidents, HID initiated a special pipework initiative.

84. The HID onshore national project on pipework started with the 9 UK Refineries in the 2002/3 workplan, reported in September 2004 and confirmed maintenance problems. The follow-on project for non-refinery COMAH sites started during 2003/04 workplan and was scheduled for 5 years. Other parts of HSE, such as FOD, even if they had intended to or been resourced to follow suit on relevant non-COMAH sites would not have been able to put the issue into national workplans before the ICL explosion occurred. **[Tech Gen/33 Integrity of Pipework Systems Project – UK Refineries and AMcN/17: SPC/Enforcement/60 Chemical Plant Integrity: HID National Inspection Project 2003/4: ICL/9517-9556]**

85. So, HSE **had** reacted to evidence of emerging problems of ageing pipework infrastructure. Offshore, HSE and Oil company executives had launched the Step Change initiative to reduce the concerning level of loss of containment incidents, a percentage of which were pipework related. The pipework inspection strategy for COMAH sites also tightened up due to the lessons of the BP Grangemouth incidents in 2000. The national natural gas pipeline network replacement strategy was underway as a lesson from incidents culminating in the Transco major incident at Larkhall in 2000.

86. As a result of the increased HSE activity regarding pipework and liaison with the industry, it is my opinion that the major gas suppliers should have been aware of pipework as a major hazard issue including at sub-COMAH LPG sites and small bore underground pipe. They must have known pipework was ageing, much of it was over 20 years old and corrosion could be predicted in a percentage of an increasing incidence of leaks from

corroded pipework nationally (which if it did not ignite and cause incidents would not necessarily be reportable to HSE). This is the classic precursor to major incidents.

87. The Lightweight Body Armour explosion in 1987 should have been an early warning to the LPG industry. Organisations have no memory of the lessons of major incident history, according to Professor Trevor Kletz, a renowned expert in major accident hazards.

I confirm that the factual contents are true and the context and opinions expressed in this statement are well founded on practical regulatory experience.

Witness signature _____

Date_____

AD McNab
14 May 2008

ICL PUBLIC INQUIRY – ALISTAIR DOUGLAS McNAB: QUALIFICATIONS AND MAJOR HAZARDS (AND LPG SPECIFIC) EXPERIENCE

APPENDIX 1

Qualifications:

1. BSc (Hons 1st Class) in Science with Industrial Studies. Postgraduate Diploma from Aston University in Occupational Safety and Health. NVQ Level 5 in Middle Management. Chartered Health & Safety Practitioner member of the Institution of Occupational Safety & Health (IOSH).

1980 – 1992:

2. HM Inspector of Health & Safety since April 1980, inspecting, advising and enforcing in a very wide range of industries and services. In 1990/91, seconded to Greater Glasgow Health Board to advise the Board on health and safety management and costs of accidents. Latterly in the Chemicals Team run by John Ives, HM Principal Inspector of Health and Safety until promotion to HM Principal Inspector of Health & Safety in July 1992. Transferred to Carlisle outstation, dealing with companies such as BNFL Sellafield.

3. While not an LPG expert nor chemical engineer, gained practical regulatory experience of interpreting and applying HSE general and LPG specific Guidance, inspecting LPG sites, enforcement of the management of LPG risk by letter, Notices (eg safe carriage and cylinder filling from bulk tanks) and referral to the Procurator Fiscal. Investigated in 1983 a major fire with exploding LPG and oxygen cylinders at Burnthills Demolition Ltd, Floors Street, Johnstone when around 70 cylinders were involved injuring firefighters and putting the public at risk. Recommended legal proceedings to the Procurator Fiscal. Company pled guilty receiving the then maximum fine under HSWA of £1,000. Because of this incident, I have kept a particular interest in LPG throughout my career.

4. 12 years in West of Scotland inspecting many sites with "major hazard" chemicals such as chlorine and LPG (cylinders and bulk) in water treatment, shipyards, hospitals, brick factories etc.

1992 – 1996:

5. BNFL Sellafield – managed FOD team inspections in tandem with HSE Nuclear Safety Divisions of what was a major chemical site as well as nuclear.

1996 – 1999:

6. HSE Edinburgh dealing with variety of industries including paper mills and quarries. Managed Quarry Inspector interventions with quarry explosives and investigation of Flyrock major missile incidents.

1999 – 2006:

7. Specialised in major accident hazards at local, national and international level, mainly under the COMAH (Control of Major Accident Hazards Regulations 1999) permissioning regime. For LPG this means quantities above 50 tonnes classed as 'Lower Tier' and over 200 tonnes 'Top Tier'. Also I continued to inspect sub-COMAH quantity LPG.

8. Between April 1999 and April 2006 HM Principal Inspector in HSE Hazardous Installations Directorate dealing with onshore major hazard and chemical sites, including LPG storage up to refinery scale (thousands of tonnes), and with national Lead Unit role with BP plc and their subsidiaries including BP Gas, their LPG business. Managed the team inspecting the Calor Gas Grangemouth Top Tier COMAH site. Specialised in Landuse Planning around major accident hazard pipelines and COMAH sites. LPG specific experience included giving evidence to 2 public local inquiries for proposed development near the BP Forties pipeline in Bo'ness. The major 36" unstabilised crude oil pipeline. Unstabilised means containing LPG fractions which are stabilised ie removed at BP Kinniel, Grangemouth. In addition I dealt with Planning around the Stornoway LPG gas plant and harbour import LPG pipeline.

9. In May/June 2000 until February 2001, investigation leader for a series of major incidents at BP Grangemouth petrochemicals complex, one of which involved a fire from LPG fractions from pipework failure at a debutaniser tower, part of a Fluidised Catalytic Cracker Unit. BP PLC reported to the Procurator Fiscal and in 2002, BP pled guilty and were fined £1m. Managed HSE national interface with BP plc, London and tracked BP Grangemouth Improvement Plan 2000 - 2005.

10. Lectured and published an article based on the lessons from BP Grangemouth and other UK refineries, for the 17th Annual International Conference on Risk, Reliability and Security run by the US Center for Chemical Process Safety in Jacksonville, Florida 8 – 11 October 2001. Highlighted the need to improve process safety and integrity management, in particular pipework infrastructure which was often out of sight, out of mind.

11. HSE managed publication of BP report onto internet for August 2003, which included a key recommendation to the chemicals/major hazards sector to improve process safety and integrity management. A specific recommendation was to improve the attention to and maintenance of

pipework. While the report was aimed at major hazard sites, the major gas companies like Calor and BP Gas, would have been able to read across to other smaller bore pipework on non-major hazard sites as well as COMAH sites.

12. Presented lessons **[date not located]** from BP to a meeting of CDOIF (Chemical & Downstream Oil Industry Forum) (which involved HSE, LPG Association, the CIA (Chemical Industries Association) and Trade Unions.

13. **Between 2001 and 2005** - managed (with HSE Process Safety Specialist input) the Improvement Notice action on BP Grangemouth to improve safety at LPG pressurised spheres and bullets containing thousands of tonnes of LPG (propane and butane). BP complied to the agreed standards via a programme of work over several years.

14. **October/November 2005** – attachment to the US Federal Chemical Safety and Hazards Investigation Board (CSB) in Washington to assist with the investigation into the BP Texas City major incident in March 2005 (15 dead and over 170 injured). Attended public meeting in Texas City. Met OSHA (US Regulator) in Houston. Peer reviewer for the CSB published report, and continued to assist them by email and by meeting in Edinburgh in 2006.

15. **27 June 2006** - following the CSB work invited to submit evidence on behalf of HSE to the US "Baker Panel" chaired by ex Secretary of State James Baker, which reported publicly on BP Texas City, BP safety culture and Directors action in January 2007.

16. **April 2006 to date** - Promoted to Head of Operations in Field Operations Directorate, and continued involvement with LPG. November 2006 - investigation of a major LPG explosion incident at a domestic property in Glespin, South Lanarkshire. The underground vapour pipe was corroded and leaking. Participated in national meetings with Company Directors and HSE topic and policy colleagues to pass the lessons on to the Trade Association for a review of national and individual gas company pipework strategy.

17. Continue to discuss and inspect the LPG topic. In recent weeks joint visited to a paper mill found bulk tanks not fully meeting the standards. Another visit to an engineering works with small bulk LPG spheres found that the company had replaced the underground pipe recently via a request from their Insurer. This was a welcome sign that the message on underground pipework is getting through.

ICL PUBLIC INQUIRY – STATEMENT OF ALISTAIR DOUGLAS McNAB

APPENDIX 2: PRODUCTIONS

AMcN/1	HSE Major Incident Investigation Report BP Grangemouth (Extracts) 18 August 2003.
AMcN/2	HSG34 "The storage of LPG at fixed installations" – Crown 330
AMcN/3	FIC 286/43 (Revised) "Underground, steel pipes conveying LPG as a liquid"
AMcN/4	ACDS - Advisory Committee on Dangerous Substances 1991/2 statistics
AMcN/5	HSE file bundle: Crown 221
AMcN/6	Specialist Report by Dr Gunn 1982
AMcN/7	HSC Permissioning Policy
AMcN/8	Mr Stott's letter replying to A McNab's letter
AMcN/9	HSE report into explosion at Lightweight Body Armour Ltd, Daventry
AMcN/10	OC 286/14 "Pipelines for conveying LPG liquid and vapour"
AMcN/11	OM 1998/114 "Guidance on the storage of LPG"
AMcN/12	Code of Practice 1 "Bulk LPG at fixed installations, Part 3: 2006 Examination and Inspection"
AMcN/13	SLC/2004/26 "Developing an inspection strategy to ensure the ongoing external integrity of buried metallic pipework"
AMcN/14	2005 Pamphlet "Checking Industrial and Commercial LPG pipework"
AMcN/15	Article for 17th Annual Process Safety Conference, Florida
AMcN/16	SPC/Tech/Gen 33 "Integrity of Pipework systems project – UK Refineries"
AMcN/17	SPC/Enforcement/60 "Chemical Plant integrity: HID National Inspection Project 2003/4