

## ICL INQUIRY STATEMENT

BRIAN WILLIAM FULLAM

### History of employment and education

1. I have worked for the Health and Safety Executive (HSE) for the past 31 years. I started in January 1977 in the Leeds office.
2. I have a degree and PhD in chemistry. For the first two and a half years after leaving University, I worked in the Royal Ordnance Factory at Bishopton, Renfrewshire as a shop manager running a rocket propellant plant.
3. After 18 months undergoing training in a general inspectorate group dealing with chemicals and printing I began work as a specialist Fire and Explosion inspector in the Leeds Field Consultant Group.
4. Subsequently, I moved into headquarters in Bootle and took up post in the LPG duty in October 1984. This role involved representing HSE as the national specialist in LPG. It also involved developing national standards and providing advice to both the industry and field inspectors.
5. In 1988, I left this role in headquarters to work on attachment for the Training Agency primarily in adult learning.
6. I returned to HSE in 1990 as the head of the North West Field Consultant Group. This involved managing groups of specialists, for example, mechanical engineers, occupational health experts, fire explosion specialists. The purpose was to deliver specialist scientific and engineering support to the frontline inspectors.
7. In 1992, I moved to a policy post and ran the Hazardous Installations Policy Unit. This involved developing policy and legislation relative to the control of non-nuclear major accident hazards.

8. In 1996 I moved to a new directorate, the Chemical and Hazardous Installations Directorate (CHID) having been involved in the establishment of the group. Paul Davies, the Director of CHID had his office in HSE's operational headquarters in Bootle but the majority of staff were located in HSE's regional offices. For six months I managed one of the regional Units before returning to HQ to take on a corporate technical role managing a corporate technical team and delivering the directorates IT systems. Part of my role was to develop CHID's technical resources developing suitable management arrangements and recruiting the staff, a mix of electrical and control systems engineers, mechanical engineers who were, specialists in pressure systems and process safety specialists. When, in late 1999, CHID was expanded to become the Hazardous Installations Directorate (HID) I became responsible for all corporate functions, relinquishing my technical interests.
9. In 2002, I moved out of HID to run the Corporate Science and Knowledge Unit which formed part of the then newly established Chief Scientists Office.
10. In October 2006, I returned to a specialist role in Process Safety as head of the Process Safety Corporate Topic Group. This is the first time I have returned to working on the standards for the safe storage and use of LPG since 1988. I am a Superintending Specialist Inspector. I am head of Unit 2 of the Corporate Specialist Division. I manage two corporate topic groups, the Process Safety Corporate Topic Group and the Electrical and Control Systems Corporate Topic Group. I am based in Leeds and I manage a team of approximately 15 people who are located in a number of different offices across the UK. Through frequent contact with colleagues in operational and policy groups, we can identify issues where a corporate approach, which we can provide, would be beneficial. There is also a more formal process of reviewing reports, analysing information on previous incidents and failures and agreeing a way forward, often through the medium of a technical seminar. The support we provide is discussed with and agreed by the operational and policy directorates. In HSE, Process Safety specialist inspectors are responsible for advising on the safe storage and use of flammable liquids, gases and solids, including the integrity of pressure systems, and the control of hazardous reactions. LPG is one of the flammable gases on which process safety specialists provide advice.

11. I am asked if the position of "topic specialist in LPG" still exists within HSE. This role does not exist in the form I held from 1985 to 1988 but the technical subject matter of this role falls under the responsibilities of the Process Safety Group. Some of the remit of the earlier role is delivered by the CTG and some by the newly established Liquefied Flammable Gases and Fire Knowledge Hub. The lead on the development of LPG guidance with UKLPG falls to the CTG. Until July of this year Penny Taylor was responsible for this work, which is now done by Ceri Petrie. The knowledge hub is responsible for developing detailed advice for inspectors on issues outside the scope of published guidance. The knowledge hub has only existed for the past 3 months and was established to meet a need identified by field staff.
  
12. The Liquefied Flammable Gases (LFG) and Fire Knowledge Hub is a virtual team, that is a team of individuals with an interest in, and knowledge of, the subject matter drawn from a number of directorates in HSE. It is led by Mr Iqbal Essa and includes three other process safety inspectors as well as others. The hub's scope encompasses not just LPG but other liquefied flammable gases and general and process fire precautions. The knowledge hub has done little work on LPG issues to date and knowledge hub work forms a small component of the work of each of members of the team. Mr Essa has 30 days allocated in his plan of work and each of the other three members from the process safety discipline has 10 days allocated.
  
13. I am asked about the remit of the knowledge hub. The knowledge hub, one of eight, was established to capture and develop the knowledge base on the control of risks associated with liquefied flammable gases and general fire matters that are the regulatory responsibility of HSE. A major role of the hubs is to enable experienced inspectors to pass on their knowledge and skills to other inspectors and to use their experience to develop solutions to more complex problems, capturing those solutions in a form that can be accessed by others. In this way, before experienced inspectors leave HSE they have passed much of their knowledge on to others.
  
14. The knowledge hub responds to queries that individual specialist inspectors cannot answer. They can refer queries to the hub by email or by talking to the hub manager. The members of the hub meet three or four times a year to

discuss requests for advice, develop solutions and identify areas where further work is needed. It is my role to prioritise the requests for further work and seek resources for it to be undertaken.

15. I am asked if the knowledge hub ever considers standards or guidance. Providing comments on externally produced guidance or standards is within the scope of the knowledge hub. The Hub would also be consulted on internal guidance but would not be responsible for preparing new HSE guidance. Experience shows that knowledge hubs are more reactive than proactive.

#### **Review of guidance**

16. I was shown HS(G) 34 [ICL/01272-01312], entitled "The storage of LPG at fixed installations". I was also shown and read FIC 286/43 and FIC 286/43 (revised) dates 1980 and 1983 respectively [ICL/01040-01043]. I would have been aware of these FICs and they would have informed the drafting of HS(G) 34.
17. A major part of my job in the period 1984 to 1988 was to review the current LPG guidance and revise it, ensuring that it reflected good industrial practice and that the standards within the guidance were scientifically valid. The role of reviewing and revising the LPG guidance no longer exists. I was allocated this role when I first moved into the duty in 1984 as a main grade inspector and it continued to be part of my role as principal inspector. It formed part of a wider role to review all HSE guidance relating liquefied flammable gases and update, review and revise that guidance where new knowledge or technical advances were identified. Once a revised document was published, it was normal to operate with it for a number of years before a further revision was considered. Others may have had a similar role subsequently but I have no knowledge of this.
18. The HSE guidance current in 1984 was: CS5 [ICL/01168-01187] published in May 1981 'The Storage of LPG at Fixed Installations' and 'Health and Safety at Work' booklet 30, 'The Storage of LPG at Factories' dated 1973 [ICL/00500-00530], CS6 'The Storage and Use of LPG on Construction Sites' dated 1981 [ICL/03879-03888].

19. To enable me to consult on the developing draft in accordance with HSE policy and practice I also established a liaison group with the LPG industry and other trade and professional bodies. I cannot now remember the exact make-up of the liaison group but it included representatives from the LPGITA, the Institute of Petroleum, the Institution of Gas Engineers and others. I would have wanted a representative from a small users group and not just representatives from the big suppliers and would have approached Association for Liquid Gas & Equipment Distributors (ALGED) for such a representative. The LPGITA contingent was led by their technical manager supported by representatives from the bigger companies such as Calor, British Gas, BP, Shell, Flogas, all acting under the LPGITA umbrella, but also protecting their company's interests. I chaired this group over about 18 months. This working group no longer exists. The working group provided a mechanism for interested stakeholders to review the draft guidance and provide their views. Before publication the document was seen and approved by the Advisory Committee on Dangerous Substances. HS(G) 34 was first published in 1987. I arranged for the document to be distributed to all HSE Offices.
20. I was asked if there was anything within my new post that involves a working group with interested stakeholders. There is not, although the CTG liaises with UKLPG, other relevant trade associations and professional institutions on a reasonably regular basis and comment to the organisations on guidance produced by them.
21. I was asked to consider the development of the guidance in HS(G)34 [ICL/1272-1312] and why it appears to have provided less specific acknowledgement of the need to consider old underground LPG pipes than the earlier documents, in particular FIC 286/43 [ICL/01040-01043]. The document included the essential guidance to be found in the FICs on buried LPG pipelines containing liquid but does not elaborate on pipes carrying LPG in the vapour phase. I cannot remember precisely why the guidance developed in this way but it would have reflected the perceptions in HSE of the relative risks from liquid and vapour LPG pipe-work. The revision started against the background of a major incident at the Pemex LPG Terminal in Mexico City in November 1984 where more than 500 people lost their lives following a major fire, which involved the violent rupture of a number of large

storage vessels. The initiating event was the rupture of an above ground pipeline carrying liquid LPG from a refinery to the storage site. This incident, the incident history in the UK, and incidents elsewhere in the world, as far back as the incident in 1966 at a French refinery at Feyzin indicated that the loss of liquid LPG was considerably more hazardous than the loss of LPG from vapour lines. The reason that LPG from liquid was perceived to be significantly more hazardous than LPG from vapour lines was principally to do with the fact that a leak of liquid will form a considerably larger flammable gas cloud than a leak of gas from the same size of orifice. One volume of liquid will give approximately 12,000 volumes of gas at the lower limit of flammability. It is for this reason that a liquid leak is more hazardous than a vapour leak, for the same size of leak you get a considerably larger flammable vapour cloud and it will be driven out at a pressure that is higher than found in most pipelines transporting vapour. At the time of the production of HS(G)34 the focus was on the principal hazards associated with the storage of LPG, that is the amount of inventory, the vessels in which it was stored and pipe work conveying LPG in its liquid state.

22. Whilst I cannot recall any detailed consideration of underground LPG pipe-work in relation to HS(G)34 I do have a memory of having agreed with LPGITA that detailed standards for pipe-work containing LPG vapour would be included in Code of Practice Number 22, [ICL/01448-01501] which was in the early stages of preparation at the time. I see that Code of Practice Number 22 says very little about inspection and maintenance and a lot about construction and the materials to be used in construction. As I was on secondment at the Training Agency between July 1988 and June 1990 I was not involved with LPG over the period the first edition of Code of Practice Number 22 was developed and issued.
  
23. I am sure that as part of the process of preparing this revised guidance I would have tried to capture the lessons learnt from any LPG incidents that had occurred and which HSE knew about. I cannot now remember any of those incidents nor the process by which that was done. As part of the process I got scientists in HSE's laboratories (the predecessor of HSL) to model the impact on LPG vessels of various sizes of fires at different distances from the vessels. I also got them to model the dispersion of releases of LPG from the vessel, modelling different sizes of leak to

determine whether the leak dispersed and was diluted to below the lower flammable limit within the separation distance.

24. The target audiences for the document were users and suppliers of LPG and field inspectors, for use during inspections. The document described good industrial practice, which had to be interpreted on the basis of individual circumstances. It established an interlocking package of controls which required expert interpretation where the circumstances deviated from those described in the guidance.
25. Paragraph 2 of HSG34 states that the recommendations should not be applied rigidly to existing premises. The thinking was that where an installation complied with previous guidance, but not all aspects of the new guidance, only those changes that were reasonable or essential for safety would be required. Implicit in the statement was a requirement on the occupier to undertake a risk assessment of the installation.
26. I would have expected inspectors to be aware of and use the guidance. This was because arrangements were in place in the Factory Inspectorate to provide the guidance to the individual inspectors most likely to use it. Each area office would receive a number of copies. Process Safety Inspectors would each receive a copy and regulatory inspectors would have copies made available to them. Inspectors were expected to refer to these when making an inspection.
27. In addition to the distribution, I personally ran a series of training courses for inspectors on the guidance in the document. I am fairly certain I also ran some workshops for the industry as well as a couple of industry seminars. I was asked how often workshops would take place. I cannot recall. I was asked if there were any workshops specifically in relation to LPG. There were. I also recall that there were more general training courses within HSE that looked at flammable materials, including LPG.

**ICL Plastics Ltd and ICL Tech Ltd**

28. I was shown a copy of Alan Tyldesley's, a specialist Fire and Explosion inspector, report [ICL/11446-11449] on a visit to ICL Technical Plastics Ltd. The report is dated 22/8/88 and refers to a visit paid on 9/8/88. I have read this report. Paragraph 6.11 is in my opinion the right recommendation to make.
29. My attention is drawn to my comment made above in relation to Mr Tyldesley's recommendations. I am asked if I have any comment to make regarding Mr Ives involvement. My only knowledge of Mr Ives' involvement comes from material before the Inquiry. As a general principle, I would have expected Mr Ives to follow Mr Tyldesley's recommendations unless there was good reason not to do so.
30. I was asked if I agreed with Mr Ives approach/compromise with Calor. Without any knowledge of the precise discussions between Mr Ives and the Calor representative, it is not possible to say what the nature of the compromise was. Mr Colville suggested examining the riser pipe and carrying out a pressure test. I understand that Mr Tyldesley was made aware of and agreed to that course of action. I do not wish to speculate on what Mr Colville meant by the letter nor on what Mr Ives or Mr Tyldesley thought the letter meant.
31. I appreciate that the pressure test on its own would be an issue as a pressure test is only as effective as at the time it is done. Mr Tyldesley identified that the only way of knowing about the continuing integrity of the pipe is to understand its physical state as well as to carry out a pressure test. A pressure test provides assurance that, over the period of the test, the pipe is not leaking but provides no information on the capacity of the pipe to continue to contain the hazardous substance. HS (G) 34 at paragraph 188 makes reference to the "*continuing integrity*" of the underground pipework, which is not demonstrated by a pressure test alone.
32. I would have expected, having considered Alan Tyldesley's recommendations, and in particular his concern about the condition and corrosion protection of the underground pipe, that, when advising ICL how to respond, Calor would have proposed steps which would have involved some

excavation, albeit perhaps limited, of the pipe. The letter does not explicitly mention excavation and to consider that excavation was part of what was proposed involved an assumption about the intentions of the author of the letter. If in fact those intentions did not include excavation of the underground section of the riser and simply examination of the riser pipe above ground and the pressure test in my opinion that did not comply with the then published guidance namely HS(G)34

33. Paragraph 6.10 mentions LPG pipe-work in the basement. In my opinion, this presented the most obvious risk of a leak within a confined space. There is insufficient detail on this for me to make a judgement on the state of the pipe and associated risk. However, I would have expected such a pipe to be routed out of the basement or to be of all welded construction.

#### **Dissemination of information**

34. I was shown a copy 13/1/88 of a HSE investigation report into an explosion of 14.12.87 in Daventry [ICL/11510-11522]. It involved underground LPG pipe-work and an explosion from leaking LPG. I have read this report and viewed the photographs. I did not see this report at the time and the incident occurred after the publication of HSG 34. If I had seen it I would have, in my HQ's role, distributed the information to all specialist inspectors in Fire and Explosion. By the time the incident occurred and the report was circulated, in 1988, HS(G)34 had already been signed off and published. As a single isolated incident where the cause of the failure was obvious, the lack of adequate corrosion protection, the Daventry report would not have been sufficient to cause me to revisit HS(G)34 even had I seen this in 1988. However, I would have filed the report as evidence to be considered when the guidance was updated or if there were any similar incidents.
35. In 1987, unless Daventry had come to me as a report it may not have been seen by anyone else other than those on the circulation list. I was asked if there was an informal protocol to send important document to headquarters? This was the case but it was not always followed.
36. Now, information is disseminated through HSE's IT systems. Individual Inspectors put reports of their visits onto the COIN database. Others can

interrogate the database but I currently do not have sufficient staff to do this. I was asked if the IT system is some sort of 'shared drive'. It is not. It is a database that operates from a number of servers across the country, with information being updated across them overnight and stored in a data warehouse. There is no mechanism for automatically bringing incidents to the attention of interested parties. Individuals are more likely to hear about smaller incidents through their own networking.

37. I was asked if I was aware of any proposals to change this. I am not aware of any.
38. I organise a conference for process safety specialists each year, usually in November, which provides an opportunity to share information on matters of interest. In addition, there is an electronic community of practice and interest for process safety specialists that permits people to post items of interest and seek advice. This facility is used regularly; however, it requires an inspector to identify an item that it is of interest to others and find the time to post it. I was asked if an incident such as Daventry would have been posted on the COPI. Yes, it would have been drawn to the attention of the process safety community as a matter of interest.
39. I was asked if any of these incidents would be brought to the attention of external stakeholders. During the investigation or any legal proceedings HSE is careful not to publish material that could prejudice any legal action. Where there is an imminent risk that a similar incident could happen at other establishments then a mechanism exists to publish a safety alert. Others may be better placed to provide more information on this point.
40. I have, in the past, required LPG pipe-work to be dug up. I cannot recall the details.

#### **Installation**

41. The word installation is not defined in relation to LPG. It could mean the vessel but it could mean the whole system including pipe-work but there is no legal definition I am aware of.

42. In 1988 I would have expected the LPG user to have a competent person to maintain and inspect their pipe-work. I would also have expected the supplier at least to check that the user had a competent person capable of installing the pipework to an appropriate standard and subsequently maintaining it.
43. I am asked to define competent person. I would define this as 'someone with the technical knowledge and experience to do the work to the specified standard in a safe manner'. As far as I am aware, competent person is not defined in the legislation or guidance. In relation to the installation of pipe-work a person registered with CORGI as capable of undertaking work with LPG should be competent to carry out those activities in a safe manner.

I confirm that the contents of this statement are true

Witness signature

Date