ORAL HEARING

PROPOSED LIQUEFIED NATURAL GAS (LNG) REGASIFICATION TERMINAL LOCATED ON THE SOUTHERN SHORE OF THE SHANNON ESTUARY IN THE TOWNLANDS OF RALAPPANE AND KILCOLGAN LOWER, CO. KERRY

HEARD BEFORE THE INSPECTOR,

MR. ANDREW BOYLE

ON FRIDAY, 25TH JANUARY, 2008

AT THE BRANDON HOTEL, TRALEE, CO. KERRY - DAY 5

I hereby certify the following to be a true and accurate transcript of recordings of the evidence in the above-named action.

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APPEARANCES

KERRY COUNTY COUNCIL:	MR. T. SHEEHY
FOR THE APPLICANT (SHANNON LNG):	MR. HUGH O'NEILL SC MR. JARLATH FITZSIMONS BL
INSTRUCTED BY:	NICOLA DUNLEAVY SOLICITOR MATHESON ORMSBY PRENTICE
OBJECTORS:	MR. J. McELLIGOTT MS. GRIFFIN MR. NOEL LYNCH MS. JOAN MURPHY MR. DONNCHA FINUCANE MS. EILEEN O'CONNOR MR. E. McELLIGOTT MRS. LILY O'MAHONY MR. RAYMOND O'MAHONY MR. TIM MAHONY MR. THOMAS O'DONOVAN MR. MICHAEL FINUCANE MR. RICHARD O'SULLIVAN MR. DES BRANIGAN

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THE HEARING RESUMED, AS FOLLOWS, ON FRIDAY, 25TH JANUARY, 2008

INSPECTOR: Good morning everybody. This is Day 5 of the oral hearing into the Shannon LNG proposal. Yesterday we were hearing from the applicants on the health and safety issue and I think they have one more speaker that they wish to present so I will hand over now to the applicants. 10:03 10:04

MR. O'NEILL: Good morning, sir. Perhaps before I ask our next witness to make this his presentation there is just a housekeeping matter. The QRA and the questions and answers arising from the QRA have been the subject of some debate and I think it may be appropriate if I make available to you, or formally make available to you the QRA and the questions and answers. I do so, obviously, on the basis of not any obligation, because we are very conscious and I am sure the Board is very conscious, of the fact that -- and we will be submitting that, of course, the Board looks at issues of health and safety but having regard to the expertise of the Board, undoubted expertise of the Board and, of course, the undoubted expertise of the Health and Safety Authority, that a significant amount of reliance is identified and being placed by the Board on the HSA. So, I am giving you the documents not on the basis that you should go off and second guess them, so to speak, but in case you 10:04 10:04 10:04

need to refer to them, particularly in the context of questions being asked. (SAME HANDED TO THE INSPECTOR)

INSPECTOR: Thank you, Mr. O'Neill. I think that comes as something of a relief to me. 10:05

MR. O'NEILL: If you have any difficulty sleeping I am sure they will assist you, sir.

My last expert in this field is Dr. Raj. Dr. Raj is an expert in LNG risk assessment and the consequences of spills and it is important to emphasise that he has not been involved with any aspect, with one small exception which Dr. Raj will refer to, in any aspect in relation to the preparation of the EIS or the QRA. He has been brought in as an independent person after all this documentation has been prepared and presented to the Board, the EIS to the Board, and the QRA to the Health and Safety Authority, for the purposes of expressing his independent view as to whether the criteria under the various legislative provisions and the guidelines, the various guidelines, have in fact been complied with and, indeed, whether in his view the facility and the operation of the facility constitutes a significant risk. Dr. Raj please. 10:05 10:06 10:06 10:06

DR. PHANI RAJ PRESENTED HIS SUBMISSION, AS FOLLOWS:

DR. RAJ: Good morning, Mr. Inspector. My name is Phani Raj, I am the President of Technology and Management Systems (TMS), Burlington, Massachusetts, which is a suburb of Boston in the United States. 10:06

My company is a small consulting company specialising in safety assessments. My evidence addresses liquefied natural gas facilities in general and my assessment, in particular, of the design, safety and other issues related to the proposed Shannon LNG terminal Co. Kerry. 10:07

My testimony before you today will cover the following items: 10:07

1. My educational background, work experience and professional qualifications.
2. The extent of my involvement in the project issues and activities undertaken to present this testimony. 10:07
3. Brief review of the safety of the LNG industry.
4. Comparison of the US and European approaches in siting and land use of LNG facilities.
5. Comments on the project safety analysis and the Environmental Impact Statement. 10:07
6. Opinions on the submissions raised by third parties.
7. Other technical issues relating to safety.

My education achievements includes a Bachelor's Degree in Mechanical Engineer from the university of Bangalore, Masters Degree in Power Engineering from the Indian Institute of Science (both in India), Master in Science and Ph.D. Degrees in Engineering from Harvard University, (Cambridge, MA, USA) and an MBA Degree in Finance from the Northeastern University in Boston. I have worked as a post doctoral research fellow at Harvard University, as a senior consultant at Arthur D. Little, Inc of Cambridge, MA, and internationally recognised consulting company, and as the President of Technology and Management Systems for over 25 years. By the way, Mr. Inspector, I started this company Technology and Management Systems in 1981. 10:08

I come before you as a researcher in the field of LNG safety with over 35 years of experience in conducting experiments, analysing the test results and developing mathematical models for the behaviour of LNG upon its release into the environment and the hazards it may pose. My research projects related to LNG have been funded primarily by U.S federal government agencies such as the US Coast Guard and the US Department of Transportation, and to a lesser extent by the LNG industry. My LNG research, including designing and to conducting field tests to understand the various phenomena related to the behaviour of LNG after release, dates back to early 1970's. My recent research, sponsored jointly by the Pipeline Hazardous 10:09

Material Safety Administration (PHMSA) of the US Department of Transportation and Distrigas of Massachusetts, LLC, has been to evaluate the data from the largest LNG fire experiment to date and develop a new mathematical model characterising the behaviour of very large LNG pool fires and their radiant heat effects. Other research also funded by the U.S. DOT that I recently concluded includes the experimental determination of human tolerance (without injury) to LNG fire radiant heat. I will cover this a little later, sir 10:10 10:10

In my capacity as a scientist and researcher in the field of LNG behaviour modelling I have (i) provided consulting support to the Government agencies, the LNG industry and standard setting bodies (ii) testified before administrative and regulatory proceedings (iii) presented my many scientific research findings before peer groups, responded to the safety questions from the public in public hearings (iv) trained firemen and first responders in the properties and behaviour of LNG, and (v) authored a number of technical publications in reputable journals. I also serve as a full voting member of the National Fire Protection Association (NFPA), Technical Committees on LNG Standards (NFPA 59A) and the LPG Standards (NFPA 58). Many parts of the NFPA 59A, which has a title "Standard For the Production, Storage and Handling of Liquefied Gas", are recognised and used by many countries as 10:10 10:10 10:11

guidance for siting, design and operation of LNG facilities. NFPA 59A (2001 edition) has been made part of the US Department of Transportation regulations for LNG through the incorporation. Recently I, as a Chairman of the NFPA Sub-Committee Task Group, helped develop a chapter for the application of risk based analysis for siting LNG facilities, which has been voted and accepted by the full Committee for inclusion in the 2008 edition of the NFPA 59A. 10:12

Mr. Inspector, I would like to say that while the Committee has voted it has one additional voting that is necessary by the full members of the NFPA which will take place in June and I fully expect that this will be included in the 2008 edition. 10:12

In addition to conducting research and working on LNG industry safety issues, I have also evaluated safety in other chemical and petrochemical industries and in the transportation of hazardous materials in road trucks, rail tank cars, barges and ships. I have also performed independent risk analysis calculations for the LPG industry, US Federal Railroad Administration (to evaluate the risk to the US population from the transport of over a hundred highly hazardous chemicals on the US rail system), storage of large quantities of liquid oxygen and chlorine in a military base. 10:12 10:13

I have published over 50 technical (peer reviewed

journal) papers and over 120 technical reports on chemical and energy fluids' safety issues and mathematical models to calculate the hazards. I have taught in the chemical engineering department of MIT, given week long seminars in Europe on LNG behaviour modeling. I have edited the proceedings of a conference held at MIT on the LNF fires. My membership in Committees and advisory panels include the following:

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- I am a member of the Advisory Panel on LNG to the Government Accountable Office (GAO) Washington DC.
- I am the Technical Consultant to the Centre for LNG, Washington DC.
- I am a member of the American Institute of Chemical Engineers.

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- I am a member of the Technical Committee on Liquefied Natural Gas (NFPA 59A), as I mentioned before.
- I am also a member of the Liquefied Petroleum Gas Standards Committee

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- I am also a member of the Committee for The Study of Railroad Tank Car Design Process, Transportation Research Board, which is a part of the National Research Council in Washington.

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- I was a Senior Consultant to the Nuclear Waste Technical Review Board.
- I was a member of the Committee on the Transportation of Hazardous Materials (which is also

part of the National Research Council.

- I was also a member on the Editorial Board of the Journal of Hazardous Materials.

I have testified before US legislative and regulatory bodies on LNG safety. Last year I was invited to testify before a Committee of the US congress on matters relating to LNG tanker security and associated potential LNG hazards. I served also on the expert panel that provided advice to the General Accountability Office on its work related to LNG tanker safety. 10:14 10:15

Section 2 - Project Involvement

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I was approached relatively recently by representatives of Shannon LNG and its attorneys to perform an independent assessment of the project technical work on safety performed by other contractors and to indicate my opinions on the various safety issues. I am retained by the law firm of Matheson Ormsby Prentice (MOP) of Dublin who are the solicitors for Shannon LNG to report to them on my findings. My testimony for the Board is based on my review of the project materials and the subsequent findings. I have neither participated in the original development of any of the safety analysis, nor performed any assessments based on independent calculations, with one exception. The exception is the set of calculation results I provided 10:15 10:15

in late July 2007 to Environmental Resources Management Limited (a contractor to Shannon LNG). These calculation results were obtained by exercising the new LNG Pool Fire Model, which I developed for the US Dept. Of Transportation. This model represents more realistically the LNG fire characteristics observed in field experiments. These results have been compared with the more conservative (i.e. larger) hazard distance values used by ERM and presented in its report on the Quantitative Risk Assessment. 10:16

Since July 2005. TMS has a 'task order' type of contract with Hess LNG/Weaver's Cover Energy. Over the past 2.5 years TMS has provided occasional and relatively minor consulting services to Hess LNG on LNG properties and behaviour issues. 10:17

My involvement with Shannon LNG application hearings began on December 20th, 2007. Specifically, my work in this regard includes: 10:17

1. Reviewing various documents related to the application by Shannon LNG to An Bord Pleanála.
2. Evaluating the QRA performed by ERM for Shannon LNG.
3. Providing opinion on LNG siting requirements in the US and Europe by discussing the differences in the requirements of the NFPA 59A standard the US DOT regulations and the EN1473 Standard. 10:17
4. Preparing this statement of evidence.

5. Providing responses to and opinions on safety concerns indicated in the submissions.

I have, in preparation for this oral hearing, undertaken the following work: 10:18

1. Reviewed the four volumes of the Shannon LNG Terminal Environmental Impact Statement.
2. Reviewed the contents of the report entitled "Land Use Planning QRA Studies of the Proposed Shannon LNG Terminal", Report 02, September 2007, by ERM. 10:18
3. Reviewed the questions raised by Ireland Health and Safety Authority (HSA) and the responses provided by Shannon LNG.
4. Reviewed several documents published by the UK Health and Safety Executive on issues related to land use planning, risk analysis and recommendations on failure rates of equipment and hazardous dose criteria. 10:18
5. Walked over the entire area of the proposed Shannon LNG terminal site in Co. Kerry on December 28, 2007, reviewing the locations of various proposed equipment and noting the site's geographical relationship to the Ballylongford Bay and the Shannon River Estuary. Mr. Inspector, I might also add that I did do a second visit recently in preparation for this appearance. 10:19 10:19
6. Reviewed the questions raised in the submissions related to safety and developed responses (see later

sections)

Section 3 - Issues Considered

3.1. LNG Industry Safety Record

The worldwide safety record of the LNG industry is enviable and unmatched by any other comparable industry. Not a single injury or fatality has occurred to a member of the public from the import, storage or handling activity in terminals for over 40 plus years, representing a combined operating time of about 15 million hours. The injury rate among the workers in the industry is one of the lowest in all comparable industries. Currently there are over 60 large LNG Regasification Terminals (Import Terminals) and over 170 new terminals are proposed and some are under construction. In the US, in addition to currently operating six Import Regasification Terminals, there are 57 LNG peak shaving facilities. During the periods of low demand, peak shaving facilities store LNG either produced on-site by liquefying pipeline natural gas or received by trucks from import terminals. The stored LNG is then vaporised and then fed into pipelines to meet peak demand generally during the winter months. Both import terminals and peak shaving facilities have operated safely for over 60 years.

Trans-continental shipments of LNG in ocean-going tankers started in 1959. The worldwide demand for LNG

has grown significantly since the 1960's and today over 250 LNG ships are plying the oceans safely delivering the liquid to port in many countries, including Japan, France, Belgium and many more, in some of the most busy and the most congested ports of the world and near high 10:21
population centres. Annual shipments of LNG exceeds 120 million metric tonnes. In the 60 years of shipping over the oceans over 52,000 tanker shipments have occurred worldwide covering over 150 million kilometres of ship voyages without any significant LNG spills 10:21
(other than very minor leaks through pipe gaskets and small spills during make and break of the unloading arms). As at the end of 2007 additional 125 ships of capacity exceeding 200,000 m^3 are on order.

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The industry is highly regulated in the United States, European Union countries and the United Kingdom and other countries. Projects have to comply with very strict requirements on site layout, mechanical design, low public impact, emergency response planning, 10:22
operational safety and personnel training. The ships transporting LNG are built to international standards, are of double-hulled design and have been from the very beginning of the industry. The shore-based operations and facilities of LNG terminals come under the purview 10:22
of the National Regulatory Agencies. In the US it is the US Department of Transportation. The standards for the design of storage tanks and other systems in the facility are indicated in the industry consensus

standard in the US, namely, the National Fire Protection Associations's "Standard for the Production, Storage and Handling of LNG", also known as NFPA 59A and by the standard EN1473 in the EU countries. Other countries as well use the standards to ensure adequate designs. The stringent regulations in all countries with LNG terminals (and lately the addition of security requirements in these regulations), in addition to the industries self-interest to operate extremely safely, have been the principal cause of the safety success story. 10:23 10:23

There has never been an accident of any size affecting the public, the environment or damage to property from an import and regasification terminal or the associated tanker activity in over 60 years. However, there was a large accident in 1944 in a peak shaving LNG facility in Cleveland, Ohio. In this accident about 6,500 m^3 of LNG was released from two tanks. Post accident investigation by the US Bureau of Mines (which is a part of the Department of Interior) indicated that the release was most likely due to the use of improper steel in tank construction. This accident involving public fatalities stands as a single event in the history of the otherwise unblemished record of the LNG industry. A consequence of this accident has been the subsequent development of codes, standards and regulations, whose implementation and enforcement have resulted in the outstanding safety record of the 10:23 10:24 10:24

industry. The standards and regulations require the use of LNG compatible steel and other materials, designs to prevent leaks and releases, provision of active and passive systems and technologies to minimise the effects of any spill and the development of 10:24
effective emergency response actions, of course in consultation with and cooperation from local emergency responders. Other post 1944 incident releases of LNG reported in the literature are small in quantities and are primarily due to failures in gaskets and releases 10:25
from improper coupling between pipes segments during transfer operations or in barge filling operations. Therefore, Mr. Inspector, I would like to reiterate my observation that LNG storage and regasification facilities operate safely, have operated safely and 10:25
that best practice systems and procedures are implemented to prevent even the smallest of releases. No other energy industry can boast of such an outstanding safety record.

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Section 3.2. Comparison of EN1473 AND NFPA 59A

There are many similarities in the requirements specified for LNG facility location, layout construction and operation in both the EN1473:2007 and 10:26
the NFPA 59A:2006 edition standards. However, there are also fundamental and significant philosophical differences between the two standards. It is not possible state whether one standard is "better" than

the other simply because of different approaches to ensuring public safety. Both standards, and I might add the regulations in the US which are based principally on the NFPA 59A:2000 edition) have the same general goal, namely to prevent and minimise any 10:26
adverse effects on the public health and welfare arising from the location and operation of an LNG facility in the neighbourhood. There are also some important differences between the NFPA 59A (2001 edition), the US DOT Regulations in 49CFR, part 193, 10:27
and the positions taken by the US Federal Energy Regulatory Commission (FERC). While the similarities and difference among EN1473, NFPA 59A, DOT Regulations (and also FERC's interpretation and application of DOT regulations and, in additions, its own requirements) 10:27
are in the details of a few requirements, it suffices to state that the LNG plants built complying with specific requirements of the US or European standards are conservatively designed and operate safely.

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Section 3.3. Suitability of the Shannon LNG site

I have conducted field walkovers of the Shannon LNG proposed LNG import, storage and regasification site and noted the locations of the proposed water storage 10:27
pond, administrative building, the four LNG tanks, the jetty and the proposed vaporisation and process areas. I observed the local geography and the topography and was also appraised of the proposed terraced site

preparation. I have also reviewed the site terraced construction approach indicated in the EIS Volume 2, section 2.5.2.4 and figure 3.9 Volume 3. I noted the features of the area surrounding the site, including the location of the closest residence to the site boundary as well as the proximity of the residences along the Coast Road proximate to the site's southern boundary. 10:28

In my LNG consulting I have visited a number of operating LNG facilities and proposed terminal sites. Each proposed site has its desirable attributes and shortcomings. However, it can be said that Shannon LNG site represents one of the most suitable locations for an LNG import, storage and regasification facilities because of: 10:28 10:29

1. The deep water attributes of the Shannon river estuary.
2. Relatively large distances to existing residences. 10:29
3. The unique site topography which lends itself to the development of terraced construction.
4. Sloping ground towards the water.

The terraced topography of the proposed site provides additional safety against the effects of any potential releases at the jetty or from storage tanks. Any vapour cloud resulting from postulated potential releases would have difficulty in dispersing into the 10:29

southerly direction because of the very steep up-slope topography in this direction. It is noted that the nearest residences are located in this direction. Also, the lower parts of any postulated and potential pool fire in the plant would be masked or shielded by the ground slope and the terraced topography, thus reducing their effects. By "their effects" I mean fire effects. A higher fraction of the overall heat output from a fire originates from the lower parts. Therefore, masking the lower part of any fire results in less intensity being felt at a distance, resulting in a smaller hazard area. 10:29 10:30

It should be noted that none of the above discussed beneficial effects of the topography have been included in the QRA calculations. Therefore, the results of the QRA are very conservative. 10:30

Section 3.4 Environmental Impact Statement

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I have reviewed the relevant sections of the EIS and am satisfied that the EIS documents presented to the Board contain the appropriate planning information that is provided in many other EIS's that I have reviewed. I do not claim expertise in ecological issues discussed in the EIS. However, I am qualified to discuss the adequacy of the overall design of the facility, the storage tanks, process equipment, fire protection, spill impoundment and safety assessments described in 10:31

the EIS.

Mr. Inspector, I will briefly go through some of my reviews and my opinions on the various attributes in the proposed facility. 10:31

Section 3.4.1: The LNG storage tanks [described in section 3.6.1 EIS Volume 2] are proposed to be "full containment" type LNG tanks. A full containment tank is one in which the liquid is contained in an inner 10:31 tank (SLNG tank is made of 9% nickel steel) and the outer tank being formed of pre-stressed concrete with vapour tight dome over it. This type of tank is approved under the EN1473 standard and the NFPA 59A Standard (2006 edition). Each tank shall have a 10:32 capacity of 200,000 m^3 of liquid storage and of outer dimensions of 96m diameter X 50.5m high from the top of the dome to the tank slab (figure 3.9 EIS volume 3). Because of the terrace construction of the site and the location of the tanks at the lowest terrace, 10:32 approximately 20 metres of the height of the tank will be obscured by the ground when looking north from outside the site boundary. It is my opinion that tank design and operating conditions of the tanks described in the EIS Volume 2, Section 3.6.6 are consistent with 10:32 accepted design parameters for full containment tanks.

3.4.2. **The Vaporisers**: Shannon LNG has proposed a hybrid heat exchanger system (plate-frame and shell and

tube exchanger) to vaporise the LNG and send the gas to the natural gas transmission pipeline. The heat exchangers include seawater-to-monoethylene-glycol (plate-frame exchangers) and monoethylene-glycol-to-LNG vaporisation (shell and tube). Seawater heat exchangers are in widespread use throughout the world in a number of LNG and other plants. 10:33

3.4.3. **Impoundments:** An impoundment basin, or sump, of size 10.1m x 10m x 4m depth below the grade is proposed to be provided for each set of two tanks. Any hypothetical or potential releases from any of the tanks will be channeled into the impoundment basin servicing the tank. The size of the impoundment basin design is adequate considering that the design is based on the more conservative requirements of NFPA 59A, section 5.2.2 (2006 edition). The NFPA requirement is to size the impoundment basin to hold 100% of the release from a transfer piping with the highest flow rate for 10 minutes or during a shorter duration where there is a demonstrable shut down provision. Shannon LNG facility design includes the provision of surveillance and automatic shut down within 30 seconds of the release. The design of the impoundment basin is very conservative and has provided for impounding a spill at the full LNG pump rate out of the tank for 10 minutes notwithstanding the quick shut down capability. 10:33 10:33 10:34 10:34

3.4.4 Hazard Detection, Control Systems and Fire Protection: My review of the (EIS section 3.10.1 through section 3.10.3 in volume 2) indicates that the proposed type and number of safety controls, hazard detection and fire protection systems proposed are in keeping with best engineering practices for LNG facilities and conform to the requirements of EN1473. For example, it is important to provide redundant and functionally different systems to detect any potential LNG leak in the possible ignition of vapours. These are achieved by installing in strategic locations detectors that detect temperature changes, vapour concentration, fire induced smoke and infrared and ultraviolet signals from the flame detection. Normal locations for these type of detectors are near tank relief valves, gas vents, impoundment basins, vaporisation units, unloading jetty or platform and storage tank roof platform. In the Shannon LNG design these are indicated to be the locations where such devices will be provided. In addition, Shannon LNG design includes CCTV monitoring of all process areas, tanks and shipment loading areas. It is my opinion that these system, if maintained in working condition, will ensure a high degree of safety of the plant.

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The active fire protection systems that are to be provided include the firewater system, the high expansion foam dispensing systems (in the impoundment basins), portable dry chemical units and dry chemical

extinguishment and/or nitrogen gas snuffer systems (to be located on the pressure relief valves and the cold vents on the storage tanks and warm vent discharge areas). These designs are in conformity with the requirements of EN1473:2007 (section 6.9.3.7, clause 13, and specifically section 13.4 to 13.6), and also, in principle, conform to the requirements of NFPA 59A, Chapter 12. 10:36

INSPECTOR: Dr. Raj, can I just stop you there for a moment so that we don't pass on it and I forget it. You are talking about closed circuit TV monitoring, does that imply that you can actually see a gas leak under Irish atmospheric conditions? 10:37

DR. RAJ: Mr. Inspector, yes, because as you saw from Dr. Havens film yesterday, even in the dessert conditions where the relative humidity was 5% you could see the gas, because it condenses water from the atmosphere. So any leak in the Shannon LNG plant, if it occurs at all. 10:37

INSPECTOR: I got the impression that the opposite would apply here, where you had a high atmospheric vapour content already. Are you saying that, in fact, it is the other way around, that it will be more visible here? 10:37

DR. RAJ: Yes indeed, Mr. Inspector. Because it condenses water from the atmosphere, the more water there is in the

atmosphere, which is what the high humidity represents, it would be more visible.

INSPECTOR: Okay. Thank you for that. Please continue.

DR. RAJ: 10:38

Section 3.5: Safety assessments (QRA) and its adequacy

The process of quantitatively evaluating the risks that may arise from a proposed facility that receives, stores and handles the hazardous materials involves the following steps: 10:38

1. Identifying the scenarios of potential release of the material and the equipment from which such releases may occur. 10:38
2. Determining the rates of release and quantity of release of the material.
3. Cataloging the probabilities of occurrence of each scenario, location and type of release.
4. Classifying the post release behaviour of the hazardous material (fire, generation and dispersion of vapour, explosion, etc.), and also obtaining the conditional probabilities of different types of behaviour. 10:38
5. Determining the distance or area of hazards to people and property from each type of hazard and each condition of release; The criteria for each type of hazard to people and property being based on accepted standards and official publications of 10:38

the local or national regulatory agencies.

6. Developing the values for the individual risks either at a specified distance from the facility or calculating individual risks at the nodes of a grided area (the result of adding gridlines to create identifiable blocks around the facility) with which to block contours of constant individual risk around the facility.
7. Developing the profiles for societal risk (the annual probability of affecting, adversely, a given number of people plotted against the number of people affected).
8. Evaluating the individual risk patterns surrounding the plant with the criteria for risk acceptability set by the local community, state or national regulatory agency or (in their absence) using the most widely recognised international guidelines.
9. Performing sensitivity analysis by perturbing those parameters that have the significant influence on the risk results.

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The Quantitative Risk Assessment performed by Environmental Resource Management Limited tracks the above steps very closely.

3.5.1. Considerations of events and occurrence frequencies

In my opinion, the QRA has been performed properly, using published data and methods that are available in

peer reviewed publications. Where the data are not published but are available in public sources such data have been used. This is particularly the case for failure frequencies of components and systems. The public sources include governmental agencies, such as 10:40
the UK HSE, Professional Associations, e.g. The Society of International Gas Tanker and Terminal Operations (SIGTTO), UK Onshore Pipeline Operators Association, UK Advisory Committee on dangerous substances etc., and certified commercial entities. As indicated in section 10:41
3.1 of this evidence, because of the very good safety record of the LNG industry, failure data that are directly applicable to LNG facilities are not available and I would say, Mr. Inspector, thankfully. ERM has, therefore, used component failure data from other 10:41
similar industries. The use of such "imported" data from other industries results in attributing to LNG terminal components failure rates which are, very likely, higher by one or two orders of magnitude than what they may actually be in LNG plants. Therefore, 10:42
the QRA results for Shannon LNG have a high degree of conservatism included in them.

The QRA has also included in its consideration such scenarios as are highly improbable. For example, the 10:42
release of liquid from a full containment tank is assumed even though the very design basis of the full containment tank is to prevent release of either liquid or vapour to the environment. Also, in assessing

potential scenarios of LNG behaviour in the environment, the QRA has made very conservative assumptions on the conditional probabilities. For example, in the scenario of potential releases from a full containment tank the QRA assumes the relatively low probability of ignition even though it can be argued that such releases can only occur if caused by a highly energetic event. Such events are always accompanied by significant heat releases, which will result in the ignition, with a very large probability, of the release LNG. Mr. Inspector, I might just indicate to you that in Dr. Havens film that we saw, even though all precautions are taken in the experiment you saw the ignition of the vapour cloud. So, any agency that causes the release is very likely to ignite. Whereas in the QRA they only assumed 50% of the time for very large releases would be ignited quickly. This has implications on the conservative calculations in the QRA.

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To continue with the evidence. The result of such assumptions caused the QRA results to predict higher risks compared to what the real risks may be. The QRA has also considered extremely low probability events in the interest of full and complete evaluation. Some of these low probabilities scenarios may indicate comparatively large distances to which their effects may be felt. However, these highly improbable and theoretical assumptions do not represent and events

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that one reasonably expect to occur within the lifetime of the facility. One should recognise that some of these events considered are postulated to occur once in several tens of millions of years; that is in time frames comparable to many epochs that have occurred in earth's history. 10:44

3.5.2. Hazard Types and Estimation of Hazard Distances

The QRA has considered three types of hazards, namely, the radiant heat effects of pool fires, the area covered by vapour fires after the ignition of a dispersed vapour and blast over pressure events. The consideration of these types of hazards are consistent with the experimentally known behaviour of LNG (and the vapour generated by its evaporation) in the environment. Except the QRA has assumed that LNG vapours, Mr. Inspector, will have explosion but no experiment has shown that in the open, that LNG vapours can explode. So, there is another built-in conservative calculation for risk. 10:44 10:45 10:45

The types of releases and the magnitude of release sizes assumed are reasonable and ere on the conservative side. The hazard areas are calculated using the HSA guidelines for effects. The overall result of these calculations is to "predict" larger areas of potential hazard than they may really be. 10:45

3.5.3. Risk Criteria. Mr. Inspector, with your

permission I will skip this because these were very eloquently indicated yesterday by Mr. Pat Conneely of the HSA and so I will just be repeating them.

HSA's policy on the types of land use that exists within each zone and their implications on the permissibility, permissibility with restrictions, or rejection of a proposed facility are similar to those postulated by the UK HSE. Many facilities meeting the above criteria have been permitted in the UK without any adverse effect on the public. 10:46 10:46

The QRA results indicate that the individual risk of dangers dose or worse to a hypothetical resident in the nearest residence to the property is about 1/3 of the risk per HSA criteria. Also, on the basis of the societal risk guidelines in the UK HSE and the Dutch requirements, the risk for the Shannon LNG site is well within the values set in these international criteria. 10:46

It is my opinion that the risk contours presented by the QRA have a high degree or level of confidence. This is because of the conservative assumptions made in the QRA on various failure probability values, values for the conditional probabilities of LNG behaviour, modeling the effects of LNG behaviour and estimation of the magnitude of the hazards. 10:47 10:47

4. Conclusions

It is my opinion that if the Shannon LNG facility is designed, constructed and operated in accordance with the requirements of applicable Ireland and European standards as described in the applicants EIS, the facility will meet safety requirements set out in EN1473 and the HSA guidance. The QRA results further indicate a very low level of individual and societal risk. Therefore, it is my opinion that the Shannon LNG terminal design is safe. 10:47 10:48

Mr. Inspector, I would like to now address some of my responses to the questions raised in the submissions to the Board. 10:48

Submission L003 by Adam Kearney & Associates and L054(30) by Kilcolgan Residents Association: We do not fully understand the reactive or explosive properties of LNG (US GAO report). Even the 19 international LNG experts consulted by the US Government Accountability Office unable to agree. 10:48

Response: The submitter has misinterpreted the GAO report. The GAO experts, of which I was one, do agree on LNG properties. The experts could not reach consensus on the likelihood of the specific scenario of a cascading failure in a LNG ship, nor on its postulated effects. To quote from the GAO report: 10:48

> "Experts agreed that (1) the most likely public safety impact of an LNG spill is the heat impact of a fire; (2) explosions are not likely to occur in the wake of an LNG spill unless the LNG vapours are in confined spaces; (3) some hazards. Such as freeze burns and asphyxiation, do not pose a hazard to the public. Experts disagreed with the heat impact and cascading tank failure conclusions reached by Sandia National Laboratories Study with the Coast Guard users to prepare Waterway Safety Assessments (WSAs)."

LNG (liquid) is neither reactive nor explosive. All experiments conducted to date with actual LNG vapours in the open (unconfined) being ignited by either a charge or by piloted ignition source have resulted in the formation of only a deflagrative (i.e. slow burning vapour fire) and no explosion type of burning. 10:50

Mr. Inspector, I might add that I personally participated in field experiments, I designed and carried out these experiments in a facility called China Lake in California back in the 70's. So, I can attest to that personally. 10:50

Only under very limited circumstances, when the vapours of LNG are mixed with the proper proportion (5% to 15% by volume) in air and ignited under fully confined or near fully confined conditions, there may result, and the accent is on the word "may", result is explosive burning. In the latter type of behaviour overpressures would occur and their effects would be felt far outside 10:50

the burning vapour cloud. None of these effects have been observed in any experiments conducted in the open to date.

The disagreement among the 19 experts of the GAO, which the submission alludes to, has to do with the causes and details of if, when and how a ship can suffer multiple tank failures and the effect of already spilled liquid from one tank to initiate "cascading" failures of other tanks. The disagreement, therefore, is not on the LNG properties or explosivity. 10:51 10:51

Submission L004 by Mary Kelly-Godley and L043 by Raymond and Margaret O'Mahony: Sheltering behind a tree to be safe. 10:52

Response: This submission may have arisen because of the incorrect interpretation made by a comment at the public meeting on 29th October, 2007, in response to questions about the consequences of a large release of LNG from a carrier. The comment was not intended to suggest that sheltering behind trees is the only means of protection against radiant heat effects of an LNG fire but to highlight the fact that simple objects that cast a shadow in visible light also are opaque to radiant heat and, therefore, offer protection. In a recent experiment -- this is a experiment that I conducted, Mr. Inspector -- a single sheet of newspaper reduced the radiant heat flux by a factor of almost 4. 10:52 10:52

Many actions can be taken by a person exposed to radiant heat from any fire, including running away from the fire, hiding behind objects such as trees, buildings and automobiles, running inside a building or in some cases even holding a newspaper sheet in front of the face if one is available. LNG fire durations are relatively short, of the order of minutes, and for such durations temporary sheltering in place may be the most effective least harmful option. 10:53

Submission L011 by Kathy Sinnott: LNG is an incredibly explosive, condensed form of gas, very flammable. Even a small leak can do a great deal of damage. A serious accident or terrorist attack would result in a nuclear size explosion minus the radiation. 10:53

Response: LNG is not explosion. LNG vapours are not explosive in the open, as has been discussed in response to submissions 3 and 54. The GAO report referenced in the submission confirms this. 10:53

Small leaks of LNG in the Shannon LNG plant cannot do great damage simply because in the proposed plant design systems are provided to monitor leaks, take immediate action to limit the quantity released and initiate emergency response actions. 10:54

The comparison of the pool burning of LNG or the burning of a dispersed LNG vapour cloud with nuclear

explosions is quite incorrect and scientifically unsupportable. A nuclear explosion releases substantial energy in matters of fractions of a second, resulting in the production of very high intensity blast pressure waves. Even the most conservative 10:54
estimate of the release times of large quantities of LNG from a ship (through very large, metre size, holes) is of the order of several minutes, or actually several tenths of minutes. The LNG released itself cannot
burn. It has to evacuate first, then the vapour has to 10:55
mix with the atmospheric air to form cloud of vapour concentration in the flammable range and meet an ignition source that is active within the part of the vapour cloud that has flammable concentrations. The
phenomena of evaporating and mixing with air takes 10:55
significant times of the order of tens of minutes. Therefore, the energy release time in LNG burning when compared to the energy release times in a nuclear explosion is about a million times longer and
correspondingly the hazardous effects in the area are 10:55
significantly smaller.

Finally, it should be clearly noted that the radiant heat from and LNG fire is no different from the radiant
heat that one feels when standing in front of a home 10:55
fireplace. So, comparison of the hazardous effects on people, property or the environment from any LNG release with those from a nuclear explosion is improper, unscientific and unjust.

Mr. Inspector, you may recall that Dr. Havens made exactly the same point two days ago.

Submission L014 by Chloe Griffin: Concern: It is claimed that LNG is perfectly safe. 10:56

Response: That LNG has been handled, stored and transported safely over the past 60 years is factual. This has been discussed in section 3.1. 10:56

Submission L014 by Chloe Griffin and L54 by Kilcolgan Residents Association: It is claimed that LNG vapour floats through the atmosphere into space. 10:56

Response: It is possible that the submitter misinterpreted the statement attributed to a "expert". The expert may have indicated that when LNG vapours are mixed with air and diluted (also heated by the ground or water substrate and by the sun) the vapours may become positively buoyant and rise in the atmosphere and would be further diluted. 10:56

From my own experimental experience in the field, I can attest to the fact that LNG vapours, when they are released, are heavier than air and they tend to be heavier than air for significant distance. 10:57

Submission 54 by Kilcolgan Residents Association: A

report by IoMosaic quote a 3.7km hazard range to 50% lethality.

Response. The IoMosaic report alluded to in the submission does not provide the details of the scenarios and the mathematical models used and the assumptions made by the authors in postulating the above 50% lethality distance. They seem to have assumed the release of 150,000 m^3 of LNG in five minutes from an LNG tanker. Neither the type of the accident nor the incident that can produce a size and rate of spill, nor the criterion for the lethality from exposure to radiant heat from an LNG fire has been indicated. Last, but not the least, the assessment seems to have ignored the findings presented in their own report that for LNG pool fires greater than about 25m in diameter the level of heat flux emanating from a fire decreases (well below the 220kw per square assumed in their assessment). Also, the authors ignore the findings from recently published research that LNG fires become very smoky, and consequently put out very little radiant heat; the emitted heat is almost of the same magnitude as from a similar sized gasoline fire. 10:57 10:57 10:58 10:58

In view of the above stated and unstated assumptions and scant details of other parameters used, it is difficult to evaluate IoMosaic's calculation procedure or its accuracy. Additionally, it is impossible to develop an opinion on the release scenario since no 10:58

details are provided. Finally, the report alluded to is not a peer reviewed publication in a technical journal and hence, the results and claims should be viewed with skepticism.

10:59

I might also add that this so-called report is an advertisement issue on the part of IoMosaic.

Submission L054(2) by KRA: The evidence obtained from Dr. Jerry Havens report prepared by the Public Utilities Commission of the State of California for the Federal Energy Regulatory Commission highlights worrying scientific evidence....He has provided (that is Dr. Jerry Havens) detailed analysis supporting his conclusion that there should be a minimum of 3 miles between an LNG terminal and a densely populated area.

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Response: The above submission refers to the report by Dr. Havens to the California Public Utilities Commission (CPUC) and his testimony filed with the Federal Energy Regulatory Commission regarding the SCS project proposed in Long Beach, California. A detailed report has been filed with FERC rebutting each and every contention of Dr. Havens and pointing out the various unscientific assumptions and incorrectness in his analysis. In this rebuttal report it has been clearly pointed out how his conclusions are based on incorrect science, arbitrary and scientifically unsupportable extrapolation of the results, arbitrary

11:00

11:00

reduction in regulatory criteria for calculating hazardous effects and neglect of real experimental information and natural phenomena that limit the extent of hazard. These unscientific assumptions lead to his calculation of a 3 mile hazard distance. It is noted that Dr. Havens' analysis is based on the premise of very rapid release on to the water surface of 12,500 m^3 of LNG from each of the three tanks of the carrier. His results have nothing to do with the releases from this proposed terminal or the ship-to-shore transfer operations. 11:00 11:01

Submission 54(45) by KRA: A report on the LNG blast in Algeria (see attachment 24) mentions the contaminant gases that LNG is made up of. Note that when HSE, Sandia and other regulators do test with LNG it is with 100% pure methane. We object that the level of contaminant gases to be shipped by Shannon LNG has not been disclosed and request that the Board ask the developer to state the level of the contaminant gases they expect to have in the LNG shipments and whether they will vary depending on the origin of LNG in that a QRA be undertaken and analysed with this information in mind. 11:01 11:02

The submission goes on to state: A 1980 Coast Guard study entitled "LNG research at China Lake" states that LNG imported into this country is often far from pure and it reveals that vapour clouds made from impure LNG

actually explode as readily as the highly volatile LPG. When natural gas is super-cooled and turned into a liquid as much as 14% of the total cargo shipped as LNG may actually be LPG or other hydrocarbon fuels, according to the Coast Guard report. Natural gas 11:02
contains these other fuels when it is pumped from the ground. LNG containing these so-called higher hydrocarbons is known as "hot gas" and has higher energy content than pure methane. The Coast Guard report reveals that vapour clouds of LNG containing at 11:03
least 13.6% of these other fuels can detonate just like pure propane gas. The agency concluded in its report that this deserves "special consideration as the commercial LNG being imported into the US east coast has about 14% other hydrocarbons". 11:03

Response: The accident in Skikda, Algeria, referred to in the submission occurred in a natural gas processing and liquefaction facility and not in an LNG import and storage terminal. There are significant differences 11:03
between a natural gas processing facility and an LNG receiving terminal. In the former, hydrocarbon separation processes and storage of heavier hydrocarbon liquids and separated LNG take place. The only similarity between the two facilities lies in LNG 11:04
storage and marine jetties. In the Algerian incident referenced in the submission the LNG storage and loading jetties were totally unaffected by the incident.

Tests were conducted in the "China Lake, California" with LNG vapours being ignited in the open by normal ignition sources. Mr. Inspector, I made reference to this earlier in my evidence. The cloud did not explode, but burned only as a flash fire back to the source of vapour. The other China Lake tests alluded to in the submission were conducted with room temperature mixture of vapours and methane, propane, together mixed with the chemically correct amount ("stoichiometric quantity") of air and held in a five metre diameter hemispherical thin polyethylene balloon. The vapour-air mixture was ignited by a 1kg booster explosive (and not a flame ignition as may be expected in normal urban area). Even under these circumstances only those mixtures that contained close to 14% propane in the methane-propane vapour (mixed, of course, with the proper amount of air) and ignited by an explosive charge experienced an explosive burning. Higher concentrations of methane in the mixture did not result in an explosive burning, even when set off by an explosive charge. 11:04 11:04 11:05 11:05

The sources from which LNG is proposed to be imported into the Shannon LNG facility are not confirmed yet. The composition of LNG from different sources varies. However, except for one source (Libya), LNG from most other sources has methane concentrations in excess of 88%. That means only less than 12% are heavier 11:05

hydrocarbons, such as ethane, propane, butane and so on. When LNG spills on the ground or on water it evaporates, selectively releasing pure methane vapour into the atmosphere. That is, LNG undergoes what is termed in chemical engineering as a "fractional distillation". The fractional distillation, resulting in the release of high concentration methane vapour, continues for almost 80% of the total duration of evaporation of the liquid. By the way, these have been measured, Mr. Inspector, and I have given the references. 11:06 11:06

In conclusion, no LNG vapour cloud explosion is possible in the open, even if the LNG has over 14% propane concentration, unless certain unique and rare conditions prevail. The chance is essentially zero that all of these conditions will occur in the open area surrounding the proposed Shannon LNG facility; the conditions that must occur simultaneously include the ignition of a vapour cloud by a (currently non-existent) explosive charge and the concentration of the vapour containing heavier hydrocarbon vapours is exactly 8%. Therefore, the conditions simulated in the China Lake experiments cannot occur in any potential spill at the proposed Shannon LNG terminal. 11:06 11:07 11:07

That concludes to my responses to submissions that were submitted to the Board. I have since developed some responses to the written questions and oral submissions

made by Mr. David Robinson of Safe Haven in this hearing in the past two days and, if it is acceptable to you, I will be happy to read that, Mr. Inspector.

INSPECTOR: Please continue.

DR. RAJ: Other questions raised by Mr. Robinson have been answered by many of my colleagues here so I will take those questions that are within the purview of my expertise. 11:08

Question 6(b): The percentage of contaminant gases in LNG that make it as explosive as LPG. This is of extreme importance as when LNG is spilled on water and regasified the LNG companies will lead you to believe that regasified LNG will not explode. Please note, on 19th January, 2004, in Skikda, Algeria, an LNG vapour cloud did explode, resulting in the death of 27 souls and the injury of 120 people. This is known as a "Seeded" explosion. In this case a steam boiler blew up under a vaporised cloud of LNG. This phenomena is not fully understood but is believed to alter the explosive range of a gas cloud which normally 5% to 15% in air, it is thought that the explosive range could be altered to 5% - 45% in air if the LNG has contaminant gases that are higher than 14%. That is 86% methane and 14% butane, ethane and propane. The latter three being detonator gases. Hence the reason for this question. 11:08 11:09 11:09

Response: Some of the concerns in this submission have already been responded to in response to a submission from the Kilcolgan Residents Association.

Mr. Robinson's characterisation that in the Skikda accident LNG was released is incorrect. There have been no official findings so far on what gases were involved in the explosion. In regard to this accident FERC, in its final Environmental Impact Statement on the Weaver's Cove Energy application said: 11:10

> "On January 19th, 2004, a blast occurred at Sonatrachs, Skikda, Algeria LNG liquefaction facility that killed 27 and injured 56 workers. No members of the public were injured. Preliminary findings of the accident investigation suggest that a cold hydrocarbon leak occurred at 11:11 liquefaction Train 40 and was introduced to the high pressure steam boiler by the combustion air fan. An explosion developed inside the boiler fire box which subsequently triggered a larger explosion of the hydrocarbon vapours in the immediate vicinity. The resulting fire damaged the adjacent liquefaction process and LPG separation equipment of Train 40 and spread to 11:11 Trains 20 and 30. Although Trains 10, 20 and 30 had been modernised in 1998-1999, Train 40 had been operating with its original equipment since start up in 1981".

The reason I provide this verbatim quotation, Mr. Inspector, is to note that FERC never referred to 11:11 the vapours that were released in the Skikda accident as LNG vapours. It is hydrocarbon vapours, which could be anything because there was a lot of storage of other materials in that facility.

Question 7: In your risk assessment deliberations did you take into account that the Surface Emissive Power of a large LNG Pool Fire is unknown? (Page 12 of the above report) 11:12

Response: There has never been an LNG pool fire either from an operating import terminal or from a ship. While no experimental data exists beyond 35m diameter LNG pool fires, it is clear from the data available 11:12 that as the size of the pool fire increases the fire Emissive Power decreases. GAO recognised the lack of experimental data for larger fires and has recommended further research on this issue. However, a recently published US DOT report, of which I am the principal 11:13 author, indicates a model for calculating large LNG fire Emissive Powers. This model has also been published in a peer reviewed technical paper recently. I give the citation for the paper.

11:13

Question 8: Mr. Gordon Milne, Senior Analyst of Lloyd's Register of Shipping comments in a document released under the Freedom of Information to Safe Haven entitled "Explosions and Gas Release from LNG Carriers" that 1.5kw per metre squared is safe. 11:13

Response: Mr. Milne in his paper does not provide the scientific source on which he based his above statement. To the best of my knowledge, Mr. Milne is

not a researcher in fire effects on people. Without knowing the basis of this statement and not knowing the published source of such information it is difficult to comment on its credibility.

11:14

In addition to written questions, Mr. Robinson made some oral statements and submissions and I would like to respond to them.

Submission 1: In the United States it is required to consider a hole of 12 metres on the side of a tanker to determine the potential hazard for LNG release from the carrier. 11:14

Response: It is not clear what document or source that Mr. Robinson used to make the above statement. To the best of my knowledge, no such requirement exists in any regulations in the United States. 11:14

Submission 2: Spill of 1/5 content of an LNG tanker will create a pool fire with the hazard zone of 1.9km to 5kw per metre squared radiant heat flux level. 11:14

Response: MR. Robinson did not state the source of the claim of 1.9km distance to a pool fire hazard from a ship spill. 11:15

Sandia's report provides calculated distances to hazard from LNG pool fire and water for the different assumed

conditions. It has to be emphasised, the word "assumed conditions". The correctness of the model and the appropriateness of the parameter values used in the Sandia study have been questioned in a filing with FERC. It has been shown in this filing that with proper characterisation of LNG fires of diameters considered in the Sandia Report, a substantial reduction in the hazard distance results. For example, from Sandia's calculated value of 1,579m to 630m from the fire centre for the same size fire. 11:15

Submission 3: At this distance a person's skin will experience a second degree burn when exposed to a radiant heat flux of 5kw per metre squared for 30 seconds. 11:16

Response: Mr. Robinson contended that at 5kw per metre square radiant heat flux level anyone exposed for 30 seconds would suffer a second degree skin burn. In my opinion, this claim is not correct. Field tests with LNG fires were conducted under a contract from the US Department of Transportation. I was not only the principal researcher but the experimental subject in this field test, where I exposed myself to the heat. In these tests I was in civilian clothing, with my face and head unprotected and was exposed to radiant heat at an average of 5kw per metre squared for 30 seconds several times. I can attest to the fact that in these field tests with LNG fire I experienced neither a 11:16 11:16

severe pain nor a skin burn nor blisters on the skin. By the way, Mr. Inspector, this test was witnessed by all of the Federal Agencies, about 30, people from a distance of 250 metres, whereas I was very close to the fire, 20 feet from the fire. This series of tests forms the very first time that a full scale test has been conducted with a live person with instruments attached to measure the heat flux incident on the skin. 11:17

11:17

The final report giving the details of the test, data gathered and conclusions reached is available on the web site of the US Department of Transportation. A technical paper containing the condensed version of this report has been accepted for publication in a peer reviewed journal. I provide the citation for the journal. It is already available on the journal's web site and is expected to be in the printed journal some time this spring. Thank you Mr. Inspector. 11:17

11:18

END OF SUBMISSION

INSPECTOR: Thank you Dr. Raj. It is a quarter past 11. Does that conclude your presentation? 11:18

MR. O'NEILL: That does conclude my presentation. There was one question raised by Mr. Robinson that hasn't been answered yet, but I envisage it will be answered during

the course of the questions that are asked, and if not we can deal with it at the end.

INSPECTOR: As I say, it is a quarter past 11, we will take a five minute break before we start questions. 11:18

SHORT ADJOURNMENT

11:32

THE HEARING RESUMED AS FOLLOWS AFTER THE SHORT ADJOURNMENT

INSPECTOR: I am going to call now for the questions to the 11:34
Applicants. I see one had one, Catherine McMullin of An Taisce.

THE APPLICANTS WITNESSES WERE CROSS-EXAMINED AS FOLLOWS BY VARIOUS OBJECTORS 11:34

MS. McMULLIN: Before asking questions I would like to just maybe make a few comments of things in the health and safety field that have arisen over the course of this hearing. 11:34
I am here representing An Taisce which is the National Trust for Ireland which was set up to protect the physical heritage of the Irish nation and we are interested in the protection of the built and the

natural environment. You may say what has that got to do with health and safety health, but of course health and safety isn't there just to protect people and property, it's also there to prevent damage to the environment so in that sense I want to make some comments. 11:35

The first thing I would like to refer to is there was claims earlier on that the rezoning was not carried out in the proper manner. Now, I have taken some advice on this and I have been told that the rezoning as carried out by Kerry County Council may have complied with the Irish legislation, but that the original European legislation could be interpreted as meaning that if it was known that the site was going to have a Seveso Directive industry on it that then SCA should have been carried out so this is perhaps something I could refer back to An Bord Pleanála and to the Local Authority to investigate if this should have been done in this particular case. 11:35 11:36

There were particular things I wanted to bring up. The next one is the availability of the QRA. Again I have been talking to the Applicants about this and the impression seems to have been given that the QRA was not supposed to be on public display but to be given to the Health and Safety Authority. I would dispute this interpretation of it. I feel it is mentioned in the EIS, but only very briefly, not in sufficient detail 11:36

that a member of the public could draw any conclusions from it. I think while the Applicants themselves put it on their website, this isn't really making it available to the general public. There are people like myself who don't have broadband and wouldn't be able to 11:37
download the file. There are people that who don't have computers at all and who couldn't download it and it was not put on display in the planning office. If it had been there at least I could have gone and looked at it, but when I checked it wasn't there. Perhaps for 11:37
future strategic infrastructure projects that it should be considered that that should be put on display right from the beginning. It would have been a great help to me, if I had had it available I could certainly have asked for advice from other more qualified people and 11:37
perhaps understood better what it was all about.

Since then we have had some excellent presentations from the Applicants over the last couple of days which have actually answered quite a lot of the questions 11:38
that I was going to raise on it anyway so I will just go through a few other things. I didn't quite understand, and maybe be one of the panel could clarify for me, the QRA gave some very useful information on the methane itself which was not available before and 11:38
which explained a lot of the problems that could arise and how they could be dealt with and I learned that cryogenic fluid, you have problems with burns to people and it's an asphyxiant, but I would imagine both of

those would be just problems to the factory personnel, not necessarily to the general public. There was a mention in it if in the case of a catastrophic failure of the tank in weather about the maximum downwind distance to the lower flammable limit of 12.4 11:39
kilometres -- well, there is two things I would like to know. The first is in reaching the lower flammable limit, when would it have reached the higher flammable limit, would it be reached just after where the spill took place or would it be further away? As a corollary 11:39
to it, in the following section there is a lot of data about the probability of ignition of this vapour cloud. It is mentioned that once the cloud had reached two kilometres the probability of ignition is essentially zero because it would almost certainly have ignited 11:40
before this point so perhaps if the Applicants should clarify those points for me.

MR. O'NEILL: Perhaps before that specific issue is dealt with, if I could just deal with the first couple of 11:40
issues that were raised. The first was the issue in relation to the rezoning and the availability of the QRA. In relation to the rezoning what has been said is that, yes, the rezoning may well have complied with Irish legislation, legislative provisions but perhaps 11:40
not the EU provisions. The position is clear, from a legal point of view Kerry County Council are obliged to comply with Irish law. If the implementation of EU directives by the Irish bodies do not conform with

those directives that doesn't absolve the County Council of its obligation to comply with the Irish legislation. Of course the issue of non-compliance is something that can be taken up and of course normally could be taken up by the Commission against the Member State in question, but unless and until the Irish legislation regulations, whatever, are declared not to be in compliance with the EU Directive they must be regarded by the Local Authorities as being valid; in other words, they are valid until struck down. 11:41

The second issue relates to the availability of the QRA and, yes, the observation that has been made is an observation that has been made by a number of people. The QRA, to put it in context, the QRA is not one of the documents that in fact accompanies an application for planning permission. It's a document that emanates from a request by the HSA to assist the HSA or to inform the HSA in its investigation of health and safety issues. The QRA was available, however, on the website and I understand of course that not everyone has a computer and indeed even those that do have computers did have difficulties in downloading the QRA. Shannon LNG are sorry about that. There was, however, and there is still and indeed now available copies. There was available copies of the QRA in the Shannon offices, but again certainly there was no intention to preclude people from having access to the QRA, anyone who asked for a copy received one. Unless there is another issue you want to raise in relation to that.

MS. McMULLIN: Just in relation to that. No, your interpretation of it is what mine would be too. It is also a project that has been done under an EIS and again my understanding is that the legislation dealing with Environmental Impact Statements and Environmental Impact Assessment, the information has to be made available to the public so I just wondered if maybe that would have meant that it should have been put on public display. 11:43

MR. O'NEILL: The EIS has to be made available and the information in the EIS has to be made available, but the QRA in fact is something separate, it's an assessment for the HSA. 11:43

MS. McMULLIN: Yes, but the information in it, when I got it, it was obvious to me that the information in it should probably have been in the EIS as well. There are a few pages in the EIS, but they are very brief and would not give one the full picture, that possibly a synopsis of it in layman's language in the EIS would have been very useful. 11:43

MR. O'NEILL: You are correct. In the second volume I think of the EIS there is a synopsis of the QRA and of course in volume 1 there is the layman's guide to the EIS, which is obviously a shorter document and will obviously go into less detail. There is a no doubt that the QRA is 11:43

a very technical document and difficult to summarise I suspect in non-technical terms without losing the import and impact of that document. We take your point and if people want to have a look at that document, whether or not they understand doesn't really matter, if they want to look at it, it was the intention of Shannon to make it available and for that reason it was on the website and if there were difficulties in relation to obtaining copies we do apologise. 11:44

MS. McMULLIN: I don't think it's necessary to apologise because I am not blaming Shannon LNG. I think it is probably just the procedures need to be reconsidered for future applications of this type. 11:44

MR. O'NEILL: Thank you. Now we will get to answer the meat of your question in your to the health issue. 11:44

MR. FRANKS: Mr. Inspector, if I can deal with the first point raised about the 12.4 kilometre distance and what would have been the distance to the upper flammable limit. This would have been somewhere between the edge of the pool and the LFL, the lower flammable limit distance is 12.4 kilometres. We haven't actually extracted the numerical value from the modelling results, but I can try and do that and perhaps feed that back to you if you think that would be useful. 11:45 11:45

MS. McMULLIN: That's fine, the answer you have given.

INSPECTOR: Sorry, are you talking about the higher flammable limit.

MR. FRANKS: The upper flammable limit, yes. That is the reach concentration, if you like, at which the fuel will burn. The lower flammable limit is the lean concentration at which the fuel will burn. 11:45

INSPECTOR: Ms. McMullin, are you clear that the distance to the higher flammable limit will be less than to the lower flammable limit? 11:46

MS. McMULLIN: Oh, yes. I myself am a scientist and have worked for many years in the health and safety field. I just want to get a sort of general picture. 11:46

INSPECTOR: I think there was confusion on behalf of somebody else yesterday and I just wanted to be sure you weren't in the same boat, that's fine. 11:46

MR. FRANKS: The second observation made about the likelihood of ignition of the cloud as it grows is pretty much correction. If we have a release of LNG and it doesn't ignite immediately then of course the cloud will develop and spread. Now, the bigger the cloud gets the more chance there is that it is going to encounter an ignition source so what we do is analyse the growth of the cloud at several stages and we ask ourselves 11:46

'what's the chance that before it gets this big the cloud has actually already met an ignition source and, therefore, ignited' and at a distance of two kilometres the chance that the cloud has already ignited before it gets that big is close to 1, as observed, which means that the chances of it going beyond that distance are very, very low. I hope that addresses the question. 11:47

1 Q. **MS. McMULLIN:** Thank you. I have a couple of other small points. One was them about the contamination in the gases which we have discussed this morning. I had raised this question already and what I would like to know is just assurance from Shannon LNG that they will be ensuring that whatever gases they import are checked beforehand so that we don't have this problem of the hot gas as has been described. 11:47 11:47

A. **MR. BOWDOIN:** My name is Leon Bowdoin for those of you who have forgotten. Mr. Inspector, the answer to that question is Shannon LNG will ensure that all gas that is delivered into the pipeline system will meet the Irish specifications. 11:48

2 Q. **MS. McMULLIN:** Thank you. Now, another one, again I am not sure that I have got the picture correctly, we were talking this morning about the overflowing at the tanks or there was mentioned yesterday, for instance in the scenario where the LNG is being pumped from the boat to the tanks, if the pump was not switched off at the 11:48

appropriate time what would happen in the tank, how far up would it rise, where would it overflow from, assuming the tank itself hasn't been damaged.

A. **MR. VINECOMBE:** Mr. Inspector, Ian Vinecombe, for the record. 11:49

The design of the filling protection system for the storage tanks relies on a tiered approach to measuring the level in the tank and then taking action based upon the levels which are measured. What we do is we employ redundant measurement systems, that is spared, 11:49 backed-up measurement systems to ensure that a failure of a single instrument won't render the system unsafe so basically the level will rise as you are filling the tank and you will be monitoring the level rising using the available instrumentation. As you get to what we 11:49 would call the design maximum level, the operators will understand by virtue of their operating procedures that the tank is full. As you approach that level there is a high level alarm that will sound in the main control system to indicate the level has been reached. Now, 11:50 that high level alarm, as I said, will be read via two discrete instruments so they will be functionally independent. That's the point at which the operator will then press the stop button and stop the unloading of the ship. The action of stopping the unloading of 11:50 the ship will trip the pumps on the ship to stop the flow of liquid and again that system will be a redundant system to ensure that a failure in the stop signal cannot credibly occur. Above that system we

then have a trip system, what we call an automatic shutdown system and this is part of the emergency shutdown system on the terminal. Again functionally independent instrumentation will read a level above the alarm point and then that will take an automatic action 11:51
to shut down the ship pumps, close emergency shutdown values and that will stop the flow so that's how the system works.

To answer the question that was raised what happens if 11:51
you physically overflow the liquid out of the inner tank. In principle what would happen is obviously the liquid would get to the top of the inner nickel tank and would then flow out into the secondary containment area, obviously something we don't want to happen, it's 11:51
not what the system is designed to do, but the secondary containment would ensure there is no loss of containment of either LNG or vapour.

INSPECTOR: Can I just clarify that. Between the outer tank and 11:51
the inner tank there is insulation of perlite; is that right?

MR. VINECOMBE: That's correct.

3 Q. **INSPECTOR:** The gap is fully filled with perlite? 11:52

A. **MR. VINECOMBE:** That's correct. Basically the insulation gap, which is approximately a metre, is made up of effectively two materials. The inner tank is wrapped in (indicating)

like a rock wool type blanket like you would have in your loft insulation and then between that blanket and the outer concrete wall, which will have a steel vapour barrier liner on, which will perlite insulation which is a fine powder type insulation, a high vapour space which is where the insulation properties come from so it will be completely filled with solid material.

4 Q. **INSPECTOR:** If the inner tank overflows into the outer tank surely there is very little room, it is full of perlite? 11:52

A. **MR. VINECOMBE:** The nature of the insulation is like the insulation in your loft at home or anywhere else, the insulation is effectively air with a very fine structure around it to trap that air and it's the air that is providing the insulation. The powder obviously fills the space, but it has a high voidage as we would call it so you will effectively fill that space up with LNG and perlite if it overflowed. 11:53

INSPECTOR: Okay. 11:53

5 Q. **MS. McMULLIN:** The Inspector has actually asked the question I was going to ask you, but what if it goes undetected so long that it actually fills up that as well, what happens then? 11:53

A. **MR. VINECOMBE:** From the point of view of whether that could happen of course, we would consider this to be a non-credible overfill event because of the protection systems which

are in place. I am certainly not an expert in working out the probability failures of such systems, but under the EN 1473 design code for the terminal we are required to do a safety integrity level assessment of all of the protection systems on the plant, it is called SIL analysis and it's a requirement of the European codes that we do that. That SIL analysis will tell us the level of the integrity that these instrumented systems need to have to ensure that the risk of that overfill is reduced as low a practical a level so that we can be assured that it becomes a non-credible event. 11:54 11:54

6 Q. **INSPECTOR:** All of these systems are dependent on an electricity supply, if there is a complete power failure does the whole system just shut down automatically? 11:54

A. **MR. VINECOMBE:** As with many other things on the terminal design we basically have a tiered approach to ensure that the system is always available when it is required. Basically that system works by using the normal power supply initially. In the event that the normal power supply is unavailable to the plant, which is a very credible occurrence as you can imagine, basically we then move to a mode of operation where we keep what we call the essential services operational. Now, if we lost main power to the plant we would basically shut down the terminal operations in terms of the ship unloading would be stopped. We would then rely on our 11:54 11:55

emergency power system which operates via a combination of means. We essentially will have an emergency generator which is diesel driven which will keep power to essential services. The instrumentation systems will generally be driven through what we could call an UPS system, an uninterpreted power supply system which is a battery backed-up system where the power is fed into that system from the emergency generators. That will ensure that the instrumentation is available for a defined period of time and that will allow the safe shutdown of the systems in the event that there is a power failure. This is a very conventional approach to shutdown design. 11:55 11:56

7 Q. **MS. McMULLIN:** I am still surprised, though, that you haven't looked, at least in theory, at a situation where what we think is totally impossible should happen and that the liquid should fill up to the top of the concrete tank, what would happen then, if only so that if you say the symptoms arising you would know this is what had happened? 11:56 11:56

MR. VINECOMBE: Maybe Mr. Leon Bowdoin would be better positioned to answer this question.

A. **MR. BOWDOIN:** Mr. Inspector, a range of things will be taking place in the event that you overtop the inner tank. One of the first things that will happen, in addition to all of the alarming that is going in relation to the liquid 11:56

level being too high, is your tank pressure will begin to rise and that in itself will trigger a set of reactions and shutdowns that would stop the operation. If that were continued to be allowed to happen through some additional failure of the control systems then the 11:57
tank discretionary vent would be allowed to operate, that is the warm vent. In addition, we also have a cold discretionary vent on the tanks which would also be allowed to operate and finally a triple redundancy in the vapour system is the tank relief systems so 11:58
there are about seven or eight different systems that would be all layered to be able to manage the event should it occur. As Ian has said, as you postulate what can happen it does become a very incredible event that it is not detected, not reacted to and not 11:58
mitigated.

8 Q. **MS. McMULLIN:** Thank you very much. I think that probably covers what I was trying to get at. I have just one other question for the moment and it's to do with 11:58
smoking on the site for workers. When I worked in the chemical industry we never allowed anyone to smoke within the periphery of the plant except in certain designated areas which were the canteen and offices which were sufficiently far away from hazard material 11:59
to be no problem. I was somewhat surprised when the remark was made that they could smoke in the car park. Now, I appreciate the legislation has changed, you can no longer allow them to smoke in the offices or the

canteen and I just wondered how the industry is coping with this situation?

A. **MR. BOWDOIN:** Mr. Inspector, there will be no uncontrolled ignition sources, whether that be smoking or any other device allowed within the confines of the process parts of the plant that are considered essential or part of the process. There will be designated smoking areas as required by the regulations of the Irish Government. The car park area, which is a significant distance from the process plant, will be located in an entirely safe area so it will be outside of any ignition restriction areas that we would have within the process part of the plant. If one were to look at the layout drawings you will notice that the car parking areas are outside of the inner perimeter fence of the facility. 11:59 12:00 12:00

MS. McMULLIN: Thank you, Mr. Bowdoin. I think that's all for the moment, Mr. Inspector.

INSPECTOR: Thank you, Ms. McMullin. Any other questions? Could I have your name please. 12:00

9 Q. **MS. O'MAHONY:** My name is Lilly O'Mahony, I am one of the residents of Kilcolgan. I want to make reference there to the evidence that was given earlier on page 15. This is how I reads, it says: 12:01

> "Many actions can be taken by a person exposed to radiant heat from any fire including running away from the fire,

hiding behind objects such as trees, buildings or automobiles, running inside a building and in some cases even holding a newspaper or a sheet in front of the face, if one is available."

'If' is a very small word written on paper, but it has an awful lot to answer for. Now, my question is this: My house is 912 metres away from the nearest proposed storage tank, my son's house is 800 metres away from the nearest proposed tank. I cannot run myself as I had both of my knees replaced, I am lucky to be able to walk. What about the children who are not able to walk, never mind run. In your opinion what is the safest action for me, will I have to talk around with a newspaper and I would like an answer in layman's language please. 12:01 12:01 12:02

A. **DR. RAJ:** Mr. Inspector, this is Phani Raj. Let me qualify that statement by saying that those are applicable when you are exposed to 5 kW/m^2. It is my assessment from the EIS and the QRA that the 5 kW/m^2 from any of the postulated scenarios does not extend that far, 912 metres and 800 metres. In fact the risk to the nearest residence is one third of the maximum allowed by the HSA. I would indicate that in these residence locations you will not even feel the heat, let alone 5 kW/m^2. As I indicated I have faced 5 kW/m^2 for 30 seconds in ordinary clothing and I am here to tell the story live. 12:02 12:03

Q. **MR. McELLIGOTT:** Mr. Inspector, my name is

Johnny McElligott. Phani Ray is Indian, I am bald and I am very fair skinned and I spend about two minutes in the sunshine I will burn like a tomato. Now, he says on page 3 on the addendum to the statement of Phani Raj that he can attest to the fact that in the field tests with himself he received neither a severe pain nor a skin burn nor blisters on the skin, would that be the same case for me, if you look at me now and you see what I look like? 12:03

A. **DR. RAJ:** Mr. Inspector, the short answer is yes. Because I have looked at the medical literature on the susceptibility of skins to infrared and it is well known in the medical literature that skin colour that sees invisible light has nothing to do with what one feels as heat and therefore whether I am Indian or any person will feel the same amount of heat. As to the sunlight most of the burn that people get from the sunlight is because of ultraviolet, that is why we have ultraviolet screening lotions that people put on when they go for sunbathing so it is not by the infrared heat that one feels from the fire. 12:04 12:04

11 Q. **MR. McELLIGOTT:** My skin is also very sensitive to cold so it's not just the ultraviolet light, it's just the changes of temperature affects my skin as well, how would you answer that? 12:04

A. **DR. RAJ:** Mr. Inspector, we are talking here about

potential exposure to a fire. I have never experienced a cold fire.

INSPECTOR: Catriona Griffin?

12 Q. **MS. GRIFFIN:** Catriona Griffin. Just going back to something Ms. McMullin mentioned a few minutes ago, like I said earlier in a week I too could not download the QRA, but I have noticed that since Monday the Shannon LNG website is no longer attainable on the internet either. Just going back to yesterday, something Mr. Eoghan Lynch mentioned, it was in reference to a query by submission LO24, Mr. John Fox. He mentioned that ten years is too long a period as ask the locals to endure basically living around a construction site. Mr. Lynch said that the duration of the first construction phase will be approximately four years and then later on there will be more construction, if necessary. I just wonder, I remember seeing in the Shannon LNG brochures something about at works jetty, am I correct? 12:05 12:05 12:06 12:06

A. **MR. LYNCH:** Yes, there is a marine jetty in the application, Mr. Inspector, a materials jetty I should say.

13 Q. **MS. GRIFFIN:** A materials jetty. Will any of the materials or equipment for construction will be coming in via sea? 12:06

A. **MR. LYNCH:** Mr. Inspector, we cannot say at this stage if material will be coming in by sea. We included a materials jetty in the application to have the

provision so to do. This was something that will be dependent on the contractor who would be constructing the terminal. We want to have the facility to be able to bring in materials by sea, but we carried out the traffic analysis on the roads on the basis that we would not be importing material using a materials jetty.

14 Q. **MS. GRIFFIN:** As you appreciate from my perspective I live on the side of the main road so for me materials coming in by sea would be a lot less intrusive than 170 odd trucks a day doing past my house. 12:07

A. **MR. LYNCH:** Mr. Inspector, I appreciate that point. As I say we included in the application to have the provision. We wanted to include everything in the planning application at this stage, but it is something that we cannot say that would happen until later on in the project. 12:07

15 Q. **INSPECTOR:** Is there any likelihood, do you think there is a real likelihood that the materials would come in by the jetty? 12:07

A. **MR. LYNCH:** There is a likelihood, Mr. Inspector, but we really don't know. It will depend on the contractor, where the contractor is based, the materials, the supply of the materials, the make-up of the materials. It's not really until the detailed design is done and 12:07

the contractual arrangements are put in place that we would know that.

16 Q. **MS. GRIFFIN:** I have just got another question for Mr. Lynch, if that's okay. On page 17 of Mr. Lynch's statement of evidence he mentions that the fence is being moved back further into the site so as to impact less on the view people have from their homes. He mentioned that there had been new photomontages produced. I have actually seen one of the montages and my understanding of it was that the ditch that is there at the moment is still on the photomontages. 12:08 12:08

A. **MR. LYNCH:** Mr. Inspector, we created photomontages for the immediate neighbours to give the impression of the revised proposal for the fencing. Included in that we are proposing to reinstate a sod and stone ditch with a hedgerow, blackthorn or native species, but it would be further back from its current position because the road would be widened by Kerry County Council so the ditch would be replaced further away from where it is at the moment. 12:08 12:09

MS. GRIFFIN: I just wanted to point out that it doesn't give a totally accurate picture. 12:09

17 Q. **MS. O'MAHONY:** I would just like to say that we were given those pictures as well and when you look at those pictures, the last ones that you gave us, Eoghan, our wall

actually looks like a kerb rather than a wall, it looks like you would be looking from here into Listowel rather than looking onto the site. They are at some distance, where it came from I don't know, but they are not at all what it looks like in reality.

INSPECTOR: Mr. Lynch, will these photomontages will shown later in a later module?

A. **MR. LYNCH:** Certainly. Mr. Thomas Burns will be addressing landscape and visual later on. In fact as part of his presentation he will be explaining the method that was used in the make-up of the photomontages to try and explain what it is based upon and the perspectives that were taken and certainly the photomontages will be available. These were photomontages, Mr. Inspector, that was created further to the submission of the planning application when we went back to discuss the issue with the immediate neighbours.

INSPECTOR: They are photomontages that I have not seen and I don't know whether other people have seen them either, provided they are made available later.

MR. LYNCH: Absolutely.

INSPECTOR: Maybe that's the appropriate time to discuss that.

MS. O'MAHONY: Mr. Inspector, would you allow me to bring in my

photographs on Monday and show them to you.

INSPECTOR: Well, on Monday we are doing the ecological module.

MS. O'MAHONY: It's too far for me to go home and back now, you are talking about 66 miles, it is 33 miles each way. 12:11

INSPECTOR: I am proposing that we discuss that at a later time anyway so probably Monday or even later. 12:11

MS. O'MAHONY: Thank you.

MR. LYNCH: We have no problem printing out the photomontages, Mr. Inspector.

INSPECTOR: Okay. The gentlemen here in the middle. 12:11

18 Q. **MR. O'DONOVAN:** Mr. Inspector, my name is Thomas O'Donovan, I did put in a submission. I just wanted to ask some of the panel over here from the LNG if they know the temperature of the water that will be brought in from the Shannon as it exits this site. That would be one of my questions because obviously it has been estimated that 100 million gallons of water would be transferred through the site for cooling purposes and for other purposes I am sure and that warming a pipe or an installation of that low temperature would obviously exit some water at a very, very low temperature so I would just like to ask them what that would be? 12:11 12:12

INSPECTOR: I am not sure that that is relevant to health and safety, but if you can give a quick answer.

A. **MR. BOWDOIN:** The first point I would like to make is the estuary water temperatures vary quite significantly with time of year. The data that we have collected recently shows the temperatures down as low as approximately 6^{o}C and I believe as high as 17^{o}C and I will ask anybody to correct me if my memory is faulty. There is great seasonal variation. I believe the minimum temperature which we have used in our modelling, which includes some excursion from normal temperatures, would be in the winter where we have would have a 6 or 7 degree temperature, we would have a minimum temperature of zero or minus one degrees centigrade at maximum. 12:12 12:13 12:13

19 Q. **MR. O'DONOVAN:** Just briefly a follow-up question. As this volume of water would be transferred daily not alone would the varying degrees of temperature, but also I would like to know the component as it exits. Obviously it is clear water, pristine coming in and as it exits after going through a process we are not fully sure of the process. I want to know obviously does this change the process and as it would exit I am aware that it's comprised of various chemicals which would be detrimental to the area and the wildlife in the area, I would just like a brief response to that please. 12:14 12:14

A. **MR. BOWDOIN:** Mr. Inspector, the quality

of the water will be discussed in one of the next sessions so I will leave it to those experts to talk about, but in just general terms, with the exception of the hypochlorite concentrations that we will be adding in very small concentrations, and again there is a very detailed presentation planned on that subject and its influence on the estuary, which is not significant, there is no chemical change that takes place to the water. The water is merely used as a heating source so there is some change in temperature but not in terms of chemical composition other than the small amount of hypochlorite added to it. 12:15 12:15

INSPECTOR: I think you will be getting a more detailed answer on that later on. 12:15

MR. O'DONOVAN: Thank you, Mr. Inspector.

INSPECTOR: Ms. Griffin.

20 Q. **MS. GRIFFIN:** Catriona Griffin. I just want to clarify a few things with Dr. Raj. On page 9, Dr. Raj, under the section, 3.4.1 LNG storage tanks, you mention on the last sentence: 12:16

> "The tanks described are consistent with accepted design parameters for full containment tanks." 12:16

I just wondered in your own personal opinion how would you view the safety of in-ground or underground storage tanks in comparison to overground storage tanks?

A. **DR. RAJ:** Mr. Inspector, I can only speak from my experience, I am not a constructor of LNG tanks or a designer of LNG tanks, but there are a lot of considerations that go into designing a tank, whether it is overground or underground or full containment, but the very concept in my opinion of a full containment tank is nothing comes out of it even under extraordinary circumstances. As has been discussed before in these hearings about the difficulties of underground tanks and the issue that one has to deal with in the design have been discussed and I think I will leave it to the others to explain that. In my opinion the full containment tank as the name implies is to contain everything within itself. 12:16 12:17 12:17

21 Q. Thank you for that, Dr. Raj. I just wanted to ask you another question on page 9, second paragraph, last sentence, in the report it is written there:

> "...the results of the QRA are conservative." 12:17

But when you were reading it out you said 'therefore the results of the QRA are *very* conservative' so I just wanted to clarify whether you meant conservative or very conservative? 12:18

A. Mr. Inspector my adjective 'very' is correct, I meant it. If I had to do the QRA I would probably take more realistic probabilities of certain things that Dr. Franks has not included in the sense that he has

taken the worst situation possible to get the largest area for this contours, if I had to do this calculation I would not be as conservative as he is.

22 Q. Thank you for that. Just one more question, Dr. Raj. On page 14, last paragraph, first sentence: "LNG liquid is neither reactive nor explosive". I have come across an article in the American media regarding a Rhode Island press coverage of a meeting regarding LNG in 2005 and it mentions Mr. Gordon Shearer and it says when Mr. Shearer was asked what would happen if an LNG storage tank failed he said: 12:18 12:19

> "It would be the world's largest Roman candle."

I just wanted some clarification on that remark. 12:19

A. **DR. RAJ:** Mr. Inspector, I am not aware of that code, I have not read that particular press release, but Mr. Shearer is here, if you want you can get clarifications from him. 12:19

INSPECTOR: Mr. Shearer, Roman candle?

MR. SHEARER: Mr. Inspector, that was a quotation and direct response to a question that was asked of 'what if the roof of an LNG tank failed and it caught on fire' and as I think you have heard, and you can ask any one of the specific technical experts here, the odds and probability of that ever happening are extraordinarily remote as to be non-credible events. 12:19

23 Q. **MS. GRIFFIN:** Okay, thank you, Mr. Shearer, but just to clarify did you or did you not say it would be the world's largest Roman candle?

A. **MR. SHEARER:** I believe that's what I just confirmed so yes. 12:20

MS. GRIFFIN: Thank you.

DR. RAJ: Mr. Inspector, if I may just offer a clarification because Ms. Griffin is quoting from my presentation here. Indeed LNG by itself as a liquid is neither explosive nor can it burn, it is the vapour. You have to vaporise it and that is not even sufficient, you have to vaporise it and mix it with air and then have ignition and then only it will burn. 12:20

24 Q. **MR. McELLIGOTT:** Dr. Raj, could you explain what happened in the video that Dr. Havens showed where we saw a mushroom cloud, something that went up in the air, almost like a Hiroshima type explosion, could you explain exactly what that was? 12:21

A. **DR. RAJ:** Mr. Inspector, if the question is related to what was the purpose of the experiment or what actually happened, I would like to have clarification. 12:21

25 Q. **MR. McELLIGOTT:** Could you explain what was that, it looked like an "explosion" to me when something went up in the air, a big bang and you have a lot of cloud like a mushroom,

it was a Hiroshima type cloud, I am a lay person, you are the expert, could you explain again what happened in that video, could you walk us through it and just explain in clarity what happened or we could show it to you again if you would like? 12:21

A. **DR. RAJ:** Mr. Inspector, I thank Mr. McElligott for the offer to show it, I have seen it many times so I don't need to see it again. What actually happened is in spite of the best efforts of the experimenters to 12:22 prevent any ignition from happening this cloud ignited and in fact that leads me to mention that's why I said the QRA is very conservative because in the QRA the immediate ignition probability is assumed to be 50% and not 99.9% which is what I would have used in anything 12:22 as you saw from the experimental film. What Mr. McElligott I think is referring to is the way that vapours burn. It was pure vapour on top of the surface of the water and it did not have air and the only way it can burn is to ingest air. When you have a very 12:22 large high concentration vapour that is there it has to ingest air and that's where the buoyancy lifts the thing and it is burning. It is called a fire ball type of burning and that is not uncommon. There was no explosion, there was no pressure effects on everybody 12:23 nearby it was just another form of burning.

INSPECTOR: It was not an explosion, okay.

26 Q. **MR. McELLIGOTT:** Dr. Raj, is there anything

in Dr. Havens' testimony that you would disagree with?

A. **DR. RAJ:** Well, not particularly. I think he said all the things that I have been saying for many, many years. 12:23

27 Q. **MR. McELLIGOTT:** Just maybe a point to the Inspector. The Kilcolgan Residents Association are asking that An Bord Pleanála request that Shannon Development present An Bord Pleanála with a complete Development Plan for the 12:23 development of the entirety of the land bank to include all proposed deep water port facilities in the aim of creating large scale employment possibilities as per the county and local Development Plans so that this project may be assessed in its overall context. This 12:24 would be fully in keeping with sustainable and integrated development objectives. This would also require a new land based and marine based QRA. Dr. Raj, you said you visited the site, did you take into account when you visited the site and gave your 12:24 expert opinion the future developments of this land bank because what I am asking is that we need to know the effects on a large scale employment land bank, not just the greenfield site that it is at the moment?

A. **DR. RAJ:** Mr. Inspector, that was 12:24 beyond the purview of my contract with the attorneys, my work was only technical.

MR. O'NEILL: Can I just give a

clarification there, Sir. As you are well aware the application is for the development identified in the application. What the Applicant has done, and it's not part of the application for planning permission, it has identified possible future developments, but obviously any possible future development will be subject to an application for planning permission and will be subject as appropriate to EISs and to HSA vetting, but all the Applicant is seeking in this application is permission to carry out the works the subject matter of the application and nothing more. 12:25 12:25

INSPECTOR: Just to clarify that, you are talking about the possible power station, is that right? 12:25

MR. O'NEILL: Yes, Sir, that's right.

MR. McELLIGOTT: We are talking about the adjacent sites on the land bank. What we are saying is that this has been presented as just a terminal like I said before without going over the old ground, but if really we want to develop the full lot of the land bank and bring lots of industry and deep water port facilities how can you do a QRA based solely on that single unit without taking into account the other developments that it is supposed to entice into the area or what possible developments would come into the area, Dr. Raj? 12:26 12:26

MR. O'NEILL: Perhaps I can answer that because that's actually a

legal question. The planning regulations, the planning Act and all the safety measures that have to be taken are very clear. What has to be assessed is the application for development, not some hypothetical application that may or may not be made at some stage in the future. Indeed An Bord Pleanála's jurisdiction is limited to considering the application in the context of proper planning and sustainable development. Let me finish please, Mr. McElligott. It cannot speculate as to what subsequent applications for other lands, not under the control of this Applicant and indeed in respect to which this Applicant would not in any event be entitled to make an application, it cannot speculate on future applications. Obviously in due course any applications that are made by others for adjoining lands will be the subject of the planning process, either through the planning authority or An Bord Pleanála if appropriate. 12:26 12:27 12:27

MR. McELLIGOTT: I agree particularly with you, Sir. In your planning application Ria Lyden specifically referenced the County Development Plan where this would encourage other developments and uses of the land bank so the Applicant themselves has already referred to how we would encourage new development so that is why in my previous statement I ask, now that you have yourself referenced the rest of the development of the land bank, that this should be taken into account in the interests of sustainable and integrated development 12:27 12:27

which is why I made the statement that we want Shannon Development to present an overall Development Plan. For instance, how can Shannon Development who own this land pretend to us, the people of North Kerry, that they have had some big plan for this. It is almost like they are say 'oh, nobody came to us over these last few years, we are waiting, we are waiting', any developer that owns a large plot of land should have a Development Plan put forward and just because they are sitting on cushy jobs, well paid, they have not presented anything viable for the whole area, they are waiting for a developer to come in and do it and for me it is unethical. 12:28 12:28

MR. O'NEILL: That perhaps is a criticism directed towards Shannon Development, I am not going to answer for them, but we have expressed the view, and indeed Kerry County Council have expressed the view, that this development will have a benefit in terms of attracting development to the adjoining lands. That is our view, that is the view of Kerry County Council and to date other than raised by way of questions there hasn't been any evidence to suggest the contrary. 12:28 12:29

28 Q. **MR. McELLIGOTT:** Okay. Dr. Raj, in your addendum to your statement in the first page, when referring to the accident in Algeria's LNG liquefaction plant you say that the Algeria LNG liquefaction facility that killed 27 and injured 56 workers, no members of the public were 12:29

injured. If I understand correctly 56 workers were interested, do Shannon LNG consider that workers have to be treated differently to the general public and, secondly, there is the Health and Safety and Welfare At Work Act which says that we must protect people that are in the working environment and if the rest of the land bank is supposed to be developed and encouraged for large scale employment have you considered the effects of an accident in the LNG terminal at Tarbert, the effects it would have on the other large scale numbers of future employees that will be working on the site and adjacent sites? 12:30 12:30

A. **MR. SHEARER:** I am going to speak to the issue of health and safety of employees. I will repeat, I don't have my testimony in front of me from the first day, but I will reiterate what I said then. We are committed to the safety, the health and the welfare of our employees, our contractors and the communities in which we do business, that's an absolute undertaking and it is fully disclosed in the corporate sustainability report that is sitting on the table in the middle of the room so I do not need to repeat that here again today. 12:30 12:30

29 Q. **MR. McELLIGOTT:** Dr. Raj, do you recommend that there should be automatic drink and drug testing of staff and psychological evaluation of people that are working in an LNG terminal to take account of human error, could that be taken into account as well? 12:31

A. **DR. RAJ:** Mr. Inspector, that is not an area of expertise that I have or have professed to that extent, that is not for me to answer.

30 Q. **MR. McELLIGOTT:** Dr. Raj, I am not sure, maybe it was Dr. Andrew Franks, they say that the chances of meeting an ignition source on land is very high up to two kilometres and what I am wondering is what are the chances of meeting an ignition source over water considering that the LNG terminal is on the estuary and if the wind blows the vapour clouds out along the estuary what are the chances of meeting an ignition source and the distances over water if there are very few ships around? 12:31 12:31 12:32

A. **MR. FRANKS:** Clearly if there are very few ships around then the chances of meeting an ignition source are lower, if there are very few ships around. If there is a passing vessel there would be obviously ignition sources present. Similarly if there are any passing fishing vessels or leisure craft. 12:32

31 Q. Has that that LNG spill on water so been taken into consideration?

A. The QRA has modelled LNG spills on to water from the unloading arms on the jetty and from the pipes on the jetty back to land. 12:32

32 Q. What about a moving ship, if there is an accident or a leak from the moving LNG container ship, does that

change?

A. The QRA does not address marine risks.

MR. McELLIGOTT: Thank you for clarifying that.

INSPECTOR: Ms. O'Mahony, I think you want to ask a question. 12:33

33 Q. **MS. O'MAHONY:** I wanted to get back to the area of the DVD that I saw here on Wednesday. I know that Dr. Raj said that it wasn't an explosion, but if it wasn't an explosion it was a fire, wasn't it? 12:33

A. **DR. RAJ:** Mr. Inspector, could I have the question repeated, I was a little sidetracked.

INSPECTOR: Could you put the question again. 12:33

34 Q. **MS. O'MAHONY:** The DVD that I saw on Wednesday, you said there just a few minutes ago it wasn't an explosion, but wasn't it a fire, hasn't that as much importance as an explosion? 12:33

A. **DR. RAJ:** First of all, Mr. Inspector, I would like to point out that we did not have any sound in the film. Had there been sound, in fact I have heard this, there is no hiss even let alone an explosion so it was not an explosion. Yes, there was a fire, we all saw that on the video so I don't know what the question implies. 12:33

35 Q. Does that mean just because it wasn't an explosion that the fire was just as important as the explosion, if a fire occurred instead of an explosion wouldn't it still do harm, do you understand the question?

A. Mr. Inspector, yes, I do understand the question. I think the concept of the fire and its effects have been taken into consideration in the safety assessment. 12:34

36 Q. But you have seem to dismiss that it wasn't an explosion, but you didn't dismiss that it was a fire?

A. I am not sure I understand the question, Mr. Inspector. 12:34

INSPECTOR: I think he is accepting that there was a fire.

MS. O'MAHONY: But he seemed to dismiss the part that it was an explosion, but he didn't dismiss the fact that it was an actual fire as well. 12:34

INSPECTOR: He is not disputing the fact that there was a fire.

MS. O'MAHONY: That is as important.

INSPECTOR: He is drawing a distinction between the effect of a fire and the effect of an explosion. 12:35

MS. O'MAHONY: The effect of the fire is very much important as well if you are living near it with the threat of it. 12:35

DR. RAJ: Mr. Inspector, I never claimed that the fire is not hazardous. I think I have said repeatedly that the safety assessments have taken into consideration the

effects of fire.

MS. O'MAHONY: Thank you.

37 Q. **MR. McELLIGOTT:** Dr. Raj, in your testimony you speak of currently there are 60 large LNG regasification terminals and over 170 new terminals proposed, I take it that that is worldwide. Now, in your experience would you consider that such a rapid expansion of the LNG industry is increasing the chances of an accident happening in the future? 12:35 12:36

A. **DR. RAJ:** Mr. Inspector, I think that is a very speculative statement in my opinion because the LNG industry is the most regulated, highly inspected, extremely well run industry. In my 30 years of experience of dealing with the industry and the regulators so to expect that just because the number of them increases they are going to be less audited and less subject to regulation is not correct. 12:36

38 Q. **MR. McELLIGOTT:** Dr. Raj, on page 8 of 19 in your testimony, the last paragraph: 12:36

> "The terraced topography of the proposed site provides additional safety against the effects of any potential releases at the jetty or from storage tanks. Any vapour clouds resulting from postulated potential releases would have difficulty in dispersing into the southerly direction because of the very steep upslope topography in this direction. It is noted that the nearest residences are located in this direction." 12:36

What I would like to ask you, for instance Tom O'Connor and Michael O'Connor in Ardmore, they are east of this site, would you consider, therefore, that they are more in danger and that the rest of the land bank is to the west of this proposed site, Catriona Griffin is to the south so they are probably safer, but are the people to the east and the west more in danger then in your opinion? 12:37

A. **DR. RAJ:** Mr. Inspector, in looking at the site and going as far as the jetty, and we are concerned only with the jetty releases, and I want also to direct your attention to the fact that Dr. Havens clearly stated, and I agree with him very well, that the LNG vapour if it gets released is heavier than air and tends, therefore, to hug the ground and disperse. When it encounters a barrier like a hill it doesn't go up the hill, it goes sideways, so to that extent the vapour cloud effects probably are going to be limited to the shoreline even though the QRA ignores this and assumes that the vapour cloud can go in all directions with equal facility. 12:37 12:38 12:38

39 Q. **MR. McELLIGOTT:** Okay. For wind direction then, would the wind be more likely -- since the wind usually comes from the west towards the east, would the vapour clouds be more likely to go east or west then, would that make any difference? 12:38

A. **DR. RAJ:** Mr. Inspector, I think those have been carefully taken into account in the QRA without consideration of the topography. If the topography is included, the fact that the topography actually rises from the water level to everywhere else would make the cloud not go that far and we have seen from the results of Dr. Franks' work that none of the residences are in any danger within the purview of HSA's criteria.

40 Q. Dr. Franks [sic], thank you, but you did state that any potential releases would have difficulty in dispersing in the southerly direction so when you say that you must have an idea of where the cloud is more likely to go and I would like you to clarify for people just to know in which direction, therefore, would it be more easily or more likely or have less difficulty in going, which is the easiest route for that cloud to go? 12:39 12:39

A. Mr. Inspector, I do not have the contour plots for the proposed site and my guess is all of those wind direction effects have been considered in the QRA with their probabilities and, therefore, anything I say is only to say that the QRA is more conservative than it actually should have been if exact information was taken into account. 12:40

41 Q. Okay, Dr. Raj. From what you have just said there in your page 8 we can just assume, without asking you to speculate on other things, I would just like you to confirm that those that are in the south are in the least zone of danger; is that correct? 12:40

A. Based on what I am talking about, Mr. Inspector, in this particular paragraph reference to vapour only, vapour dispersion, yes, that is correct.

MR. McELLIGOTT: Thank you, Doctor.

INSPECTOR: Ms. Griffin. 12:41

42 Q. **MS. GRIFFIN:** Catriona Griffin. Just to point out about Dr. Raj and Dr. Havens saying that gas vapour clouds are denser than air and tend to stay closer to the ground, I know from my own experience that the first couple of visits 12:41 we had from representatives of Shannon LNG that their big selling point, if you like, was that the gas escape -- because a lot of people at the time asked that question, if the gas escaped what would happen and we were told that it was lighter than air and it would 12:41 disperse. That is also highlighted in the earlier brochures proved by Shannon LNG.

I have got just a few questions for Mr. Lynch. On page 5 you mention the hydrotest, that sea water would be 12:41 used for doing the hydrotest; is that correct?

A. **MR. LYNCH:** Sorry, could you repeat the question again.

43 Q. Page 5, last paragraph of your statement, you mentioned that sea water would be used to do the hydrotest of the 12:42 tanks; is that correct?

A. No, Mr. Inspector, we do not propose to use sea water for the hydrotest.

INSPECTOR: That is not said in your

report, is it?

MR. LYNCH: No. It is presented as one of the options that was considered, but it was discounted because we propose to use water from the pond for hydrotest. 12:42

44 Q. **MS. GRIFFIN:** On the subject of the pond, the pond will be initially filled by the steam when there is a good flow, is that going to be the main source of water for the site from the pond? 12:42

A. The main requirement, Mr. Inspector, for the pond is to satisfy the large requirement of volumes of water for the hydrotest and also it would provide a source of fire water during the operation of the facility.

45 Q. Because I have walked that land bank during the summer and even in Irish summer where you have plenty of rain, if we go through a period of a few dry days the level of water in the stream and the pond is practically non-existent? 12:43

A. Well, Mr. Inspector, we are allowing for two seasons to fill the pond, but it is possible that it could be filled quicker. 12:43

46 Q. **MS. GRIFFIN:** Thank you. Sorry, I have got one other question to the gentleman to your right, Ian, I can't your name. You mentioned that in the event of a power cut that there is a back-up system for the electricity, I think batteries and a diesel generator were mentioned, how long would they last, if you know what I mean? 12:43

A. **MR. VINECOMBE:** Mr. Inspector, the length of time that they last will obviously be a decision that Shannon LNG will make for commercial reasons. In terms of what is essential, which is what I am most concerned with as designer of the facility, is you need to have sufficient electricity available to ensure that the plant is maintained in a safe condition so I will have to refer to Mr. Leon Bowdoin ...(INTERJECTION) 12:44

MS. GRIFFIN: Sorry. My understanding is during the winter time especially when there is bad weather, we often have a power cut that could last more than 24 hours, I just wonder would it cover that period of time. 12:44

MR. BOWDOIN: The diesel back-up system has been specified in our design documents as having a minimum of one week's supply of fuel and that period of time was chosen so that if we needed more fuel we could arrange for more fuel to be delivered and continue on without a restriction in time. 12:44 12:45

MS. GRIFFIN: Thank you.

47 Q. **MR. McELLIGOTT:** Just to ask another question about the water. Tom O'Connor and his wife Kathleen who were here yesterday from Ardmore, they have their own water source in their own house and that comes from underground, they say that that water source will be coming from where the site is about one mile all around 12:45

so if you are going to be doing construction works on the site are you not taking away their water source?

A. **MR. LYNCH:** Mr. Inspector, we have addressed this issue in the EIS in that we have said that we would liaise with the neighbours to the site and monitor their water supply and if it is considered that we are having any effect on their water supply that Shannon LNG would be prepared to discuss with them the provision of an alternative supply. 12:45 12:46

48 Q. **MR. McELLIGOTT:** Would you provide that for free considering you would have taken away their water supply?

A. **MR. LYNCH:** Mr. Inspector, I am afraid I couldn't commitment on behalf of Shannon LNG in that respect, I would have to confer with Shannon LNG. 12:46

49 Q. If they are not paying for anything at the moment, you would be taking something away from them.

A. I am afraid, Mr. Inspector, I would have to confer with Shannon LNG on that matter, but we would certainly enter into discussions for the provision of an alternative supply. 12:46

MS. GRIFFIN: The majority of people in that area, including myself, have our own well, from our own water supply so this could be a big problem. 12:46

MR. BOWDOIN: Mr. Inspector, let me follow up on that question,

if I could. My name is Leon Bowdoin again. If Shannon LNG interrupts the water supply of any of our neighbours we will replace their water and they will not have to incur any costs.

MS. GRIFFIN: Are we going to have that in writing? 12:47

MR. BOWDOIN: I assume there will be a transcript of this hearing that they would be able to use, but I am sure if they contact Michael Biggane he can give them all the assurances that they would need, whether it be in writing or verbally or whatever it is they would require. 12:47

50 Q. **MR. McELLIGOTT:** What about contamination of the underground water supply, if it is contaminated? 12:47

A. **MR. BOWDOIN:** Mr. Inspector, I do not want to foresee contamination of the water supply by any activity that we would be undertaking. I would point out that there is an expert coming up in a later session that will be addressing issues of ground water. 12:48

MR. McELLIGOTT: No, but you have just said that if you interrupt our water supply you will compensate us so that means complete compensation, but if your construction works, and there is chemicals and everything flowing around, for the safety of people, if their water supply -- it's not a hypothetical question, but if the water supply is 12:48

contaminated and, therefore, posing a safety risk to the residents will you compensate them as well for full ...

MR. O'NEILL: Can I answer that, Sir, Hugh O'Neill. The position is, and I can speak on behalf of Shannon LNG in this regard, if an established water supply is interfered with; in other words, cut off or contaminated as a result of activities on behalf of Shannon LNG, Shannon LNG will resolve that issue. Whether or not they pay compensation over and above the remediating the position is of course something that has to be assessed on a case by case basis, no commitment to pay compensation can be given in circumstances where the loss if any is not even quantified at this stage. 12:48 12:49 12:49

MS. GRIFFIN: You have got farmers in the area who use a huge amount of water for cattle, what happens if the water is cut off, how long is it going to take to be reinstated, you cannot expect cattle to do without water for a couple of days. 12:49

MR. O'NEILL: I can't address that issue obviously, but what I have said and what Mr. Bowdoin has said is that if the water supply is interfered with, an established water supply is interfered with as a result of activities by or on behalf of Shannon LNG, Shannon LNG will actually legally have to deal with that. Let me finish please, Mr. McElligott. They will have to legally deal with 12:49

that, but in any event they are clarifying the position saying 'they will deal with it'. I can put it no further than that. Obviously if there is an issue arising for compensation, that is something that has to be looked at. Clearly no-one is going to give a 12:50
compensate without limit at this stage in circumstances where the event hasn't occurred and the consequence of that improbable event are not identified.

MR. McELLIGOTT: Your previous speaker said that he would guarantee the 12:50
water supply and compensate for it so you are now saying something different to the previous speaker.

MR. O'NEILL: Not really, no. The question asked was 'if the water supply was halted what would happen'. If it is 12:50
halted the supply cannot be guaranteed. What would be an alternative supply would be provided or the supply that was previous enjoyed by the person in question would be resumed.

MR. McELLIGOTT: Yes, but ...(INTERJECTION) 12:51

INSPECTOR: Mr. O'Neill, would there be a baseline study of surrounding wells before development started?

MR. O'NEILL: I will have to ask somebody else to answer that 12:51
question and it may be in fact -- these are issues that are coming in, I know there are concerns that the members here have, but there are perhaps issues that are properly addressed during a later stage, the

ecology stage I would have thought. I can't answer that specific question, Sir.

MR. McELLIGOTT: No, Mr. Inspector, the previous speaker said he would guarantee the water supply. For us that means if there is a problem with the water you are going to have to give us that water for free because that's just what the previous speaker said and now you with your legal jargon, you are saying 'oh, if, if', but the previous speaker said he will guarantee it and if it is contaminated you have to guarantee it. 12:51 12:51

MR. O'NEILL: I can understand the need for the question. Mr. McElligott's water supply is not going to be interfered with in Listowel. Anyone's water supply which is interfered with, and it is a big 'if' because it's not believed that that will happen, but if it does happen, and let's assume it does happen, an alternative supply will be provided or the original source will be restored. 12:52 12:52

INSPECTOR: Okay, Mr. McElligott. I think the front table has been hogging this rather too long. I see a questioner in the second row.

MR. O'DONOVAN: Just to briefly add on a little bit about the water. We are very lucky in Tarbert village and the surrounding townlands and areas to be serviced by a good drinking water and it has always been there for 12:52

us. As the country has experienced few and fewer areas of quality drinking report, which has been reported in the papers and so forth, and as global heating is probably going to kick in, you will have drier and more sunnier summers and wetter winters there could be periods where the water supply would not be sustained on a daily or a weekly basis and as is proposed for this huge development it would take up a lot of water, I am not sure of the quantity, but I am sure it would take up a lot which would be after being used contaminated, it would be useless for drinking anymore. Now, the thing is we would be very concerned, and this is why I put in a submission so that I could bring my concerns to the Board, I am not against anybody or for anybody, but I bring my concerns and my concerns are that if that water supply is exhausted or interfered with back in the Kilcolgan area I do believe that if planning permission were permitted they would tap into our pristine water supply. There is people even come from Listowel and several areas to get buckets of water from the tap in Tarbert because it is so good so I want that put on the record, it is a concern of mine. Thank you very much, Mr. Inspector.

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INSPECTOR: I think in general you are going to come to water supply and hydrogeology in a later module; is that right?

MR. O'NEILL: That's correct, Sir. In fact the question you asked

whether or not a survey of existing water supplies will be undertaken the answer is, yes, it will, but the details of that will be provided in the later module.

INSPECTOR: Okay. Mr. Fox.

51 Q. **MR. FOX:** Mr. Inspector, John Fox, Tarbert Development. As we live down wind, as we would describe it, Tarbert village is down wind of the plant, I want to go back to something Dr. Raj said because I am not clear about the fire situation. We saw very clearly on Wednesday with Dr. Havens that there was a fire under test conditions without the introduction of an ignition source where the vapour did go on fire, to my eyes there was many explosions, but the whole test bed was engulfed in flames, that was clear. My concern is this: If you have a leak on site and if it drifts towards the village of Tarbert, clearly on a summer's day, a temperature of 25 degrees, it is possible that the vapour will rise, will mix with air and get into what I think Dr. Raj described as stoichiometric conditions, if it hits or comes into contact with an ordinary domestic overhead line, 220 volts, is there the danger of ignition? Remember the overhead lines, ordinary domestic supplies, can be going into the neighbouring houses next door or adjacent to the site. 12:55 12:55 12:55 12:56

A. **DR. RAJ:** Mr. Inspector, I will try to answer, but I think I may also need some help from Dr. Franks about this. The question was, and I hope I understood the question

right, if the cloud drifts, if there is no ignition at the source and if there is a vapour cloud that drifts towards Tarbert and the temperature is 25 degrees Celsius in the atmosphere will the cloud rise and then somehow hit the overhead power lines and be ignited? I assume that that is my correct interpretation of the question. 12:57

MR. FOX: (NODS)

A. The answer to that is no because even in the temperature of the air is 25 degrees Celsius the cloud does not arise because the cloud starts at minus 160 degrees Celsius and as it mixes with air and becomes higher in temperature but always lower than the air temperature. Second, based on the experiments that I have witnessed in the desert where the temperatures are much higher than 25 degrees Celsius we did not see the cloud rise. Third, do overhead pylons as I have observed, and I can only guess the height of that, I don't have the exact number, but it is probably more like 30 or 40 feet or 10 to 15 metres then I don't think the cloud will be flammable at that height, that's my best guess, Sir, even if the cloud drifts towards a pylon and the high tension wires. 12:57 12:57 12:57

52 Q. **INSPECTOR:** It will be flammable?

A. **DR. RAJ:** No, it will not be. It will not be flammable at the height where the wires are. 12:58

INSPECTOR: Okay.

53 Q. **MR. FOX:** Mr. Inspector, if I may,

I was speaking more about the normal domestic supply on the timber poles that you and I would see out in the countryside, not the pylons. I accept what Dr. Raj is saying about the height of the pylons, but I am talking about the domestic supply, the neighbour houses around that area, ordinary supply? 12:58

A. **DR. RAJ:** Mr. Inspector, the answer is yes. They have been taken into consideration by Dr. Franks' analysis in the QRA where he has looked at different ignition sources for the types of surroundings that are there, urban, rural and so on where there is established densities of ignition sources that have been provided and so those ignition sources have been taken into consideration in the QRA. 12:58 12:59

54 Q. **MR. FOX:** Mr. Inspector, may I address a question to Mr. Vinecombe, if I may please. In his particular documentation or evidence to the tribunal he made no mention of the electrical supplies being underground or overground, would you like to clarify that please, on site electrical supplies? 12:59

A. **MR. VINECOMBE:** Mr. Inspector, I am afraid I need to pass this to Mr. Bowdoin. From my position as a designer I am capable of putting power cables above or below ground. Mr. Bowdoin as the developer, if you like, is better placed to speak on why a developer would choose for them to be above or below ground. 12:59

MR. BOWDOIN: Mr. Inspector, I think on the particular project we are talking about there will be both above ground and below ground wires. For the most part the wiring will be run in cable trays adjacent to the equipment and connecting from one piece of equipment to the other and so if you were to go back and look at the drawings that we have shown, we have actually shown the pipe racks or what we call pipe racks on that which would also include the cable trays so within the majority of the process part of the plant the wiring would be on cable trays. Going from one part of the plant to another part of the plant they may be either above ground or under ground, no final decision has been made in that regard as those types of decisions are typically made at the detailed design phase, but I can say that there are cases where they would by preference be put underground rather than overhead, but it is pretty hard to be much more specific since we haven't got through the detailed design phase. 13:00 13:00 13:01 13:01

55 Q. I presume from that answer that we are talking about running more or less parallel to the pipes within the plant that will be above ground supplying motors and the like rather than high up, 10/20 feet, (indicating) that's what I am talking about, that height? 13:01

A. **MR. BOWDOIN:** The electrical systems that are running on the cable trays are typically the ones that are going to be on the interior parts of the plant inside. Outside of the

process part of the plant we have not made any decision whether those will be above ground or under ground at this time.

56 Q. Is it too early to comment on the supply from the proposed or planned, shall we say, or intended power station, is it too early to comment on that because that will be high voltage stuff? 13:02

A. The process layout identifies the location where the main substation will be located on the site. How it gets to that location is subject to that planning application. 13:02

57 Q. **MR. FOX:** That's okay. I would just say that we will be watching that with some interest. Can I ask just two related points and I am finished then, Mr. Inspector, please. In Mr. Vinecombe's presentation he made no reference to local employment whereas Mr. Leon, as I know him, I am sorry, this last gentleman, he made a reference to the employment, how many jobs would be involved, Mr. Vinecombe didn't do that, I presume it was an oversight as part of his brief and I just wanted confirmation as regards to the numbers and your policy statement in relation to the employment of local people. 13:02 13:03

I have one other related matter if I may please, Mr. Inspector. How do you propose to manage the employment policy and trade unions and that type of thing? 13:03

A. **MR. BOWDOIN:** Mr. Inspector, Michael Biggane will be speaking later to those very subjects and I would propose that we defer the answer to those questions until he makes his testimony.

INSPECTOR: Okay. It's one o'clock now so maybe we should break for lunch. Mr. Kearney, one final question.

58 Q. **MR. KEARNEY:** I just have one question there for Dr. Raj. In your experience of LNG applications in the USA is it common place to not conduct marine based QRAs that includes LNG spills on water? 13:04

A. **DR. RAJ:** Mr. Inspector, this is Phani Raj. There is no regulation in the United States for water spills period. There is no department for conducting a QRA. However, the US Coast Guard requires a waterway safety assessment to be done and that is risk based, it is not a quantitative risk based. 13:04

59 Q. **MR. KEARNEY:** Sorry, in your professional opinion, Dr. Raj, would you recommend such a risk assessment be conducted?

A. Mr. Inspector, that is bordering on policy issues in different nations and different jurisdictions and I don't think I want to express an opinion on that. 13:05

INSPECTOR: Okay. We will break for lunch. When we come back from lunch, I think we have probably gone as far as we

have on the health and safety issue and I was going to propose that we would move on to other planning matters so if we could be back by, say, five past two please.

13:05

(LUNCHEON ADJOURNMENT)

THE HEARING RESUMED, AS FOLLOWS, AFTER THE LUNCHEON ADJOURNMENT

INSPECTOR: Good afternoon everybody. If people could resume their seats please. Now, this afternoon I was hoping to start on the next module, which is other planning matters, including visual impact, roads and traffic, noise, vibrations, dust etc., but excluding ecology, that's because we are doing ecology on Monday. 14:13

MR. SHEEHY: Mr. Inspector, there is one very short point, if you wouldn't mind, just a clarification item really at this stage, on Andrew's presentation.

INSPECTOR: Okay, Mr. Sheehy, you have been very quite today so I suppose we can accommodate you for the moment. 14:14

MR. SHEEHY: It is just to request clarification on Table 2.2 on Dr. Franks' presentation. It is in relation to the inner, middle and outer zones, this is table 2.2 in the Acceptable Land Uses. The items raised in table 2.2, I just want to clarify that I am correct in this, these are the acceptable uses for where there is an established activity and page 324 of the EIS, where the HSA established criteria for new establishments that the nearest property should be outside zone 2. Just the clarify, am I correct in thinking that once a permission is granted, if permission is granted, for 14:14 14:15

this development that it becomes an established development and the criteria of table 2.2 will then apply.

DR. FRANKS: Mr. Inspector, that's my understanding of the HSA policy, yes.

MR. SHEEHY: Yes, that's the clarification.

INSPECTOR: That's it. Thank you, Mr. Sheehy. Before we just start this module I just want to point out that we have had a number of requests from people if we could break a bit early today, I don't know what it is about, if it is a sports fixture or what, or whether it is just because it is Friday, but I propose that we stop at 5:30 today. 14:15

Now, on other planning matters, I am going to invite the audience to speak first again. I think in this instance I will call on Catherine McMullin of the Kerry branch of An Taisce. I see you have a number of other issues, other than just the health and safety. 14:16

MS. McMULLIN PRESENTED HER SUBMISSION, AS FOLLOWS:

MS. McMULLIN: Thank you. Well, the other issues were mainly relating to amenity. Visual amenity has been a problem for us. The main problem is, obviously, the storage tanks and I

have no doubt many others have been of the same. When the site was rezoned for industrial most industrial buildings would probably have been quite acceptable visually on that site, because they tend to look like farm buildings or existing structures, but in the photomontages we have been shown four huge white tanks dominating the landscape and certainly close by and we identify in our submission the ones we found most worrying. And even from places as far away as Carrickfoyle Castle they can be seen. Carrickfoyle Castle is, obviously, a tourist amenity and quite a lot of visitors go there. I noticed, too, that Clare County Council also took issue with this whole visual effect from their side of the river. 14:17 14:17

I don't know what can be done to modify that visual effect and it is, perhaps, something that we will be told about later in the day. I gather that there is problems with trying to have too much planting on the side close to the processing area because of the dangers of fire. Again, I'd leave it to the applicants, perhaps, to expand on that. 14:18

The white colour of the tanks is what makes them stick out, presumably the white colour was taken because that way it would reflect the sunlight and slow down any heating up of the tanks. But I just wondered if there were more neutral colours that, perhaps, could achieve the same effect and be less obtrusive in the landscape 14:18

there.

One other short thing. Just a moment while I turn the page. I was not expecting you to call on me so quickly, I am afraid I am not quite organised. It was to do with the recreational amenity. When this proposal first was mooted I discussed it with some of our members who live in the area and they had a very strong feeling that, well, if a lot of industrial projects are being set up on the Shannon Development site it would be nice if the community could have some other benefit from it in the case of amenity. I don't want to be too specific as to what the company, or whatever other companies are going to be sited on the Shannon landbank, and, in fact, the locals may have more ideas about this than I would have, but we do feel that there should be some bit of access to the shore, or maybe some kind of right of way through it. Not necessarily through the plant itself, that's obviously not on. But some other way that the community could gain some recreational benefit from it. I will leave it at that. Thank you very much.

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END OF SUBMISSION

14:20

INSPECTOR: Thank you Ms. McMullin. I am going to allow submissions in total and then I am going to allow the applicants to respond in the fashion that we have done

to date. So, does anybody else wish to say something.

UNKNOWN SPEAKER: Thank you, Mr. Inspector. I am also a member of An Taisce, the Kerry branch of An Taisce and that's why I am sitting here with Catherine McMullin. I suppose, just to make a very brief statement. I suppose everyone has their own special area of interest in this. You know, Kerry County Council would probably get some money if the facility went through. Everybody has their own area. LNG would like to get it through, you know, because there is a profit margin there, surely. For myself I am mostly in the environmental, you know, those would be my concerns. In that area we actually put pen to paper and we produced a magazine Kerry Eco News, which showed the beauty and sustainability of Kerry. In fact, this lady came back from Canada and saw the beauty of Kerry and she said we must do something to maintain it. So, I gladly obliged with any input I have. In fact, I have a song in there, I have a ballad for the planet, which I wrote. But at the moment we are just trying to save Tarbert.

But anyway, that's my input into it. The thing is we have a beautiful area all around Kerry and we want to preserve it. So, that's why I am here today, as a member of An Taisce and as an individual from Tarbert. Another thing is maybe there are people there who have a certain interest in contracting and in making a profit margin on rent from their properties, too, and

developing in other addendums, in other areas outside and including the village. So, you know, good luck to them. But that is my concern anyway, is the environment and sustainability and, of course, primarily safety. Thank you, Mr. Inspector. 14:22

INSPECTOR: Okay. Anybody else? Mr. McElligott, I think you have an expert who wishes to make a presentation.

MR. J. McELLIGOTT: Yes, please. 14:23

DR. DECLAN DOWNEY PRESENTED HIS SUBMISSION AS FOLLOWS:

MR. DOWNEY: Mr. Inspector, I shall introduce myself very briefly. I am Dr. Declan Downey, University College Dublin, School of History and Archives. I should like to speak very briefly about the heritage and historical aspects of this area and drawing specific reference to some of the proposals for the location of tanks within 400 metres, of Ralappane House. Now, the area, the immediate local area, consisting of the townlands of Kilcolgan, Ardmore, Caroonakilla, Saleen, Returk, Lislaughtin, Pooleen (as heard), these areas are very well steeped in history going back over a period of 2,000 years human habitation. But I am not going to speak about the archaeological significance of the area I am going to speak about the historical significance of the area. 14:23 14:23 14:23

Within that radius we have very fine ruins of the 15th century Abbey, or friary of Lislaughtin. Not far away from that, of course, Carrickfoyle Castle, which has been referred to earlier. These are two of the jewels in the crown of North Kerry tourism and are very much a part and focus of the tourist industry. Which I might add is being developed at a higher level now to niche market tourism, in terms of cultural tourism. 14:24

So, the visual impact of the tanks that are being referred to by Ms. McMullin from An Taisce, this is a matter we look forward with interest to hearing from LNG how they propose to deal with this issue. Certainly, we can cooperate with them with regard to suggestions. Some have referred to the planting of trees. I have seen in other areas a very useful situation of the building of earth mounds around the tanks. That also helps in the event of fire. 14:24 14:25

But my specific concern to address you here is with regards to Ralappane House. Now, Ralappane House, ladies and gentlemen, is a 17th century farmhouse and here in Ireland we have very few farmhouses that date back as early as the 17th century. Most date to the mid 18th century or late 18th century, or indeed from the early 19th century. 14:25 14:25

Ralappane House, as I said, is 17th century and it is on the site of an earlier habitation, a medieval manner house, which was part of the lands of Carrickfoyle. It

was held by the O'Connor Kerry family for over 700 years. Then it passed, in the 17th century, into the hands of the Sands family, a Cromwellian planter family. Later it passed into the hands of the Hoare family. Then it passed, through marriage, in around 1820 to the Musgrave family, who occupy it at present. 14:26

It is a two-storey L-shaped residence, of four bays with a porch in front. It is gable ended with chimney stacks set unevenly between the gable ends. It has dormer windows, with very interesting fret work features around the windows and porch. Its interior is remarkably well preserved. It has some very fine early 18th century paneling and a very fine staircase, etc., and it is reputed to have been the birth place of a 17th century Irishman who had tremendous distinction in Europe, Bonaventure O'Connor Kerry. He was a Franciscan who had been professed in Lislaughtin Friary and later educated in Louvre and in Salamanca and at Airfort. He became a theologian, a dualist, he was a great classical scholar in the course of his long and distinguished careers in the Universities of Airfort, Innsbruck and [inaudible], and has left a considerable corpus of literature, in terms of the origins of international law and theology. He is one of our significant figures of 17th century Irish history. He is a significant figure on the European context as well and Ralappane is reputed to have been his birth place. So, there is that connection, too, which also enriches 14:26 14:26 14:27 14:27

its focus and its importance in terms of North Kerry tourism.

Not far from Ralappane there is another area, down in Ardmore, and there are a few old farmhouses down there, 14:28
which, of course, have been abandoned since they have been sold to the various speculators in the 1970's, forming part of that landbank. But, again, one of those farmhouses, which belonged to O'Connor family and remained in their possession down through the 14:28
centuries, was the reputed birthplace of another Kerry man and, indeed, Irishman of great international reputation in 17th century Europe, and that Bernard O'Connor Kerry, who was a very distinguished medical professor at Oxford, Paris, he was physician to King 14:28
Yansovieski of Poland. He had a very distinguished international career, not only as a medic, as a great professor of surgery and its use, in developing that, but he was also an historian and he was the first to write an history of Poland. 14:29

SO, we have a very deep sense of historical significance in this region of North Kerry. A significance that stretches not just only beyond North Kerry to the rest of Ireland but further afield, to 14:29
Europe. Therefore, I would request that LNG would address the issue of the location of storage tanks within 400 metres of Ralappane House specifically. Also, in view of the fact that various submissions have

been made with regards to the environment, health and safety issues, amenity, etc., that some way could be worked out whereby the genuine and legitimate concerns of the local residents could be balanced with the concerns of LNG in producing a suitable and workable solution to these matters. 14:30

So, therefore, Mr. Inspector, I should just like to conclude my remarks that I hope that I have indicated to you the importance of this locality in terms of its historical significance as well as in terms of heritage, its impact, of course, as well for local tourism and that, hopefully, this matter can be addressed by LNG with regards to the location of their storage tanks and modifications that could be made to the visual affect of those tanks, too. Thank you. Inspector. 14:30 14:30

END OF SUBMISSION

14:31

INSPECTOR: Thank you, Dr. Downey.

MR. O'NEILL: If I could just briefly respond to that. Maybe not, I don't want to interrupt the flow and I can deal with it later if needs be. 14:31

INSPECTOR: I think we will try and see if there are any further submissions. Mr. Kearney, you are Adam Kearney & Associates; is that right?

MR. KEARNEY: That's right, yes.

INSPECTOR: You have made submissions in relation to visual impact as well, do you wish to say anything.

MR. KEARNEY: Not at this time, no. Just to reiterate the fact that I think the bulk and scale of the tanks is overwhelming in this location. 14:31

INSPECTOR: Okay. Ms. Griffin?

MS. GRIFFIN: Catriona Griffin. I just want to check. In the brochures we have been given it says the height of the tanks is 50 metres, but if you take into account the various valves and rods on top of the tanks they appear to be more like 70 metres in height. 14:31

INSPECTOR: Okay. Do you wish to make another statement?

UNKNOWN SPEAKER: I just want to make another statement. Yes, it is on record and An Bord Pleanála granted planning permission for about 20 wind turbines in the Tarbert area. I don't know exactly the location. But, you know, obviously, that is a couple of years ago and they were never followed through. I know that there were some objections in Tarbert, I don't know why, but there was. Maybe some people were close by and the wind and everything else. But I maintain that, this would be my submission anyway, that if the whole landbank was utilised with wind turbines I'd say that they could 14:32 14:32

supply a tremendous amount of energy. It is sustainable, it will last forever and I don't think there is any danger of them blowing up. I put my submission fully for full safety. It was brought up the other day that even boiling a kettle is not fully guaranteed safe but relatively I do believe more safe than an LNG gas terminal. So would wind turbines. 14:33

I do believe that we have to move away from fossil fuel, however safe it is they say, or environmentally impacted, and move on to sustainable energy. Global warming is here or global heating, whichever you want to call it, is here. It is not ten years down the line, it is here. We have the capacity in this country to supply all our LNG needs with sustainable wind, wave and sun. If the Vatican, which is a State, if that can be carbon neutral -- I believe it is a small State but it is the only State which carbon neutral in the world. We have all the facilities here and working in conjunction with nature I believe that we could do the same here, if not at least close to it. Thank you, Mr. Inspector. 14:33 14:34 14:34

INSPECTOR: Thank you. This is a fairly wide ranging topic, so does anybody else wish to make a submission. Okay. 14:35

MR. FINUCANE: Michael Finucane. Just in reply by the way for the record. I would like to reply to Dr. Downey there and his history of the place. I can trace my family back

to the 1780's, they are part of the landbank. But there was a few omissions by Dr. Downey. There was 28 Celtic families dispossessed on that land in the plantation of Munster. He also forgot to mention about the decimation of Carrickfoyle Castle, the seat of the 14:36
O'Connors, by General [inaudible] on Palm Sunday, 1690. I have reason to believe it was the first...(INTERJECTION).

MR. INSPECTOR: Sorry, could you speak a little bit more clearly, I 14:36
think our stenographer is having difficulties.

MR. FINUCANE: By the decimation of Carrickfoyle Castle, the seat of the O'Connor's Kerry, in 1690, Palm Sunday, it was the first time that gun powder was used in Ireland. 14:36
General[inaudible] was one of the Generals [inaudible]. They also sailed up Ballylongford Bay and they sacked the Franciscan Friary at Lislaughtin and murdered and looted the Franciscan Nuns. Three of the nuns escaped and they were caught over Glencloosey, practically near 14:36
where the actual terminal is proposed. They were spotted by the soldiers and their ears were cut off. And that's how the name of that area is called Glencloosey to this day, for years. It is easy to glance over history, if you want to go back far enough 14:37
you can pick what you like out of it. But history should be told as it happened. That's all I can say.

INSPECTOR: Thank you. Any other contributors?

INSPECTOR: Okay, I am going to ask the applicants if they wish to respond to those remarks.

MR. O'NEILL: Thank you, Inspector. Some of the issues that have been raised will be dealt with in the individual submissions that are made. I would like to just deal with Dr. Downey's observations in case they slip between the submissions and are not dealt with. I don't want them to go unanswered. 14:37 14:38

The first thing I would say is that the EIS has a study of the historical context of the area, not only the site itself but the immediate area, and that's at paragraph 14.3 of the EIS Volume 2. There is a specific reference in that to Ralappane House. I will also note that the occupiers of Ralappane House, the Musgrave family, are, I understand, in fact very supportive of the proposal. I understand that Dr. Downey is appearing on behalf of the Kilcolgan Residents Association, and, of course, he is entirely entitled to do that, and very welcome. I don't understand him to be speaking on behalf of the Musgraves. Although if I am incorrect no doubt I will be corrected on that. 14:38 14:38 14:39

MR. DOWNEY: May I reply to that?

MR. O'NEILL: I am practically finished, Dr. Downey can then reply. Mr. Downey has been talking about the house in the

historical context rather than the architectural context. I don't understand Ralappane House to be, from an architectural point of view, of particular significance or of sufficiently important significance to be mentioned in the Development Plan. Again, if I am incorrect on that no doubt the record will be set straight. 14:39

But really what I am saying is that the historical context of this area has been taken account, has been assessed in the EIS. 14:39

MR. DOWNEY: Mr. Inspector?

INSPECTOR: Dr. Downey, Yes.

MR. DOWNEY: First and foremost, I know the Musgrave family, I have known them all my life, I am a native of Tarbert and I know that they have reservations about the location of these tanks within 400 metres of their house. We are old Tarbert families, we go back over 300 years in the district. 14:40 14:40

Secondly, as regards the matter of architecture and the architectural significance of the house, this has been noted by a number of architectural historians and has been given prominent coverage in various publications regarding the historic houses in Co. Kerry. I would refer you to Valerie Barry's recent publication on the historic houses of Kerry. The interior of the house, as well as its exterior, might not be as grand and as 14:40

flamboyant as a marvellous Palladian mansion, but that is not the context in which the house is important. It is important as gentleman's farmhouse and that, too, is part of the heritage of the country. Thank you, Chairman. 14:41

INSPECTOR: Thank you Dr. Downey.

MR. O'NEILL: Thank you, sir. If I may just clarify that, in fact, the Barry study to which Dr. Downey refers to is itself referred to in the EIS. As I say, all of these matters 14:41 have been considered and no doubt you can draw attention to those matters. As I say, they are at 14.3 of Volume 2 of the EIS.

I now intend dealing with the various aspects covered 14:42 under this module and the first person I am going to...(INTERJECTION)

MS. GRIFFIN: Mr. Inspector, could I just answer something that was just said? Could I just make a comment to 14:42 something that was just said?

INSPECTOR: Okay, Ms. Griffin.

MS. GRIFFIN: Catriona Griffin. No doubt Mr. O'Neill has read all the submissions on this planning application, as I 14:42 have, and the Musgrave family have not put in a submission either for or against the terminal.

MR. DOWNEY: If I might add to that, Mr. Inspector. I know that

the Musgrave family have reservations, I am a personal friend of them, and I know that they do not wish to make any submission as they wish to retain a certain distance from this.

14:42

Mr. O'Neill, just looking over your reference here to the historical coverage of the area, it is rather general. My intention of drawing attention here to the historical significance is to go beyond that. I have referred to significant personages from this area who 14:43 attract a lot of attention in Europe as well as in Ireland, in terms of the historical interest and significance of the area. There names and their significance is not addressed in this. But I do complement you on your report, in that you have given 14:43 an overall view of the historical significance of the area.

With regards to another speaker who addressed certain things that I failed to omit earlier. I said that I 14:43 was going to keep my comments brief and focus on the immediate matters here in relation to Ralappane House and the location of the tanks within 400 metres of that house. The other matters that are raised are interesting but I consider them not to be immediately 14:44 relevant to the purposes of this forum. Thank you.

INSPECTOR: Thank you, Dr. Downey. okay Mr. O'Neill, do you wish to commence your submissions.

MR. O'NEILL: Yes, sir, thank you. I am going to ask Mr. Thomas Burns of Brady Shipman and Martin to deal with landscape and visual aspects. He has a presentation to make so he is going to make from the podium if that's convenient, sir. 14:44

MR. THOMAS BURNS PRESENTED HIS SUBMISSION AS FOLLOWS:

MR. BURNS: Okay, Mr. Inspector, I will commence. I have prepared a brief statement of evidence and while it deals with some of the issues already dealt with in the EIS, in terms of a summary of the receiving environment and the impacts, I propose to do a summary of that element, as you have announced that we should do. 14:45 14:45

Qualifications and Experience: My name is Thomas Burns, I am a landscape architect and partner with Brady Shipman Martin, Environmental Landscape and Planning Consultants. I hold a bachelor of agricultural science degree in landscape from University College Dublin and a post graduate diploma in Environmental Impact Statement Management, also from University College Dublin. I am a member of the Irish Landscape Institute and the European Foundation of Landscape Architecture. My main areas of expertise are in the assessment of landscape and visual impacts and I have been involved in such assessments for over 17 14:46 14:46

years. I have been involved in the landscape and visual aspects of numerous Environmental Impact Statements for a wide range of infrastructural, commercial and industrial developments, including for various developments at Irish Cement Facilities in Platin, Co. Louth and Mungret, Co. Limerick, the Dublin Waste Energy Project in Poolbeg in Dublin and the Masonite facility in Co. Leitrim. 14:46

Introduction: Brady Shipman Martin undertook the landscape and visual impact assessment section of the Environmental Impact Statement, the preparation of the associated Photomontages and the development of the landscape proposals for the proposed Shannon LNG project. My statement of evidence provides an overview of the principal findings of our assessment and responds to landscape and visual issues as raised in the various submissions to An Bord Pleanála. 14:47 14:47

The assessment was conducted having regard to the guidance and structure recommended for the studies by the Environmental Protection Agency in their guidelines on the information to be contained in Environmental Impact Statements and the advice notes on current practice in the preparation of Environmental Impact Statements. 14:47 14:47

The following sections I propose to present in an abridged version.

The site is a low-lying, undulating land located on the south shore of the Shannon estuary. The Tarbert to Ballylongford Coast Road defines the Southern boundary of the site and the prominent ridge effectively screens views of the estuary from the Coast Road. While the broad waters of the Shannon Estuary are the defining landscape feature, however the estuary cannot be considered as an untouched natural landscape as it has previous precedent of the establishment of significant stand alone facilities, include the nearby Tarbert and Money Point generating stations, as well as Aughinish Alumina and Irish Cement further up river. The site is visible from the Co. Clare side of the estuary, from the waters of the estuary and from limited sections of the south shore extending west to beyond Ballylongford Bay. 14:48 14:48 14:48

The undulating nature of the landscape east of the site provides for effective middle ground screening, while intervening roadside and field vegetation provides effective foreground and middle ground screening of views from within the flatter landscape west of the site. 14:48

In summarising the landscape planning context. The site, together with the adjoining lands, is zoned for industrial related use in the Kerry County Development Plan. The Plan does not identify the site as either a primary or secondary special amenity area and the site 14:48

has no trees or woodlands identified for preservation or protection.

The site falls within the visual context of two identified view and prospects, one from Carrig Bridge local road and the second from the elevated lower slopes of Knockinore Mountain some 10km distance. The site also falls within the visual context of a number of scenic routes, as identified within the Clare County Development Plan. 14:49

Now, I am going to go on and just summarise the potential impact section. That's page 6 of my brief of evidence.

14:49

Construction Stage: The construction stage will give rise to landscape and visual impacts through earthworks and general construction activity. Construction works will be of a significant visual influence. However, a similar level of construction related activity is commonly associated with the majority of major infrastructural projects, including road schemes and any large green field development. Indeed, the construction of any major facility on this site would result in similar overall levels of site disturbance and landscape and visual impact. 14:50 14:50

Operational Stage: While the development has many associated elements and features the proposed LNG tanks

will be the primary visual impact features and the development will give rise to significant visual impact for properties within the immediate areas. Nighttime illumination, which is an existing feature of the Money Point and Tarbert Island generating stations, will tend to accentuate the degree of change in the landscape. 14:50

LNG ships will be prominent visual features in moving through the estuary and in mooring at the LNG site. However, the estuary is an important shipping corridor and large ships already move further up stream to Foynes and Aughinish Alumina. 14:50

The proposed development will come within the visual context of two views and prospects within Co. Kerry and three scenic routes within Co. Clare. The listing do not preclude development and the existing generating stations at Money Point and Tarbert already define the visual context of the listings. It is considered that the proposed development will not be significantly obtrusive or impacting on these views. 14:51 14:51

The Kerry County Development Plan identifies the site as a potential location for a premier deep water port activity and associated industrial use. Again, it is likely that any major industrial development, in whatever form it may take, would result in a similar degree of landscape and visual impact on this site. 14:51

Mitigation Measures: This is page 9 of the brief. In terms of mitigation, a series of measures have been considered throughout the process from design to layout to construction and operation of the facility. Some of the specific design and layout measures aimed at reducing landscape and visual impact include: The use of lower profile tanks some 8m lower in overall elevation than normal profile LNG tanks; the excavation of a lower base level on which to locate the tanks, thereby avoiding skyline impact when viewed from the north and reducing local visual impact; and siting of the tanks close to the shore, at the minimum practical level, makes best use of Ralappane ridge-line in providing screening for local residences and areas further south. 14:52

In addition, the landscape design provides for the reseeding of disturbed areas outside of the actual operational parts of the development with dry grassland seed mixes. New tree and shrub planting will be established on up to 8 hectares of the site, including areas of regraded slopes, areas along the site boundary, along the public road and at entrances. Consultation has and will continue to take place with local residents, particularly with regard to the type and location of planting. The aim is to provide an acceptable level of integration of the development, while retaining existing views to the Shannon Estuary. 14:52

At this stage Mr. Inspector, I would just say that photomontages were prepared for the EIS and these have been included in the EIS, but I would propose to go through a small number of those just to set the visual context and the setting for what we are talking about today. 14:53

First, this is the plan which shows the location and range of Photomontages that have been prepared for this particular project. As you can see, they include Counties Kerry, Limerick and, indeed, Co. Clare to the north. This is the first one, it is View 2 from the list of EIS montages. It is taken from the Coast Road directly south of Ralappane House. It shows a number of things. First of all, it shows Money Point here on the right-hand side, visible just over the landscape. The second thing is, and important thing here, is it shows the effect of Ralappane ridge-line. This ridge, which rises to about 34 metres over datum, has a significant effect in screening the site and in screening the estuary from the Coast Road. So, as you are moving through landscape you are unaware of the estuary, which is in dramatic contrast to areas further east and west, where you are much more proximate to the actual estuary and visually experience it. 14:53 14:54 14:54

If we move on. That's the existing view. This is the as proposed view. It shows the effect of the ridge in screening the tanks, but also the effect of the

earthworks and the regrading that was proposed on this site in order to set the tanks as low as practical on the site, thereby reducing the impact from the majority of the residences, which are located south of the actual Coast Road itself. So, we can see one tank is directly behind the farm buildings, one tank is directly behind the house, one is behind this clump of trees and one tank, further west, is more open to view there. 14:55

The second one prepared is View 4, which was taken on higher lands further south of the development. Here you can see the nature of the elevated views that some of the residences have over the site and to the estuary. Now, again, Money Point is just to the right of the house, it is visible over the lower part of the house, to the immediate right. But apart from that it is an open view. Here we have the LNG tanks inserted into the view and, again, it shows how we have tried to set the tanks so that as much as possible we tried to avoid breaking up onto the skyline in some of these critical views. Now, this isn't always possible in every location. But I think you will see as we go through this that we have tried to achieve this in the majority of situations. Again, there is an expansive and open view of the estuary which retained in this view. 14:55 14:56 14:56

This is a view from the Tarbert to Ballylongford Coast

Road southwest of the south, and this is View 7 from the EIS. Again, we have got Money Point in the distance, in the centre of the view here, in the distance, in an otherwise very typically flat North Kerry landscape. 14:56

This is the tanks inserted into this view and the tanks appear just to the right of Money Point. But they are not of particularly significant impact in this location. It shows the effect of -- once we are into a 14:56 very flat landscape, with a lot of intervening hedgerows and trees, and even roadside boundaries, even though they are not particularly significant in height it is just the interlocking effect and the actual foreground screening that they provide. They just 14:57 provide that basic anchoring for the visual setting of the tanks. The critical thing here is I think we can all accept that these tanks cannot be screened entirely, but it is important that we try to anchor the base of the development into the landscape so that the 14:57 whole of the development does not appear to loom up from the local landscape.

Second, this view here is View 12 from the EIS and it is from Carrig Island to the west of the site. So, we 14:57 are viewing across the waters of the south estuary. Here we have the tanks appearing just on the promontory and this is one of the most open views of the development from the Kerry shoreline. Again, we have

the Money Point generating station to the left of the view and the stacks are considerably higher, rising to 220m above datum. The tanks on the site here are rising to 60.5m above dating. That's the top of the tanks, I will come back to the height of the tanks again. 14:58

Here we have another view from much more elevated lands, on a local road in Ballykilane Upper, to the southeast of the site. We are looking north over the whole of the North Kerry coast from this location. It is a very panoramic and expansive view. We have got Tarbert on the right, Tarbert Island on the immediate right. Again, we have Money Point. At this distance it is less distinct but it is in the centre of the view. The site is immediately almost above the tourist sign in this location here. So you will see the tanks insert in to the right of where I was pointing. It is just there. So, the four tanks are located in there. They are not particularly intrusive visually in the view, the wide expansive nature of the view still dominates the view of the estuary. At the end of the day, the existing visual references of Tarbert and Money Point will still be the dominant visual references in that landscape. 14:58 14:58 14:59 14:59

Here is a view. Now we move across the estuary on to Co. Clare and we are on the N67 at Killimor. We have a residence in the immediate foreground and we have Money

Point just beyond. In this location the site is on the far side of the estuary, on the southern side, in the background. This is where I come to the fact that we have purposely designed these, selected the height of the tanks and the base level to try and maintain the top level in line of the skyline or below it. So that from Co. Clare we are not appearing to break and to come up onto the skyline. I think that is important in these views. 15:00

Again, we are on the N67 and viewing more directly along the road and across the estuary to the site. Again, we have the tanks located very close to the shoreline and, again, they are not breaking the skyline. There is an issue in the submission from Co. Clare as to the arrangement of the tank and I will come back to that again. But I think shows that while they are a linear arrangement there is still that view through. And it is not a wall of tanks, as was implied in the submission. In many regards, in fact, the ship in the view is probably the most prominent element, and that's infrequent and when it is not moored it is moving up and down the estuary. It is a feature which is common on the estuary at the moment. 15:00 15:00 15:01

If we move into a few night-time shots. This is the same location. As you can see, it is a shot taken at night-time from the same location. We have got the illumination associated with Money Point in the

middle-ground there, on the left-hand side. Here we have the inserted LNG facility on the background of the estuary here. It is a much less illuminated facility than Money Point, or either Tarbert for that matter. The lighting has been specifically, where possible, been minimised and, also, designed to refuse the night-time glare effect that you do see on the Money Point facility. I think it is even more noticeable in this one. This is an existing one again taken from one of the daytime locations. Again, this is the night-time version, again on the N67. It shows the strong dominant effect of illumination which is on the Money Point facility. In the background there is the insertion of the LNG facility. 15:01 15:01

Now, finally then in the photomontages, looking at the Co. Kerry side. Here we have a view from southwest of the site, an elevated view, slightly elevated view. You have got Money Point, again a very much an illuminated facility, in the background, over the ridge of Ralappane there it is visible. If we insert the LNG facility, again there is illumination and it is certainly going to draw reference to the presence of the facility at night. However, it is not illuminated to the same extent that is in the existing facilities at Money Point and Tarbert. 15:02 15:02 15:02

Okay, I propose at this stage just to move on to deal with some of the submissions and some of the issues

raised in the submissions to An Bord Pleanála. I will just give you the correct page reference. This is page 10 of my brief of evidence.

Item 7 - Response to Submissions to an Bord Pleanála: 15:03
A number of landscape and visual related issues have been raised in submissions on the proposed Shannon LNG facility. While submissions by Clare County Council and Kerry County Council are discussed at the end of this section the principal issues raised by third 15:03
parties are considered separately in the following sections. The first issue relates to the boundary fence.

There have been some concerns raised regarding the 15:03
proposed 2.9m high boundary fence and that the photomontages do not show the boundary treatment. In response to that: The boundary fence is required for reasons of access control and health and safety on the site. The proposed fence is to be 2.4m high chain-link 15:04
fencing with barbed wire on top, taking the full height to 2.9m. In general, the fence is to be located at or close to the site boundary. Where existing hedgerows define the boundary the fence will be located to the inside. Where the boundary is undefined, open or 15:04
adjusted the fence will be located on the boundary and planting willing be established along the inside. In either situation the fence will not be particularly visible and will not give rise to visual intrusion or

impact.

The photomontages do not illustrate the boundary fence. However, the fence, if present, would only be visible in View 3 (figure 5.3.3b of the EIS). In all other 15:04
views the fence is screened from view. In addition, a number of residents have expressed a particular concern about the location of the fence along the Coast Road. While the fence was to be located close to the road, the applicant is willing to have the fence set back 15:05
into the site, where it can be screened by low planting along the roadside. Where the road is to be widened, the edge of the new road will be defined by a new sod and stone bank in keeping with the existing road boundary. 15:05

Mr. Inspector, at this point, as the fence was not included in photomontage View 3 we have prepared an updated version and that's figure 5.3.3c. This shows the fence and I just go to that now. This was the view 15:05
as in the EIS and the fence which would be here is not visible in that, is not being included in it. This is an updated view and the fence runs across the view at that location there. It is not particularly visible because you do have planting behind it, so you are 15:06
always seeing this fence against the background of planting.

However, as I said in my response there, there has been

particular concern about this fence raised by some residents and an alternative option was prepared. That will give you this effect, where the edge of the road is defined by a sod and ditch bank and the fence is located in a much lower level back from that fence. If I just move on. This drawing here shows the alternative proposed locations for this fence, showing how it is set into the site. It is actually set at a level which is much lower than the road. If we have a look at this in section this is the effect of what we are looking at. We have the road and the road is widened in some locations, we have a grass margin verge and the actual fence was to be located at that location there. But what we are now proposing, what the applicant is proposing is that they are willing to have the fence located at a much set back location, which is considerably lower than the road and the planting, it is much easier to screen the fence with low planting, while at the same time not really interrupting views from the residents towards the estuary. That is a particular concern of the residents, to try and retain as much open views as possible. That's a current proposal on that, which we are proposing to address some of the residents' concerns.

15:06 15:06 15:07 15:07

If we move on to issue two, which is visual mitigation. A number of submissions have raised issues that steps should be taken to reduce the visual impact of the LNG plant as much as possible and that insufficient

information on landscape and visual mitigation and issues of why was the white colour of tanks chosen and why not plant mature trees along the road.

In response to these issues: As stated in the EIS (section 5.6) and noted previously in my brief of evidence, significant measures have been incorporated into the design of this facility, the layout of the facility and the proposed landscaping so as to mitigate landscape and visual impact. 15:07 15:08

These mitigation measures, in particular, they include the use of lower profile tanks, and these are 8m lower than normal LNG tanks. The tanks are located on the lowest practical excavated base level. The excavation of a lower base level on which to set the low profile tanks. This setting and the siting of the tanks makes best use of Ralappane ridge-line for visual screening and backdrop. The development has an over all compact layout, reducing its visual expanse. This is particularly as viewed from the Kerry side and from the local residents. Earth modelling and regrading is utilised to screen and break up the obviously engineered forms, such as access roads, leveled areas. Extensive landscaping, including predominantly native and indigenous tree and shrub planting is also proposed. 15:08 15:08 15:09

Just to try and illustrate, because it has been raised

here by Professor Downey again today, that measures have been taken on board in terms of mitigating the landscape and visual impacts and I am just going to go through a series of some sections which illustrate the effect of some of these measures. 15:09

This is a sketch, just a typical section through the sight at the location of where the tanks are. We have a sea level at the estuary and we have an approximate level on top of Ralappane ridge-line of 34m AOD (above 15:09 datum) and that's Malin.

One of the first things that was looked at is just placing your normal LNG thank on this landscape in a simple engineered form. That would have provided a 15:09 tank with a top of dome height of 76m AOD (above ordnance datum).

Now, I think at this stage, Inspector, it is important to say while I am going through these sections that 15:10 these are options that were considered but they are not what we are proposing. The tanks that we are proposing have a top of dome height of 60.5m AOD. So you will see how we arrive at that situation in the next few slides. 15:10

The second alternative would have been to use the low profile tanks on the minimal site works development. That would have given us a top of dome height of the

tanks of 68m AOD. Then another option that we have looked at is excavating out the base of the site, and this is what we have proposed and this is what forms part of the application, this excavation, effectively providing a lowered base level of 10m AOD for the actual platform for the tanks. Again, the actual process area has been set into a further reduced area. You can see the dashed line represents the existing land, so you can see how the tanks and the development have been set into the landscape. 15:10 15:11

Again, this would have been the situation using a normal LNG tank. It would, again, have been a height of 68.5 metres AOD. In this section, which is effectively what is before the Board, is the use of a low profile tank, the tank itself is 50m in height, 50.5m in height to the top of the dome. It sits on a platform of 10m AOD and that gives you your top of dome height of 60.5m AOD. I know there is some confusion about those levels out there, but that is the actual levels, the top of the tank is 50.5m high, sitting on a platform of 10m AOD. 15:11 15:11

Just as a summary, this is just a slide which pulls together all the previous ones and it shows how this development has been set into this landscape and the use that has been made of the topography to provide that screening, both to lands to the south and also from areas to the north, in Co. Clare, in using 15:12

Ralappane ridge-line, in as much as practical, as a backdrop to the development.

So, you have got your higher tank of the upper level and then that's gradually reduced to give us our low profile tank sitting on an excavated base. Similarly here, the process plant has been reduced from this level down to this level here. It is effectively tucked in behind the actual tank and it is giving it that very minimal visual presence in the landscape. 15:12

Just continuing and moving on to one of the other issues and it is mainly to do with the colouring of the tanks. The LNG tanks are constructed of concrete and do not have a specific white finish. Just to clarify that. They are not painted and they do not have a particular colour treatment applied. They are constructed of concrete. However, the natural appearance of new concrete, as has been used in the photomontages, may appear initially near white when viewed in direct sunlight. The new concrete finish -- now, this was selected in the photomontages as being the most visible. So, the tanks as represented in the photomontages have a new concrete finish and that was chosen because it will present the tanks in their most visible form. 15:13

However, as with all concrete products, this initially lighter colour tends to fade or weather to a more

visually recessive grey appearance. I will come back to colour again because it is raised particularly in the Clare County Council submission.

Finally on this issue. The use of mature trees has been limited for two reasons: Firstly, there is an expressed wish amongst local residents that existing views to the estuary be retained wherever possible. As such, planting is selected and located so as to avoid additional screening of these views. Secondly, the site has an exposed estuarine setting (and this can be evidenced from the existing vegetation), so in this environment more mature trees would be significantly less likely to establish and develop successfully on the site. 15:14

In effect, what we are doing is we are taking a long-term view on this project and in terms of establishing the best optimum screening and landscape development we are proposing to use trees which would be in the range of 1m to 2m to 3m in height, and that's what is going to give us the best effect in screening. 15:14

Now I am going to move on the issue No. 3, and this deals with scenic areas and scenic routes. Some of the submissions call this a pristine amenity and scenic area, the impact on the Saleen to Kilcolgan scenic route and the river is scenic and the river and shore use for recreation. I want to just run through a 15:15

response on these issues.

The landscape is of a rural, agricultural and typical low-line nature. While having an estuarine backdrop, it is not designated as either a prime or secondary landscape area and, similarly, has no landscape amenity or recreation designation in the Kerry County Development Plan. The site or immediate landscape was not highlighted in An Foras Forbartha's *Inventory of Outstanding Landscapes in Ireland* (1977). 15:15

The wider estuarine context is the setting for large industrial developments, including electricity generating stations at Tarbert Island and Money Point and Aughinish Alumina, near Foynes further east. In addition, the site is zoned for industrial related and deep water jetty use. 15:16

As such, the landscape cannot be described as a pristine and scenic area. While the development will be visible between Saleen and Kilcolgan, the route also includes views of both Tarbert and Money Point generating stations. Nevertheless, the estuarine landscape is visually attractive and visually interesting, an aspect which is influenced by the existing developments, a landscape image that will not be altered by the proposed development. 15:16

Issue 4: Landscape and visual impact: This is concerns relating primarily to the visual impact of the tanks and the impact on the greenfield site and scenic rural area and that the tanks will destroy the landscape. I am dealing with these in this response. 15:16

As already noted in response to issue No. 3, that I have just gone through, the landscape is of a rural, agricultural, typical lowland nature. It is not designated as either a prime or secondary landscape 15:17 area and, similarly, has no landscape amenity or recreational designations in the Kerry County Development Plan. The wider estuarine landscape is also the setting for large industrial developments, including electricity generating stations at Tarbert, 15:17 Money Point and, also, Aughinish Alumina. While the site is a greenfield in appearance, it is zoned for industrial related and deep water jetty use and any such development would have a similar level of landscape and visual impact. Undoubtedly, the 15:17 development will give rise to locally significant impacts. However, given the presence of other significant development on the estuary, the Shannon LNG facility will not adversely alter the existing estuarine image of the landscape and will not be 15:17 seriously injurious to its landscape and visual characteristic.

Construction impacts - In particular, there was an

issue on the impact of lights during construction.

In general, construction working will be between the hours of 7:30 a.m. to 6:00 p.m. weekdays and 8 a.m. to 2:00 p.m. on Saturday. However, 24 hour working will be required for tank concreting (slip formation) and for some jetty works as required by weather or tide. As such, with the exception of occasional short term periods, the main lighting during construction will be restricted to early mornings and late evenings during winter months, and a low level of site lighting will be required at all times for security and safety reasons. It is worth noting that a significant level of nighttime lighting is an existing feature of Tarbert Island and, most especially, Money Point generating statement. This lighting is clearly illustrated in the EIS nighttime photomontage (View 29, figure 5.3.29) and I have already shown that image today. 15:18 15:18 15:18

The visual impact from Co. Clare was brought up by the third parties but it is also brought up in more detail by Clare County Council and I will deal with that towards the end of this submission. 15:18

The height of the tanks, there is a statement that the height of the tanks was lied about and while Mr. Bowdoin has already responded to this issue I will again just clarify the issue, because it is being raised here again today. There is some confusion, and 15:19

it is just confusion, between the height of the tank and its elevation above datum. It comes down to the fact that the site for the tanks is effectively at a level of 10m AOD. So, every height is then, to get its level above datum, you then add on 10m. So, while the top of the dome is 50.5m that is 60.5m above datum. And that's all it is. 15:19

I would probably draw people's attention to figure 3.14 of the EIS. That shows the cut away section of the proposed LNG tank and it clearly shows the height of the tank, both at the cylinder, at the cylinder wall. The height of the cylinder wall is 40 metres. The top of the dome is 50.5m. There was a query there today about the top of the vent, the top of the vent is 61.5m. That is the highest point of the structure. However, in a visual context, the basic tank is the primary feature, the vent and other aspects are not of particular visual significance. 15:20 15:20

Issue 8: Submerged tanks - should use submerged tanks

Again, this has already been responded to by Mr. Bowdoin.

Issue 9: ESB powerlines - pylons and powerlines 15:21

The powerlines are not part of this application and Mr. Power and Ms. Lyden have responded to this issue so I don't propose to go back into that.

Similarly, the issue of the gas power station has already been responded to. The submission did not include for a gas power station and, therefore, it is not included in the photomontages. That was one of the issues raised in the submission. 15:21

Issue 11: Photomontages do not show the tanks accurately

In response to this: The photomontages were prepared using survey, site and photographic reference information. This information was then used in digitally establishing and inserting the rendered model of the proposed development. The representation of the tanks in the photomontages is fully accurate. Just to show the process by which the photomontages have been prepared I have got a number of slides that just give an overview of that. I just propose to run through these slides. 15:21 15:21

Just for illustrative purposes what we have done is we have taken View 9, which is one of the views shown in the EIS, and I will just run through how that has been set up. 15:22

The first stage is to take an existing photograph. So, you identify the site. We survey this site, the camera location, and we take the actual photograph. This photograph has a number, it is centred on Money Point 15:22

and otherwise it is a typical landscape shot of the area.

The second stage is to survey in a number of reference points that appear in the landscape and which have also been included in the photograph. So, for instance, for this photograph the top of this ESB pole was surveyed, the top of Money Point stack, the ridge of a house in the centre of the shot and the ridge of the house to the right of the shot. It is important, when you are surveying these points, that you take a range of locations across the photograph, because they are used in fixing the development into the site and making sure that it is at the correct level. 15:22 15:23

The second stage, you set up the camera angle. So, you record the angle and you set it up on the photograph so you know how it all relates from the actual camera to the actual reference points which are shown here. Meanwhile, at the same time a model of the actual development is prepared. This is prepared from the application drawing, so you have a fully accurate model prepared in 3D and it is capable with the ability to look at this model from any angle and to prepare an image from any angle required. In this instance we prepare an image from the camera angle. 15:23 15:23

So, this is how it looks when the model has been rendered from the location of the camera, from the

height of the camera. This shows the tanks, it shows the terrain and these four cones, the top of the cones indicate the reference points which have been selected on site and surveyed in. You will see in the next few slides how that works. 15:24

Next thing, we take out the black background and the model is set into the photograph using the reference points. So, if I just flick between those two you will see how the model comes in. Because we have a range of 15:24 reference points we are fully confident that the development is at the correct height and, also, importantly for a wide development, that it is at the correct angle, that it is set within the landscape at the correct angle, so there is no tilting of the model 15:24 in the view.

Then to finish the photomontage procedure we remove the reference points. Secondly, the development is cut into the landscape. So, those elements of the 15:25 landscape which are in front of the development are cut to the front so you have it in its correct visual position, where you can see the difference. Because of the intervening vegetation all the lower elements of the development are removed. Finally, this shows the 15:25 effect then of some further earthworks and planting associated with the development.

So, that's how the actual photomontages are prepared,

and each and every one of the photomontages have been prepared in this manner.

Issue 12: Some photomontages say the visual impact is moderate to slight - from many views it is much greater. This is one of the issues raised in submission. 15:25

While the visual impact from many locations is, indeed, considered to be slight or moderate, in some locations the visual impact is also greater. These more significant impacts have been assessed and described in detail in the EIS (section 5.5.3) and they have been noted in my full statement of evidence, which I have not read out here again. I just draw your attention to section 5 in the statement of evidence. I don't propose to go back into. 15:26 15:26

I don't accept the issue, that the assessment states that the impact is moderate to slight. It is moderate to slight in some locations. It is greater than that in other locations. And that has been assessed fully and correctly in the EIS as appropriate. 15:26

Now, if I can move onto the submission by Clare County Council. The submission notes that the southern shores of the Shannon Estuary are mainly rural and agricultural in nature. However, the Money Point power station forms an industrial focal point in the area and 15:26

that views across the estuary to the site are expansive from this area, particularly when viewed from points along the N67 national secondary road. So, the submission is just setting the context and we would support that context. 15:27

The submission notes that the shorelines of the southern shores of the Shannon Estuary -- and I would take it that that probably should mean the northern, but I may be wrong in that -- the southern shores of 15:27 the Shannon Estuary and adjoining lands are designated as visually vulnerable in both the West Clare Local Area Plan 2003 and the Clare County Development Plan 2005. Policies CDP 46 of the County Development Plan and ENV 1 and 2 of the Local Area Plan relate to a 15:27 protection of vulnerable landscapes and development in open landscape and in areas designated as visually vulnerable.

So, in particular, policy ENV 2 of the Local Area Plan 15:27 states that *proposals for development within areas designated as visually vulnerable will normally be permitted only where it can clearly demonstrate that:*

- the proposed development does not intervene with views of the water from any point within the visually 15:28 *vulnerable area, or*

- the view of the skyline is not significantly impinged on by the proposed development when viewed at a reasonable distance from the ridge-line.

Before I go on, I think it is important to state that the "visually vulnerable" designation relates to landscapes within Co. Clare and not to those of Co. Kerry, including the site, which has no such designation. Nevertheless, while often openly visible from within such areas in Co. Clare, it is considered that the proposed development has been designed, sited and mitigated (as set out in section 5.6 of the EIS and section 6 of this statement) so as to meet the objectives of Policy ENV2. Firstly, the development will be viewed in the backdrop of existing views to and over water of the estuary, thereby avoiding any intervention within such views. Secondly, the site has been regraded and lowered and low profile tanks utilised so as to purposefully avoid or reduce potential for skyline impact in views from the landscape of Co. Clare. 15:28 15:28 15:29 15:29

Policy CDP 51 of the County Development Plan requires development in the environs of a scenic route - such as that section of the N67 east from Ballymacrinan Bay - have *no adverse obstruction or degradation of views towards or from visually vulnerable features; nor significant alterations to the appearance or character of these areas.* 15:29 15:29

That's just from the submission from Clare County Council.

The stated section of the scenic route already takes in open foreground views of Money Point station, together with more distant background views of Tarbert Island generating station. The Shannon LNG development will be visible from sections of the route where it will 15:29
appear in the background of such views. The development will not give rise to visual obstruction or degradation of views to and from visually vulnerable features within Co. Clare and it will not adversely alter the particular estuarine image of the landscape. 15:30

In discussing visual impact the submission by Clare County Council proposes consideration of a *block of 2X2 tanks* in contrast to the as proposed line of four tanks. The submission also recommends consideration of 15:30
using an appropriate external colouring or painting of the tanks.

Given the topography of the local landscape and the location of surrounding residences, a linear 15:30
arrangement for the siting of the LNG tanks is considered the optional layout for minimising visual impact within their overall context. A 2x2 arrangement may have lesser visual impact from Co. Clare; however, this is marginal given the significant distance and the 15:30
fact that the development of either a 2x2 block or a straight line arrangement always forms a smaller part of an otherwise expansive estuarine view. By contrast locally within Co. Kerry, a 2x2 block arrangement would

have significantly increased the visual massing of the development from nearby views and from passing views from the Coast Road. In particular, a block arrangement would have necessitated significantly greater excavation into the Ralappane ridge, reducing its visual screening effect from residents and roads located further south. Given the nature of the topography, it is also likely that in a block arrangement the second or most southern line row of tank would be sited at a higher base level, thereby increasing their visual presence both locally and in a wider context, including from Co. Clare.

A number of issues are worthy of consideration in responding to the external treatment of the tanks. The tanks are large structures, visible against a range of backgrounds, including land, water and sky. More usually the tanks are viewed against a combination of two or more such backgrounds within any given view. In addition, views of the tanks must be considered in terms of aspect, with the most open views being from the north, the west or south west. As such, the tanks will be primarily viewed both into the rising and midday sun and with the afternoon and evening setting sun. Against this context the external treatment of the tanks must be capable of best minimising visual impact and obtrusiveness in all views, all conditions and consistently over time. Given the scale of the tanks, dark colouring will tend to define and hence

accentuate their bulk, Especially at distance. While at proximity dark colouring will tend to increase the perception of proximity and visual massing. White colouring has a high contrast against landscape, and especially water, and its highly reflective nature would give rise to glare when viewed with direct sunlight. Taking such factors into account, it is considered that the best appearance can be achieved using a natural concrete finish. While light coloured initially, concrete quickly weathers to a grey, giving the optimum visually recessive appearance against land, water, sea and sky. The photomontages used a worst case new concrete appearance. However, this will tend to fade towards a grey finish but will retain an acceptable appearance over time and a visual consistency in a wide range of environmental conditions. So, again, I would reiterate there is no proposal to paint or treat the external colour surface of the tank to a white finish. 15:33 15:33 15:33

Finally, **submission (Manager's Report) by Kerry County Council**: In reviewing the Shannon LNG project, the Manager's Report notes the Plan states that in general land zoned for industrial use will be located within urban zone and the Council recognises that coastal zone is a vital asset with limited capacity to absorb development. However, the Plan also notes that for strategic locational reasons there are instances where lands outside of urban areas may be zoned for 15:34

industrial purposes.

The Manager's Report notes that the County Development Plan includes the following reference: 15:34

> "Section 5.2.9: Lands have been identified at Ballylongford/Tarbert as suitable for development as a premier deep water port facility and for major industrial development and employment creation."

In considering views and prospects the Report notes that the Plan does not give rise to the prohibition of development, but that development, where permitted, should not seriously hinder or obstruct these views and should be designed and located to minimise their impact. 15:34 15:35

In discussing the location of the tanks the Report states that *the planning authority is satisfied that locating the tanks on the eastern portion of the site reduces the need for processed pipe work, excessive jetty construction and minimises the visual impact on the surrounding landscape through screening by more elevated ground to the south.* 15:35

In discussing the visual impact and landscape assessment the Report notes that the planning authority accepts that for technical, economic and operational reasons the location chosen for the tanks is the optimum location within the site. It has further 15:35

considered that minor structures and process equipment will not have significant visual impact and that the primary aspect of visual impact will centre on the tanks and the jetty.

15:35

The Reports notes the range of slight to significant visual impact associated with the project. However, in considering its context the Report goes on to recognise the existence and significance of existing developments on the coastline of the estuary, including Aughinish 15:35 Alumina, Money Point and Tarbert Power Stations. The Report considers that in the context of the existing environment the development will not alter the populations image of the estuary or the landscape and state that the *construction of the proposed development* 15:36 *will not therefore be a precedent and will not constitute a development encroaching on a pristine unspoiled landscape.*

In relation to views and prospects the planning 15:36 authority considers that, as required in section 11.4.1 of the Development Plan, the proposed development does not seriously hinder or obstruct these views. When viewed from these locations it is considered that the development, while clearly visible, does not dominate 15:36 the landscape due to the distance from the development, the angle of view available and given the context of existing development in the area.

In summary, the planning authority notes that there is significant visual impact arising from the development. The planning authority also notes that the landscape on which it is situated is not highly sensitive or scenic; that there is precedence for other development of significant scale in the vicinity; that the image value of the estuary will not be altered; and that the proposed development is not located on land with an amenity designation but rather it is zoned industrial. 15:36

15:37

The Report also notes that the planning authority considers the mitigation measures provided, while not screening the development, has given consideration to landscape and visual impact issues.

15:37

The Reports states that it is clear that *the County Development Plan envisages and facilitates major industrial development at this location. The planning authority considers that this zoning is in accordance with the provisions of the Development Plan and is not inconsistent with the objectives regarding landscaping listed above*. 15:37

Conclusion: The proposal envisages the provision of a major industrial development on an open estuarine landscape. The development will give rise to landscape and visual impacts for properties and viewers in areas immediately south, south-west and west of the site, and for those on the immediate north shore of the estuary. 15:37

The Shannon Estuary is an important landscape resource. However, it is also a commercial resource and the setting for some of the largest infrastructural industrial developments in the country. Developments such as Money Point and Tarbert Island generating stations, and Aughinish Alumina further east, are already physically and visually prominent industries on the estuary and amongst the primary aspects of visual reference in the wider landscape. 15:38

The proposed development is lower in height than some of the existing developments; nevertheless its prominent visual mass will result in significant visual impact. However, negative landscape and visual impacts must be considered against the wider significance of the proposed development; its specific locational requirements; the appropriate zoning of the site; the presence of other large prominent developments in the locality; and the appreciation that any significant development with associated deep water jetty is likely to give rise to similar landscape and visual impacts on this open site. 15:38 15:38

In conclusion, it is accepted that the proposed Shannon LNG project will, as may be expected, give rise to landscape and visual impact. However, given its specific requirements, the siting of the facility on industrial zoned lands in the vicinity of other significant developments is appropriate and in overall 15:39

consideration will not give rise to seriously adverse negative landscape and visual impact.

END OF SUBMISSION

15:39

INSPECTOR: Thank you, Mr. Burns. It is 3:40 so maybe we will take a five minute break.

MR. J. McELLIGOTT: Could I just make a quick comment. Johnny 15:39 McElligott, Kilcolgan Residents Association. Just before the land was rezoned in March 2007 -- it was rezoned specifically for this project -- the zoning of the land was Rural Secondary Special Amenity. So, I am just going to read out how the Kerry County Development 15:39 Plan viewed this actual site just before it was rezoned from Secondary Special Amenity. It says at 11.2.8:

> "The landscape of areas in this designation is generally sensitive to development. Accordingly, development in these areas must be designed so as 15:40 to minimise the effect on the landscape. Proposal designs should take account of the topography, vegetation, existing boundaries and features of the area. Permission will not be granted for development which cannot be integrated into its surroundings. Residential development will be considered for people wishing to establish a primary place of 15:40 residence in accordance with the provisions of section 3.3.7 of this plan."

Now, I would just like to point out to the Inspector that we have appealed to the European Union Parliament

Petitions Commission that this place was rezoned illegally. But, in any case, just because the site was rezoned industrial specifically for this project only in March 2007 from Secondary Special Amenity it does not change its landscape characteristics. The Council is suddenly viewing this site in a completely different light, whereas less than a year ago it saw it completely differently. 15:41

The second point is that I visited the site in Milford Haven and the valves that are on top of the dome extend for 10m above that. Now, if you have ever visited the George Pompidou centre in Paris you see all the pipes and valves that are outside that building and 10m equate to roughly two bungalows, including the roofs, one on top of the other. So, if you can imagine the valves and everything that are the equivalent of two bungalows, one on top of the other, on top of the dome I would actually ask the Inspector to look at the plans and try and integrate that idea to the photomontages at a closer level when he looks at the photomontages in detail later. Thank you very much. 15:41 15:41

INSPECTOR: Okay, Mr. McElligott. Can you just give me the section of the Development Plan that you were quoting from there? 15:42

MR. J. McELLIGOTT: It is the Kerry County Development Plan 2003-2009, section 11.2.8, page 157.

INSPECTOR: Thank you. Mr. O'Neill, there is a model of the tanks, is there?

MR. O'NEILL: Yes, I believe there is, and that can be made available after the break. I suspect it is probably in the EIS but I will get a lose copy of that in any event. 15:42

INSPECTOR: Okay, we will take that five minute break now. Thank you. 15:42

SHORT ADJOURNMENT.

15:55

THE HEARING RESUMED AFTER A SHORT ADJOURNMENT AS FOLLOWS

INSPECTOR: Okay everybody, I think we have had a five minute break, perhaps if you could resume your seats please. 15:55

MR. O'NEILL: I will just go and get our people.

INSPECTOR: Mr. O'Neill, are you ready to commence? 16:00

MR. O'NEILL: Yes, Sir, and thank you. I am handing out, more copies are being made at the moment, one of the figures from the EIS, figure 3.14, which shows a cross section

of one of the tanks with the dimensions on it and also the height of the vent above base. As you will see the vent is 10 metres higher than the top of the tank -- sorry, eleven metres higher than the top of the tank. 61.5 metres as against 50.59. The vent pipes are over the top left-hand corner. 16:01

INSPECTOR: Right.

MR. O'NEILL: I don't know if any explanation is needed other than what I have given you, Sir. More copies are being made at the moment and will be left on the desk so people can pick them up if they want or left on the table. My next witness is Colin Doyle who is going to deal with noise and vibration. 16:01

16:01

MR. DOYLE ADDRESSED THE ORAL HEARING AS FOLLOWS

MR. DOYLE: Inspector, you have a copy of my presentation and I propose presenting a shortened version, if that's all right. 16:01

INSPECTOR: Thank you.

MR. DOYLE: My name is Colin Doyle. I graduated from Trinity College Dublin with an honours degree in experimental physics in 1979 and obtained an MSc from Trinity College in 1982 by researching the subject of environmental radioactivity. I hold a postgraduate diploma in pollution management from the University of 16:02

Staffordshire. I am a member of the Institute of Acoustics.

I am an environmental consultant with ANV Technology and director of the company. ANV Technology was established in 1995 and provides measurement and consultancy services in the areas of noise, vibration and air quality. 16:02

My main areas of expertise are noise, vibration, air quality and computer modelling of noise propagation and dispersion of pollutants in the environment. I have over 25 years experience in environmental science, of which 18 years were in the areas of noise and vibration. I have carried out Environmental Impact Assessments for in excess of 60 development projects. My evidence will deal with noise and vibration aspects of the proposed development both during the construction phase and operational phase. 16:02 16:02

ANV Technology was appointed to carry out a noise and vibration impact assessment of the proposed Shannon LNG Terminal. The scope of work included baseline surveys to determine the existing noise environment, computer modelling of noise levels during the construction phase and operational phase and specification of mitigation measures. I am going to skip over methodology, Inspector, which is described in the EIS. 16:03 16:03

Reporting. The complete results from the baseline surveys studies, noise modelling and impact assessment were presented in a noise impact assessment report which was prepared by ANV Technology for this project. The assessment is presented in the EIS volume 2 section 9. 16:03

I am going to skip over the noise terminology which is for background reading and I am going down to the second last paragraph on page 3. 16:04

Operational noise emissions from industrial sites are subject to noise limits applied by the Environmental Protection Agency. These limits are 55 decibels during daytime and 45 decibels during nighttime. The limits apply at noise sensitive locations, which in this case are the houses in the vicinity of the site. It is expected that these noise limits will be included as conditions in the licensing of the proposed Shannon LNG site by the Environmental Protection Agency. 16:04

For construction noise there are no national noise limits. However, the National Roads Authority has published guideline limits for road construction works which can validly be applied to other construction projects. The National Roads Authority guidelines propose a noise limit of 70 decibels during daytime at houses with lower limits applicable in the evening and weekend periods. In cases where nighttime works are 16:04

necessary, further limitations on noise emissions will be required as considered appropriate to minimise impact, taking appropriate account of the duration of the activity.

16:05

The noise and vibration assessment included a baseline study which is described in the EIS and I propose to move on to section 3.1 of my statement.

Noise During Construction Phase. In the early site preparation phase there will be significant noise generation on site due to site clearance and rock excavations. The rock excavation works were modelled as a small quarry. Details of the predicted construction noise levels are presented in the EIS volume 2 section 9.5.1.4. The resulting noise level at the nearest house was calculated to be in the range of 44 to 47 decibels. This is comfortably within the standard 70 decibel construction noise criterion and the noise impact will be slight.

16:05

16:05

16:06

At houses on the coast road, the calculated construction noise level is in the range 38 to 51 decibels and the impact will be negligible to slight.

16:06

In addition to the steady noise from the site, there wills also be construction traffic noise levels experienced at the houses along the coast road of level 52 decibels. The construction traffic noise will be 7

decibels higher than the existing traffic noise. However, the overall traffic noise level will still be relatively low and the impact will be slight. For construction traffic on the road network (N69, R551 and R552 and Tarbert) beyond the coast road the relative impact will be less with a predicted increase of just one decibel which is negligible. The traffic noise impact assessment is presented in the EIS volume 2 table 9.7. 16:06

16:07

Construction noise levels in the Candidate Special Area of Conservation and Proposed National Heritage Area adjacent to the site will be in the range 45 to 51 decibels with negligible impact.

16:07

During the subsequent facility construction phase, noise levels will be significantly lower with negligible impact.

There will be a necessity for nighttime works in connection with construction of concrete tanks. There will also be nighttime works nearby at the jetty area due to tidal restrictions. The resulting noise levels at the nearest house can readily be controlled to less than 45 decibels using standard noise mitigation measures. These works will be of limited duration and the noise impact will be slight to moderate. 16:07

Regarding construction phase vibration and blast

overpressure. These are described in the EIS and I will summarise these issues when I discuss mitigation. So I turn over to page 6.

Under the heading **Operational Phase Noise**, this is described fully in the EIS section 9.5.2.1. I will just summarise the main finding which is the third paragraph in section 3.4. 16:08

The predicted operational noise levels are presented in the EIS volume 2, table 9.9. At Rallapane House, which is the nearest noise sensitive location, the noise model indicates that an operation noise level 20 decibels lower than EPA daytime level and 10 decibels lower than the EPA nighttime level will be technically achievable. The noise from the facility will be close to the existing nighttime background noise. The impact will be negligible. At the nearest houses along the coast road, the calculated operational noise level ranges from 23 to 30 decibels with negligible impact. 16:08 16:08 16:09

I turn now, Inspector, to the mitigation on page 7 which is summarised in section 3.5.

During the construction phase the environmental management plan will include assessment and control of the noise in accordance with BS5228 which is titled "Noise and Vibration Control on Open and Construction Sites". This will ensure that daytime construction 16:09

noise limits are comfortably complied with. Any nighttime works will be careful assessed in advance and controlled to ensure that the guideline nighttime noise limit is not exceeded.

16:09

Blasting will be designed and controlled to ensure that guideline limits for protection against cosmetic damage are comfortably complied with at the nearest residential properties.

16:10

A detailed method statement will be drawn up by an ecologist and agreed with the National Parks and Wildlife Service prior to commencement of works. The method statement will specify the timing of blasting operations and the need, if any, for ecological supervision. Noise and vibration monitoring will be carried out during the construction phase, including acoustic monitoring of dolphin activity as stated in the EIS volume 2 section 9.6.2 and in the statement which will be presented by Dr. Simon Berrow.

16:10

16:10

The facility will be designed to minimise noise emissions and will incorporate standard noise mitigation measures such as enclosures, silencers, screens to ensure that the resulting noise levels at the nearest house are comfortably within EPS guideline noise limits.

16:10

I would like to reply now to the submissions that were

made to An Bord Pleanála concerning noise aspects.

Firstly, the submission by Catriona Griffin, reference L016. This submission raises concerns over construction traffic noise, rock blasting and noise associated with 24 hour per day construction works. 16:11

Response: As detailed in the EIS volume 2 table 9.7, the calculated construction traffic noise level at houses on the coast road is 52 decibels. This is a relatively low traffic noise level and the impact will be slight. As stated in the EIS volume 2 section 9.5.1.7, noise from blasting will be subject to standard EPA limits regarding blast overpressure and will have no adverse impact at houses in the locality. 16:11 The period during which 24 hour working will occur will be relatively limited in duration over the four year construction period and was covered in the testimony of Leon Bowdoin and Ian Vinecombe.

16:12

Submissions by Kathleen Kelly L002; John C. Foley, L013; Patrick Griffin, L015. The issue of noise and disruption was mentioned in these three submissions.

Response: The detailed noise impact assessment indicates that construction noise from the development site and from construction traffic will be comfortably within acceptable standards during the construction phase. 16:12

Submission by Raymond and Margaret O'Mahony, L043. Their submission claims that they will never hear the sea from their house if the project proceeds.

16:12

Response to that is: Under typical weather conditions with for example a light to moderate breeze the natural wind and wave noise will continue to be the main audible feature in the locality. Noise from the proposed facility will be lower in magnitude. Under higher wind conditions wind noise dominate. In general, therefore, the additional noise from the facility will have negligible impact on the existing background noise levels.

16:13

16:13

Submission from Kerry County Council. In section 5.6 of this submission it is requested that noise monitoring during the construction phase should be a condition of planning and that mitigation measures should be approved by the local authorities. Shannon LNG agrees with this comment. Noise monitoring and mitigation during the construction phase required by Kerry County Council will be carried out in accordance with the methodology of BS5228 as stated in the EIS volume 2 section 9.6.

16:13

16:13

Finally, I would just like to conclude: During the construction phase noise levels will be comfortably within acceptable criteria; construction traffic will

have a negligible to slight noise impact; blast vibration and overpressure will be subject to standard limits and blasting will be planned in conjunction with ecologists to minimise the potential impact on wildlife; noise modelling indicates that the facility can operate comfortably within the applicable EPA noise limits and lower than existing average background noise levels. 16:14

Overall, it is concluded that for a facility designed and built in accordance with the noise criteria described in the EIS, there will be negligible impact on the existing noise environment and comfortable compliance with Environmental Protection Agency limits during daytime and nighttime. The noise impact will be negligible and that concludes my statement. 16:14 16:14

END OF SUBMISSION OF MR. DOYLE

INSPECTOR: Thank you, Mr. Doyle. I wonder could you explain for the benefit of all what the situation will be in relation to the actual operation, and I am talking about in the event of permission being granted and the operation being subject to an IPPC licence, can you just explain what rights of input people would have on that? 16:14 16:15

MR. DOYLE: What rights of input?

INSPECTOR: Yes.

MR. DOYLE: I think that's probably a legal matter.

INSPECTOR: Do you wish to answer that?

MR. O'NEILL: Yes, I would like to consider that. I don't want to give an off-the-cuff answer to that, but I will consider and address you on that, Sir. 16:15

INSPECTOR: Okay.

60 Q. **MR. McELLIGOTT:** Mr. Inspector, Raymond O'Mahony in an oral submission here on Monday, I think it was, described how if a tractor or a machine drives by on the road the articles on the mantelpiece in his house shake. The reason given was that when he was building his house the engineers said that his house was on the same stretch of rock from his house down to the coast so what effect will the vibrations of the construction phase have on his house would you think, Mr. Doyle? 16:15

A. **MR. DOYLE:** The activities on the site which might generate significant vibration would be blasting and that's dealt with in the EIS. That would be subject to blast vibration limits which are set out by the EPA. My estimate is that ground vibration levels at the nearest house, which would be Rallapane House, would be less than 2 million metres per second blast vibration. 16:16

61 Q. Given the new information that Raymond gave on Monday where he described even machines about 150 metres away would have an effect, and that's just a tractor, he 16:16

said, so if you are having heavy blasting on a rock face further down it will go right up -- it's like if you hit a hard board, the vibration will carry on, if I bang the table over there the vibration would be felt at the other end so I imagine it must be the same on rock, would it not?

A. I can't comment on the particular local circumstance of that house, but it would be common knowledge and common practice that quarries blast throughout the country on a rock stratum which continues underneath the nearby houses and the limits have been set taking that into account so they are technically achievable. 16:17

62 Q. Will his house still be standing after that?

A. Absolutely. The vibration limits which are set by the EPA, and which are the same practically in all countries and the UK, are for protection against cosmetic damage, which refers to slight cracking of paint work. There is no question of structural damage at these values. 16:17

63 Q. His insurance company said that they will not be liable for any damage done by Shannon LNG in the blasting works so will you guarantee that you will be viable for any work or any damage your work does to his house? 16:17

MR. O'NEILL: That's again a legal matter, Sir. I think that's a matter that should be taken up by the house owner rather than Mr. McElligott. If there is damage caused to a house by activities carried on by Shannon for which there is legal responsibility Shannon even if 16:18

they wanted to couldn't get out of its legal liabilities.

MS. O'MAHONY: I am Raymond O'Mahony's mother and Johnny McElligott is our spokesperson so if he doesn't speak for us what do you expect, he is the one asking you the question. 16:18

MR. O'NEILL: I note that and I think I have answered the question. If you want clarification I will certainly give you that, but what I indicated was that if damage is caused by Shannon LNG blasting or blasting carried out on their behalf for which they have a legal liability that is something they must address. It's difficult to see, having regard to the requirements and the standards that will be set in relation to blasting, how there can be any possibility of damage. The house is approximately 1,000 metres away from the ...(INTERJECTION) 16:18 16:19

MS. O'MAHONY: 800 metres. 16:19

MR. O'NEILL: Sorry, 800 metres from the vicinity. The tractor we were talking about is 150 metres or so away, I think a big difference. Clearly if damage is caused it's a matter that has to be addressed by Shannon LNG and Shannon LNG is not going to try to escape from any responsibilities it has. 16:19

MS. O'MAHONY: Thank you.

MR. McELLIGOTT: The second question is:

I once lived in a war zone and I used to hear all the explosions and ever since when I hear explosions going on like even fire crackers or fireworks I find it very frightening. Will Shannon LNG compensate people if they suffer mental stress from all the blasting because I understand the effect that a sudden blast will have on people. Some people might not be able to cope with all that especially if you are going to be having construction works going on for ten years, it seems like a very long time. 16:20

MR. O'NEILL: I am afraid that is something the Supreme Court has addressed, there is a limit to operators' liabilities. If there is a liability obviously it has to be addressed; if there is not a liability Shannon is not going to obviously assume a liability which it would not otherwise have. My understanding is that in the short period during which blasting will take place, a short period relevant to the operation of the facility, that there will be prior notification and consultation. 16:20

MR. McELLIGOTT: Thirdly, I notice that whenever I sleep on the coast road in my family's house, I could be there from two to five or o'clock or six o'clock and I wouldn't hear a car passing and all I will hear at night is the curlew. I noticed in your Environmental Impact Statement that the curlews will probably disappear from the area around the site proposal and also there is a 16:20

bit of curlew migration from Ballylongford Bay over towards Tarbert Bay and the Department of the Environment has asked for further clarification on the effect of migration between these two special areas of environmental interest. Have you considered the effect you are going to have on the bird life? When I say that all I can hear is the curlew at night when I am sleeping there it's really to bring home the point to all of you that when you are talking about acceptable levels of noise in a rural area, but this coast road, especially since a lot of the people left, has got much quieter and most people now travel the upper road and for you to say that it is acceptable, it's a very subjective matter because when you have no noise at all you can hear a car coming from Tarbert for about two or three miles away, two miles anyway, you can hear it coming so I just want to get across to you the idea that for you to say it's acceptable in a rural context it depends on where in the rural context you are talking about so have you addressed that correctly? 16:21 16:21 16:22 16:22

MR. O'NEILL: I think that will be addressed during the ecology session we are going to have on Monday.

MR. McELLIGOTT: No, it is noise, it is actually noise so I would like to get the expert, Mr. Colin Doyle's opinion, on how he distinguishes between different levels of noise in different contexts and how he is able to define this specific area as compared to other rural areas and, 16:22

secondly, the effect of the noise that I am going to miss in the future is the migration birds.

MR. O'NEILL: The impact on wildlife is something that will be dealt with on Monday. I am not trying to avoid your question at all, but I think it may be better asked of the appropriate experts on Monday. 16:22

MR. McELLIGOTT: That's about the birds. What about the question I asked of how would you compare different rural areas? 16:23

MR. DOYLE: I can answer that.

Firstly, the existing noise environment is described in the EIS and the areas is described as 'quiet rural' which concurs with what you have said. In terms of acceptability, during the construction phase it is accepted generally that construction activities will necessarily involve generation of some noise and for that reason the criterion that is considered acceptable during the construction phase is 70 decibels for ordinary construction projects. The calculated noise level at the nearest house is significantly lower than that criterion and on that basis I say that the impact will be slight. 16:23 16:23

Regarding the operational noise, all industrial activities will generate some process noise, some degree of process noise. In a quiet rural area the point you are making is that 'will this have greater

impact', I presume. Now, that has been addressed in the EIS where we have presented a table of the predicted noise level and we compare it with the background noise level that was measured at the site and the predicted noise level at nighttime from the proposed facility is comparable to the existing average background noise level.

MR. McELLIGOTT: Especially at night, I would have to disagree that at night. You can hear almost a pin drop on the road so that any work whatsoever at night is a complete invasion of people's well-being, I need to get that across, that at nighttime it is just so quiet, that's all.

16:24

16:24

INSPECTOR: It is my intention really to allow the Applicants to continue their presentation. I would just ask one question myself, and I didn't really intend to open it up. Mr. O'Neill, do you wish to present your next speaker.

16:24

16:25

MR. O'NEILL: The next speaker is Musetta O'Leary who is going to speak to archaeology and cultural heritage.

16:25

MS. O'LEARY ADDRESSED THE ORAL HEARING AS FOLLOWS

MS. O'LEARY: Inspector, I propose to read a slightly shortened version of my witness statement and I will refer to the relevant areas as I read through it. 16:25

Qualifications and Experience. My name is Musetta O'Leary and I hold a Bachelor of Arts Degree (1998) and a Masters Degree (2000) from the National University of Ireland Cork. I am associate member of the Institute of Archaeologists of Ireland. I have worked with Sheila Lane & Associates since June 2001. My position in the company is that of coordinator of all road and large EIS projects undertaken by the office. I have been involved in the compilation of a number of Environmental Impact Statements for a wide range of developments that include the following: **Road Projects** such as the N6 Athlone to Kinnegad; the N5 Charlestown Bypass; N24 Carrick-on-Suir bypass; N22, Tralee bypass, Tralee to Bealagreallagh; N17, Galway to Tuam Road. Wind energy projects include Curraheen and Kill-Hill in Co. Tipperary and Foiladaun in Co. Cork and other various industrial, housing and mixed use developments throughout the Munster region. 16:26 16:26 16:26 16:27

Before joining Sheila Lane & Associates, I worked with the Cork Archaeological Survey, National University of

Ireland, Cork, with responsibility for compiling an archive of the Record of Monuments and Places of Co. Cork.

Sheila Lane & Associates was formed in 1998 and has achieved considerable growth since that date. The company principal is Sheila Lane who is a licensed archaeologist with over 30 years experience in archaeological consultancy, urban and rural excavation, research and surveying. The company comprises a core group of seasoned archaeologists with experience in different areas dating from the Neolithic through to the Post Medieval Period. 16:27 16:27

Sheila Lane & Associates has carried out a large proportion of the archaeological work in the Cork area over the past ten years. The company has been involved in numerous environmental impact projects throughout the country. In some cases these Environmental Impact Statements have been brought from the initial site selection phase through to oral hearing and pre-development testing phase. The company has worked for Cork County Council on a number of projects such as road widening and monitoring. In the past number of years the company has been involved in many road projects such as the Watergrasshill bypass from the initial desktop stage to final design and build phase. Archaeological excavation of three large medieval urban Cork City sites have been undertaken by the company in 16:28 16:28 16:28

the past four years.

Sheila Lane & Associates involvement in the project. Sheila Lane & Associates was retained by Shannon LNG to assess the archaeological, architectural and cultural heritage impacts of the proposed Shannon LNG Terminal. The potential impacts during the construction phase and during the operational phase were considered and appropriate mitigation measures were recommended to ameliorate these impacts. 16:28 16:29

In the EIS the term cultural heritage encompasses the following topics: Archaeology, folklore, tradition/history, architecture settlement, monuments and features. The archaeological, architectural and cultural heritage section of the EIS, chapter 14, was compiled in accordance with the most recent EPA guidelines 2002 to 2003 and guidelines issued by Dúchas, now the National Monuments Service at the Department of the Environment, Heritage and Local Government. Consultations with the National Monuments Service and the County Archaeologist for Kerry were ongoing throughout the compilation of this EIS. 16:29 16:29

The purpose of my evidence. The purpose of my evidence is to provide an overview of the receiving archaeological and cultural heritage environment of this proposed development. My principal points of evidence will cover: Methodology, impact, and 16:29

mitigation.

Methodology. I conducted the following phases of assessment as part of Sheila Lane & Associates scope of works: 16:30

I propose to just summarise each stage of that methodology. An extensive desk stop survey of the proposed development site and an area within two kilometre radius of the proposed development site, 16:30 figure 14.1 volume 3.

Consultations took place with people in the area with knowledge of local history in July 2006 and again in April 2007. 16:30

Field inspections were carried out to identify new and potential cultural heritage sites within the proposed development area and to verify the condition of known cultural heritage sites. 16:30

An aerial survey of the proposed development site was carried out by Sheila Lane & Associates on 14 August 2006. An archaeological geophysical survey commissioned by Sheila Lane & Associates was carried out by Target Archaeological Geophysics between 3 and 16:31 10 October 2006.

In August 2006 a Marine Geoarchaeological survey, commissioned by Sheila Lane & Associates, was carried

out by maritime archaeologist Mr. Donal Boland. Continuing on on page 5.

In November 2006 Sheila Lane & Associates carried out archaeological monitoring of engineering trial pits, 16:31
volume 4 appendix 14G. In April 2007, following on from production of a final scheme for the site, a final maritime archaeological report was produced by maritime archaeologist Mr. Donal Boland.

16:31

Now, upon completion of these assessments I compiled the section of the EIS dealing with archaeological, architectural and cultural heritage, section 14.

The Main Findings. The identified constraints within 16:32
the entirely proposed development site are detailed below summarised in table 14.2 volume 2 and shown on figure 14.12 volume 3. All culture heritage sites and potential cultural heritage sites were assigned to cultural heritage site numbers. Findings of the marine 16:32
geoarchaeological surveys and the mitigation to be implemented will be summarised by marine archaeologist Mr. Donal Boland. The main findings:

There is one recorded archaeological site, a ringfort 16:32
(CHS10) within the proposed development site. A buffer zone will be established around this site where no development will take place.

Twelve cultural heritage sites and potential cultural heritage sites were identified during field inspections.

Moving on to page 6. Consultation with people in the area identified two features of local cultural heritage interest. The next: Six potential archaeological sites (Areas B, C, D, E, F and H) were identified during aerial flyover. An additional five potential archaeological sites (Area areas I, J, K, L and N) were identified from OS Ordnance Survey aerial photographs taken at 20,000 feet. An archaeological geophysical survey of selected areas within the proposed development site identified four areas of archaeological potential, areas, 6, 8, 10 and 13. 16:32 16:33 16:33

Now, development will take place on the eastern side of the proposed development site as outlined on figure 14.12 volume 3. Eight of the above sites (CHS 1, 3, 8, 11, 12, 15 and areas D and E) lie outside this area and will not be impacted by the proposed development. 16:33

The predicted impacts of the proposed development. The ringfort (CHS 10) is situated alongside the eastern boundary of the proposed development. Field inspection confirmed that there is no above ground evidence of this site. No evidence for the site was identified during the aerial survey. The geophysical survey identified a curvilinear feature (a possible ditch) and 16:34

in turns features associated with the ringfort (Area 17). The proposed development has been designed to avoid impacting this ringfort.

The proposed development will impact on the following outstanding structures identified during field inspection: Three farm complexes, (CHS 4, 2 and 9); a well, (CHS 6); a gun placement (CHS 7); partial remains of a structure, (CHS 15). The proposed development will impact on ten possible archaeological features: CHS 5 and areas B, C, F, I, J, K, L, N and area 8 and three areas of possible archaeological potential, areas 6, 10 and 13. 16:34 16:34

The proposed development will impact on secular well, Tubberagleanna, (CHS 13). A number of fields (4, 8, 18, 20, 26, 33, 51 and 57) within the area, that's shown on figure 14.13 volume 3, proposed for development contain a typical environment in which fulachta fiadh may be found. These fields are considered to be areas of archaeological potential. 16:35 16:35

The proposed development impact on the stream also (a town land boundary) running northwest through the development site. It is proposed to impound the stream at one site forming a pond. The stream bed and banks will be impacted in this area. 16:35

The proposed development will entail the removal of top

soil and a substantial amount of ground reduction. Where extensive earth working is involved there is always the possibility that previously undetected subsurface archaeological remains will be revealed.

16:36

Mitigation Measures. Given the scale of the proposed development, an extensive programme of pre-development licensed archaeological testing will be undertaken in the eastern half of the site where the initial development will take place. Testing will comprise of 16:36 linear trenches ten metres apart throughout the areas where topsoil will be removed. These areas likely to be stripped of topsoil are coloured yellow on figure 14.12, volume 3. This testing strategy has been agreed with the National Monuments Service at the Department 16:36 of Environment, Heritage and Local Government and the County Archaeologist of Kerry. Following the completion of archaeological testing, a report will be compiled on the results incorporating recommendations for further archaeological intervention such as 16:36 excavation as required. The programme of archaeological testing will be followed by a full archaeological resolution, that is complete excavation of the features identified before construction commences. 16:37

Archaeological excavation will be carried out to a professional standard as required by the Department of the Environment, Heritage and Local Government and that

policy guidelines on archaeological excavation in the Department of Arts, Heritage, Gaeltacht and the Islands. When excavation is complete all post excavation requirements will be fulfilled. This will involve the compilation of a report on each site, analysis by specialists of environmental remains and finds covered as well as possible requirements for dating and conservation. 16:37

In the areas likely to be subjected to fill, those areas coloured orange on figure 14.12 volume 3, and areas which are not likely to be disturbed, green on figure 14.12 volume 3, there will be no archaeological testing as there will be no subsurface disturbance. 16:37

Archaeological testing will be carried out outside the western perimeter of the ringfort CHS 10. The results of the testing will inform the size and extent of the buffer zone around the ringfort. This buffer zone when established will be fenced off and excluded from development. A written photographic survey will be made of all impacted structures listed in table 14.2, volume 2 in advance of their removal. 16:38

A wading and metal detection survey will be carried out a portion of the stream to be impacted by the development. This will be agreed with the Underwater Unit of the Department of the Environment, Heritage and Local Government. 16:38

Now, response to submissions to An Bord Pleanála. Submission reference No. L018 Tarbert Development Association: All archaeology should be protected and no damage should be to done to items of archaeological value. Submission: Reference No. L054, No. 55, Kilcolgan Residents Association, all archaeological sites to be protected. 16:38

Response: There is one known recorded archaeological site, a ringfort, (CHS 10) within the proposed development site. A buffer zone will be established around the ringfort within which no development will take place. Archaeological testing will be carried out outside the western perimeter of the ringfort. The results of the testing will inform the size and extent of the buffer zone around the ringfort, thus preserving any underground remains of this site in situ. The buffer zone around the ringfort will be fenced off prior to commencement of construction to avoid any impact. 16:39 16:39

Any archaeological remains identified during archaeological testing will be preserved by record. That is complete excavation of the features identified before construction commences. Preservation by record is standard practice where preservation of archaeological remains in situ is not feasible. Preservation in situ of previously unknown 16:39

archaeological features is at the discretion of the National Monuments Service. Archaeological excavation will be carried out to professional standards as required by the Department of the Environment, Heritage and Local Government in their policy guidelines on archaeological excavation in the Department of the Arts, Heritage, Gaeltacht and the Islands. 16:40

Submission reference No. L031 Tarbert-Ballylongford Working Group, Church Street, Tarbert. Heritage (archaeology etc.) to be protected during construction phase. 16:40

Response: A buffer zone will be established around the site of the recorded ringfort (CHS 10) and it will be fenced off and preserved in situ. Any archaeological sites identified during archaeological testing will be preserved by record following consultation with the National Monuments Service. 16:40

Submission reference No. L054 No. 23, Kilcolgan Residents Association. Object to demolition of houses because it is part of our cultural heritage.

Response: There are no protected structures within the proposed development site. Furthermore, none of the buildings within the proposed development site were recommended for protection by the National Inventory of Architectural Heritage published in 2002. The 16:41

buildings within the proposed development site are of local cultural heritage interest. A written and photographic survey will be made of all impacted structures listed in table 14.2 volume 2 in advance of their removal, thus preserving them by record. 16:41

Submission reference L051 from the Department of the Environment, Heritage and Local Government. Targeted archaeological testing should be done at areas of archaeological potential and areas B, C, F, I, J, K, L, 16:41 M and 6, 8, 10 and 13. A wade and metal detection survey of the water course, full record of areas CHS 13, 15, 2, 4, 5, 6, 7, 9 in advance of their removal. Schedule testing to be done. 16:42

Response: Consultation with the National Monuments Service was ongoing throughout the compilation of our report and all the above will be undertaken prior to construction. 16:42

Submission reference No. L056 page 30 from Kerry County Council. Pre-development archaeological testing, as previous agreed, should be carried out across the proposed development site prior to construction. A testing strategy should be agreed with the National 16:42 Monuments Service at the Department of the Environment, Heritage and the Local Government as part of the archaeological licensing process. Targeted archaeological testing around the ringfort KE003-004

will be required to confirm the extent of the monument prior to the placing of a 20 metre buffer zone. Targeted testing of the anomalies identified in geophysical assessment must also be undertaken. Reports on these archaeological works should be submitted to the planning department of Kerry County Council, Kerry County Archaeologist and the National Monuments Service. Should significant archaeological remains be uncovered during archaeology testing further mitigation, that is full excavation and/or avoidance through redesign may be required. 16:43 16:43

Response: Consultation with the County Archaeologist for Kerry was ongoing throughout the compilation of our report and all the above will be undertaken prior to construction. 16:43

Conclusion, the main points: The recorded ringfort CHS 10 within the development site will not be impacted. Comprehensive archaeological testing will be carried out prior to construction and any archaeological remains identified will be fully resolved in consultation with the National Monuments Service. There are no protected structures within the proposed development site. A written and photographic survey will be made of all impacted structures in advance of their removal, thus preserving them by record. 16:43

I am of the view that the proposed development will not

have an adverse effect on the archaeological, architectural and cultural heritage. It is my opinion that the potential impacts of the proposed LNG terminal development in terms of archaeological, architectural and cultural heritage will be satisfactorily mitigated. 16:44

END OF SUBMISSION OF MS. O'LEARY

INSPECTOR: Thank you, Ms. O'Leary. How many more speakers are 16:44 you going to present in this module?

MR. O'NEILL: I have five more papers. I am not going to get them finished today obviously, but we are moving slightly quicker. I was going to now deal with maritime 16:44 archaeology.

INSPECTOR: I was just wondering whether we should allow questions because on Monday I intend to do the ecology modules and we will be breaking anyway and I think it 16:45 would be unfair to expect people to remember everything for Tuesday.

MR. O'NEILL: So be it. After the maritime archaeology it may be an appropriate place to break, but I am in your 16:45 hands. That paper will probably take 15 minutes to deliver. If more questioning time is required than that perhaps this is the appropriate time.

INSPECTOR: Okay. We will go with the

maritime archaeology.

MR. O'NEILL: That paper is going to be presented by Donal Boland.

MR. DONAL BOLAND ADDRESSED THE ORAL HEARING AS FOLLOWS 16:45

MR. BOLAND: Mr. Inspector, my name is Donal Boland. I proposed to read a shortened version of my statement. I produced some additional maps and charts for 16:45 clarification in the statement. My name is Donal Boland, I am a maritime archaeologist and I hold a Diploma in Archaeology from the National University of Galway and a Diploma in Maritime Archaeology from the University of Ulster Coleraine. My area areas of 16:46 expertise are maritime archeological geophysics and marine geophysical data analysis and interpretation. I have been involved in the compilation of a number of Environmental Impact Statements for a wide range of developments including bridge crossings, pipeline 16:46 crossings, harbour developments, marinas, marine wind farms and channel dredging. I have conducted maritime archaeological research projects in conjunction with the University of Ulster Coleraine and St. Andrews University Scotland. 16:46

Before becoming a maritime archaeologist, I worked in a multinational firm as a senior engineering manager. My services involve an investigation of the impacts of

marine and coastal developments on all identified and potential submerged and buried maritime archaeological remains.

The purpose of my evidence is to provide an overview of: The intertidal and maritime geophysical surveys conducted at and adjacent to the site of the marine structures of a proposed by liquefied natural gas (LNG) terminal at Kilcolgan Lower, Co. Kerry; the results and interpretation of data derived from these surveys; the perceived impacts and recommended mitigation measures appropriate in light of my findings and my response to submissions made by third parties. 16:47 16:47

Moving to page 3. Involvement in the project, introduction. I was retained by Sheila Lane & Associates to carry out an investigation of known and potential maritime archaeology and produce a related section for the EIS of the proposed Shannon LNG terminal development. I conducted the following phases of the assessment as part of the scope of works: 16:47 16:47

A review of baseline environmental context and cultural history. Moving down.

16:48

An initial site investigation report (conducted in October 2006, Licence No. 06R163 and Licence No. 06B071) which detailed the baseline information for the site, while the final development plans were still

being formulated. Moving down to the bottom of the page.

Following on from the production of a final scheme for the site, a final maritime archaeological report was produced in April 2007, licence No. 07R0048. 16:48

Moving on to page 4. The pre-development intertidal and geophysical surveys were conducted under licence with guideline and acquisition parameters as recommended by the Maritime Unit of the Department of the Environment, Heritage and Local Government under licence numbers already stated. Upon completion of the assessment, I was involved in the compilation of the section of the EIS dealing with maritime archaeology. 16:48 16:49

Main Findings. During the final maritime archaeological assessment of the area (April 2007), two features (anomalies 1-2) were identified from the intertidal area at the location of the proposed development at Ballylongford, Shannon Estuary, Co. Kerry. Reference table 1 and table 2 of this document. The features, a van and a small boat/cleared foreshore (detailed in October 2006 report, anomalies 1-5) are interpreted as being non-archaeological. The initial site investigation survey 2006 identified a further six intertidal features; three of which (numbered 6-8) have archaeological potential and have been identified as the remains of a fish trap and peat deposits indicating 16:49 16:49

a prehistoric landscape. Refer to table 2 of this document. The final scheme is remote from these features. They will therefore not be directly impacted by the proposed development and they were not included in the report of 2007. 16:50

Moving on to page 5. No magnetic anomalies were identified during the marine geophysical surveys at Ballylongford. During the final marine archaeological survey of the area in 2007, Licence No. 07R048, 12 16:50 features were interpreted from the high resolution site-specific side-scan sonar survey, reference table 4 of this document. All but one of these 2007 anomalies S8 is interpreted as being non-archaeological, i.e. drag marks and artefacts from engineering 16:50 investigations at the site. During the October 2006 survey, seven side-scan anomalies were identified, reference to table 3 of this document. Side-scan anomalies four to seven were interpreted as manmade features, which may have archaeological potential. 16:51 They are, however, likely to be debris from fishing vessels or shipping in the Shannon Estuary.

Moving down to potential impacts. The final scheme for the proposed development avoids the 2006 intertidal 16:51 anomalies numbered 6 to 8. They will therefore not be directly impacted by the proposed development. 2007 side-scan sonar anomaly S8 is an anomalous feature unlikely to be of archaeological significance as debris

from fishing and shipping common place in a busy estuarine area. If archaeological potential does exist at this site the distance of the features from the proposed development (at least 130 metres) east is likely to limit any direct impact. 2006 side-scan anomalies 4 to 7 were interpreted as manmade features which may have archaeological potential. They are, however, likely to be debris from fishing vessels or shipping in the Shannon Estuary. If archaeological potential does exist at these sites, the distance of the feature from proposed development (at least 100 metres west) is likely to limit any direct impact. 16:52

Mitigation Measures. The 2006 intertidal anomalies 6 to 8 will be protected by avoidance. An exclusion zone of 50 metres will be established around the features during the construction phase of the development. The 2007 side-scan sonar anomaly S8 will be protected by avoidance. A seabed impact exclusion zone of 50 metres will be established around the feature during the construction phase of the development. 2006 side-scan sonar anomalies 4 to 7 will be protect by avoidance. A seabed impact exclusion zone of 50 metres will be established around the feature during the construction phase of the development. 16:52 16:53

Archaeological monitoring may be required for some of the offshore construction phase depending on the engineering method chosen for construction of the two

jetties on the surface water outfall pipe. Once the construction engineering strategy is finalised the maritime unit of the Department of the Environment, Heritage and Local Government should be consulted in order to establish the requirement for the methods for archaeological monitoring. 16:53

Moving forward past the area of the tables dealing with response to submissions to An Bord Pleanála.

Submission: The Department of the Environment L051 raised concerns relating to the difference between the archaeological findings of the intertidal survey and the side-scan survey report submitted in 2006 and 2007; mitigation with respect to secondary or passive impacts; recommendation for diver survey along the footprint of the proposed jetties; a recommendation that all archaeological materials and deposits that were identified during the 2006 survey should be included and assessed as part of the overall assessment. This should include mitigation measures. 16:53 16:54 16:54

Response: Because there is a number of those I will go through them individually, the first one being the difference between the archaeological findings of the intertidal survey and side-scan sonar survey reports submitted in 2006 and 2007. The number and position of side-scan sonar anomalies for the 2006 site investigation differs from the survey for 2007 as the results are based on different data sets. The data set 16:54

provided by Irish Hydrodata Services Ltd. through the client covering a much wider area around the site and the 2007 data set covering the area and adjacent to the proposed marine development. Just to clarify on that. The original site investigation covered a very wide area whereas the surveys conducted in 2007 covered by myself covered the areas of the jetties producing two completely different data sets. 16:55

Similarly the intertidal data submitted in the 2007 report relates to the area of the proposed marine development while the data submitted in 2006 report covers a wider area of survey. 16:55

The submission: Mitigation with respect to secondary or passive impacts. 16:55

It is not envisaged that secondary impacts arising from the construction of the marine and foreshore elements of this development will impact the features revealed by the surveys conducted in 2006/2007 due to their distance from the proposed development. 16:56

It is not envisaged that the operation of the proposed facility will impact on features revealed by the surveys conducted in 2006 and 2007. 16:56

Looking at possible passive impacts or secondary impacts, I looked at the discharge from the outfall.

The discharge being taken into consideration were chlorine level and temperature and looking at the modelling this is minimal at a distance of 50 metres from the point of discharge so that features are protected by avoidance, the distance from discharge being greater than 15 metres. 16:56

The other impact we looked at was propeller wash affecting features identified as potential archaeology. The draft of the ship (propeller level) is given as twelve metres. The features identified are at depths of 20 metres and they are mitigation protected by distance from scour source. 16:56

Again a submission: Recommendation for diver survey around the footprint of the proposed jetties. 16:57

Response: I recognised that diver survey is an option for further investigation at the proposed jetty sites. However, it was not recommended within the report that no features of archaeological potential were noted during the side-scan surveys of the footprint of the jetties. 16:57

Submission: Recommendation that all archaeological materials and deposits were identified during the 2006 survey should be included and assessed as part of the overall impact assessment. This should include mitigation measures. 16:57

Response: All features identified as archaeological or potential archaeological by way of the surveys conducted at and adjacent to the proposed marine development site have been included and will be protected by way of a 50 metre seabed exclusion zone. I reference here the charts and if you look at the first map it shows you the features which were located during the surveys and the assessments. The second map indicates the proposed development with respect to the location of the features and the third map shows the features and the proposed exclusion zone around those features for protection with respect to the development. 16:58 16:58 16:58

Submission: Kilcolgan Residents Association (L054) states that all archaeological sites should be protected.

Response: The proposed mitigation measures will achieved this outcome with regard to the underwater archaeological features. 16:59

Conclusion: The surveys conducted at and adjacent to the site of the proposed maritime development revealed a number of foreshore and seabed features. These features which have been identified as being archaeological or potentially archaeological will be protected by avoidance with a 50 metre seabed exclusion 16:59

zone being established around each feature.

Archaeological monitoring may be required for some of the marine construction phase depending on the engineering method chosen for construction of the two jetties and the surface water outfall pipe. Once the construction engineering strategy is finalised, the maritime unit of the Department of the Environment, Heritage and the Local Government will be consulted in order to establish the requirements for the method for archaeological monitoring. 16:59

Accordingly, I am of the view that the potential impacts from the proposed LNG terminal development in terms of features revealed by the surveys conducted at and adjacent to the proposed development will be insignificant. 17:00

END OF SUBMISSION OF MR. BOLAND

17:00

INSPECTOR: Thank you, Mr. Boland. Can I just clarify you don't carrying out a diver survey?

MR. BOWDOIN: Diver surveys may be required when we move to the monitoring phase of the development. 17:00

INSPECTOR: Do people have questions for the last speakers?

MR. DOWNEY: Mr. Inspector, I would just like to make some comments on the recent submissions from LNG. First, if I might deal with the underwater archaeology. Just overall I want to compliment both the archaeologists on their reports. They are splendidly produced and you address all my concerns marvelously. I want to just put it on record here, Chairman, with regards to a matter that you raised concerning a diver survey. In 1520 there had been a naval battle off Ardmore Point between the merchants of Galway and the merchants of Limerick, a trade war that went to blows. We know that in the various reports in State papers of Henry VIII that at least two ships went down. Given of course the movement of currents etc in the river there may not be anything there, but I think that it's something to be observant of, that there may be some late medieval shipping or artefacts that could come up in a diver survey, particularly in silts etc. or gullies under water so just to highlight that as a possibility and it needs to be noted.

17:00 17:01 17:01 17:02 17:02

As regards the potential sites etc. for excavation, that's all marvellously covered again and of course this is the legal requirement anyhow by the state for an archaeological survey before construction begins and excavation and that is very well catered for.

Chairman, just for the record I noted that all the experts from LNG gave full details of their

qualifications, perhaps I was being a little too shy or moderate in my own self-introduction at the beginning, but just for the record I would just like to put it here I hold my Ph.D. from Cambridge in 1994 in Legal and Diplomatic History. In 2002 I was made a member of 17:02
the EU India Think-Tank on Energy and Security Cooperation. We are looking at the uses of total fusion nuclear power so those of you who might have worries that I might be some sort of environmentalist fundamentalist. You may rest assured that I am opposed 17:03
to any form of industrial development provided of course that it meets all the criterion for health and safety and protection of the environment and its heritage.

17:03

I am a member of Europa Nostrum, the EU Heritage Foundation and I have been involved in issues concerning heritage most notably recently with the preservation of the Rice House in Dingle and this brings me a point here, but it's really a matter that 17:03
has to be addressed to Kerry County Council with regards to the listings of buildings. Here I would like to return to my earlier submission which was specifically focussed on Rallapane House. As far as I know to date it hasn't been formally listed by Kerry 17:04
County Council as a special heritage status house, but the County Council are in the process of updating their listings in this regard in the light of what had happened in Dingle over the Rice House issue, they did

make it a special heritage designated status so that's a matter of course for Kerry County Council to deal with, but I would just like to have it observed and noted in the record.

17:04

Going back to, if I may, Thomas Burns, your statement of evidence there. Again I wish to compliment you on your splendid portrayal and you addressed all the issues concerned. Again I just want to refer back there to the issue of screening or earth modelling 17:04
etc., earthworks. Again with regards to Rallapane House there is a proposed location of a tank within 400 metres of the house. Now, I know that there are issues concerning the ownership of property and whether or not an earth mount could be constructed, and I know that 17:05
LNG have made it clear that they would be willing to come to some arrangement with the Musgrave family with regards to screening etc., but in your opinion is it possible to raise the height of the earthworks, earth modellings at all to maximise or to further maximise 17:05
indeed the visual impact of the tanks?

MR. BURNS: What I would say is that given the topography and the site boundary as we have it at present, the screening provided for with a lowering of the tanks and 17:06
a lowering of the base provides the maximum visual screening that can achieved on the site at the moment. In terms of considering additional earthworks or screening outside of that then that's a separate issue

that I haven't considered. Obviously if there is more elevation and more earth bunding then that would further reduce the visual presence.

64 Q. **MR. DOWNEY:** Right, but it is possible you think that it could be done theoretically? 17:06

A. **MR. BURNS:** Not within the existing site boundary.

65 Q. Then that would be a matter for discussion with the owners of the other side of the boundary? 17:06

A. Correct.

66 Q. **INSPECTOR:** Is it appropriate in any way that you would make an offer in that regard?

A. **MR. BURNS:** What I would say is that I think it is significant -- I think it has been demonstrated and I think from my presentation I was showing the significant measures that were proposed on the site as we have it at the moment. Either way we are not going to screen these tanks from view, these tanks will be a visual presence on this site and in many ways the less intervention we do, additional intervention we do on the landscape, then the more the existing ridgeline stays within its natural context. Berms themselves can look very odd particularly if they are very steep or unnatural looking features in the landscape and in any case two or adding three more metres of screening on the top of Rallapane ridge is not going to appreciably 17:07 17:07

reduce the visual presence of what remains of the tanks from the proposed level at the moment.

INSPECTOR: Dr. Downey, have you completed what you want to say? 17:08

MR. DOWNEY: Thank you very much.

INSPECTOR: Could we have An Taisce next please.

MS. McMULLIN: I would like to concur very much with what Declan 17:08 Downey have been saying. I found by experience over the years that good planting on top can be a very effective way of screening. The other thing I have noticed is, just as the Applicant has said, that too much screening doesn't look right either and that very 17:08 often even a scattering of trees with spaces between can break up the line and make all the difference to the appearance of the development. I would like also to ask, we were handed out a photomontage view 3 which shows the tanks rising up over the hill top, I wonder 17:09 maybe if Mr. Burns would give us an estimate just in metres how much of the tanks are visible at that point?

MR. BURNS: View 3 is figure 5.3.3(b) in the EIS.

MS. McMULLIN: Yes. 17:10

MR. BURNS: In this montage all four tanks are visible with the most western tank being the most obvious and the most elevated over the ridge. I would say in that instance

approximately 50% of the tank is visible, of the actually cylinder of the tank is visible. As you move across to the right it probably reduces down to probably 20% so there is somewhere in the order of 25 metres of the tank visible on the left-hand tank, maybe 10 on the right-hand tank.

17:10

MS. McMULLIN: Thank you very much. Just one other comment I would like to make and again it's to back up what Declan has said about Rallapane House. In the Kerry County Development Plan we have a relatively small number of houses listed and far fewer than should be listed. I am talking of getting enough information and getting them into the plan. I know that the Local Authority would have to see as many of possible buildings of merit protected in this way and I know An Taisce over the years have given them lists and yet we keep discovering more and more so I would hope as the Development Plan is being reviewed, and I gather we don't even have to wait for a full review of the plan, there can be houses added in during the lifetime of the plan as well so I would hope that the Local Authority would bear that in mind when they are upgrading the list of houses. Thank you.

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INSPECTOR: Did somebody say that the NIAH had not listed Rallapane House?

17:11

MS. O'LEARY: Yes, the National Inventory of Architectural Heritage

doesn't list Rallapane House.

67 Q. **INSPECTOR:** Is there a significance in that?

A. **MS. O'LEARY:** This survey was carried out, it was published in 17:12
2002, but it was carried out under the direction of the Department of the Environment, Heritage and Local Government and its function would be to assess the built environment and then provide that information to the County Development Plan with a view to listing 17:12
certain structures that they felt were historically or architecturally significant. It just isn't in that.

INSPECTOR: So that's not definitive one way or the other?

MR. DOWNEY: If I may, Mr. Inspector, 17:12
I understand that is already considered to be outdated and that a new plan is to be submitted. There are a number of architectural features in various houses in rural Ireland which have been identified as being of 17:13
significance particularly when they are from a period earlier than the 18th century. There has been over a years a blind spot that anything worthwhile preserving had to date from the 18th century and be of specific or typically Georgian character. Rallapane House, like so 17:13
many other or these smaller houses or dwellings of lesser grand or a lesser significance, shall we say, to the houses of the nobility, it's a gentleman's house. It's a country house, it's a manorial house of the 17th

century. It has interesting features externally and internally as well and it is part of the local heritage and as I pointed out in my earlier submission it is also the reputed birthplace of a gentleman of Kerry origin who had major significance in European history in the late 17th century, Bonaventure O'Connor of Kerry. 17:14

MS. McMULLIN: Sorry, I would concur with Declan on that. My experience has been that an awful lot of houses are not on the official list, but are well worth putting in it. 17:14

INSPECTOR: Okay. Any more questions?

MR. McELLIGOTT: I would just like to know why are some of the houses being demolished, some of the houses like the O'Connor house is very close to the main road really, that's my grandmother's house, which dates from about the 1820s, and it's also the ancestral home of Paddy Power by the way, but why is that house being demolished particularly, could anyone answer me? 17:14 17:15

MR. O'NEILL: I think we have the wrong people here at the moment to answer that question, but we will deal with it on Tuesday.

MR. McELLIGOTT: Okay. 17:15

INSPECTOR: Any further questions? It's 5:15 so maybe we will break even earlier. I just want to point out to you that sometime next week I hope to draw this hearing to

a conclusion and before the conclusion there will be an opportunity for people to make concluding statements. Now, whether you are for or against the development you have to recognise that it's the Board's prerogative to decide to grant permission and in which event you may 17:15
wish to consider what conditions you would wish to be imposed and in that regard I suppose those who are opposed to the development might regard it as making the best of a bad lot so I am just asking you to give that some consideration over the weekend, if you feel 17:16
so inclined.

I would point out that the conditions should relate to the development site. I know one or two of you are concerned about the pylons which would be necessary for 17:16
making the electrical connections, that's a separate day's work I am afraid. As well as that if permission is granted for this development it will be the subject of a licence from the EPA on integrated pollution control. That means that as far as the operation of 17:16
the site is concerned we cannot impose conditions in relation to pollution control. We can impose conditions in relation to the construction phase in terms of noise emissions, dust, that sort of thing so with that I would just ask you to give that 17:17
consideration and we will see you all again then on Monday at 10 o'clock when I am hoping to do the ecology module so thank you everybody and have a good weekend.

THE HEARING WAS ADJOURNED TO MONDAY, 28TH JANUARY 2008 AT 10:00 A.M.

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