

BOSTON FIRE DEPARTMENT

May 25, 2004

Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First St., N.E. Room 1A
Washington D.C. 20426

Reference: Docket No. AD04-6-000

Dear Ms. Margalie:

Attached to this cover letter is an original and 2 copies of comments regarding the document titled, “Consequence Assessment Methods for Incidents Involving Releases from Liquefied Natural Gas Carriers”, May 13, 2004, by ABS Consulting. (Docket No. AD04-6-000). One of the copies will be labeled to the attention of the LNG Engineering Branch, PJ-11.4.

The author of these comments is:

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Once all of the comments have been received, would you please inform me how to get copies or review them on-line. Thank you.

Respectfully,

Joseph M. Fleming, Deputy Chief
Boston Fire Dept.

BOSTON FIRE DEPARTMENT’S COMMENTS

ON

**“UNITED STATES COAST GUARDS REQUEST FOR COMMENTS
ON
FALL RIVER’S PETITION FOR UNITED STATES COAST GUARD TO SET
EXCLUSION ZONES FOR MARINE LNG SPILLS”
USCG DOCKET NO. 2004-19615**

The Boston Fire Department would first like to respond to some comments that have already been submitted to the USCG.

Comments from Distrigas of Massachusetts

From Page 2

“Distrigas opposes the Petition because

(i) the regulations were developed to addressFrom page 9 of the ABS Report – “*On the other hand, the orifice model does not address any additional ship damage that might occur as a result of a postulated release.*”

If FERC is looking for guidance regarding the potential consequences of an LNG release it is critical that they consider the potential additional damage to the ship that might occur from a given release. It is clear from Table 3.1, of the ABS Report, that the steel hull of the ship is going to be exposed to Heat Flux levels of 50-100 Kw/m². Tables 2.7 and 2.8 of the report appear to indicate that steel will weaken and fail at levels of 37.5-100 Kw/m². It would appear that if a pool fire were to form and ignition were to occur that further failure would be inevitable. This failure would cause the duration of the fire to be longer than is assumed. It could also cause the size of the fire to be larger than assumed. An analysis of this possible consequence would seem to be needed to properly estimate, “*flammable vapor and thermal radiation hazard distances for potential LNG vessel cargo releases during transit and while at berth*” – (from page 1 of the ABS Report). Here are quotes from some references that discuss this possibility.

- “There is a possibility of escalating failure of the ship structure due to embrittlement, followed by an internal explosion caused by either a rapid phase transition, or by a gas air mixture being ignited.” (*From page 90 of the Lloyd’s Report, Commissioned by Tractabel for the Port of Boston.*)
- “Fires on the ship or adjacent to the ship may lead to high temperatures on the hull, the tank walls, insulation, and tank support structures which further can lead to failure of the cargo containment system and release of cargo.” (*T. K. Authen, in a paper titled, Gas Carriers – Effects of Fire on the Cargo Containment System. - Gastech 76, Conference Proceedings*)

- “A pool fire caused by LNG release from one tank may threaten the integrity of adjacent tanks. It seems that fires of medium size and long duration represent a greater threat in this respect than large and short lasting fires.” (*Solberg et al in a paper titled, Assessment of Consequences from Accidental release of Liquefied Gases – Gastech 81 Conference proceedings*)

Question:

- 1. Does FERC intend to account for the possibility of escalating failure when analyzing the potential consequences of an ignited spill from an LNG vessel?**

Comment Two

From Page 32 of the ABS Report – “For purposes of onshore facility siting analysis, 49 CFR 193 and NFPA 59 A specify a level of concern of 1,600 BTU/hr/ft² (5Kw/m²).”

Actually NFPA 59A, which FERC uses to analyze on-shore facilities, specifies 3 levels of concern.

NFPA 59A, Section 2.2.3.2 (a) Provision shall be made to prevent thermal radiation flux from a fire from exceeding the following limits: (the following language is abridged)

1. **1600 Btu/hr/ft² (5000 w/m²)** at the nearest point located outside the owner’s property used for **outdoor assembly**.
2. **3000 Btu/hr/ft² (9000 W/m²)** at the nearest point of the building outside the owner’s property line used for **assembly, educational, health care, detention or residential**.
3. **10,000 Btu/hr/ft² (30,000 W/m²)** at a **property line** that can be built upon for a fire over an impounding area.

I have the following concerns regarding these “levels of concern”.

Concerns About 1600 Btu/hr/ft²: The NFPA Committee Members, and by reference FERC, consider this level of radiation acceptable for an outside assembly location

However, according to Table 2.6 of the report:

- This level of heat flux will cause 2nd degree burns in 30-40 seconds.
- This level of heat flux will cause sever pain in 13 seconds.
- This level of heat flux will be fatal to 1% of the affected population in 50 seconds.

These effects might be acceptable to the NFPA and FERC but others feel differently. The Society of Fire Protection Engineers Handbook recommends 750

Btu/hr/ft² (1/2 of the NFPA's acceptable level) as a recommended maximum to allow for people to safely evacuate. An "outdoor place of assembly" could be a little league baseball field. A young child in Center Field may not react quickly enough to reach shelter before serious injury or death occurs.

Questions:

- 1. What provisions in the FERC regulations insure that the population that might be exposed to these levels of radiation has shelter available to them?**
 - 2. What logic does FERC use to justify this "level of concern" as acceptable?**
- Concerns About 3000 Btu/hr/ft²:** The NFPA Committee Members, and by reference FERC, consider this level of radiation acceptable for buildings containing educational and healthcare occupancies.

However, according to several references:

- This level of heat flux will cause 2nd degree burns in 15 seconds.
- This level of heat flux will cause extreme pain in 5 seconds.
- Fatal to 50% of the affected population in 60 seconds.

Why is it "acceptable" to potentially expose school children to these types of heat flux? Most Educational Occupancies have a playground, i.e. an "outdoor assembly location" adjacent to the school. So why is the "acceptable" heat flux for a school twice the acceptable heat flux for the playground at the same location? In addition, Hospitals have large windows in patient rooms. Won't the patients be exposed to unacceptable levels of heat flux before the nursing staff can remove them from the room? In fact, isn't reasonable to assume that most patients in rooms, with windows, will experience a high mortality?

Questions:

- 1. What provisions in the FERC regulations insure the safety of population in these occupancies will not be exposed to these levels of radiation.**
- 2. What logic does FERC use to justify this "level of concern" as acceptable?**

Concerns about 10,000 Btu/hr/ft² - The NFPA Committee members and by reference FERC consider this level of radiation acceptable for buildings outside the property lines of the LNG Plant.

However, it appears from the information in Tables 2.7, 2.8 & 2.9 of the report that heat flux levels as low as 4,000 Btu/hr/ft² can cause buildings to ignite after prolonged exposure and that levels as low as 8,000 Btu/hr/ft² can cause buildings to ignite after just a short exposure.

Questions:

1. **Why does FERC consider it acceptable to expose structures outside the property lines to Heat Flux Levels that will be sufficient to ignite them? In addition, these heat flux levels will preclude any firefighting or rescue activity (see Table 2.6 of the Report). This is a bit problematic for any occupants of these buildings since it will be too hot for them to evacuate, but the building they are located in will be burning in a short period of time so they must evacuate.**
2. **Why does FERC consider it acceptable to expose people located in buildings, off-site to levels of heat flux that exceed these levels?**

Comment Three

Boston Fire Department Recommendations to FERC
Regarding “Acceptable Heat Flux Levels”

The BFD believes that it is important to point out that these guidelines incorporate as much opinion and value judgement about what is “acceptable” as it does scientific information. Unfortunately the Public does not seem to appreciate this. Recently, in a letter published on the NFPA website, in response to an interview on ABC’s 20/20, the NFPA President, James Shannon stated that, *“Our codes are written by committees of experts who are drawn from all over the country, and they determine what the appropriate thresholds are what the appropriate provisions are.”* Based on conversations that I have had with people in the fire service as well as the general public, I do not think most people realize that not all of these experts are “fire” experts, even though they may be experts regarding LNG. According to the 2001 Edition of NFPA 59A the majority of the committee members appear to come from the industrial or consulting sector, the balance seem to be from Government regulatory agencies FERC or the DOT. I could not identify a single member from the Fire Service. (A Copy of the Committee members is attached in Appendix A.)

The BFD believes that it is important when making value judgements, which have to balance the safety of the public against the financial viability of the regulated community, to have all affected parties represented on the committee. The BFD recognizes that it is a difficult job and would like to publicly thank the Committee members who are willing to participate in these very tough cost/benefit decisions. Our concern is that the fire service, as well as the general public, which represent perhaps the most important parties, are under-represented. The under-representation of public officials is probably due to the fact that individual communities find it hard to justify sending their employees to far off locations to attend meetings that have only an indirect short-term benefit. Unfortunately this results in an unbalanced committee. In testimony before Congress in 1970, Admiral Hyman Rickover commented on this phenomena, *“ The typical industry-controlled code or standard is formulated by a committee elected or appointed by a committee elected or appointed by a technical society or similar group. Many of the committee members are drawn from the manufacturers to whom the code is to be applied. Others are drawn from engineering consulting firms and various Government organizations. However, since near unanimous agreement in the committee must generally be obtained to set*

requirements or to change them, the code represents a minimum level of requirements that is acceptable to industry.” (Quote taken from “Occupational Safety Management and Engineering”, W. Hammer, Prentice Hall, 1985.)

The point that the BFD is trying to make is that if a committee is not properly balanced the decisions that the committee reaches, regarding acceptable levels of heat flux, may differ from the general public’s opinion. This is important since governmental agencies, such as FERC, adopt NFPA Codes and Standards. They feel comfortable doing this because they assume that the committees are balanced. To quote once again from Admiral Rickover, *“In a subtle way, the use of industry codes or standards tends to create a false sense of security. Described by code committees and by the language of many codes themselves as safety rules, they tend to inhibit those legally responsible for protecting the public from taking the necessary action to safeguard health and well being. Many states and municipalities have incorporated these codes into their laws, thus, in effect delegating to code committees their own responsibility for protecting the public. (See previous citation.)*

FERC should make their own value judgements regarding “acceptable levels of heat flux. They should be based on realistic assumptions regarding evacuation capability, building survivability, and firefighters ability to withstand certain levels of heat flux for long duration. The following are possible guidelines that the BFD has incorporated into a Standard Operating Procedure for Vessels Fires.

**BFD RECCOMENDATIONS TO SIMULATE
CONSEQUENCES OF HEAT FLUX EXPOSURE***

Thermal Flux (BTU/hr-ft²)	Major Incident With Spill That Ignites
10,000	Assume concrete structures will fail if exposure is for a long duration. Assume steel will weaken after a short duration. No rescue or fire fighting activity possible.
7,000	Assume buildings will ignite if exposure is for a short duration. Assume steel weakens after a long duration. Rescue or fire fighting activity not recommended except for life safety. The radiative heat on the floor of a room, just prior to flashover ranges from 6,000 – 7,000 BTU/hr-ft ² .)
4,000 (Fire Zone)	Assume buildings will ignite if fire burns for more than 30 mins. Rescue or fire fighting activity not recommended except for life safety. FFs exposure should be limited to a few minutes of exposure.
2,500 – 4,000 (Hot Zone)	Buildings should not burn but this level is extremely dangerous to civilians still dangerous to fire fighters , so defend in place unless it is anticipated to become a catastrophic incident. Then evacuate using as much shielding as possible. Firefighters should only enter this zone if risk/ benefit in terms of life safety is justified.)
1,500 – 2,500 (Warm Zone)	Buildings should not burn but this level is dangerous to civilians (<30 seconds exposure) , so defend in place unless it is anticipated to become a catastrophic incident. Then evacuate using as much shielding as possible. Firefighters should be able to operate reasonable safely in this zone, for longer periods of time, wearing bunker gear and taking advantage of as much shielding as possible.

<p>500 – 1500 (Evac Zone)</p>	<p>Buildings should not burn but this level is hazardous to civilians (30 – 90 seconds exposure), so defend in place unless it is anticipated to become a catastrophic incident. Then evacuate using as much shielding as possible. Police and EMS personnel could handle evacuation duties in this the safer parts of this zone taking advantage of as much shielding as possible. Staging Areas should be located at boundary of this zone.</p>
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* Based on the information in Table 2.3 of the ABS Report, these guidelines may overestimate the exposure capability of municipal firefighters. This information from API 521 (1977) recommends only a few minutes exposure at 1,500 BTU/hr/ft².

Without guidelines that provide better information about the impact of different levels of heat flux, proponents of new facilities will continue to take public positions which appear to be intended to provide a “sense of security”, but in actuality only provide a “false sense of security. Here is an example:

“Frank Katulak, Senior Vice President of operations for Distrigas says even if a fire did occur, Fay’s scenario overestimates its likely impact. By throwing water on an LNG fire within seconds, the tugboat escort could reduce a fire’s effects, Katulak says. He agrees that water could not extinguish the fire.” – Providence Journal 01/04/04

Let us review this statement in light of what some reference sources state about LNG and water as an extinguishing agent.

From the NFPA Handbook

“Contact between water and pooled LNG should be avoided to prevent increased vaporization, unless vapor can be controlled.”

From Liquefied Natural Gas in California: History, Risks, and Siting

“Water is ineffective in fighting LNG fire because it provides a heat source for vaporization”. (Which makes the fire and heat worse – my words)

It appears that, even if it was proper to use water on an LNG fire, which it isn’t, it is doubtful that a fire-fighting tugboat could approach within 1,000 feet of the pool fire. I am not aware of any deck gun, which can project water that distance. Table 3.1 of ABS Report estimates the Heat Flux at 1,000 ft to be in excess of 12,000 BTU/hr/ft². Unfortunately this information, which clearly indicates that Mr. Katulak is wrong, is not readily apparent due to the manner in which the NFPA chooses to incorporate Heat Flux guidelines.

Questions:

1. Does FERC intend to develop more realistic levels of “acceptable” Heat Flux using the data in the ABS Report?
2. Does FERC intend to recommend updates to the NFPA’s LNG Standard, 59A? Does FERC feel that the make-up of the NFPA Committee provide adequate representation to all “interested parties”?
3. Does FERC intend to develop “exclusion zone” guidelines for vessels similar to the ones that exist for land facilities? If yes, how will FERC determine the pool size to be modeled? Will Public Safety Agencies be involved in the development?

Comment Four

From Page 50 – “Ship and facility emergency response plans – Both LNG carriers and LNG terminals are required to develop emergency response plans, complete with personnel training and exercises. These plans serve to help ensure that prompt and effective action results if a release scenario occurs. Emergency response actions include release isolation (if possible), minimization of ignition sources (e.g., by shutting down equipment or restricting activities), and evacuation of ship crew or members of the public if deemed appropriate.”

*“**Evacuation plans and procedures** – If necessary, an emergency response plan will call for evacuation of locations where the emergency personnel are concerned that threats to personnel may develop. Particularly for an unignited release, emergency responders may involve law enforcement or other public resources to help notify personnel in the downwind direction to take action and move away from the area of the hazard.”*

According to Table 3.1, of the ABS Report, the distance out to which serious property damage and life loss could occur appears to be 2,800-4,600 feet. In addition, information on Pages C-12 & C-25 indicates that the pool will reach its maximum diameter in less than 3 minutes. How are public safety agencies in Boston supposed to evacuate an area within 3 minutes, which, in Boston, due to the narrow channel could involve hundreds of buildings and thousands of people?

The “Notice of Availability” issued for Docket No. AD04-6-000, states, “*The methods recommended by ABSG will be used by FERC staff to calculate site-specific flammable vapor and thermal radiation hazards in the National Environmental Policy Act review for each import facility application before the Commission.*”

Questions:

- 1. Does FERC intend to “calculate site- specific flammable vapor and thermal radiation hazards in the National Environmental Policy Act review for each import facility already approved by the Commission”? Wouldn’t this be a prudent action given the affect that it might have on existing response and evacuation plans?**
- 2. Does FERC finally intend to become actively involved in developing a response and evacuation plan for the Port of Boston?**
- 3. Does FERC have any paperwork that indicates that it has reviewed and approved the existing response and evacuation plan for Port of Boston?**
- 4. If FERC does evaluate current response and evacuation plans, what criteria is used to determine an acceptable plan? For example: is it acceptable that 1,000s of people die because they cannot be evacuated in time?**
- 5. Is the opinion of the Public Safety Agencies that have to respond, regarding the validity of the response and evacuation plan, taken into account by FERC?**

Comment Five

Attached to this commentary are pictures of Boston Harbor that show possible location of the LNG Tanker as well as the area of impact that a pool fire might have on the city. The radius of the circles used is approximately 3,500 feet. (This distance is midway between 2,800 ft and 4,600 ft. (See Table 3.1 of ABS Report.) I would like to compare this estimate of potential damage with the estimates discussed in the original Environmental Impact Statement for the Everett Facility. (Final Environmental Impact Statement – For the Construction and Operation of an LNG Import Terminal at Everett, Massachusetts (Port of Boston), Federal Power Commission, Bureau of Natural Gas, 09/76.)

From Pages 23-24 of 1976 EIS Report

“For some locations it is possible that an LNG pool fire could pose a greater hazard than the hazards associated with an ignited vapor cloud. For LNG facilities located in remote areas or having marine terminals well offshore, the number of fatalities from exposure to radiation from a pool of fire would be less than those fatalities resulting from the ignition of a vapor cloud drifting over land. However, an LNG pool fire occurring in a confined harbor or channel area could cause greater fatalities than a drifting vapor cloud. The evaporating pool of LNG would fuel an intense fire resulting in high levels of thermal radiation covering a wide area. It has been conservatively estimated that 20 percent of the population located within this area would be unshielded by buildings or other structures and therefore could sustain severe burns or death.”

“Attachment 2 to this study describes procedures for estimating radiation levels experienced at various distances from an LNG pool fire. Difficulties arise in selecting a value of radiation for the purpose of estimating fatalities to radiation levels and time of exposure. Staff has therefore selected a radiation level of 5,300 BTU/hr-ft² and an exposure time of 5 seconds to estimate the area of potential fatalities. This is the level at which blistering

occurs upon five seconds of exposure. Exposure to these levels has been found to result in second-degree burns. Calculations for one-tank pool fires yields an area of hazardous radiation extending 3, 595 feet radially.”

From Page 26 of 1976 EIS Report

“The maximum probable number of fatalities, which could result from a severe tanker casualty, were estimated at 2,500 and 3,000 for vapor clouds and radiation hazards, respectively. These figures were estimated based on the formation of a vapor cloud and the maximum range of hazardous radiation levels resulting from an unconfined spill of LNG on water (see Attachment 1 and 2 of this appendix). The geometry of Boston Harbor would prevent such a pool from forming in most locations, particularly in the Inner Harbor area where the maximum number of fatalities were estimated. As a result, the actual range of radiation and vapor clouds may be somewhat less than the maximum calculated values. However, due to the high concentration of population in this area, a large number of people would still be exposed to a risk. The strict enforcement of the USGC LNG-LPG Operation/Emergency Plan is a necessity to prevent a large spill from occurring.

The probabilities of a fatality per exposed person per year for vapor cloud and radiation hazards are estimated to be 3.57×10^{-8} and 2.63×10^{-7} , respectively. Their estimated frequencies of occurrence of these events are once in every 100,000 and 77,500 years respectively. These risks were based on spills resulting from grounding type casualties. It should be noted that the effectiveness of the USCG’s LNG-LPG Operation/Emergency Plan for the Port of Boston, while considered for collision type casualties was not considered in evaluating grounding type casualties. It is felt that the travel restrictions contained in this plan should certainly reduce the calculated probability of grounding. Although no consideration was made for this reduction, it is the opinion of the staff that the risks for both vapor cloud and pool radiation hazards are considered to be acceptable.

It seems clear that the reason that a potential life loss of 2,500 people was determined to be an “acceptable risk” is due to the fact that the probability of an incident was assumed to be extremely small. What happens if circumstances change over time so that the probability of an incident increases?

Questions:

- 1. Does the conclusion that the LNG transit through Boston Harbor is an acceptable risk change, if one assumes that many of the structures that people will seek shelter in are probably going to burn. (This could push the original estimate to as high as 10,000 fatalities.)**
- 2. How does FERC intend to account for sabotage? How does the possibility of sabotage affect the probability estimates? Is it even possible to place a probability on a deliberate action such as sabotage?**
- 3. If thousands of people could die in the event of a sabotage event, and it is impossible to stop all sabotage attempts, is it the opinion of the FERC staff that the risks for both vapor cloud and pool radiation hazards are still considered to be acceptable?**

Comment Six

The “Notice of Availability” issues by FERC for Docket No. AD04-6-000, it states that, “Copies of the study have also been mailed to interested parties and government agencies.” Isn’t the Boston Fire Department, which has primary responsibility for emergency response and evacuation for an incident in Boston Harbor involving an LNG Tanker an “*interested party*”? Fortunately the local United States Coast guard Office brought the issuance of this report to our attention. If they had not done so it is unlikely that we would have been able to meet the deadline for public comment. In addition, 2 weeks does not seem to be enough time to adequately review such a complicated document.

Question:

- 1. Could FERC please inform the Boston Fire Department with a list of these “interested parties”?**

Comment Seven

The BFD has had difficulty determining which agencies have jurisdiction over this issue. We have worked with the USCG extensively, and with the DOE minimally. We have not worked with FERC at all, yet this report seems to imply that FERC has ultimate authority.

Question:

- Does FERC have sole jurisdiction for the Everett Facility or does the State of Massachusetts have joint responsibility for safety issues?**

Comment Eight

In the opinion of the Boston Fire Department the conclusions of the ABS report raise serious questions about the validity of the FERC approval and regulatory process.

Questions:

- 1. Why did it take FERC until late 2003, 2 years after 9/11 to fund this study? The test data for LNG spilled on water was done in the 70’s. (See Table 2.1). The LNG Pool fire data identified in this review date from 1983 to 1997. (See pages 21-22 of Report.) The Modeling Approaches that were reviewed date from 1996 to 2004. (See page 20 of the report.) Report uses the values chosen by REW (1996). The information needed to conduct this study appears to have been in the literature for more than 7 years, without FERC acknowledging its existence or importance.**
- 2. Does FERC conduct periodic review of existing facilities?**

- 3. Does FERC apply the most-up-to-date technical information to a review of existing facilities?**

Comment Nine

According to a United States Coast Guard Report titled, "Safety Aspects of Liquefied Natural Gas in the Marine Environment", *"Hazards from LNG facilities can, indeed, meet the criterion that the public shall not be exposed to any undue risk, so long as the interaction among designers, regulators, and the public continues to be one of active multi-disciplinary probing and a vigorous programs of system improvement and quality assurance are maintained."*

The existing system, that FERC uses to regulate LNG in the United States, would appear to have little or no:

- Continuing interaction among designers, regulators, and the public. *(The BFD has had little or no contact with anyone from FERC, even after 9/11.)*
- Active multi-disciplinary probing, *(FERC has not committed to using the ABSG Information for existing facilities.)* or
- "Vigorous" program of system improvement and quality assurance. *(FERC has delegated much of its regulatory authority to the NFPA, which is an industry, and consultant dominated board.)*

To achieve the laudable goals of the USCG Report, the Boston Fire Department would like to propose the following recommendations.

Boston Fire Department Recommendations to FERC
Regarding "Periodic Review of Existing Facilities"

All facilities should be required, every 5 (or 10) years, to do the following.

A. Provide a comprehensive report which should include:

1. Analysis of "reasonable worst case" accidents using risk and hazard analysis techniques
 - Note: risk analysis takes into account probability of events, hazard analysis assumes that event occurs.
2. Analysis of potential consequences of a terrorist attack, including worst case releases.
3. The consequences of #1 and #2 on surrounding infrastructure, communities and terminals.
 - a. When analyzing items 1-3. The following criteria should be used.
 - Identification of specific required capabilities on-site, or in the local community, that are in place to manage these consequences.

- Identification of specific required capabilities on-site, or in the local community, that are not in place to manage these consequences. (The report should identify means to acquire or provide those items that are needed but not currently in place, such as equipment for local fire department, etc.)
4. Comparison of the existing plant or facility with the *latest* Federal, State, and Industry, such as NFPA, Safety Standard(s) that apply to this facility. (Most facilities are only required by the State to meet the requirements of the standard that was in existence when it was built.) All areas where the plant or facility does not meet the latest standard should be identified. For each area, the potential reduction in hazard, as well as the cost to achieve those reductions should be identified.
- B. The report described in A, should cover any land or water based vehicle that transports LNG to and from the facility.
- C. The operator of the facility should provide an amount equal to the cost of preparing the report that meets the requirements of A & B to the local responding community so that they could hire their own independent expert to review the report. (Without this requirement no one would be checking the validity of the report.)

The Facilities Report and the local community’s “Peer Review” of that report could be forwarded to FERC, as well as any State Agency with jurisdiction for safety. Modifications to the original Environmental Impact Report and/or the Response and Evacuation Plan could then be implemented if warranted.

The following quotes will help explain why it is necessary to require a “peer review”, who works for the local communities, in order to “balance the technical input of the applicant and FERC. Neither the applicant nor FERC is neutral and objective, in the opinion of the BFD.

“In fact, a research survey of about 1,500 members of the Society of Risk Analysis found that such human factors as data fabrication and bias in research design are more common in the risk assessment process than one would think. As the researchers put it:

Surveys of almost 1,500 members of...professional societies (e.g. environmental economics, epidemiology, exposure assessment, industrial hygiene, toxicology) found that 3 in 10 respondents had observed a biased research design, 2 in 10 had observed plagiarism, and 1 in 10 observed data fabrication or falsification. Respondents with many years in risk analysis, business consultants, and industrial hygienists reported the greatest prevalence of misconduct. These respondents

perceived poor science, economic implications of the research, and lack of training in ethics as causes of misconduct.” (Greenberg and Goldberg, 1994: 223)

“Virtually all discussion of uncoupling focuses on the separation of policy and service-delivery functions. But for obvious reasons, service-delivery and compliance functions should also be separated. When one organization must enforce compliance and deliver services, the two missions often work at cross-purposes. The U.S. Federal Aviation Administration has long struggled with the fact that Congress asks it to be responsible for promoting commercial aviation and enforcing compliance with safety regulations, for example. Every time there is a major accident, critics wonder whether the first mission has received too much attention at the expense of the second.” (FERC is another Federal Agency with dual and sometimes conflicting missions: 1) promoting LNG and 2) regulating the safety of LNG. - BFD comments)

In the opinion of the BFD the recent reliance of both FERC and the DOE on the Quest and Lloyd’s Reports on LNG Safety in Boston Harbor, to justify policy decisions involving Boston Harbor and elsewhere, validates the concerns expressed by these authors.

Regarding the Quest and Lloyd’s Reports

“The Lloyd’s Report, commissioned by Tractabel LNG North America LLC, the company that runs the Everett LNG terminal, instead concluded that, at worst, an attack on a tanker would “create a slow moving relatively confined fire.””- Boston Globe 10/13/01. This Report is important because according to the Providence Journal, “The Lloyd’s Report was used by the Coast Guard in approving a safety plan for the Everett site.” - Providence Journal, 01/04/04.

“According to Quest Officials, the estimates were commissioned to help determine whether it was safe to reopen Boston Harbor to LNG shipments following the Sept. 11, 2003, terrorist attacks.” – Mobile Register 10/19/03.

It is important to point out that these two reports have been used by Federal Officials and Industry Representatives to support the construction of new LNG facilities at various locations around the country.

The Dept. of Energy later used those computations (i.e. Quest’s) to argue that LNG shipments would pose only a limited threat to a nuclear plant near an LNG facility in Cove Point, Md.” – Mobile Register 10/19/03.

“The Federal Energy Regulatory Commission cited the Quest computations in its decision to allow a new LNG terminal at Hackenberry, La, near Lake Charles.”” – Mobile Register 10/19/03.

What Federal Officials failed to point out was that the Lloyd's and Quest Reports reach very different conclusions regarding the potential radiation problem. However, in the PowerPoint presentation developed by Donald Junkett of the DOE this is not readily apparent because when displaying the Quest data he cites the distances to certain heat flux levels. When discussing the Lloyd's report he merely states that, "Exposure at 300 meters (1000ft) from a pool fire would cause pain within 60 seconds". He failed to point out that a commonly accepted heat flux level which cause pain in 60 seconds is 500 BTU/hr/ft². This means that Lloyd's had calculated the heat flux at 1,000 ft as 500 BTU/hr/ft² at the same time that Quest had calculated the heat flux at 1,000 ft as 4,000 BTU/hr/ft². By expressing Lloyd's results in "time to pain" this major contradiction becomes less obvious.

Discrepancies between the two reports are not the only reason why relying on these reports is a mistake. Quest itself has distanced itself from the conclusions reached in its own report. Although the Quest Report differs from the Lloyd's Report, at least it seems to take a more conservative approach. (Quest numbers are 3 times larger than Lloyd's numbers for heat flux.) However, the Quest numbers are far smaller than numbers produced in similar studies

"Because Quest's numbers are so out of line with other studies, and because the company's assumptions and results have never been peer-reviewed the "estimates must be considered to lack the credibility for public confidence," said Jerry Havens, a University of Arkansas chemical engineering professor, whose scientific work lies at the heart of federal regulations for LNG Terminals." – Mobile Register 10/19/03.

In a letter to the DOE, sent in 11/03, John Cornwall, Principal Engineer for Quest attempted to explain why Quest's numbers differ from previously published studies. He explains that the incident, which Quest modeled, was a ship collision in the outer harbor. Quest assumes that this is the "*most credible worst case event*". Because the event occurs in the outer harbor Quest assumes that the wave action in the outer harbor limits the pool size and as a consequence limits the fire size. Mr. Cornwall then states, "***It is important to note that the model developed by Quest is flexible in the sense that other locations with different site-specific conditions may yield significantly different results.***"

If Mr. Cornwall is correct then, the fact that Quest claims not to have analyzed an incident in the "inner harbor" is troubling. In addition, why did Quest analyze a ship collision as the worst credible event? This assumption moves an incident from the inner harbor to the outer harbor thereby allowing Quest to take into account its "wave action theory". However, this assumption is unreasonable if one assumes as Mr. Cornwall has stated that, "*The calculations would address a national security concern with the Boston LNG Terminal following the Sept. 11, 2003 attacks.*" – Mobile Register 10/19/03. How is a ship collision a national security concern? It seems to be common sense that any study that was meant to address national security concerns would look at a deliberate act in the inner harbor not an accident in the outer harbor. But if Quest had done that they probably would have come up with, "***significantly different results.***"

Another troubling aspect of the Quest Report is that Mr. Cornwall seems to indicate that he would have produced a different report if he thought the public might see the results. *“Some of the modeling we did for DOE – in hindsight we should have done a more complete paper. ... I’ve learned you never write anything that you don’t want public.”* – Mobile Register 10/19/03. Why is the Quest report good enough, in Mr. Cornwall’s opinion, for the Federal Government to use when making life and death decision regarding the public but not good enough for the public to review?

Despite these clarifications in the 11/17/03 letter, which raise serious questions about the reports' validity. Federal Officials still intended to use it. On November 25, J. Robinson of FERC stated, *“FERC does not set exclusion zones around tankers.”* But he also stated, *“FERC had used and would continue to use the Quest Study”*. (Mobile Register, 11/25/03.) In a story that appeared on 12/04/03, after Federal Officials had time to review Quest’s “clarifications”, J. Mark Robinson, a FERC official stated *“That FERC officials stood behind the Quest study and they would continue to use it to determine whether LNG terminals can safely locate in cities like Mobile”*. . – Mobile Register 12/04/03.

It is also interesting to point out that there is some confusion about the agency that hired Quest.

- After receiving a request for information from the BFD, the USCG informed the BFD it was the State of Massachusetts that arranged for the Quest Study. (05/02)
- The Massachusetts Executive Office of Public Safety denied involvement in the Quest Study. (06/02)
- In an e-mail, Donald Juckett, from the DOE identified, Michael. Bolden, Under Sect. of Public Safety as making request for a study to DOE. (07/03)
- Juckett also stated in this e-mail that DOE, *“was able to task Quest using existing government funds”*.(07/03)
- DOE Press Officer, Drew Malcolm later stated, *“DOE was not involved with the study in any way”*.(– Mobile Register 10/19/03)

It is hard to believe that this report was used by a Federal Agencies to make important policy decisions that affected thousands of lives. The ABS Report points out that the methodology used by Quest has not been validated and they do not recommend it use. In the opinion of the Boston Fire Department, this conclusion would have been reached two years ago if a legitimate peer review had been conducted.

The BFD would also like to point out that the Executive Office of the President – Office of Management and Budget has issued guidelines to require Peer Review for many issues less complicated and less hazardous than the storage and transport of LNG. (Information on this policy is attached to this analysis.)

Question:

Does FERC intend to continue to use the Quest Report?