LOUISIANA POWER & LIGHT / 142 DELARONDE STREET
P. O. BOX 6008 • NEW ORLEANS, LOUISIANA 70174 • (504) 366-2345
MIDDLE SOUTH UTILITIES SYSTEM

August 3, 1981

W3P81-1788
Q-3-A29

Mr. R. L. Tedesco
Assistant Director of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

SUBJECT: Waterford 3 SES
Docket No. 50-382
Site Hazard (SER Section 1.7
Outstanding Issue No. 15)

Dear Mr. Tedesco:

Subsection 2.2.3 of the Waterford 3 FSAR provided a discussion of the evaluation of the effects of potential accidental releases of hazardous chemicals from nearby industrial and transportation facilities. During the course of the NRC Staff's review certain additional concerns have been raised about the capability to protect the control room operators and the safety grade plant structures from the effects of toxic gas releases and explosions. These concerns may be summarized as follows:

1. The control room is provided with automatic detection and isolation features to protect the operator from chlorine and ammonia releases. LP&L had, until now, intended to rely on administrative procedures, using operator training for protection from all other potential toxic gas hazards. The staff has expressed concern over the sufficiency of these administrative procedures.

2. FSAR Section 2.2.3.1.2 discusses the effects of a fuel tank truck explosion on Highway 18 (approximately 600 ft. from the plant). The staff however has expressed concern over the possibility of the formation of a fuel air mixture cloud due to this incident and its subsequent detonation over the plant site.

3. The staff has requested additional information on our intentions regarding monitoring the combustible and potentially toxic products processed and transported near the site.

B001
S1/0

The following discussion addresses each of these concerns.

We are currently investigating the availability of devices for detecting a broad range of gaseous chemicals. These detectors will be provided with indication, alarm and ability to automatically isolate the control room before toxic levels have been reached. In essence, we intend to provide the same degree of automatic control room operator protection for a wide range of chemicals as we now do for chlorine and ammonia. Although it is premature to state precisely what chemicals may be so detected, our findings thus far indicate that the range will afford protection against most significant nearby toxic hazards. As a result, we are confident that this additional level of protection combined with existing instruments and administrative procedures will alleviate the NRC's concern in this area. A description of these additional broad band detectors will be presented in a future amendment to the FSAR as the design progresses.

In response to the staff's concern regarding the hazards to the plant from detonation/deflagrations of LP gas released from truck accidents at a critical distance of 634 feet from the plant, probabilities of accidents leading to different consequences were examined as follows:

The probability that an LP gas truck accident would take place within the stretch of road passing in the immediate vicinity of the plant was assessed from historical data, as reported in WASH 1238 (see Table 2.2-17 of the FSAR).

The probability per vehicle mile that an accident will occur that will have consequences ranging from minor to extreme varies substantially with the more severe accidents being considerably less probable.

Conservatively, it was assumed that the probability of a tank truck accident of the minor category represented a base estimate of the frequency of truck accidents in the Waterford 3 vicinity. The frequency with which these accidents would be accompanied by a spill or leak is 0.02 times less, this being the fraction of accidents involving tank trucks with sufficient impact to cause rupture of the tank. As reported in the FSAR, the probability of ignition and explosion from a spill is determined by DOT's Office of Hazardous Material to be 0.0113. The overall probability of an in-transit explosion of a LP gas truck is thus 3.6×10^{-10} explosions per vehicle mile. There are, however, different kinds of explosions/detonations with different consequences. Leaking vapor can ignite and explode immediately or can form low lying vapor air clouds which can explode after a delay.

Tank truck data (from Risk Analysis in Hazardous Materials Transportation, Volume 1, University of Southern California, PB-230810, March 1973) is rather inconclusive, but shows that out of forty-four (44) accidents, seventeen (17)

occurred en-route. Of the en-route accidents, only one resulted in a large explosion which was at the accident scene. The other explosions occurring during unloading, or as a result of leaks were also localized at the accident scene. In lieu of adequate tank truck data, the corresponding rail data from the same reference has also been examined. This data does present evidence of one true delayed air-vapor detonation of our seventy-seven (77) accidents reviewed.

When all of the tank-truck and rail accidents leading to leaks and fire with explosions are counted, only one out of sixty (60) (55 rail and 5 tank-truck) is assessed to be a true air-vapor explosion/detonation resulting from significant quantities of vapor being released at the accident location. It is concluded therefore that for significant leaks of vapor the probability of a delayed air-vapor cloud detonation/explosion is between one to two orders of magnitude less than the probability of an immediate in-situ explosion.

The data however is insufficient to determine whether such conclusion is also applicable to relatively small leaks of vapor. For such small leaks flammable air vapor clouds would be formed not far from the leak location even under light winds. Hence, it is not possible to determine from the data whether an explosion had really occurred at the leak location or its vicinity.

On the basis that 3,650 LP gas trucks pass the vicinity of the Waterford site per year, the yearly probability that an accident would occur within the mile or road closest to the plant, which would cause a fire or explosion at the accident location is determined to be 1.3×10^{-6}.

The probability that such an accident can lead to the delayed explosion/detonation of a large air-vapor cloud is about 2×10^{-8}. This number is derived from multiplying 1.3×10^{-6} per year per mile by the probability that an explosion will be a delayed detonation/explosion of a large air-vapor cloud which is determined to be about 0.017 from the previous arguments.

Another way to examine what the probability of a delayed detonation/deflagration of an air-vapor cloud is in the plant vicinity, is to recall that only accidents of some severity can lead to leaks capable of forming clouds of considerable size.

The probability per vehicle mile of severe accidents is lower than that for minor severity, and is reported in Table 2.2-17 of the FSAR to be 8×10^{-9}. Applying the same ratios for frequencies of leaks and spills and explosions, and multiplying by the truck traffic one arrives at a probability per mile per year of an accident leading with potential for delayed detonation of a significant cloud of 6.6×10^{-9}, a number which

is comparable with that previously derived.

This probability is warranted to be too low to consider such event as part of design. However, the probabilities of a deflagration/detonation at the site of the accident, of a fire in the immediate vicinity of the accident, and of a relatively small leak leading to vapor clouds which can suffer delayed ignition and detonation are larger, and thus the plant's ability to withstand such hazards has been analyzed. Analysis of the in-situ detonation and deflagrations and thermal hazards from fires in the vicinity of the accident are reported in the FSAR.

The vapor clouds that can be formed by leaks of approximately 10lb/sec or smaller, have been determined on the basis of atmospheric dispersion under 2.6 fps wind and Pasquill F meteorology, as well as gravity slumping, and their detonations have been found to present no hazards to the plant.

We have also requested that industry within 5 miles of Waterford 3 provide us with the following information:

1. Provide us with the types and quantities of chemicals either produced or stored onsite.

2. Provide us with information regarding the facility's capability to assess the offsite and onsite effects of an accidental release of hazardous materials. Briefly describe the instrumentation used and procedures followed by the personnel in responding to a release of hazardous materials. Describe the information which can be provided to offsite authorities and the approximate time required to assess the consequences of a release of hazardous materials.

3. Assist us in developing a letter of agreement. This letter of agreement should contain a commitment to advise LP&L of changes in inventory of hazardous materials and to promptly notify LP&L if an accidental release of hazardoud material occurred. This letter of agreement would remain in effect throughout the life of the Waterford 3 facility.

If there are any questions, please advise.

Yours very truly,

L. V. Maurin
Assistant Vice President
Nuclear Operations

LVM/RGA/ddc

cc: Mr. W. M. Stevenson
Mr. E. L. Blake
Mr. L. Constable
Ms. S. Black