UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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In the Matter of	)	
	)	
COMMONWEALTH EDISON COMPANY	)	Docket Nos. 50-454 OL
	)	50-455 OL
(Byron Nuclear Power Station, Units 1 and)	)	

REBUTTAL TESTIMONY OF SAUL LEVINE
WITH RESPECT TO ROCKFORD LEAGUE OF WOMEN VOTERS
CONTENTIONS 8 AND 62 AND DAARE/SAFE CONTENTION 2a

The purpose of this testimony is to address those elements of the NRC staff testimony regarding the Final Environmental Statement (FES) for the Byron Station (NUREG-0848) which covers the public risk from hypothetical accidents. In particular, I wish to address page 4 of the staff testimony where it is stated that the risks at Byron would not be above an uncertainty factor of 100 times the risks from internal events as stated in the FES. While I would find it difficult to disagree that there are uncertainties in the risk estimates in the FES, I do not agree that the range should be as large as a factor of 100 in the direction of increased risk.

As I have testified previously, the NRC approach to estimating public risks due to potential nuclear power plant accidents that is described in the FES is a reasonable one. I have also stated my view that the estimated risks in

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the FES are conservative; that is, although they are small compared to other risks to which the population in the vicinity of the Byron plant are exposed, they are too high compared to those that would be predicted in a more realistic estimate. While it is clear that PRA analyses have uncertainties associated with their predicted risks, these uncertainties stem partly from attempts to make the risk predictions as realistic as possible. On the other hand, when estimates are made that are clearly conservative, as I believe those in the FES are, it would not be reasonable to apply large values of uncertainties in the direction of higher estimated risks.

The uncertainty factor of 100 in the staff testimony is apparently intended to bound the increases in risk that might arise if the analysis of external events (primarily earthquakes) were to be added to the probabilistic analysis of severe accidents (based only on internal events) in the FES and also to account for some of the uncertainties involved in the calculation of consequences. This raises a number of areas that require consideration.

First of all, it must be recognized that there is no necessary relationship between the contributors to risk from internal events and those from external events. Thus the factors of 10 or 30 as the ratio of external to internal risks derived from the Zion and Indian Point PRAs cannot

apply to Byron except by coincidence. The foregoing conclusions are based on the fact that the relationship of internal and external event contributors to risk is highly dependent on specific site characteristics and specific plant design details; there is no clear relationship which establishes that seismic risk will be larger or smaller than internal risks. Because of this consideration, I believe it is inappropriate to use the results of PRAs for other plants as the basis for establishing quantitative uncertainty factors to be applied to FES risk estimates for the Byron plant.

Secondly, a more fundamental question is whether it is either necessary or useful to provide uncertainty estimates on the risk results in the FES. The model used in the FES can be described as a very general approach to the calculation of severe accident risks. It uses large source terms and relatively high frequencies of releases as the basis for the FES consequence calculations. As I have already said, this represents an approach that is adequate for use in an FES to characterize the risk to the public due to potentially severe reactor accidents from the Byron Plant, especially since it yields estimated risks that, although conservative, are very small compared to other types of risks to which people in the vicinity of the plant are already exposed. However, this type of general approach to PRA does not lend itself to uncertainty analysis. Such

analyses are done by the explicit consideration of uncertainties in the inputs to models and by sensitivity studies that pertain to all necessary aspects of the PRA models as applied to the specific plants and sites. It is not clear how one could go about doing a meaningful uncertainty assessment on the FES model because it is not plant-specific. Thus while the "PRA" model used in the FES is not very rigorous, its use for a conservative generalized estimate of risk is justified; however, an attempt to estimate the uncertainties in such a model is not justified.

I also believe that estimates of uncertainty are not needed for the FES as long as the FES estimated risks are sufficiently conservative so that items and uncertainties not covered in the analysis will not affect the major conclusion that the predicted public risks are small when compared to other risks. My view is that the FES analysis is conservative enough so that uncertainties need not be included. The basis for this view have largely been presented in my previous testimony. I would like to review and elaborate on those points and to add some additional perspective. This includes factors that can affect both the magnitudes and probabilities of radioactive releases as follows:

(1) The magnitude of atmospheric releases used in the FES (Table 5.11, FES), are generally based on the models used in the RSS which were developed several

years ago. This was before the current views developed in the world-wide technical community that the largest releases, commonly called source terms, used in WASH-1400 may be significantly over-estimated. There are several reasons for this development:

a. The WASH-1400 analysis assumed no deposition of radioactivity in the primary coolant system. This type of deposition would cause a reduction in the amount of radioactivity released to the environment. Methods have now been developed which can treat this type of deposition and more research is being done to develop even better models.

b. There is now evidence that radioactive iodine will be released not in its elemental form, but as cesium iodide. Cesium iodide is much more soluble in water than is elemental iodine and this should tend to reduce releases of iodine to the environment. Since iodine is one of the principal contributors to early fatality risks and to thyroid risk, this could cause reductions in these predicted risks.

c. Tellurium is also one of the principal contributors

to early fatality risk. There is now experimental evidence indicating that tellurium may not be released in large quantities from overheated fuel. These experiments indicate that tellurium will be largely captured and held by the Zircaloy cladding, stainless steel, or other metallic components in the reactor core. This could significantly reduce the amount of tellurium released to the environment.

(2) Event V in Table 5.11 of the FES results in the largest predicted releases of radioactivity. There have been significant changes in the design and testing of components in the systems that could be involved in this event that reduce its chance of occurrence by a large factor, thus making the contribution of the event to predicted public risks very small. Some design differences among the reactors can also reduce the source term significantly.

(3) Perhaps the most important factor that can cause large reductions in source terms and thus in estimated risks relates to the time of containment building failure following a predicted core melt accident. More careful analyses done since WASH-

1400 was performed have established that large dry containment buildings of the type used for the Byron Station have greater strength than estimated in WASH-1400, and thus it will take higher pressures to cause them to fail. Also more careful analyses of predicted containment pressures following a core melt accident have indicated that the pressure will build up more slowly. Thus for many accident sequences, the containment is not predicted to fail due to over pressure and in others the failure time would be longer and thus result in smaller releases of radioactivity than predicted in WASH-1400 because of the additional time for aerosol settling, fission product plateout and radioactive decay inside containment.

While the factors indicated above would tend to contribute to uncertainties in the direction of decreased risk, there are others pointed out in the staff testimony that might tend to contribute uncertainties in the direction of increased risks. However, it is my judgment that the factors I have listed above will tend to outweigh, in the direction of decreased risks, both the inclusion of external events and variations in the calculation of consequences. Therefore, I would conclude for the model used in the Byron FES that it is

not possible to assess uncertainties in a meaningful way, nor is it necessary to include estimates of uncertainty in these conservative calculations.