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ILLINOIS POWER COMPANY

CLINTON POWER STATION, P.O. BOX 678, CLINTON, ILLINOIS 61727

December 3, 1985

Docket No. 50-461

Director of Nuclear Reactor Regulation
Attention: Mr. W. R. Butler, Chief
Licensing Branch No. 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Clinton Power Station
Variance Request for Regulatory Guide 1.97, Empirical Determination of Sample Line Loss Correction Factors

Dear Mr. Butler:

Illinois Power Company (IP) has committed to meet Regulatory Guide 1.97, Revision 3, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident". Regulatory Guide 1.97, Revision 3, Footnote 12 to Table 2, requires that sample "...line losses or line deposition should be empirically predetermined and appropriate loss correction factors should be applied". However, IP has not yet empirically determined iodine and particulate loss correction factors for the Accident Range Effluent Radiation Monitors.

Illinois Power is currently investigating methods to empirically or analytically determine iodine and particulate loss correction factors for the Accident Range Effluent Radiation Monitor sample lines. IP is requesting that empirical determination of iodine and particulate line loss correction factors be delayed until ongoing industry and NRC research programs develop acceptance criteria and methodology for performing such tests.

IP's justification for delaying the implementation of the above requirement is provided in the attachment. Please notify us at your earliest convenience of your approval for delaying the empirical determination of iodine and particulate line loss correction factors.

Sincerely yours,

F. A. Spangenberg
Manager - Licensing
and Safety

JBD/kaf

Attachment

cc: B. L. Siegel, NRC Clinton Licensing Project Manager
NRC Resident Office
Regional Administrator, Region III USNRC
Illinois Department of Nuclear Safety

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VARIANCE REQUEST FOR REGULATORY GUIDE 1.97, REVISION 3

EMPIRICAL DETERMINATION OF PARTICULATE

AND IODINE LINE LOSS CORRECTION FACTORS

Illinois Power Company and its Architectural Engineer have performed an investigation for determining iodine and particulate line loss correction factors. Research has been performed to determine the approach utilized by other nuclear stations to develop correction factors. In addition, a recent Electric Power Research Institute (EPRI) workshop on this subject was attended.

Iodine transmission factors have been calculated for Clinton Power Station's Accident Range Effluent Radiation Monitors using the method outlined in a paper written by M. T. Kabat (Deposition of Airborne Radioiodine Species on Surfaces of Metals and Plastics) which was presented at the 17th Department of Energy (DOE) Air Cleaning Conference. This article describes a method for calculating potential sample line losses for various iodine chemical species. One assumption used in estimating the iodine line loss correction factors involves the anticipated iodine chemical species distribution. No credible reference exists which quantifies the distribution of radioiodine chemical species expected during accident conditions.

Another problem encountered in determining iodine losses is the assumption regarding the humidity of the stack effluents and samples. The humidity of stack effluents will depend upon and will vary widely with the accident scenario that is assumed to have taken place. Kabat's paper presents data for only two cases; one with sample gases at 5% humidity and another at 97% humidity. Clinton's Accident Range Effluent Radiation Monitor sample lines are heat traced to prevent the sample gases from cooling below the dewpoint and condensing. The heat tracing should keep the samples at relatively low humidity conditions; however, the exact sampling conditions are not known and may vary widely depending upon the accident scenario.

Other problems encountered in determining iodine loss correction factors involve phenomena such as resuspension of deposited iodine as well as chemical species conversion within the sample lines. These phenomena are considered important and may have a significant effect on the actual amount of radioiodine which is deposited in the sample lines.

Particulate transmission factors have also been calculated for Clinton's Accident Range Effluent Radiation Monitors. The calculation was based on methods described in ANSI N13.1, 1969 (Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities). Similar to the problem of determining iodine chemical species present after an accident, there are uncertainties regarding the particle size distribution and density in the sample lines which have a significant impact on the results of the calculations.

Another problem with computing particulate line loss correction factors is the assumed distribution of radioactivity on the particles which are released. For example, if it is assumed that a major portion of the radioactivity is contained on large particles, a large correction factor (used because most of the large sized particles will be lost in the sample lines due to gravity settling) will not be realistic because most of Clinton's post accident effluents will be filtered through High Efficiency Particulate Air (HEPA) and charcoal filters before being released.

The results of our calculations show that HOI and CH_3I have very high transmission factors while I_2 has a relatively low transmission factor. High humidity conditions will not significantly affect the transmission of HOI and CH_3I, but do, however, significantly reduce the transmission of I_2. The calculations also show that intermediate sized particles have a high transmission factor while small and large particles have a low transmission factor. Determining exact iodine and particulate line loss correction factors from these calculations is difficult due to the large number of uncertain factors which affect the results.

IP has researched what other nuclear stations have done in this area and we have concluded that there currently is no clear, technically sound and cost effective method of performing tests to determine actual radioiodine and particulate line loss correction factors. We are aware of current NRC research programs to develop acceptance criteria for empirically determining such loss correction factors. IP recently participated in and supported a visit from an NRC consultant, Battelle Laboratories, who is attempting to gather information from various utilities regarding sampling system design and methods of accounting for radioiodine losses in sample lines.

Illinois Power Company is proposing to delay any empirical determination of sampling line losses until the ongoing industry and/or NRC research programs develop reasonable quantitative data regarding post accident radioiodine chemical species and particulate size distribution and density as well as necessary testing acceptance criteria.