EXHIBIT 11

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EG&G ROCKY FLATS

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INTEROFFICE CORRESPONDENCE

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DATE: January 16, 1991 DMS-91.1

TO: T.C. Greengard, Remediation Programs Division, T130B, X7121

FROM: D.M. Smith, Environmental Monitoring and Assessment Division, T130B, X5958

SUBJECT: RISK CALCULATIONS FOR WATERS CONTAINING PLUTONIUM-239

Attached are risk calculations for ingestion of water containing Plutonium-239 (Pu-239). These calculations were prepared following a discussion with Scott Anderson, Esq., of Arnold & Porter.

Calculations were performed using the method employed by the United States Environmental Protection Agency (EPA) for estimating lifetime excess cancer risk in the Superfund Program. This technique is widely used in evaluating the risks from exposure to hazardous substances at hazardous waste sites and in other environmental exposure settings. The technique is described in the following publications:

Risk Assessment Guidance for Superfund, (RAGS), Volume 1, Human Health Evaluation Manual EPA/540/1-89/002, Office of Solid Waste and Emergency and Remedial Response, Washington, D.C.

Health Effects Assessment Summary Tables, (HEAST), Fourth Quarter FY 1990 OERR 9200.6-303-(90-4), Office of Solid Waste and Emergency Response, Washington, D.C.

The basic equation computes total intake of radionuclide over a lifetime and applies a nuclide-specific dose/response factor to estimate lifetime excess cancer risk. This computation takes the form:

Risk=(pCi/l)(2l/day)(25,550days/life)(risk/pCi)

Where:

Risk= Lifetime excess cancer risk (1 E-04, E-05, E-06, etc.)
pCi/l= Radionuclide activity/liter of water
2 l/day= Average lifetime daily water intake
25,550 days/life= Days in a 70 year lifetime
risk/pCi= The dose/response factor; the increase in cancer risk per pCi ingested when averaged over a lifetime (3.1 E-11/pCi for Pu-239). EPA recommends that risk assessors do not interchange dose/response factors from other sources when applying the HEAST technique.

REVIEWED FOR CLASSIFICATION/UCNI
By George H. Setlock
Date 1/16/91

Rearranging this equation as follows determines the radionuclide activity/liter of water (pCi/l) equating to a specified level of risk:

$$pCi/l = Risk/[(2l/day)(25{,}550\ days/\ ^{1}Fe)(risk/pCi)]$$

For the case of a 1 E-06 lifetime excess cancer risk, this equation yields a Pu-239 activity in water of: 0.63 pCi/l. This value is 70 time higher than the 0.009 pCi/l value described by Hazle, (Hazle to Holm, CDH Inter-Office Communication, January 3, 1991).

Attached is a graph of lifetime excess cancer risk versus Pu-239 activity/liter for a range of values. All values on the graph were computed by the equations described above.

DMS:plf

Attachment:
As Stated

cc:
M. B. Arndt
W. S. Busby
P. F. Folger
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EXCESS CANCER RISK VS. ACTIVITY/LITER