CHAIRMAN
COMMISSIONER OF COMMERCE

State of New York
ATOMIC ENERGY COUNCIL
Department of Commerce
99 Washington Avenue
Albany, New York 12210

STAFF COORDINATOR
DR. WILLIAM E. SEYMOUR
DEPUTY COMMISSIONER
DIV. OF INDUSTRIAL SCIENCES
AND TECHNOLOGIES

June 20, 1975

Mr. William Crow
Senior Chemical Engineer
Division of Materials & Fuel
Cycle Facility Licensing
U.S. NRC
Washington, D.C. 20555

Dear Bill:

As you know, I have informed Mr. Thomas Cashman, New York State Department of Environmental Conservation (DEC), of the NRC's intent to terminate the Pawling license based on the decontamination and soil sample analyses which have taken place to date.

The following documents related to DEC's conclusion that 2.0 dpm Pu/gram of soil is an appropriate ad hoc criteria for the Pawling site are enclosed:

1) Michael to Strnisa, July 16, 1974

2) Mills (EPA) to Cashman, January 8, 1975

3) Davies to Cashman, January 14, 1975

4) Cashman to Bradley, February 27, 1975

5) Strnisa to Cashman, March 27, 1975

6) Cashman to Strnisa, March 31, 1975

It is requested that the NRC provide the State with the criteria used to determine that the concentration of plutonium in soil at the Pawling site is acceptable for release for unrestricted use.

Sincerely,

Fred V. Strnisa
Committee on Licensing

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Enc.
cc: T. Cashman
W. Kerr w/enclosures
J. Stohr, w/enclosures

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Dr. Fred Stmisa - Committee on Licensing
Mr. Eugene Michael - Bureau of Radiation
Interim Standard for Plutonium in Soil

July 16, 1974

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In reviewing the current literature concerning an interim standard for plutonium in soil, there appears to be several possibilities. The numerical values vary considerably depending upon the author.

In the report LA-5483-MS, "A Proposed Interim Standard for Plutonium in Soils" by J. W. Healy, the author recommends a value of 300 dpm/gm of dry soil as that necessary to reach maximum permissible dose to the lung of 1.5 rem/yr averaged over the entire lung. This value is based on an assumed soil density of 1.6 g/cm^3. Healy's report discusses several mechanisms of exposure including ingestion, skin absorption and inhalation. Depending upon what limiting criterion he uses (a body burden of .004 uCi or a dose value between 1.5 to 3 rem/yr to various organs), he calculates acceptable plutonium concentrations from 130 dpm/g to 11,00 dpm/gm. Healy then arbitrarily picks a value of 300 dpm/gm as an acceptable figure.

The State of Colorado has adopted a standard of 2 dpm/gm of dry soil. This value and its justification is presented in a statement made by A. J. Hazel of the Colorado Department of Health at the state hearings on the plutonium standards. A background concentration of 0.08 dpm/gm was multiplied by an arbitrary factor of 2 and rounded to the nearest significant digit to a concentration of 0.2 dpm of plutonium per gram of dry soil. A final value of 2 dpm/gm was decided upon. Although it is not clear how they went from 0.2 to 2.0 dpm/gm, it may be a scaling up of 10 in line with the increase in MPC by a factor approximately equal to 10 when going from soluable to insoluable ^{238}Pu or ^{239}Pu in air for general population exposures.

In obtaining the original proposed value of 0.2 dpm of plutonium per gram of dry soil another justification is presented by Hazel. It is based on a contamination level of 300 dpm of plutonium per square centimeter of surface area appropriate for an occupational exposure consistent with the MPD to the critical organ of 15 rem/yr. Unlike Healy's approach, the State of Colorado declares that a value that would cause the maximum permissible dose is unacceptable. A reduction factor of 1,000 to the 300 dpm was applied to obtain 0.3 dpm/cm^2 value. One-tenth reduces the occupational exposure to general public exposure and one-hundredth is an arbitrary value the State has chosen. The origin of the 300 dpm of plutonium per square centimeter of surface area as that causing an occupational exposure of 15 rem/yr to the critical organ is not given.

1241 282

As further justification, Hazel referred to a paper entitled, "Towards Interim Acceptable Surface Contamination Levels for Environmental Plutonium Oxide" by R. L. Mathren published in April 1968 (Battelle Northwest Laboratories). A value equivalent to an average of 10 dpm of plutonium per square centimeter is proposed which would result in the maximum permissible dose to an individual. Hazel then goes on to say that since 10 dpm/cm^2 results in the MPD, a conservative adjustment of the number would reduce it to 0.3 dpm/cm^2 or per gram of dry soil.

If the New York State Sanitary Code Chapter 1 Part 16 is used, an average value of 5 dpm/gm of dry soil would result. From Table 7 of Appendix 1, the applicable value for a non-controlled area for release of material or facilities is an average of 500 and a maximum of 2,500 dpm/100 cm^2 alpha (total).

Assuming a soil density of one gm/cm^3 results in an average value of 5 dpm/of alpha per gram dry soil. A maximu value of 2,500 dpm alpha per 100 cm^2 results in a maximum value of 25 dpm/gm of dry soil. If one uses the same reduction factor as the State of Colorado (100) in going from the maximum permissible dose to the public to an accepted permissible dose to the public, a value of 0.25 dpm/gm is obtained. Since the lung is of primary concern and the insoluable form the controlling facotr, a multiplication factor of 10 may be applied to give a final proposed standard of 2.5 dpm of plutonium per gram of dry soil assuming a soil density of one gm/cm^3.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JAN 8 1975

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Mr. Thomas J. Cashman
Director, Bureau of Radiation
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, New York 12233

Dear Tom:

I am responding to your request of December 16, 1974, to provide guidance on applicable criteria useful in determining maximum residual levels of contamination of plutonium allowable on land released for unrestricted public use.

No current Federal regulations for maximum permissible soil contamination levels for these elements exist. Derived values based on maximum permissible air concentration or maximum permissible body burden have sometimes been applied, but these should not be construed as standards. The U.S. Environmental Protection Agency currently has the entire question of generally applicable environmental standards for plutonium and the other transuranium elements under review. This program is now in the information-gathering stage and public hearings have been scheduled. However, no guidelines suitable for your purpose can reasonably be expected before late 1975.

Until a comprehensive soil standard can be developed, we believe that all decisions should be made on an interim, ad hoc basis, subject to revision if necessary. In the absence of detailed information on your particular problem, we are forced to restrict our comments to only general guidance. Useful criteria for decision-making include consideration of the proposed use of the site in question, the current level of contamination, the feasibility and costs of additional cleanup, the estimated population health risk impact, and all other parameters of a comprehensive risk-cost-benefit analysis. At this time, the most restrictive soil contamination limit for plutonium in the U.S., of which we are aware, is the interim standard adopted by

1241 284

the State of Colorado in 1973. This specifies a limit of 2 dpm per gram of dry soil for areas rel ased for unrestricted occupancy. The applicability of this limit to your particular problem should be considered from the viewpoint of the above comments.

I suggest the report by J.W. Healy of the Los Alamos Scientific Laboratory entitled, "A Proposed Interim Standard for Plutonium in Soils" LA-5483-MS, January 1974, for further reading on this subject matter.

Sincerely yours,

Bill

William A. Mills, Ph.D.
Director
Criteria & Standards Division (AW-560)

cc: Mr. Herbert H. Brown, AEC
Mr. Michael S. Terpilak, Region II

1941 285

January 14, 1975

Mr. Lashman - Environmental Conservation

S. Davies - Bureau of Radiological Health

Plutonium Standards for Soil Contamination

In reply to your memo of January 6, 1975, I recommend that the Department of Environmental Conservation review all data in connection with levels of plutonium contamination at Gulf-United Nuclear. If it shows limited areas of soil contamination at levels of less than 2 dpm gram of dry soil, I would have no objection to indicating to the AEC on an "ad hoc" basis that it is satisfactory.

I do not feel that we are in a position to make a recommendation to the Department of Environmental Conservation concerning plutonium standards for soil contamination.

Mr. Michael's evaluation of Table 7 of Part 16 is not applicable with respect to soil contamination. The limits Mr. Michael refers to of 500 dpm or 2,500 dpm is based upon fixed contamination. We would not consider Pu in soil as "fixed."

The State should initiate sampling to determine Pu contamination as a result of atmospheric and liquid releases from Nuclear Fuel Services.

rt

cc: Doctor Matuszek
Mr. T. K. DeBoer
Doctor Bradley

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Committee on Licensing
RECEIVED
JAN 16 1975
New York State
Department of Commerce
ATOMIC ENERGY COUNCIL

Committee on Licensing
RECEIVED
MAR 3 1975
New York State
Department of Commerce
ATOMIC ENERGY COUNCIL

Dr. Bradley
Mr. Cashman
Plutonium in Soil - Pawling Site

February 27, 1975

The Nuclear Regulatory Commission intends to release the United Nuclear Site in Pawling for unrestricted use and has asked whether the State had any objections to such release. The State has been reviewing the applicable data in order to establish an "ad hoc" allowable level of plutonium in surface soil samples at the site in Pawling. The level of 2 dpm/g used by the State of Colorado has been recommended by D.E.C. as an "ad hoc" limit for the United Nuclear Site. The State Health Department concurs with this approach.

Your letter of February 3 and subsequent conversations indicate that if the Department of Labor had jurisdiction, a variance from Code Rule 38 might have to be obtained because Tables 5 and 2, Code Rule 38 specify 1×10^{-3} uCi/g (equivalent to 0.02 dpm/g) of soil for alpha emitters other than special nuclear and transuranic material not listed in Table 2, Column 2. Although plutonium would be exempted as a special nuclear and transuranic material it is a hazardous alpha emitter and should meet restrictions applicable to other alpha emitters unless there is a reasonable basis for using a less stringent standard.

The Code Rule 38 technical basis for the standard of 1×10^{-8} uCi/g applying to soil is not clear. However, one may come up with this conservative limit using several approaches.

The Federal Radiation Council upper limit of Range II recommendation for ^{226}Ra is 20 pCi per day continuous intake. If a person were to consume 2 liters of drinking water per day this would amount to an allowable concentration of 10 pCi/l or 1×10^{-3} uCi/ml of ^{226}Ra.

The allowable body burden of ^{239}Pu for a radiation worker is assumed to be 0.04 uCi and for a member of the general public 0.004 uCi (ICRP Report of Committee II - 1959). If a person were to consume 1 liter of water per day for 365 days, the concentration that would give a total intake of 0.004 uCi would be 1×10^{-5} uCi/ml.

The first approach is based on the ingestion of ^{226}Ra rather than ^{239}Pu. The second approach provides total intake but not the body burden as it completely ignores the fact that ingested plutonium is not taken up in human bone in the same manner as ingested radium. This difference in uptake is pointed out by the allowable body burden for a radiation worker for ^{239}Pu of 0.04 uCi compared to 0.1 uCi for ^{226}Ra

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while the allowable concentrations applicable to radiation workers for ^{239}Pu in water is 500 times higher than the ^{226}Ra limit according to the 1959 ICRP Report. The present radiation codes; Part 20, Code Rule 38, Part 16 and Part 380, have a ^{239}Pu limit of 5×10^{-6} uCi/ml in water concentration off site. This is 166 times higher than the ^{226}Ra limit of 3×10^{-8} uCi/ml.

Assuming that the limit of 1×10^{-8} uCi/g in Code Rule 38 is based on the ICRC recommendations for limits on intake of ^{226}Ra, it is not realistic to assume that a person consumes large amounts of soil. For instance, a person would have to consume approximately 9 pounds of soil per day contaminated at 2 dpm/g before the Part 20 limit for ^{239}Pu ingestion (1/3 of 5×10^{-6} uCi/ml) may be considered to be exceeded.

The resuspension of Pu from the soil on the surface and resulting air concentration is considered to be the controlling factor as to allowable concentration of Pu in the soil. This is the critical pathway assumed by the State of Colorado in arriving at the limit of 2 dpm/g. D.E.C. concurs that inhalation rather than ingestion would be the critical pathway for Pu in soil.

It should be noted that the State of Colorado has set the limit based on a dry climate with little precipitation compared to New York State. This adds additional conservatism to the use of the 2 dpm/g standard in New York.

Another factor that supports the conservativeness of the 2 dpm/g standard would be the maximum continuous concentration of particulates allowed in air by D.E.C.'s Rules and Regulations. The maximum allowable continuous concentration is 75 ug/m^3. If all of the particulates at this maximum concentration were to consist of soil containing 2 dpm of ^{239}Pu/g soil, this would amount to 0.11% of the allowable concentration of ^{239}Pu in air (6×10^{-14} uCi/ml) specified in the State radiation codes. The State would take action to reduce the dust loading in the air well before a problem with air concentration of ^{239}Pu resulted.

In view of the above information and assuming the site remained under the Labor Department's jurisdiction, would you recommend to the Board of Standards and Appeals that a variance be granted to Code Rule 38's limit of 1×10^{-8} uCi/g that you interpret as applying to plutonium in soil. Would you also recommend to the Board of Standards and Appeals the acceptance of the 2 dpm/g limit for plutonium in soil as a conservative limit that would allow unrestricted use of the property by non-radiation workers.

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cc: Mr. Perriman
Mr. DeBoer
Mr. Davies
Dr. Matuszek

1911 288

March 27, 1975

M E M O R A N D U M

TO: Thomas J. Cashman

FROM: Dr. Fred V. Stmisa

RE: United Nuclear Corporation - Pawling, New York

Per our telephone conversation on March 24, 1975, I have advised the NRC and United Nuclear Corporation of the following:

1) The State recommends that the soil at the Pawling site be decontaminated to an upper limit of 2.0 dpm Pu/gram dry soil.

2) The State recommends that resampling of the decontaminated areas be performed to insure compliance with this limit.

3) The State requests the opportunity to observe the decontamination and the resampling of the decontaminated areas.

United Nuclear has indicated that on April 1, 1975, it will begin further decontamination of those portions of the area, between the plutonium laboratory and the lake, which the recent NRC analyses showed to be contaminated to levels in excess of 2.0 dpm Pu/g. The State will be informed of the resampling date.

1941 289

The NRC's Fuel Cycle Licensing Branch No. 1 (fabrication) and Office of Inspection and Enforcement, Region I indicated that the NRC would handle the confirmatory analyses. The confirmatory samples should be forwarded by Dr. Prins in the same manner that previous samples were.

I also discussed, with the Fuel Cycle Licensing Branch No. 1, your request that the NRC provide the State with a written statement indicating its intention to release the site when the plutonium level in the soil is verified to be less than 2.0 dpm/gram. I was informed by the NRC that, based on data received from the licensee and the Regional Office of Inspection & Enforcement, the NRC sees no reason why the license should not already have been terminated.

cc: Dr. F. Bradley
W. Crow
S. Davies
T. K. DeBoer
W. Kerr

FVS:jg

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GA-15 (11/72)

New York State Department of Environmental Conservation

MEMORANDUM

TO: Dr. Strnisa
FROM: Mr. Cashman
SUBJECT: United Nuclear Corporation - Pawling, New York

DATE: March 31, 1975

Your memorandum of March 27, 1975 summarized the present status of the decontamination of the Pawling site in regard to the plutonium contamination. A recent telephone conversation with Dr. Bradley of the Labor Department confirmed his support of the upper limit of 2.0 dpm Pu/gram dry soil as an "ad hoc" standard for the Pawling site. Having clarified the technical aspects of the 2.0 dpm Pu/gram as an upper limit for unconditional release of the site I am recommending to Mr. Perriman that he obtain the concurrence of D.E.C.'s Counsel in this "ad hoc" approach.

You stated that NRC sees no reason why the license should not already have been terminated based on the existing data. Can you provide me with the NRC standard for plutonium in soil for uncontrolled use of property that is the basis for release by NRC.

The original data on which NRC had indicated to you their intent to terminate the license included levels of 12 dpm. The resampling that D.E.C. requested has one small portion of the site (10' x 15') that has a level of 24 dpm Pu/gram of dry soil. This data was reported by telephone. D.E.C. has not received the laboratory report with the resampling data. Will you send me a copy of the laboratory report when you receive the report from NRC.

D.E.C. is arranging to have a representative of the Department at the Pawling site for the decontamination and resampling of areas 1 & 4 on the sketch used in the identification of sampling areas between the plutonium laboratory and the lake.

Your cooperation in arranging for the confirmatory analyses by NRC should expedite the resolution of this matter.

TJC:sl

cc: Dr. Bradley
Mr. Davies
Dr. Matuszek
Mr. Perriman

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