

October 6, 1978

UNITED STATES  
NUCLEAR REGULATORY COMMISSION

SECY-78-536

CONSENT CALENDAR ITEM

For: The Commissioners

From: Robert B. Minogue, Director, Office of Standards Development

Thru: Executive Director for Operations *W. J. Davis*

Subject: BURIAL OF SMALL QUANTITIES OF RADIONUCLIDES: PUBLICATION OF PROPOSED AMENDMENT TO 10 CFR § 20.304 FOR PUBLIC COMMENT

Purpose: To obtain Commission decision on proposed amendments to require NRC approval prior to burial of small quantities of radionuclides.

Category: This paper concerns a minor policy question.

Issue: Should licensees be required to obtain specific approval prior to burying small quantities of radionuclides?

Discussion: NRC regulations (10 CFR § 20.304) currently allow licensees to bury small quantities of radionuclides anywhere without notification or specific approval from NRC. There is a slight possibility that a person accidentally disturbing such a burial could receive doses in excess of NRC limits.

Many State officials have expressed concern to NRC over the permissiveness of 10 CFR § 20.304. Some have suggested that § 20.304 should be deleted. This would have the effect of requiring all proposed burials to receive prior NRC review under § 20.302, which now applies to disposal of larger quantities of radionuclides.

There are many uncertainties associated with assessing the risk of burials under § 20.304. Deletion of § 20.304 would contribute to the protection of the public health by encouraging the shipment of small quantities of radioactive waste to licensed burial grounds and by improving the NRC's available data regarding amounts and locations of radioactive materials buried elsewhere.

In light of the above considerations, the staff recommends that the Commission approve proposed amendments to delete 10 CFR § 20.304. As stated above, licensees would then have to receive prior approval for proposed burials as provided in § 20.302. The staff estimates that relatively few licensees would be affected by deletion of § 20.304 (see Enclosure "B"), and therefore the impact on the industry will be minimal.

Contact:  
J. Hickey, SD  
443-5966

Staff

Resources:

In the past, staff review of applications for minor burials has involved a few man-hours per application. This would indicate that the impact of deletion of § 20.304 on staff man-power would be minimal. However, before the proposed deletion is made final, the staff will review this assessment in light of public comments and any new developments in waste management policies or regulations.

In order to maximize the opportunity for public comment, copies of the proposed rule would be sent directly to several thousand licensees, requiring a few man-hours of staff effort and several hundred dollars in printing and mailing expenses.

A more detailed discussion of issues, alternatives, and the impacts of the staff's recommendation is included in Enclosures "A" and "B".

Recommendation:

That the Commission:

1. Approve publication in the FEDERAL REGISTER of a notice of proposed rule making to delete 10 CFR § 20.304, (Enclosure "D").
2. Note that the Senate Committee on Environment and Public Works, the House Committee on Interior and Insular Affairs, and the Subcommittee on Energy and Power of the House Committee on Interstate and Foreign Commerce will be informed of this action.
3. Note that the notice will be published in the FEDERAL REGISTER allowing 60 days for public comment. If no significant comments are received, the Executive Director for Operations will arrange for publication of the amendment in final form.
4. Note that the amendments will not have a substantive and significant impact on the environment because the action is purely a change in administrative procedure affecting few licensees. It is possible that, as a result of Commission review of individual burial proposals, the potential environmental impact will be reduced. Therefore, an environmental statement or appraisal need not be prepared.
5. Note that the amendments will not affect radioactive material already buried or generally licensed and exempt material.

6. Note that if the proposed rule is made effective, it must be cleared by the Government Accounting Office, which requires a report justification analysis. A preliminary value-impact assessment and report justification (Enclosure "B") has been approved by the Paperwork Reduction Subgroup of the Standing Committee on Regulatory Effectiveness.

Coordination: The Offices of Inspection and Enforcement, Nuclear Material Safety and Safeguards, State Programs, Nuclear Regulatory Research, and Nuclear Reactor Regulation concur in the recommendations of this paper. The Office of Public Affairs recommends that no public announcement be issued. The Office of the Executive Legal Director has no legal objection to the paper.

Scheduling: For early consideration at an open session.

Robert B. Minogue, Director  
Office of Standards Development

Enclosures:  
"A" - Detailed Discussion of Issues  
and Alternatives  
"B" - Value-Impact Assessment  
"C" - Staff correspondence with  
Wisconsin  
"D" - Proposed Federal Register  
Notice

Commissioners' comments or consent should be provided directly to the Office of the Secretary by cob Thursday, October 19, 1978.

Commission Staff Office comments, if any, should be submitted to the Commissioners NLT October 13, 1978, with an information copy to the Office of the Secretary. If the paper is of such a nature that it requires additional time for analytical review and comment, the Commissioners and the Secretariat should be apprised of when comments may be expected.

This paper is tentatively scheduled for affirmation at an Open Meeting during the Week of October 23, 1978. Please refer to the appropriate Weekly Commission Schedule, when published, for a specific date and time.

DISTRIBUTION

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ENCLOSURE A

Enclosure "A"  
DETAILED DISCUSSION OF ISSUES, ALTERNATIVES, AND  
IMPACTS OF DELETION OF 10 CFR 20.304

I. Background

Section 20.304 of 10 CFR Part 20 allows licensees to bury small quantities of radionuclides anywhere without notifying or obtaining approval from NRC, provided that: (1) each burial does not exceed 1000 times the amounts specified in Appendix C of 10 CFR Part 20, (2) each burial is at least four feet deep, (3) burials are separated by distances of at least six feet, and (4) no more than 12 burials are made per year. The Appendix C quantities are approximately equal to the lesser of two values: (1) the quantity that would be inhaled by a standard man exposed for 1 year at the highest average air concentration permitted by 10 CFR Part 20 for members of the general public, or (2) the quantity that, from a point source, would produce a radiation level of one milliroentgen per hour at a distance of 10 centimeters.

Larger quantities of radionuclides may only be buried with prior NRC approval, as provided by 10 CFR § 20.302.

The question being considered is: Should the Commission continue to allow licensees to bury small quantities of radionuclides anywhere without Commission review, given the slight risk to persons who might later disturb the burials.

## II. Alternatives

A. Postpone action on 10 CFR § 20.304, until further progress is made on waste management regulations; that is, continue for at least one year to allow licensees to bury small quantities of radionuclides without notifying NRC.

Pro: (1) Maintains status quo: allows expeditious disposal of small quantities of radionuclides.

(2) Avoids double rule change (deletion of § 20.304 now, followed by waste management regulations at least one year later).

(3) Would have no impact on industry or licensing staff case load.

Con: (1) Leaves small risk of future public health or environmental problems should buried radionuclides be disturbed.

(2) Not responsive to expressed concern of State agencies.

B. Allow burials under § 20.304 to continue (as in Alternative A), but require notification of NRC and Agreement States when burials occur.

Pro: (1) Allows expeditious disposal of radionuclides.

(2) Would have little impact on industry and no impact on licensing staff case load.

(3) Would keep NRC, the States, and other interested parties informed on the numbers and types of burials under § 20.304.

Con: (1) Leaves small risk of problems if burials are disturbed.

(2) Not completely responsive to concerns of State agencies.

C. Amend 10 CFR § 20.304 to require (a) that burials under § 20.304 be in a restricted area, and (b) that the buried materials be removed prior to termination of the license except as specifically approved by the Commission.

Pro: (1) Continues to allow expeditious disposal of small quantities of radionuclides.

(2) Reduce already small risk of future public health or environmental problems associated with buried radionuclides.

(3) Partially responsive to expressed concern of State agencies.

(4) Allows opportunity for public comment on issue.

Con: (1) Continues to allow burial without prior review by NRC, leaving the possibility of problems resulting from disturbances, inadequate marking of burial location, etc.

(2) Would have slight impact on industry and licensing case load.

D. Amend 10 CFR § 20.304 to require NRC approval prior to burial of some radionuclides (for example, those with long half-lives), but not others.

Pro: (1) Reduces already small risk of future public health or environmental problems associated with buried radionuclides.

(2) Partially responsive to expressed concern of State agencies.

(3) Allows opportunity for public comment on issue.

Con: (1) Would have slight impact on industry and licensing case load.

(2) Would require detailed analysis to determine which radio-nuclides require approval prior to burial.

E. Recommended: Propose an amendment to delete 10 CFR § 20.304, which would have the effect of requiring licensees to obtain NRC approval prior to burial of any quantity of radioactive material.

Pro: (1) Further reduces already small risk of future public health or environmental problems associated with buried radio-nuclides.

(2) Allows opportunity for public comment on issue.

(3) Responsive to expressed concern of State agencies.

Con: (1) Effective rule would have slightly greater impact on industry and licensing case load than Alternatives C and D.

### III. Discussion

#### A. Discussion of Issues

When 10 CFR Part 20, including section 20.304, was published in 1957, the Atomic Energy Commission stated that Part 20 was designed such that "there is no reasonable probability of individuals in unrestricted areas receiving exposures in excess of 10 percent of the permissible levels for restricted areas."

As of now, licensees can bury radioactive material under 20.304 without prior approval or even notification of NRC. The National Conference of Radiation Control Program Directors and officials from the NRC Agreement States have expressed their concern to NRC over the permissiveness of 10 CFR § 20.304. The staff expects that expressions of concern will



continue to arise if burials under 10 CFR § 20.304 and equivalent Agreement State regulations are allowed to continue. Examples of problems identified by the States are described below:

1. A licensee in Hawaii buried radioactive material on land which was taken over by the local government in 1976. The licensee did not inform local officials of the presence of radioactive material on the land until the last minute. The local government asked the NRC staff about the hazard associated with excavating the burial area to build a swimming pool. The NRC staff replied that there was only a remote possibility that a person disturbing the site could receive doses in excess of 10 CFR Part 20 limits. However, the staff did recommend that the radioactive material remain covered by at least four feet of soil.
2. In the Agreement State Maryland, under a state regulation similar to Section 20.304, a licensee buried radioactive material in the yard of a private residence. Although the material was later removed, such a burial in a non-agreement state might have been allowable under 10 CFR § 20.304, depending on the circumstances.
3. Officials of the State of Wisconsin have expressed concern to the NRC staff over the practice of several licensees disposing of radioactive material in local landfills. Staff correspondence with Ms. Bonnie Reese, Executive Secretary, Wisconsin Legislative Council, is included in Enclosure "C". In connection with this correspondence, the staff has conducted an informal analysis which concludes that the risk associated with burials at a sanitary landfill under 20.304 is small.

Although the staff believes that the risk associated with burials under § 20.304 is small, the staff recommends that such proposed burials should receive prior NRC review on a case-by-case basis, pending development of waste classification regulations and other related waste management regulations. (See Section D, Related NRC Activities.) Deletion of § 20.304 is likely to promote protection of the public health and the environment by (1) improving the NRC's available data regarding amounts and locations of small quantities of radioactive material and (2) encouraging licensees to transfer even small quantities of waste to existing licensed burial grounds.

If § 20.304 is deleted, licensees will have to transfer waste to authorized recipients (for example, licensed burial grounds), or apply to NRC for approval of burial. The staff will review applications for all proposed burials as provided in § 20.302. The staff anticipates that it will normally approve only burials on licensee's property or at local landfills. Records would be required showing the types and quantities of material, along with dates, depths, and locations of burials. Since the burials under § 20.304 have involved licensees burying their own wastes, the burials are not considered commercial waste disposal operations. Due to the small quantities involved, the environmental impact of the burials will be minimal, so individual environmental statements will not normally be required. The staff does not anticipate that licensees choosing to send small quantities of waste to commercial burial grounds will significantly increase the volume of waste disposed of at the commercial grounds.

The staff effort required for review of individual applications would vary according to circumstances. Proposals involving disposal of short-lived radionuclides on a licensee's property would have a minimal impact on the staff's work load. Proposals for burial of long-lived material would require more detailed review to address the potential long-term impact of the burial. The staff will be able to assess better the work load associated with implementing the proposed rule after public comments have been obtained. It is anticipated that some comments from licensees will include information on the numbers and types of burials affected by the proposed rule.

B. Impact on Licensees

Deletion of § 20.304 would have the effect of requiring licensees to apply for approval of burials under § 20.302. The potential impact is difficult to evaluate because licensees can now perform the burials without notifying NRC. Therefore, it is difficult to estimate how many licensees are performing burials.

However, the NRC staff has informally contacted several NRC inspectors and State officials who are interested in the problem. Three Agreement States have outlawed burial of radioactive material other than at a licensed burial ground. They report that only one or two licensees per State were affected. The people contacted agreed with the need for prior approval of proposed burials, and expressed a belief that few licensees will be affected.

Thus, it is probable that only a few licensees would be affected by an amendment to delete § 20.304. Of course, the best way to obtain

more information would be to publish a proposed rule for public comment. This would allow licensees who would be affected to make this fact known to the Commission.

A more detailed discussion of the impacts of the proposed amendment is included in Enclosure "B".

#### C. Discussion of Alternatives

Alternative A, to postpone action for at least one year, would leave the small risk associated with burials performed without prior approval of NRC, and would not be responsive to the concerns of the State agencies. While these concerns involve a small risk to the public health, the staff recommends that they be given serious consideration, since they involve the advisability of allowing continued disposal of radioactive material without prior regulatory review.

Alternative B would require notification of NRC and the Agreement States when burials occur. This would have the advantage of keeping regulatory agencies informed. However, the burials would still be conducted without prior NRC review for suitability of location, proper marking, etc.

Alternative C would modify § 20.304 to require burials in restricted areas only, with removal prior to termination of the license except as specifically approved by the Commission. This would have the advantages of allowing both expeditious disposal of radionuclides in restricted areas and NRC review to assure protection against potential hazards at the time of termination of the license. However, burials would be allowed without prior NRC review, leaving a greater possibility of disturbances, burials

in areas inadequately marked, etc. Furthermore, this alternative would not be completely responsive to the expressed concern of State agencies, who recommend prior review of all burials.

Alternative D, to allow some burials under § 20.304, but not others, would require an extensive analysis to determine which burials should be allowed. This would have some disruptive effect on the waste management programs underway in the Office of Nuclear Material Safety and Safeguards.

Alternative E, the recommended option, would propose deletion of 10 CFR § 20.304 in order to obtain public comments. This would have the effects of requiring licensees to apply for prior approval of all burials under § 20.302. The staff believes that this option would affect only a few licensees. Furthermore, it would be responsive to the expressed concern of State agencies.

#### D. Related NRC Activities

The NRC staff has a study underway to develop a system to classify radioactive wastes (that is, determine the kinds and quantities of radioactive wastes that are acceptable for various disposal methods). One objective of the study is to identify whether certain radioactive waste may be disposed of by methods used for non-radioactive waste (for example, disposal in a landfill). Preliminary results of the study indicate that such disposal would be feasible for certain radioactive wastes. The waste classification regulation will be drafted in 1 to 1-1/2 years, with an associated environmental statement. Deletion of § 20.304 would not adversely affect the development or implementation of this regulation.

An NRC Task Force issued a report in 1977 on burial of low-level radioactive waste (NUREG-0217). The report did not specifically address the issue of burial of small quantities of radionuclides. On December 7, 1977, the Commission issued comments on NUREG-0217 (42 FR 61904). An amendment to § 20.304 would not conflict with the recommendations in NUREG-0217 or the Commission's comments.

E. EPA Regulations

The Environmental Protection Agency has authority to issue generally applicable environmental standards related to disposal of low level radioactive waste. Informal discussion between the EPA staff and the NRC staff indicates that such EPA regulations may not be forthcoming for several years. Therefore, for the present, amendments to 10 CFR Part 20 related to burial of radioactive material will not conflict with any EPA regulations.

ENCLOSURE B

VALUE-IMPACT ASSESSMENT  
AND REPORT JUSTIFICATION FOR  
DELETION OF 10 CFR 20.304  
(Burial of small quantities of radionuclides)

Task Leader: John W. Hickey  
Environmental Standards Branch  
Office of Standards Development  
Telephone: 443-5966

Enclosure "B"



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B. NEPA Assessment

The proposed amendment is purely a change in administrative procedure which will affect few licensees. Therefore, an environmental statement need not be prepared:

V. Relationship of Proposed Action to Other Regulations and Policies

A. NRC Staff Position

In 1975, NMSS, NRR, IE, and RES all endorsed the concept of amending 10 CFR Part 20.304 to make it more restrictive. The Office of State Programs has urged that 10 CFR 20.304 be amended as soon as possible.

B. The States

The Agreement States, the National Conference of Radiation Program Control Directors, and several individual State Agencies have urged NRC to amend 10 CFR Section 20.304. The Agreement States Florida, South Carolina, and Oregon have already outlawed burials which would be allowed under Section 20.304.

### C. NRC Waste Management Program

Consideration of the proposed action is included in the NRC Waste Management Program. However, if the proposed action is undertaken separately in order to resolve the issue more quickly, it would not adversely affect the overall program.

An NRC Task Force has issued a report (NUREG-0217) on burial of low-level radioactive waste (42 FR 13366, March 10, 1977). The report did not specifically address the issue of burial of small quantities of radionuclides. On December 7, 1977, the Commission issued comments on NUREG-0217 (42 FR 61904). The proposed action would not conflict with the recommendations in NUREG-0217 or the Commission's comments.

### VI. Conclusion

The proposed action should be undertaken immediately. That is, 10 CFR 20.304 should be deleted. The concerns expressed by the States justifies immediate resolution of the issue.

Enclosure "C"

Correspondence with Ms. Bonnie Reese of  
Wisconsin related to 10 CFR 20.304

Enclosure "C"



October 19, 1977

Dr. William Bishop, Chief  
Fuel Cycle Waste Management Branch,  
United States Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Dr. Bishop:

The Subcommittee on Radioactive Waste Management of the Wisconsin Legislative Council Special Committee on Solid Waste Management is presently studying the management of radioactive wastes within Wisconsin.

After hearing testimony to the effect that small quantities of radioactive waste are being buried in local landfills, several questions have arisen about burial of radioactive wastes under 10 CFR s. 20.304. In particular, concerns of the Subcommittee center on the cumulative effects of more than one licensee burying wastes in a local landfill not licensed by the Nuclear Regulatory Commission (NRC) or an agreement state.

Mr. Ernest Resner in the NRC Office of State Programs suggested that these questions be addressed to your office. The Subcommittee would be grateful if you could answer the following questions:

1. Does the NRC require a record of where a licensee buries material under s. 20.304? Are these records, if they exist, reviewed periodically by the NRC?
2. Does the NRC keep records on the number of licensees burying wastes in any one local landfill?
3. When licensed material is disposed of under s. 20.304, whose responsibility is it to ensure that the requirements in this section are met? (These requirements include that burial must be at a minimum depth of four feet and that successive burials must be separated by a distance of at least six feet.) Is it the responsibility of the licensee or of the local landfill operator? In practice, how is this responsibility fulfilled?
4. On what basis was it determined that it is safe to bury quantities of licensed material that do not exceed 1,000 times the amount specified in Appendix C of 10 CFR s. 20?

Dr. William Bishop  
Page 2  
October 19, 1977.

5. What, if any, health hazards would be posed by several licensees disposing of their radioactive wastes in a single local landfill, assuming that each licensee buries the maximum amount permissible?

Finally, we are aware that the NRC is reviewing s. 20.304. We would appreciate any information you can provide on the present status and anticipated results of this review.

A prompt reply would be deeply appreciated, if possible by November 1, 1977, the date of the next scheduled Subcommittee meeting.

Cordially,



Bonnie Reese  
Executive Secretary

BR:jc

CC: Mr. Donald Percy, Secretary  
Wisconsin Department of Health  
and Social Services

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Ms. Bonnie Reese  
Legislative Council  
Room 147 North, State Capitol  
Madison, Wisconsin 53702

→ File: Rules & Regs. 20.304  
Small Qty Burial

Dear Ms. Reese:

This letter is in reply to your October 19, 1977 request for information about burial of radioactive wastes under 10 CFR § 20.304.

Section 20.304 is currently under review by the Nuclear Regulatory Commission (NRC). If changes to Section 20.304 are deemed necessary, the proposed rule change would be published in the Federal Register. In the meantime, Section 20.304 is still in force.

The following are answers to the specific questions raised in your letter:

1. Under § 20.401(b) the NRC requires the licensee to keep a record of all material buried under § 20.304. These records are inspected during the regular inspections of licensed operations made by the NRC. The length of time between inspections varies and depends upon the type of license involved. The records should include the location of the burial, the amount of waste buried and the nature of the waste. If the licensee stops burying wastes, the licensee generally summarizes all burial records to date.

2. The NRC does not keep records on the number of licensees burying wastes in any one local landfill.

3. The licensee is responsible for ensuring that disposal requirements under § 20.304 are met. In practice the licensee generally buries the waste on his own property or supervises the burial. Burial of wastes under § 20.304 is not common due to the small quantities allowed. Most licensees send their wastes to licensed commercial burial grounds.

4. The determination that it is safe to bury licensed material in amounts that do not exceed 1,000 times the Appendix C levels was made about 25 years ago on the basis that radioactive wastes in those amounts would not present a public health hazard after burial. Some of the levels in Appendix C have since been revised downward.

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5. The HRC has not undertaken a study of the health hazards that would be posed by several licensees disposing of their radioactive wastes in a single local landfill.

Sincerely,

*P. H. Schausfor*

Michael J. Bell, Chief  
Low-Level Waste Branch  
Division of Fuel Cycle  
and Material Safety

\*See previous yellow for concurrence  
12/2/77

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LEGISLATIVE COUNCIL  
ROOM 147 NORTH, STATE CAPITOL  
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TELEPHONE (608) 266-1304

December 16, 1977

Bonnie Reese  
Executive Secretary

Mr. Michael J. Bell, Chief  
Low-Level Waste Branch  
Division of Fuel Cycle and Material  
Safety  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Bell:

Thank you for your letter of December 7, 1977 which responded to our October 19, 1977 request for information about burial of radioactive waste under 10 C.F.R. s. 20.304. If possible, we would appreciate receiving, if available, an elaboration upon the answers you gave to two of our five questions.

Question No. 4 regards the basis for determining the quantities of licensed radioactive material which may be safely buried in local landfills. Are any documents available which set forth the rationale or standards which were applied in determining why such radioactive waste would not present a "public health hazard after burial." In particular, how was "public health hazard" defined and what was the basis for revising some of the levels downward more recently?

Question No. 5 dealt with the cumulative health hazard posed by several licensees disposing of their radioactive waste in the same local landfill. You commented that the Nuclear Regulatory Commission has not undertaken a study of the health hazards posed by such cumulative disposal. If no formal documents are available, are there any persons on your Staff who could comment, either in writing or by phone, on this matter. If not, could you direct us to persons outside of the Commission Staff who could.

We appreciate your continued assistance on these matters.

Cordially,

A handwritten signature in cursive script, appearing to read "Bonnie Reese".

Bonnie Reese  
Executive Secretary

BR:jc

cc: Dr. William Bishop

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20.304 Small Qty  
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Ms. Bonnie Reese  
Executive Secretary  
Legislative Council  
Room 147 North, State Capitol  
Madison, Wisconsin 53702

Dear Ms. Reese:

This letter is in reply to your December 16 request for elaboration on information we gave you in our December 7 letter concerning burial of radioactive wastes under 10 CFR Section 20.304. We apologize for not having responded to your letter in a more timely manner. SD ←

In further response to Question No. 4, we are enclosing copies of the original regulations (1957), and the proposed rule for the change of some Appendix C values (1963). The sections that deal with your questions are highlighted. Specifically, the regulations were "designed to assure that individuals in 'unrestricted areas' do not receive exposure in excess of 10 per cent of the limits established for persons exposed in restricted areas." Revision of some of the Appendix C values was made in 1970 to reduce them to "values more consistent with the toxicity of those nuclides and the criteria used to derive the exempt quantities."

When we stated that the waste would not present a public health hazard after burial we used the words "public health hazard" in a general sense. "Public health hazard" is not a formal definition or term in NRC's regulations.

In further response to Question No. 5 there have been no "formal" studies dealing with the "potential cumulative health hazard" posed by several licensees disposing of small amounts of radioactive waste generated in their operation at the same local sanitary landfill according to 10 CFR Section 20.304. The regulation does not address the subject of burial of waste in local sanitary landfills, although such a practice is not prohibited if the conditions of 20.304 are met. The original rule was principally directed at permitting individual licensees to dispose of small quantities of radioactive material on their property, and limits were placed on the number, depth, and spacings of such burials as well as on the total quantity of material which could be buried.

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Bonnie Reese

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As indicated above, the original regulations were designed to assure that individuals in unrestricted areas would not receive exposure in excess of 10 per cent of the limits established for persons exposed in restricted areas. Then in 1963, when certain values were modified, the Commission noted that "two basic criteria were used in deriving the quantities. Since inhalation is considered the most likely route of entry into the body, the quantity that would be inhaled by a standard man exposed for one year at the highest average concentration permitted in air (by 10 CFR Part 20) for members of the general public was computed. If the radioisotope emits gamma radiation, the quantity from a point source, that would produce a radiation level of 1 milliroentgen per hour at a distance of 10 centimeters was also computed. The smaller of these two quantities was then logarithmically rounded to the nearest decade in microcuries, and entered in Section 30.71, Schedule B." (These values were also added in Appendix C)

In response to your inquiry, we have performed an informal analysis of the impact of cumulative disposal in a landfill at the maximum levels allowed by Section 20.304. A copy of this analysis is enclosed. It concludes that the dose to an individual digging up the buried waste would not exceed the doses allowed under Part 20 for members of the general public although a remote possibility exists for higher doses (see pages 3 and 4 of the analysis). You may also wish to have an independent analysis performed by State authorities (such as the Radiation Protection Section in the Health and Social Services Department) or by other competent scientists; we would be pleased to receive a copy of their report.

Let me note, additionally, that we presently have a study underway to determine the quantities of radioactive material that would be acceptable for disposal by methods normally used for management of regular non-radioactive trash (e.g., disposal at a local sanitary landfill). The study is part of a larger research project to develop a waste classification system. (Drafts of volumes I and II are enclosed). Chapters 7, 8 and 9 address the disposal of small quantities of radioactive material at a sanitary landfill. This draft report is preliminary, has not been thoroughly reviewed and the final report will contain additional information and detailed discussion. Although it may be modified, the final report is likely to conclude, as the preliminary version does, that there are radioactive wastes of such low toxicity that they can be disposed of safely by methods normally used for management of non-radioactive trash.

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When reviewing Chapters 7, 8 and 9, it is important to recognize that the concentration values listed in the tables (e.g. Table 9.1) are the maximum concentrations of radioactive material in waste to be disposed of at a sanitary landfill. The report characterizes a reference sanitary landfill and calculates maximum concentrations based on analyses of release pathways most likely to yield maximum exposures. The concentrations of radioactive material in soil calculated in Table I of our analysis based on Section 20.304 are not directly comparable to those in Table 9.1. Also, the manner in which material is buried under Section 20.304 (requiring burial at 4 foot depths with minimum spacing between burials) more closely resembles the manner in which material is disposed of at a commercially operated shallow land burial ground. (i.e. no controls are exercised on burials at a sanitary landfill in the Waste Classification report analysis). Thus, Chapters 3, 4 and 5, which discuss other pathways for release of material from a shallow land burial site, may also be of assistance in evaluating potential releases from burials of material under Section 20.304.

As discussed in our earlier letter, we are considering amendments to Part 20 to delete Section 20.304; burials of small quantities of material would then be reviewed on a specific case-by-case basis until our waste classification regulations have been developed. We would appreciate receiving any comments you may have regarding the approaches being suggested in the Waste Classification report to develop a Waste Classification system.

If we may be of further assistance, please let me know.

Sincerely,

ORIGINAL SIGNED BY  
M. J. BELL

Michael J. Bell, Chief  
Low-Level Waste Branch  
Division of Fuel Cycle  
and Material Safety

Enclosures:  
As stated

5/24/78 Mag

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ANALYSIS OF FIVE LICENSEES BURYING  
WASTE AT A LOCAL SANITARY LANDFILL UNDER 10 CFR 20.304

Background

This analysis assesses the potential maximum dose to an individual from five licensees disposing of radioactive waste according to 10 CFR Part 20, Section 20.304 "Disposal by Burial in Soil." The exposure pathway used in this analysis is termed the "intruder scenario." It assumes an individual digs into the waste immediately after burial causing suspension of the radioactive material into the air. The individual inhales the air, resulting in his exposure to the radioactive material. The staff recognizes that other scenarios may be postulated but believes the intruder scenario presents a limiting (conservative) case. The intruder would be exposed to high concentrations of radioactive material and represents the person receiving the greatest dose from the disturbance. This scenario, then, is both credible (individuals could dig into burial sites) and conservative (it assumes conditions which yield maximum upper bound doses).

Analysis

The limits on burials under 10 CFR §20.304 are:

Quantity allowed per burial:	1000 times the Appendix C Value
Minimum depth:	4 feet
Minimum spacing:	6 feet by 6 feet
Maximum Number of burials:	12/yr

For five licensees, each complying with §20.304, and aware of the other burials, the number of burials per year is determined by multiplying the maximum number of burials allowed per year by the number of licensees burying material:  $12/\text{yr} \times 5 \text{ licensees} = 60 \text{ burials/yr}$ . The total area of the landfill affected is determined by multiplying the minimum spacing by the number of burials per year:  $6 \times 6 \times 60/\text{yr} = 2,160 \text{ ft}^2/\text{yr}$ . (An area about 46 feet by 46 feet.) The average volume surrounding each burial can be determined by multiplying the minimum spacing by the minimum depth:  $6 \times 6 \times 4 = 144 \text{ ft}^3 = 4 \times 10^6 \text{ cc}$ .

For purposes of this analysis, we assume that the radionuclides buried are uniformly dispersed throughout the top four feet of soil. This assumes that the average concentration of radionuclides in the dust would be the same as the average concentration in the ground. We next assume the waste and soil mixture has an average density of 1.5 gm/cc. We can then calculate the concentration of radioactive material in the soil in  $\mu\text{Ci/gm}$  by dividing the quantity allowed per burial by the average volume surrounding each burial and, in turn, dividing that quotient by the density of soil. We evaluated the impact from burial of six critical nuclides from Appendix C for this analysis; plutonium 239, hydrogen 3, cesium 137,

strontium 90, iodine 129 and cobalt 60. The calculational method for determining the concentration of each radionuclide in the soil and results are shown in Table I.

We next assume an intruder digs in the landfill for one month (170 hours). One month is a reasonable time a worker could spend in excavation activities in preparing a house foundation (e.g. excavating a 46' x 46' x 4' deep hole). The intruder will breathe about 200 m<sup>3</sup> of air in the 170 hours that he is digging. If we assume the "dust loading" of the air is 2 mg of dust in one cubic meter of air (a conservative estimate by an order of magnitude), the intruder will inhale 0.4 gm of dust from the site while digging. (2 mg/m<sup>3</sup> x 200 m<sup>3</sup> = 400 mg = 0.4 gm). It is further conservatively assumed that all of the inhaled dust is deposited in the lung and subsequently assimilated into the body. The quantity of radioactive material inhaled by the intruder is calculated by multiplying the soil concentration of each radionuclide in  $\mu\text{Ci/gm}$  (as given in Table I) by the amount of dust inhaled (0.4 gm). The calculational method and results are shown in Table II.

The 50-year dose to the intruder resulting from inhalation of the radioactivity can then be determined by multiplying the quantity of radioactivity inhaled by dose conversion factors such as those given in NUREG-0172.<sup>(1)</sup> The calculational method and results are shown in Table III. These 50-year doses are fractions of the 500 millirem allowable

yearly doses for the general public provided by 10 CFR Part 20 and the potential health effects of these doses are considered negligible. The BEIR Report<sup>(2)</sup> presents information on and analyzes the potential health effects from exposure to low levels of ionizing radiation.

If the five licensees were ignorant of each other's burial facilities at the sanitary landfill, the burials could overlap and the concentration of material where the burials overlap could be up to five times higher. (Overlap of burials is not permitted by Section 20.304.) In this case, depending on the concentration of material and digging time, the dose to the intruder could range up to five times higher. In addition, as noted earlier, there are other scenarios that may be postulated and which would yield doses different than those calculated on the basis of the intruder scenario. Some are theoretically possible and likely to happen (e.g. eating dirt containing the waste or drinking water that has been in contact with the waste). These events would yield doses similar to those calculated for the intruder scenario. (i.e. doses not in excess of those allowed under Part 20).

Other scenarios would be theoretically possible but highly unlikely (e.g. inhaling the contents of one whole burial, ignoring whether such an event were physically possible). Such events would yield doses higher than those calculated for the intruder scenario. However,



these scenarios would have a very remote possibility of actual occurrence and although yielding higher doses because of highly unlikely assumptions, they would not always serve as a basis for our regulatory actions.

References:

- (1) NUREG-0217 "Age-Specific Radiation Dose Commitment Factors for a One-Year Chronic Intake," USNRC; November 1977.
- (2) BEIR Report "The Effects on Populations of Exposure to Low-Levels of Ionizing Radiation", National Academy of Sciences; November 1972.

TABLE I

Isotope*	(a) Allowed Per Burial ( $\mu\text{Ci}$ ) $10^3 \times$ Appendix C Value	(b) Volume Available (cc)	(a) $\div$ (b) = (c) Average Concentration ( $\frac{\mu\text{Ci}}{\text{cc}}$ )	(c) $\times$ (1.5gm/cc) Soil Concentration ( $\frac{\mu\text{Ci}}{\text{gm}}$ )
Pu <sup>239</sup>	$10^1$	$4 \times 10^6$	$2.5 \times 10^{-6}$	$1.67 \times 10^{-6}$
H <sup>3</sup>	$10^6$	$4 \times 10^6$	.25	$1.67 \times 10^{-1}$
Cs <sup>137</sup>	$10^4$	$4 \times 10^6$	$2.5 \times 10^{-3}$	$1.67 \times 10^{-3}$
Sr <sup>90</sup>	$10^2$	$4 \times 10^6$	$2.5 \times 10^{-5}$	$1.67 \times 10^{-5}$
I <sup>129</sup>	$10^2$	$4 \times 10^6$	$2.5 \times 10^{-5}$	$1.67 \times 10^{-5}$
Co <sup>60</sup>	$10^3$	$4 \times 10^6$	$2.5 \times 10^{-4}$	$1.67 \times 10^{-4}$

TABLE II

Isotope	(a) Concentration ( $\frac{\mu\text{Ci}}{\text{gm}}$ )	(b) Amount of Dust Inhaled	(a) x (b) $\mu\text{Ci Inhaled}$
Pu <sup>239</sup>	$1.67 \times 10^{-6}$	.4 gm	$6.6 \times 10^{-7}$
H <sup>3</sup>	$1.67 \times 10^{-1}$	.4 gm	$6.6 \times 10^{-2}$
Cs <sup>137</sup>	$1.67 \times 10^{-3}$	.4 gm	$6.6 \times 10^{-4}$
Sr <sup>90</sup>	$1.67 \times 10^{-5}$	.4 gm	$6.6 \times 10^{-6}$
I <sup>129</sup>	$1.67 \times 10^{-5}$	.4 gm	$6.6 \times 10^{-6}$
Co <sup>60</sup>	$1.67 \times 10^{-4}$	.4 gm	$6.6 \times 10^{-5}$

TABLE III

Isotope	$\mu\text{Ci}$ inhaled	NUREG-0172 $\mu\text{ Rem dose}/\mu\text{Ci}$	Critical Organ	Net Dose ( $\mu\text{ Rem}$ )
Pu <sup>239</sup>	$6.6 \times 10^{-7}$	$3.19 \times 10^9$	Bone	2100
H <sup>3</sup>	$6.6 \times 10^{-2}$	$1.58 \times 10^2$	Whole Body	10
Cs <sup>137</sup>	$6.6 \times 10^{-4}$	$7.76 \times 10^4$	Liver	51
Sr <sup>90</sup>	$6.6 \times 10^{-6}$	$1.24 \times 10^7$	Bone	82
I <sup>129</sup>	$6.6 \times 10^{-6}$	$5.54 \times 10^6$	Thyroid	37
Co <sup>60</sup>	$6.6 \times 10^{-5}$	$7.46 \times 10^5$	Lung	49

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Critical Regulation

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TITLE 10—ATOMIC ENERGY  
Chapter I—Atomic Energy Commission

PART 20—STANDARDS FOR PROTECTION AGAINST RADIATION

In July 1955 the Commission issued for public comment a proposed regulation to establish general standards for protection of licensees, their employees, and the public against radiation hazards arising out of the possession or use of special nuclear, source, or byproduct material under license issued by AEC. In preparing the effective regulation published below, the Commission has had the benefit of numerous comments and suggestions received since publication of the proposed rules. A number of changes suggested by those comments have been incorporated in the following regulation.

The regulation establishes standards which must be followed in handling radioactive materials which are subject to the licensing authority of the Commission and provides procedures whereby deviations from such standards may be authorized on a case-to-case basis. The regulation prescribes limits which govern exposure of personnel to radiation and concentrations of radioactive material, concentrations of radioactive material which may be discharged into air and water, and disposal of radioactive wastes. It also establishes certain precautionary procedures and administrative controls.

The standards established by this regulation will be found to agree substantially with those published by the National Committee on Radiation Protection in N. E. S. Handbook 52 "Maximum Permissible Amounts of Radioisotopes in the Human Body and Maximum Permissible Concentrations in Air and Water," and N. E. S. Handbook 53 "Permissible Dose from External Sources of Ionizing Radiation." The National Committee on Radiation Protection has under review recommendations to limit cumulative exposures over periods of years. The Commission is giving consideration to appropriate amendments to its regulations to deal with this cumulative

exposure problem.

Limitations upon levels of radiation and concentrations of radioactive material in areas affected by but not controlled by the licensee are contained principally in §20.102 ("Permissible Levels of Radiation in Unrestricted Areas"), §20.103 ("Concentrations in Effluents to Unrestricted Areas") and the sections on waste disposal.

The sections are designed to assure that individuals in "unrestricted areas" do not receive exposure in excess of 10 percent of the limits established for persons exposed in restricted areas. For this purpose, the sections limit levels of radiation and concentrations of radioactive material which may be created in unrestricted areas by licensees, without special authorization from the AEC, to extremely low levels. These levels are believed to be sufficiently low to assure that there is no reasonable probability of individuals in unrestricted areas receiving exposures in excess of 10 percent of the permissible levels for restricted areas. Procedures are incorporated in those sections, however, under which the Commission may authorize licensees in specific cases to create higher levels in unrestricted areas where the circumstances of the particular case are such as to provide reasonable assurance that individuals in the unrestricted areas will not receive exposures in excess of 10 percent of the limitation established for restricted areas.

It is believed that the standards incorporated in these regulations provide, in accordance with present knowledge, a very substantial margin of safety for exposed individuals. It is believed also that the standards are practical from the standpoint of licensees. It should be emphasized that the standards are subject to change with the development of new knowledge, with significant increase in the average exposure of the whole population to radiation, and with further experience in the administration of the Commission's regulatory program.

Pursuant to the administrative procedures Act, Public Law 404, 75th Congress, 2d Session, the following rules are published as a document subject to codi-

fication to be effective 30 days after publication in the FEDERAL REGISTER.

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\*AUTHORITY: 1) 20.1 to 20.601 issued under sec. 161 (b), 68 Stat 948, 42 U. S. C. 2021.

GENERAL PROVISIONS

120.1 Purpose. (a) The regulations

In this part establish standards for protection against radiation hazards arising out of activities under licenses issued by the Atomic Energy Commission and are issued pursuant to the Atomic Energy Act of 1954 (68 Stat. 919).

(b) The use of radioactive material or other sources of radiation not licensed by the Commission is not subject to the regulations in this part. However, it is the purpose of the regulations in this part to control the possession, use, and transfer of licensed material by any licensee in such a manner that exposure to such material and to radiation from such material, when added to exposures to unlicensed radioactive material and to other unlicensed sources of radiation in the possession of the licensee, and to radiation therefrom, does not exceed the standards of radiation protection prescribed in the regulations in this part.

**§ 20.2 Scope.** The regulations in this part apply to all persons who receive, possess, use or transfer byproduct material, source material, or special nuclear material under a general or specific license issued by the Commission pursuant to the regulations in Part 30, 40, or 70 of this chapter.

**§ 20.3 Definitions.** (a) As used in this part:

(1) "Act" means the Atomic Energy Act of 1954 (68 Stat. 919) including any amendments thereto;

(2) "Airborne radioactive material" means any radioactive material dispersed in the air in the form of dusts, fumes, mists, vapors, or gases;

(3) "Byproduct material" means any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material;

(4) "Commission" means the Atomic Energy Commission or its duly authorized representatives;

(5) "Government agency" means any executive department, commission, independent establishment, corporation, wholly or partly owned by the United States of America which is an instrumentality of the United States, or any board, bureau, division, service, office, officer, authority, administration, or other establishment in the executive branch of the Government;

(6) "Individual" means any human being;

(7) "Licensed material" means source material, special nuclear material, or byproduct material received, possessed, used, or transferred under a general or specific license issued by the Commission pursuant to the regulations in this chapter;

(8) "License" means a license issued under the regulations in Part 30, 40, or 70 of this chapter. "Licensee" means the holder of such license;

(9) "Person" means (i) any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, Government agency other than the Commission, any State, any foreign government or nation or any political subdivision of any such government or nations, or other entity; and

(ii) any legal successor, representative, agent, or agency of the foregoing;

(10) "Radiation" means any or all of the following: alpha rays, beta rays, gamma rays, X-rays, neutrons, high-speed electrons, high-speed protons, and other atomic particles; but not sound or radio waves, or visible, infrared, or ultraviolet light;

(11) "Radioactive material" includes any such material whether or not subject to licensing control by the Commission;

(12) "Restricted area" means any area access to which is controlled by the licensee. "Restricted area" shall not include any areas used as residential quarters, although a separate room or rooms in a residential building may be set apart as a restricted area;

(13) "Source material" means any material except special nuclear material, which contains by weight one-twentieth of one percent (0.05 percent or more of (i) uranium, (ii) thorium, or (iii) any combination thereof;

(14) "Special nuclear material" means (i) plutonium, uranium 233, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the Commission, pursuant to the provisions of section 51 of the act, determines to be special nuclear material, but does not include source material; or (ii) any material artificially enriched by any of the foregoing but does not include source material;

(15) "Unrestricted area" means any area entry into which is not controlled by the licensee, and any area used for residential quarters.

(b) Definitions of certain other words and phrases as used in this part are set forth in other sections, including:

(1) "Airborne radioactivity area" defined in § 20.202;

(2) "Radiation area" and "high radiation area" defined in § 20.202;

(3) "Personnel monitoring equipment" defined in § 20.202;

(4) "Survey" defined in § 20.201;

(5) Units of measurement of dose (rad, rem) defined in § 20.4;

(6) Units of measurement of radioactivity defined in § 20.5.

**§ 20.4 Units of radiation dose.** (a) "Dose," as used in this part, is the quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body. When the regulations in this part specify a dose during a period of time, the dose means the total quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body during such period of time. Several different units of dose are in current use. Definitions of units as used in this part are set forth in paragraphs (b) and (c) of this section.

(b) The rad, as used in this part, is a measure of the dose of any ionizing radiation to body tissues in terms of the energy absorbed per unit mass of the tissue. One rad is the dose corresponding to the absorption of 100 ergs per gram of tissue. (One millirad (mrad) = 0.001 rad.)

(c) The rem, as used in this part, is a measure of the dose of any ionizing radiation to body tissue in terms of its

estimated biological effect relative to a dose of one roentgen (r) of X-rays. (One millirem (mrem) = 0.001 rem.) The relation of the rem to other dose units depends upon the biological effect under consideration and upon the conditions of irradiation. For the purpose of the regulations in this part, any of the following is considered to be equivalent to a dose of one rem:

(1) A dose of 1 r due to X- or gamma radiation;

(2) A dose of 1 rad due to X-, gamma, or beta radiation;

(3) A dose of 0.1 rad due to neutrons or high energy protons;

(4) A dose of 0.05 rad due to particles heavier than protons and with sufficient energy to reach the lens of the eye;

If it is more convenient to measure the neutron flux, or equivalent, than to determine the neutron dose in rads, as provided in subparagraph (3) of this paragraph, one rem of neutron radiation may, for purposes of the regulations in this part, be assumed to be equivalent to 14 million neutrons per square centimeter incident upon the body; or, if there exists sufficient information to estimate with reasonable accuracy the approximate distribution in energy of the neutrons, the incident number of neutrons per square centimeter equivalent to one rem may be estimated from the following table:

Neutron energy	Number of neutrons per square centimeter equivalent to a dose of 1 rem
0.025 Mev	2.6 X 10 <sup>10</sup>
0.05 Mev	4.3 X 10 <sup>9</sup>
0.1 Mev	4.3 X 10 <sup>8</sup>
0.2 Mev	2.1 X 10 <sup>8</sup>
0.5 Mev	8.6 X 10 <sup>7</sup>
1 Mev	4.3 X 10 <sup>7</sup>
2 Mev	2.1 X 10 <sup>7</sup>
5 Mev and higher	1.1 X 10 <sup>7</sup>

**§ 20.5 Units of radioactivity.** (a)

Radioactivity is commonly, and for purposes of the regulations in this part shall be, measured in terms of disintegrations per unit time or in curies. One curie (c) = 3.7 X 10<sup>10</sup> disintegrations per second (dps) = 2.2 X 10<sup>10</sup> disintegrations per minute (dpm). A commonly used sub-multiple of the curie is the microcurie (μc). One μc = 0.000001 c = 3.7 X 10<sup>4</sup> dps = 2.2 X 10<sup>6</sup> dpm.

Note: Many radioisotopes disintegrate into isotopes which are also radioactive. In expressing maximum permissible concentrations in air and water of these materials, as in Appendix B of this part, the activity stated is that of the parent isotope. In some cases, the fact that daughter products may contribute to the total dose has been taken into account in the determination of the maximum permissible concentration of the parent isotopes. In the tables of Appendix B of this part this is indicated by writing Ba<sup>133</sup>-La<sup>133</sup>, Sr<sup>90</sup>-Y<sup>90</sup>, Ra<sup>226</sup>-Ac, Ra<sup>226</sup>-Th, or, etc.

Example: In Column 1, Table I, Appendix B the maximum permissible concentration of Ba<sup>133</sup> in air for occupational use is 2-10<sup>-6</sup> μc/ml. This is the maximum permissible concentration regardless of whether or not any of the La<sup>133</sup> which may have resulted from the decay of the Ba<sup>133</sup> is present.

or not. However, the value given for  $DA^{222}$  is less than it would be if  $DA^{222}$  were a stable isotope, not only because of the possibility of  $LA^{222}$  in the air but principally because, if the  $DA^{222}$  is inhaled, its radioactive decay in the body will result in the production of  $LA^{222}$  in the body.

(b) Radon. Airborne radioactivity of radon and its decay products may be determined by measurement of the activity of one or more decay products on dust filtered from the air. For purposes of the regulations in this part, the limit prescribed here will be considered to be met if the measured radioactivity of one or more decay products (for example,  $PaC'$ ) does not exceed that which would result from the occurrence, at the time of sampling, of  $1 \times 10^{-4}$  microcuries, per milliliter of air, of  $Rn^{222}$  and each of its short-lived decay products,  $PaA$ ,  $PaB$ ,  $PaC$ , and  $PaC'$ . For this purpose, due allowance shall be made for changes in the radioactivity of the measured decay products from time of sampling through the period of measurement.

(c) Natural uranium and natural thorium. Natural uranium and natural thorium occur as mixtures of isotopes of the respective elements. In the case of uranium or of thorium, the number of microcuries shall be determined by dividing the total rate, in dpm, of alpha emissions from the mixture by  $2.2 \times 10^4$  dpm per  $\mu c$ .

**§ 20.6 Interpretations.** Except as specifically authorized by the Commission in writing, no interpretation of the meaning of the regulations in this part by any officer or employee of the Commission other than a written interpretation by the General Counsel will be recognized to be binding upon the Commission.

**§ 20.7 Communications.** All communications and reports concerning the regulations in this part, and applications filed under them, should be addressed to the Atomic Energy Commission, 2001 Constitution Avenue NW., Washington 25, D. C., Attention: Division of Civilian Application.

#### PERMISSIBLE DOSES, LEVELS, AND CONCENTRATIONS

**§ 20.101 Exposure of individuals in restricted areas—(a) Exposure to radiation.** (1) Except as provided in subparagraph (2) of this paragraph, no licensee shall possess, use, or transfer licensed material in such a manner as to cause any individual in a restricted area to receive in any period of seven consecutive days from radioactive material and other sources of radiation in the licensee's possession a dose in excess of the limits specified in Appendix A of this part.

(2) A licensee may permit an individual in a restricted area to receive a dose in excess of the limits established in subparagraph (1) of this paragraph: Provided, (i) That the dose during any period of 7 consecutive days does not exceed three times the limits specified in Appendix A of this part, and (ii) that the dose during any period of 13 consecutive weeks does not exceed 13 times the limits specified in Appendix A of this part.

(b) No licensee shall possess, use or

transfer licensed material in such a manner as to cause any individual in a restricted area to be exposed to airborne radioactive material possessed by the licensee in an average concentration in excess of the limits specified in Appendix B, Table I, of this part.

The limits given in Appendix B, Table I of this part, are based upon exposure to the concentrations specified for forty hours in any period of seven consecutive days. In any such period where the number of hours of exposure is less than forty, the limits specified in the table may be increased proportionately. In any such period, where the number of hours of exposure is greater than forty, the limits specified in the table shall be decreased proportionately.

(c) Exposure of miners. No licensee shall possess, use, or transfer licensed material in such a manner as to cause any individual under 18 years of age within a restricted area to receive in any period of seven consecutive days from radioactive material and other sources of radiation in the licensee's possession a dose in excess of 10 percent of the limits specified in Appendix A of this part, or to be exposed to airborne radioactive material possessed by the licensee in a concentration in excess of the limits specified in Appendix B, Table II, of this part. For purposes of this paragraph, concentrations may be averaged over periods not greater than a week.

**§ 20.102 Permissible levels of radiation in unrestricted areas.** (a) There may be included in any application for a license or for amendment of a license proposed limits upon levels of radiation in unrestricted areas resulting from the applicant's possession or use of radioactive material and other sources of radiation. Such applications should include information as to anticipated average radiation levels and anticipated occupancy times for each unrestricted area involved. The Commission will approve the proposed limits if the applicant demonstrates that the proposed limits are not likely to cause any individual to receive a dose in any period of seven consecutive days in excess of 10 percent of the limits specified in Appendix A of this part.

(b) Except as authorized by the Commission pursuant to paragraph (a) of this section, no licensee shall possess, use, or transfer licensed material in such a manner as to create in any unrestricted area from radioactive material and other sources of radiation in his possession:

(1) Radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of two millirems in any one hour; or

(2) Radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of 100 millirems in any seven consecutive days.

**§ 20.103 Concentrations in effluents to unrestricted areas.** (a) There may be included in any application for a license or for amendment of a license proposed limits upon concentrations of licensed and other radioactive material released

into air or water in unrestricted areas as a result of the applicant's proposed activities. Such applications should include information as to anticipated average concentrations and anticipated occupancy times for each unrestricted area involved. The Commission will approve the proposed limits if the applicant demonstrates that it is not likely that any individual will be exposed to concentrations in excess of the limits specified in Appendix B, Table II, of this part. For purposes of this paragraph, concentrations may be averaged over periods not greater than one year.

(b) Except as authorized by the Commission pursuant to § 20.202 or paragraph (a) of this section, no licensee shall possess, use, or transfer licensed material in such a manner as to release into air or water in any unrestricted area any concentration of radioactive material in excess of the limits specified in Appendix B, Table II, of this part. For purposes of this paragraph, concentrations may be averaged over periods not greater than one year.

(c) For purposes of this section, determinations as to the concentration of radioactive material shall be made with respect to the point where such material leaves the restricted area. Where the radioactive material leaves the restricted area in a stack, tube, pipe, or similar conduit, the determination may be made with respect to the point where the material leaves such conduit.

(d) The provisions of this section do not apply to disposal of radioactive material into sanitary sewerage systems (see § 20.202).

**§ 20.104 Medical diagnosis, therapy, and research.** Nothing in the regulations in this part shall be interpreted as limiting the intentional exposure of patients to radiation for the purpose of medical diagnosis or medical therapy.

**§ 20.105 Measures to be taken after excessive exposures.** In the event that any individual in a restricted area receives a dose or is exposed to concentrations of radioactive material in excess of the permissible limits established in § 20.101, the licensee shall limit the weekly dose or exposure of the individual to 10 percent of such permissible limit until such time as the average weekly dose or exposure to the individual for the period beginning with the week in which the excessive dose or exposure occurred is less than the permissible limit established in § 20.101.

#### PRECAUTIONARY PROCEDURES

**§ 20.201 Surveys.** (a) As used in the regulations in this part, "survey" means an evaluation of the radiation hazards incident to the production, use, release, disposal, or presence of radioactive materials or other sources of radiation under a specific set of conditions. When appropriate, such evaluation includes a physical survey of the location of materials and equipment, and measurements of levels of radiation or concentrations of radioactive material present.

(b) Each licensee shall make or cause to be made such surveys as may be necessary for him to comply with the regula-

ions in this part.

§ 20.202 Personnel monitoring. (a) Each licensee shall supply appropriate personnel monitoring equipment to, and shall require the use of such equipment by:

(1) Each individual who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in excess of 25 percent of the limits specified in Appendix A of this part;

(2) Each individual who enters a high radiation area.

(b) As used in this part,

(1) "Personnel monitoring equipment" means devices designed to be worn or carried by an individual for the purpose of measuring the dose received (e. g., film badges, pocket chambers, pocket dosimeters, film rings, etc.);

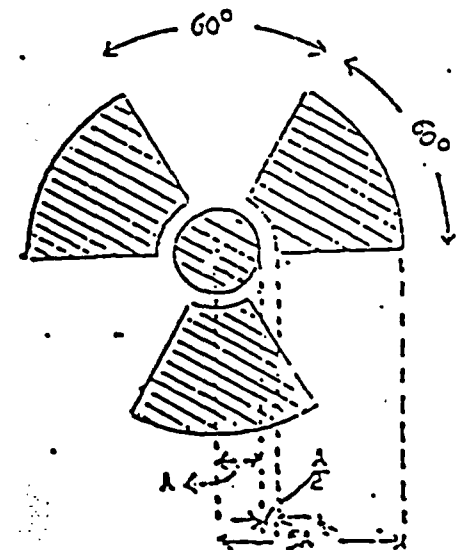
(2) "Radiation area" means any area, accessible to personnel, in which there exists radiation, originating in whole or in part within licensed material, at such levels that a major portion of the body could receive in any one hour a dose in excess of 5 millirem, or in any 5 consecutive days a dose in excess of 150 millirem;

(3) "High radiation area" means any area, accessible to personnel, in which there exists radiation originating in whole or in part within licensed material at such levels that a major portion of the body could receive in any one hour a dose in excess of 100 millirem.

§ 20.203 Caution signs, labels, and signals. (a) (1) Except as otherwise authorized by the Commission, symbols prescribed by this section shall use the conventional radiation caution colors (magenta or purple on yellow background). The symbol prescribed by this section is the conventional three-bladed design:

#### RADIATION SYMBOL

1. Cross-hatched area to be magenta or purple.
2. Background is to be yellow.



(2) In addition to the contents of signs and labels prescribed in this section, licensees may provide on or near such

signs and labels any additional information which may be appropriate in aiding individuals to minimize exposure to radiation or to radioactive material.

(b) Radiation areas. Each radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

#### CAUTION RADIATION AREA

(c) High radiation areas. (1) Each high radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

#### CAUTION HIGH RADIATION AREA

(2) Each high radiation area shall be equipped with a control device which shall either cause the level of radiation to be reduced below that at which an individual might receive a dose of 100 millirem in one hour upon entry into the area or shall energize a conspicuous visible or audible alarm signal in such a manner that the individual entering and the licensee or a supervisor of the activity are made aware of the entry. In the case of a high radiation area established for a period of 30 days or less, such control device is not required.

(d) Airborne radioactivity areas. (1) As used in the regulations in this part, "airborne radioactivity area" means (i) any room, enclosure, or operating area in which airborne radioactive materials, composed wholly or partly of licensed material, exist in concentrations in excess of the amounts specified in Appendix B, Table I, Column 2 of this part; or (ii) any room, enclosure, or operating area in which airborne radioactive material composed wholly or partly of licensed material exists in concentrations which, averaged over the number of hours in any week during which individuals are in the area, exceed 25 percent of the amounts specified in Appendix B, Table I, Column 1 of this part.

(2) Each airborne radioactivity area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

#### CAUTION AIRBORNE RADIOACTIVITY AREA

(e) Additional requirements. (1) Each area or room in which licensed material is used or stored and which contains any radioactive material (other than natural uranium or thorium) in an amount exceeding 10 times the quantity of such material specified in Appendix C of this part shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

#### CAUTION RADIOACTIVE MATERIAL(S)

(2) Each area or room in which natural uranium or thorium is used or stored in an amount exceeding one-hundred times the quantity specified in Appendix C of this part shall be conspicuously posted with a sign or signs bearing the radiation caution symbol

or "Danger".

and the words:

#### CAUTION RADIOACTIVE MATERIAL(S)

(1) Containers. (1) Each container in which is transported, stored, or used a quantity of any licensed material (other than natural uranium or thorium) greater than the quantity of such material specified in Appendix C of this part shall bear a durable, clearly visible label bearing the radiation caution symbol and the words:

#### CAUTION RADIOACTIVE MATERIAL

(2) Each container in which natural uranium or thorium is transported, stored, or used in a quantity greater than ten times the quantity specified in Appendix C of this part shall bear a durable, clearly visible label bearing the radiation caution symbol and the words:

#### CAUTION RADIOACTIVE MATERIAL

(3) Notwithstanding the provisions of subparagraphs (1) and (2) a label shall not be required:

(i) If the concentration of the material in the container does not exceed that specified in Appendix B, Table I, Column 2 of this part; or

(ii) For laboratory containers, such as beakers, flasks, and test tubes, used transiently in laboratory procedures, when the user is present.

(4) Where containers are used for storage, the labels required in this paragraph shall state also the quantities and kinds of radioactive materials in the containers and the date of measurement of the quantities.

§ 20.204 Exemptions from posting requirements. Notwithstanding the provisions of § 20.203,

(a) A room or area is not required to be posted with a caution sign because of the presence of a sealed source provided the radiation level twelve inches from the surface of the source container or housing does not exceed five millirem per hour.

(b) Rooms or other areas in hospitals are not required to be posted with caution signs because of the presence of patients containing byproduct material provided that there are personnel in attendance who shall take the precautions necessary to prevent the exposure of any individual to radiation or radioactive material in excess of the limits established in the regulations in this part.

(c) Caution signs are not required to be posted at areas or rooms containing radioactive materials for periods of less than eight hours provided that (1) the materials are constantly attended during such periods by an individual who shall take the precautions necessary to prevent the exposure of any individual to radiation or radioactive materials in excess of the limits established in the regulations in this part and, (2) such area or room is subject to the licensee's control.

§ 20.205 Exemptions for radioactive materials packaged for shipment. Radioactive materials packaged and labeled



In accordance with regulations of the Interstate Commerce Commission shall be exempt from the labeling and posting requirements of § 20.203 during shipment, provided that the inside containers are labeled in accordance with the provisions of § 20.203 (1).

§ 20.208 *Instruction of personnel.* All individuals working in or frequenting any portion of a restricted area shall be informed of the occurrence of radioactive materials or of radiation in such portion, and shall be instructed in the hazards of excessive exposure to such materials or radiation and in precautions or procedures to minimize exposure.

§ 20.207 *Storage of licensed material.* Licensed materials stored in an unrestricted area shall be secured against unauthorized removal from the place of storage.

#### WASTE DISPOSAL

§ 20.201 *General requirement.* No licensee shall dispose of licensed material except:

(1) By transfer to an authorized recipient as provided in the regulations in Part 20, 40, or 70 of this chapter, whichever may be applicable; or

(2) As authorized pursuant to § 20.202; or

(3) As provided in § 20.203 or § 20.204, applicable respectively to the disposal of licensed material by release into sanitary sewerage systems or burial in soil, or in § 20.203 (Concentrations in Effluents to Unrestricted Areas).

§ 20.202 *Method for obtaining approval of proposed disposal procedures.* Any licensee or applicant for a license may apply to the Commission for approval of proposed procedures to dispose of licensed material in a manner not otherwise authorized in the regulations in this chapter. Each application should include a description of the licensed material and any other radioactive material involved, including the quantities and kinds of such material and the levels of radioactivity involved, and the proposed manner and conditions of disposal. The application should also include an analysis and evaluation of pertinent information as to the nature of the environment, including topographical, geological, meteorological, and hydrological characteristics; usage of ground and surface waters in the general area; the nature and location of other potentially affected facilities; and procedures to be observed to minimize the risk of unexpected or hazardous exposures.

§ 20.203 *Disposal by release into sanitary sewerage systems.* No licensee shall discharge licensed material into a sanitary sewerage system unless:

(a) It is readily soluble or dispersible in water; and

(b) The quantity of any licensed or other radioactive material released into the system, by the licensee in any one day does not exceed the larger of subparagraphs (1) or (2) of this paragraph:

(1) The quantity which, if diluted by the average daily quantity of sewage released into the sewer by the licensee,

will result in an average concentration equal to the limits specified in Appendix B, Table I, Column 2 of this part; or

(2) Ten times the quantity of such material specified in Appendix C of this part; and

(c) The quantity of any licensed or other radioactive material released in any one month, if diluted by the average monthly quantity of water released by the licensee, will not result in an average concentration exceeding the limits specified in Appendix B, Table I, Column 2 of this part; and

(d) The gross quantity of licensed and other radioactive material released into the sewerage system by the licensee does not exceed one curie per year.

Excreta from individuals undergoing medical diagnosis or therapy with radioactive material shall be exempt from any limitations contained in this section.

§ 20.204 *Disposal by burial in soil.* No licensee shall dispose of licensed material by burial in soil unless:

(a) The total quantity of licensed and other radioactive materials buried at any one location and time does not exceed, at the time of burial, 1,000 times the amount specified in Appendix C of this part; and

(b) Burial is at a minimum depth of four feet; and

(c) Successive burials are separated by distances of at least six feet and not more than 12 burials are made in any year.

#### RECORDS, REPORTS, AND NOTIFICATION

§ 20.401 *Records of surveys, radiation monitoring, and disposal.* (a) Each licensee shall maintain records showing the radiation exposures of all individuals subject to personnel monitoring control under § 20.202 of the regulations in this part.

(b) Each licensee shall maintain records showing the name of each individual exposed to radiation pursuant to § 20.201 (a) (2) and the weekly dose of each such individual for the 12 consecutive weeks of highest cumulative weekly dose.

(c) Each licensee shall maintain records in the same units used in the appendices to this part, showing the results of surveys required by § 20.201 (b), and disposals made under §§ 20.202, 20.203, and 20.204.

#### APPENDIX A

##### PERMISSIBLE WEEKLY DOSE

Parts of body	Conditions of exposure	Dose in critical organs (mrem)			
		Skin, at basal layer of epidermis	Blood-forming organs	Gonads	Lens of eye
Whole body	Any radiation with half-value layer greater than 1 mm of soft tissue.	1,000	1,000	1,000	1,000
Whole body	Any radiation with half-value layer less than 1 mm of soft tissue.	1,500	200	200	200
Hands and forearms or feet and ankles or head and neck.	Any radiation	1,500			

<sup>1</sup> For exposures of the whole body to 20 or more mrem up to 3 mrem, this condition may be assumed to be met if the "air dose" does not exceed 100 mrem, provided the dose to the blood-forming organs does not exceed 100 mrem. "Air dose" means that the dose is measured by an appropriate instrument in air at the region of highest dose rate to be occupied by an individual, without the influence of the form of body or other conditions which may affect the dose.

<sup>2</sup> Exposure of these critical organs at the body surface does not affect the total weekly dose of 200 mrem permitted to the blood-forming organs in the main portion of the body, to the gonads, or to the lens of the eye.

§ 20.402 *Reports of theft or loss of licensed material.* Each licensee shall report promptly to the Commission, after its occurrence becomes known to the licensee, any loss or theft of licensed material in such quantities and under such circumstances that it appears to the licensee that a substantial hazard may result to persons in unrestricted areas.

#### EXCEPTIONS AND ADDITIONAL REQUIREMENTS

§ 20.501 *Applications for exemptions.* The Commission may, upon application by any licensee or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not result in undue hazard to life or property.

§ 20.502 *Additional requirements.* The Commission may, by rule, regulation, or order, impose upon any licensee such requirements, in addition to those established in the regulations in this part, as it deems appropriate or necessary to protect health or to minimize danger to life or property.

#### ENFORCEMENT

§ 20.601 *Violations.* An injunction or other court order may be obtained prohibiting any violation of any provision of the act or any regulation or order issued thereunder. Any person who willfully violates any provision of the act or any regulation or order issued thereunder may be guilty of a crime and, upon conviction, may be punished by fine or imprisonment or both, as provided by law.



Changes in 10 CFR 20  
10 CFR 20

Nick 27  
11413

PROPOSED RULE MAKING

(b) For skim milk in producer milk used to produce condensed skim milk, and for milk or skim milk transferred or diverted as Class II milk to a nonpool plant located outside the marketing area from a pool plant or from farms located within the marketing area, at the rate specified in paragraph (a) of this section, less 10 cents.

Signed at Washington, D.C., on August 6, 1966

G. R. Grant,  
Acting Deputy Administrator,  
Regulatory Programs.

FPL Doc. 68-2536; Filed Aug. 9, 1966;  
347,531

ATOMIC ENERGY COMMISSION

[ 10 CFR Part 20 ]

STANDARDS FOR PROTECTION AGAINST RADIATION

Microcurie Amounts of Byproduct Material

Concurrently with publication of this notice the Atomic Energy Commission is publishing a notice of proposed rule making to amend 10 CFR Part 20, "Rules of General Applicability to Licensing of Byproduct Material," 10 CFR Part 31, "General Licenses for Certain Quantities of Byproduct Material and Byproduct Material Contained in Certain Items," 10 CFR Part 32, "Specific Licenses to Manufacture, Distribute, or Import Exempted and Generally Licensed Items Containing Byproduct Material," and 10 CFR Part 33, "Human Uses of Byproduct Material." These proposed amendments to 10 CFR Part 20 would establish (a) criteria for the issuance of specific licenses for the manufacture, processing, production, packaging, repackaging, import, or transfer of the proposed exempt quantities of byproduct material, and (b) certain license conditions for these specific licenses.

Appendix C, 10 CFR Part 20, currently consists of a list of radioisotopes in which the kinds and quantities of byproduct material are identical to those generally licensed "not as a sealed source" by §§ 31.4 and 31.109, Schedule A, 10 CFR Part 31. The list of quantities in Appendix C, 10 CFR Part 20, is referred to in providing exceptions from labeling requirements pursuant to § 20.203 and in specifying quantities of byproducts material which may be disposed by release into sanitary sewerage systems pursuant to § 20.303(b)(2) or by burial in soil pursuant to § 20.304. For the purposes of these sections, the quantities of byproduct material in the present Appendix C may be modified to conform with the quantities proposed in the new § 30.71, Schedule B, 10 CFR Part 30, without undue risk to the health and safety of employees or the public.

Accordingly the proposed amendment to 10 CFR Part 20, "Standards for Protection Against Radiation," which follows would conform the microcurie amounts

of byproduct material listed in Appendix C, 10 CFR Part 20, with the quantities proposed in the new § 30.71, Schedule B, 10 CFR Part 30. Americium 241, which not included in § 30.71, Schedule B, would be added to Appendix C, 10 CFR Part 20.

And the quantities listed in Appendix C for radium 226, uranium 233, 234, 235, and plutonium 239 would be reduced to values more consistent with the toxicity of those nuclides and with the criteria used to derive the exempt quantities. The quantities listed for natural uranium and natural thorium would not be reduced because of the low specific activity of those source materials and the attendant low risk of human intake of the materials. The last entry of Appendix C, 10 CFR Part 20, now provides a quantity for "Unidentified radioactive materials or any of the above in unknown mixtures." The proposed amendment would provide two listings, one for unlisted alpha emitting radionuclides or mixtures of alpha emitters of unknown composition, and one for any radionuclides, other than alpha emitting radionuclides, not listed in Appendix C or mixtures of beta emitters of unknown composition.

Pursuant to the Atomic Energy Act of 1954, as amended, and section 553 of title 5 of the United States Code, notice is hereby given that adoption of the following amendment to 10 CFR Part 20 is contemplated. All interested persons who desire to submit written comments or suggestions for consideration in connection with the proposed amendment should send them to the Secretary, U.S. Atomic Energy Commission, Washington, D.C. 20545. Attention: Chief, Public Proceedings Branch, within sixty (60) days after publication of this notice in the FEDERAL REGISTER. Comments received after that period will be considered if it is practicable to do so, but assurance of consideration cannot be given except as to comments filed within the period specified. Copies of the comments on the proposed rule may be examined at the Commission's Public Document Room at 1717 H Street NW., Washington, D.C.

Appendix C of 10 CFR Part 20 is amended to read as follows:

Material	Microcuries
Americium 241	0.01
Antimony 121	100
Antimony 123	10
Antimony 125	10
Arsenic 73	100
Arsenic 74	10
Arsenic 76	10
Arsenic 77	100
Barium 131	10
Barium 140	10
Bismuth 210	1
Bromine 82	10
Cadmium 109	10
Cadmium 115m	10
Cadmium 115	100
Calcium 45	10
Calcium 47	10
Carbon 14	1,000
Cerium 141	100
Cerium 143	100
Cerium 144	1
Cesium 137	1,000
Cesium 134m	100
Cesium 134	1
Cesium 135	10
Cesium 136	10

Material	Microcuries
Cesium 137	10
Chlorine 36	10
Chlorine 38	10
Ciromium 31	1,000
Cobalt 58m	10
Cobalt 59	10
Cobalt 60	1
Copper 64	100
Dysprosium 163	10
Dysprosium 165	100
Erbium 167	100
Erbium 171	100
Europium 152 2.2h	100
Europium 152 13yr	1
Europium 154	1
Euraptium 153	10
Fluorine 18	1,000
Gadolinium 153	10
Gadolinium 157	100
Gallium 72	10
Germanium 71	100
Gold 192	100
Gold 197	100
Hafnium 181	10
Helium 3	1,000
Helium 4	100
Indium 114m	10
Indium 115m	100
Indium 115	10
Iodine 125	1
Iodine 129	1
Iodine 131	1
Iodine 132	10
Iodine 133	1
Iodine 134	100
Iodine 135	10
Iridium 192	10
Iridium 194	100
Iron 55	100
Iron 59	10
Krypton 81	100
Krypton 85	10
Lanthanum 140	10
Lanthanum 141	100
Manganese 52	10
Manganese 54	10
Manganese 56	10
Mercury 197m	100
Mercury 197	100
Mercury 203	10
Molybdenum 99	100
Nobelium 247	100
Nobelium 249	100
Nickel 59	100
Nickel 61	10
Nickel 63	100
Niobium 92m	10
Niobium 93	10
Niobium 97	10
Osmium 185	10
Osmium 191m	100
Osmium 191	100
Osmium 193	100
Palladium 103	100
Palladium 107	100
Phosphorus 32	10
Platinum 191	100
Platinum 195m	100
Platinum 195	100
Platinum 197m	100
Platinum 197	100
Plutonium 239	10
Polonium 210	1
Potassium 42	10
Praseodymium 143	100
Praseodymium 145	100
Promethium 147	10
Promethium 149	10
Radium 226	10
Rhenium 187	100
Rhenium 185	100
Rhenium 186m	100
Rhenium 186	100
Rubidium 87	10
Rubidium 88	10
Ruthenium 97	100



comment on the proposed quantity limits for those radionuclides for which the quantities would be reduced is requested to aid the Commission in judging the degree to which the proposed reduction in the individual quantities of these radionuclides might affect present uses.

The proposed amendments to 10 CFR Part 32 would establish, under Subpart A, requirements for the issuance of specific licenses to persons who manufacture, process, produce, package, repack, import, or transfer byproduct material for commercial distribution to persons exempt pursuant to § 30.13, 10 CFR Part 30, or equivalent regulations of an agreement State.

Persons holding an AEC byproduct material license or an agreement State license for manufacture, processing, or production of byproduct material would be authorized to make transfers, on a noncommercial basis, of exempt quantities of byproduct material possessed under the license. This provision is designed to accommodate the occasional transfers between laboratories of small quantities of byproduct material in tissue samples, bioassay samples, tagged compounds, counting standards, etc., which involve a negligible risk.

It is considered highly unlikely that the provisions of the proposed exemption, any individual would inhale or ingest more than a very small fraction of any radioactive material being used or that any individual would receive excessive doses of external radiation.

The Commission is considering a finding that exemption from licensing requirements for the receipt, possession, use, transfer, ownership, and acquisition of the specified quantities of byproduct material, under the conditions set out in the proposed amendments, will not constitute an unreasonable risk to the common defense and security and to the health and safety of the public.

Pursuant to Part 130, persons in agreement States who import the exempt quantities of byproduct material or who manufacture, process, or produce such quantities, for transfer on a commercial basis, would be subject to the Commission's licensing and regulatory authority. An agreement State producer, packager, repackager, or importer of byproduct material who intends to distribute quantities of byproduct material to exempt users, would be required to file an application with the Commission for a specific license authorizing the import or transfer of such quantities. The application should meet the criteria of § 32.13 of 10 CFR Part 32.

Pursuant to the Atomic Energy Act of 1954, as amended, and section 333 of title 5 of the United States Code, notice is hereby given that adoption of the fol-

<sup>1</sup>A State to which the Commission has transferred certain regulatory authority over radioactive material by formal agreement pursuant to section 274 of the Atomic Energy Act of 1954, as amended.

lowing amendments to 10 CFR Part 30, 31, 32, and 33 is contemplated. All interested persons who desire to submit written comments or suggestions for consideration in connection with the proposed amendments should send them to the Secretary, U.S. Atomic Energy Commission, Washington, D.C. 20545; Attention: Chief, Public Proceedings Branch, within sixty (60) days after publication of this notice in the Federal Register. Comments received after that period will be considered if it is practicable to do so, but assurance of consideration cannot be given except as to comments filed within the period specified. Copies of comments on the proposed rule may be examined at the Commission's Public Document Room at 1775 H Street, N.W., Washington, D.C.

**PART 30—RULES OF GENERAL APPLICABILITY TO LICENSING OF BYPRODUCT MATERIAL**

1. A new § 30.13 is added to 10 CFR Part 30 to read as follows:

**§ 30.13 Exempt quantities.**

(a) Except as provided in paragraphs (c) and (d) of this section, any person is exempt from the requirements for a license set forth in section 31 of the Act and from the regulations in Parts 30-34 of this chapter to the extent that such person receives, possesses, uses, transfers, owns, or acquires byproduct material in individual quantities each of which does not exceed the applicable quantity set forth in § 30.71 Schedule B.

(b) Any person who possesses byproduct material received or acquired prior to (date) under the general license then provided in § 31.4 of this chapter is exempt from the requirements for a license set forth in section 31 of the Act and from the regulations in Parts 30-34 of this chapter to the extent that such person possesses, uses, transfers, or owns such byproduct material.

(c) This section does not authorize the production, packaging, repackaging, or import of byproduct material, for purposes of commercial distribution, or the incorporation of byproduct material into products intended for commercial distribution.

(d) No person may, for purposes of commercial distribution, import or transfer byproduct material in the individual quantities set forth in § 30.71 Schedule B, knowing or having reason to believe that such quantities of byproduct material will be transferred to persons exempt under this section or equivalent regulations of an agreement State, except in accordance with a license issued under § 32.13 of this chapter, which license states that the byproduct material may be transferred by the licensee to persons exempt under this section or the equivalent regulations of an agreement State.

<sup>1</sup> Effective date of these amendments.

2. A new § 30.71 is added to 10 CFR Part 30 to read as follows:

**§ 30.71 Schedule B.**

Byproduct Material	Microcuries
Antimony 122 (Sb 122)	100
Antimony 124 (Sb 124)	10
Antimony 125 (Sb 125)	10
Arsenic 73 (As 73)	100
Arsenic 74 (As 74)	10
Arsenic 76 (As 76)	10
Arsenic 77 (As 77)	100
Barium 131 (Ba 131)	10
Barium 140 (Ba 140)	10
Bismuth 210 (Bi 210)	1
Bromine 82 (Br 82)	10
Cadmium 109 (Cd 109)	10
Cadmium 115m (Cd 115m)	10
Cadmium 115 (Cd 115)	100
Calcium 45 (Ca 45)	10
Calcium 47 (Ca 47)	10
Carbon 14 (C 14)	1,000
Cerium 141 (Ce 141)	100
Cerium 142 (Ce 142)	100
Cerium 144 (Ce 144)	1
Cesium 131 (Cs 131)	1,000
Cesium 134m (Cs 134m)	100,000
Cesium 137 (Cs 137)	10
Chlorine 36 (Cl 36)	10
Chlorine 38 (Cl 38)	10
Chromium 51 (Cr 51)	1,000
Cobalt 57m (Co 57m)	10
Cobalt 58 (Co 58)	10
Cobalt 60 (Co 60)	1
Copper 64 (Cu 64)	100
Dysprosium 163 (Dy 163)	10
Dysprosium 165 (Dy 165)	100
Erbium 162 (Er 162)	100
Erbium 171 (Er 171)	100
Eurobium 152 (Eu 152)	100
Eurobium 154 (Eu 154)	10
Eurobium 155 (Eu 155)	10
Fluorine 18 (F 18)	1,000
Gadolinium 153 (Gd 153)	10
Gadolinium 159 (Gd 159)	100
Gallium 72 (Ga 72)	10
Germanium 71 (Ge 71)	100
Gold 198 (Au 198)	100
Gold 199 (Au 199)	100
Hafnium 181 (Hf 181)	10
Holmium 166 (Ho 166)	100
Hydrogen 3 (H 3)	1,000
Indium 113m (In 113m)	100
Indium 114m (In 114m)	10
Indium 115m (In 115m)	100
Inmium 115 (In 115)	10
Iodine 125 (I 125)	1
Iodine 129 (I 129)	1
Iodine 131 (I 131)	1
Iodine 132 (I 132)	10
Iodine 133 (I 133)	1
Iodine 134 (I 134)	100
Iodine 135 (I 135)	10
Indium 202 (In 202)	10
Indium 204 (In 204)	100
Iron 55 (Fe 55)	100
Iron 59 (Fe 59)	10
Krypton 85 (Kr 85)	100
Krypton 87 (Kr 87)	10
Lanthanum 140 (La 140)	10
Lutetium 177 (Lu 177)	100
Manganese 55 (Mn 55)	10
Manganese 54 (Mn 54)	10
Manganese 56 (Mn 56)	10
Mercury 197m (Hg 197m)	100
Mercury 197 (Hg 197)	100
Mercury 203 (Hg 203)	10
Molybdenum 99 (Mo 99)	100
Neodymium 147 (Nd 147)	100
Neodymium 149 (Nd 149)	100
Nickel 59 (Ni 59)	100



Byproduct Material	Microcuries
Nickel 63 (Ni 63)	10
Nickel 64 (Ni 64)	100
Niobium 93m (Nb 93m)	10
Niobium 93 (Nb 93)	10
Niobium 97 (Nb 97)	10
Osmium 185 (Os 185)	10
Osmium 191m (Os 191m)	100
Osmium 191 (Os 191)	100
Osmium 193 (Os 193)	100
Palladium 103 (Pd 103)	100
Palladium 107 (Pd 107)	100
Phosphorus 32 (P 32)	10
Platinum 191 (Pt 191)	100
Platinum 193m (Pt 193m)	100
Platinum 193 (Pt 193)	100
Platinum 197m (Pt 197m)	100
Platinum 197 (Pt 197)	100
Polonium 210 (Po 210)	1
Potassium 42 (K 42)	10
Praseodymium 142 (Pr 142)	100
Praseodymium 143 (Pr 143)	100
Promethium 147 (Pm 147)	10
Promethium 149 (Pm 149)	10
Rhenium 186 (Re 186)	100
Rhenium 188 (Re 188)	100
Rhodium 103m (Rh 103m)	100
Rhodium 103 (Rh 103)	100
Rubidium 86 (Rb 86)	10
Rubidium 87 (Rb 87)	10
Ruthenium 97 (Ru 97)	100
Ruthenium 103 (Ru 103)	10
Ruthenium 105 (Ru 105)	10
Ruthenium 106 (Ru 106)	1
Samarium 151 (Sm 151)	10
Samarium 153 (Sm 153)	100
Scandium 46 (Sc 46)	10
Scandium 47 (Sc 47)	100
Scandium 48 (Sc 48)	10
Selenium 75 (Se 75)	10
Silicon 31 (Si 31)	100
Silver 105 (Ag 105)	10
Silver 110m (Ag 110m)	1
Silver 111 (Ag 111)	100
Sodium 24 (Na 24)	10
Strontium 85 (Sr 85)	10
Strontium 89 (Sr 89)	1
Strontium 90 (Sr 90)	1
Strontium 91 (Sr 91)	10
Strontium 92 (Sr 92)	10
Sulphur 35 (S 35)	100
Tantalum 182 (Ta 182)	10
Technetium 96 (Tc 96)	10
Technetium 97m (Tc 97m)	100
Technetium 97 (Tc 97)	100
Technetium 99m (Tc 99m)	100
Technetium 99 (Tc 99)	10
Tellurium 123m (Te 123m)	10
Tellurium 127m (Te 127m)	10
Tellurium 127 (Te 127)	100
Tellurium 130m (Te 130m)	10
Tellurium 129 (Te 129)	100
Tellurium 131m (Te 131m)	10
Tellurium 132 (Te 132)	10
Terbium 160 (Tb 160)	10
Thallium 200 (Tl 200)	100
Thallium 201 (Tl 201)	100
Thallium 202 (Tl 202)	100
Thallium 204 (Tl 204)	10
Thallium 170 (Tl 170)	10
Thallium 171 (Tl 171)	10
Tin 113 (Sn 113)	10
Tin 123 (Sn 123)	10
Tungsten 181 (W 181)	10
Tungsten 185 (W 185)	10
Tungsten 187 (W 187)	100
Vanadium 48 (V 48)	10
Xenon 131m (Xe 131m)	1,000
Xenon 133 (Xe 133)	100
Xenon 135 (Xe 135)	100
Ytterbium 173 (Yb 173)	100
Yttrium 90 (Y 90)	10
Yttrium 91 (Y 91)	10
Yttrium 92 (Y 92)	100
Yttrium 93 (Y 93)	100
Zinc 65 (Zn 65)	10
Zinc 69m (Zn 69m)	100

Byproduct Material	Microcuries
Zinc 69 (Zn 69)	1,000
Zirconium 93 (Zr 93)	10
Zirconium 95 (Zr 95)	10
Zirconium 97 (Zr 97)	10
Any byproduct material not listed above other than alpha emitting byproduct material.	1

Note: An exempt quantity of any radionuclide may be composed of fractional quantities contained in one or more packages or containers, provided the sum of such fractional quantities does not exceed the quantity specified for that radionuclide in § 30.71, Schedule B. For two or more radionuclides, the exempt quantity for the combination is determined as follows: For each radionuclide, determine the ratio of the quantity desired to the quantity specified in § 30.71, Schedule B, for that nuclide. The sum of the ratios of all radionuclides shall not exceed unity.

**PART 31—GENERAL LICENSES FOR BYPRODUCT MATERIAL CONTAINED IN CERTAIN ITEMS**

3. The title of 10 CFR Part 31 is revised to read as set forth above.

4. Section 31.2(b) of 10 CFR Part 31 is amended to read as follows:

**§ 31.2 Terms and conditions.**

(b) Persons who transfer, receive, acquire, own, possess, use, or import items pursuant to the general licenses provided in § 31.3:

(1) Shall not effect an increase in the radioactivity of said items by adding other radioactive material thereto, by combining byproduct material from two or more such items, or by altering them in any other manner so as to increase thereby the rate or radiation therefrom;

(2) Shall not administer externally or internally, or direct the administration of, said items to a human being for any purpose, including, but not limited to, diagnostic, therapeutic, and research purposes;

(3) Shall not add, or direct the addition of said items to any food, beverage, cosmetic, drug, or other product designed for ingestion or inhalation by, or application to, a human being;

(4) Shall not include said items in any device, instrument, apparatus (including component parts and accessories thereto) intended for use in diagnosis, treatment, or prevention of disease in human beings or animals or otherwise intended to affect the structure or any function of the body of human beings or animals.

**§§ 31.4, 31.100 [Revoked]**

5. Sections 31.4 and 31.100 of 10 CFR Part 31 are revoked.

**PART 32—SPECIFIC LICENSES TO MANUFACTURE, DISTRIBUTE, OR IMPORT EXEMPTED AND GENERALLY LICENSED ITEMS CONTAINING BYPRODUCT MATERIAL**

6. New §§ 32.18, 32.19 and 32.20 are added to 10 CFR Part 32 to read as follows:

**§ 32.18 Manufacture, distribution and transfer of exempt quantities of byproduct material—requirements for license.**

An application for a specific license to manufacture, process, produce, package, repack, import, or transfer quantities of byproduct material for commercial distribution to persons exempt pursuant to § 30.18 of this chapter or the equivalent regulations of an agreement State will be approved if:

(a) The applicant satisfies the general requirements specified in § 30.33 of this chapter: *Provided, however*, that the requirements of § 30.33(a) (2) and (3) do not apply to an application for a license to transfer byproduct material manufactured, processed, produced, packaged, or repackaged pursuant to a license issued by an agreement State;

(b) The byproduct material is not contained in any food, beverage, cosmetic, drug, or other commodity designed for ingestion or inhalation by, or application to, a human being, or incorporated into any commodity or product intended for commercial distribution; and

(c) The applicant submits copies of prototype labels and brochures and the Commission approves such labels and brochures.

**§ 32.19 Same: conditions of licenses.**

Each license issued under § 32.18 is subject to the following conditions:

(a) Each quantity of byproduct material set forth in § 30.71 Schedule B of this chapter shall be separately and individually packaged. Not more than 10 such packaged exempt quantities shall be contained in any outer package for transfer to persons exempt pursuant to § 30.18 of this chapter. The outer package shall be such that the dose rate at the external surface of the package does not exceed 0.5 millirem per hour.

(b) The immediate container of each quantity or separately packaged fractional quantity of byproduct material shall bear a durable, legible label which (1) identifies the radionuclide and the quantity of radioactivity, (2) states that the contents are exempt from AEC or Agreement State licensing requirements, and (3) bears the words "Radioactive Material—Not for Human Use or for Addition to Foods, Beverages, Cosmetics, Drugs, or Medicinals—Exempt Quantities Should Not Be Combined—Introduction into Products Manufactured for Commercial Distribution is Prohibited." The label, or an accompanying brochure, shall also set forth appropriate additional radiation safety precautions and instructions relating to the handling, use, storage, and disposal of the radioactive material.

(c) Not more than 10 quantities set forth in § 30.71 Schedule B of this chapter shall be sold or transferred in any single transaction.

**§ 32.20 Same: records and material transfer reports.**

Each person licensee under § 32.18 shall maintain records identifying by

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name and address, each person to whom byproduct material is transferred for use under § 30.18 of this chapter or the equivalent regulations of an agreement State, and stating the kinds and quantities of byproduct material transferred, and shall file an annual report with the Director, Division of Materials Licensing, U.S. Atomic Energy Commission, Washington, D.C. 20543, stating the kinds and total quantities of each byproduct material transferred to such exempt persons. Each report shall cover the calendar year and shall be filed within thirty (30) days after the end of the calendar year.

PART 35—HUMAN USES OF BYPRODUCT MATERIAL

7. Section 35.2 of 10 CFR Part 35 is amended to read as follows:

§ 35.2 License requirements.

No person subject to the regulations in this chapter shall receive, possess, use, or transfer byproduct material for any human use except in accordance with a specific or general license issued pursuant to the regulations in this part and Parts 30 and 32 or 33 of this chapter.

(Sec. 81, 68 Stat. 935; 42 U.S.C. 2111; sec. 161, 68 Stat. 944; 42 U.S.C. 2022)

Dated at Washington, D.C., this 20th day of July 1968.

For the Atomic Energy Commission.

W. B. McCool,  
Secretary.

[F.R. Doc. 68-0633; Filed, Aug. 9, 1968; 8:43 a.m.]

FEDERAL TRADE COMMISSION

[16 CFR Part 303]

[Reg. No. 206-2-11]

TEXTILE FIBER PRODUCTS

Fiber Content of Special Types of Products; Postponement of Hearing Date

On June 12, 1968, the Commission issued a notice of proposed rule making relating to a proposed amendment of Part 303, rules and regulations under the Textile Fiber Products Identification Act, to specify the manner and form of disclosing the required fiber content information of textile fiber products which contain two or more chemically distinct components which are combined or prior to the time of fiber formation and which if separately extruded would fall within existing definitions of textile fibers as set forth in the rules and regulations under the Textile Fiber Products Identification Act. Such notice was published in the FEDERAL REGISTER on June 20, 1968.

On application of certain interested parties and for good cause shown date for presentation of oral views, a hearing, and date is postponed to September 11, 1968.

Interested parties may participate by submitting in writing on or before September 11, 1968, their views, arguments, or other pertinent data to the Federal Trade Commission, Washington, 20480, or they may be given orally such time as 10 a.m., e.d.t., at the Building, 11th Street and Pennsylvania Avenue N.W., in the city of Washington, District of Columbia. Any party wishing to submit further views, arguments, data in response to that submitted as a result of this notice or at the hearing may do so in writing at any time within 45 days after such hearing is closed.

Such action is taken pursuant to authority given to the Federal Trade Commission under section 5(c) of the Textile Fiber Products Identification Act (72 Stat. 1717; 15 U.S.C. 70) to make such rules and regulations, including establishment of generic names of manufactured fibers, under and in pursuance of the terms of this Act as may be necessary and proper for administration and enforcement.

Issued: August 2, 1968.

By the Commission.

(SEAL) Joseph W. Sirena,  
Secretary.

[F.R. Doc. 68-2643; Filed, Aug. 9, 1968; 8:50 a.m.]

ENCLOSURE D



Enclosure "D" - Proposed Federal Register Notice

NUCLEAR REGULATORY COMMISSION

[10 CFR Part 20]

STANDARDS FOR PROTECTION AGAINST RADIATION

Burial of Small Quantities of Radionuclides

AGENCY: U.S. Nuclear Regulatory Commission

ACTION: Proposed Rule

SUMMARY: The Nuclear Regulatory Commission is considering amending its regulations to require Commission approval prior to burial of small quantities of radionuclides. The proposed amendments would contribute to the protection of the public health by encouraging the shipment of small quantities of radioactive waste to licensed burial grounds and by improving the NRC's available data regarding amounts and locations of radioactive materials buried elsewhere. The amendments would not affect material already buried, or generally licensed and exempt material.

DATES: Comment period expires \_\_\_\_\_.

ADDRESSES:

(1) Written COMMENTS should be submitted to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Branch. (2) FOR FURTHER INFORMATION CONTACT: Mr. John W. Hickey, Office of Standards Development, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555 (phone: 301-443-5966).

SUPPLEMENTARY INFORMATION:

Notice is hereby given that the Nuclear Regulatory Commission proposes to amend the regulations in 10 CFR Part 20, "Standards for Protection Against Radiation," to revise the provisions for disposal of small quantities of licensed radioactive material by burial in soil.

Section 20.304, 10 CFR Part 20, currently provides that no licensee shall dispose of licensed material by burial in soil unless: (a) the total quantity of licensed and other radioactive materials buried at any one location and time does not exceed, at the time of burial, 1,000 times the amount specified in Appendix C of Part 20; (b) burial is at a minimum depth of four feet; and (c) successive burials are separated by distances of at least six feet and not more than 12 burials are made in any year. Section 20.302 of 10 CFR Part 20 specifies the method for obtaining approval of proposed burials other than those allowed by § 20.304

Representatives of several State agencies have expressed concern to the Commission over the practice of allowing licensees to bury small quantities of radionuclides without notification or prior approval of the Commission or its Agreement States. These State representatives suggest that the risk of allowing such burials may be unacceptable.

The Commission would like to obtain public comments before making a decision on whether to allow continued disposal of radioactive material under § 20.304 without prior regulatory review. The proposed amendments would limit burials to two circumstances: (1) where the licensee has obtained prior Commission approval as provided in 10 CFR § 20.302, or (2) where the licensee transfers such material to authorized recipients (e.g., licensed burial grounds). The effect of the proposed amendments may be to contribute to the protection of public health by encouraging the shipment of even small quantities of waste to licensed burial grounds and by improving the NRC's available data regarding amounts and locations of radioactive materials buried elsewhere.

Examples of public comments which would be particularly helpful to the Commission are: information on the numbers of burials currently being conducted pursuant to § 20.304, the quantities and types of radionuclides buried, estimates of the potential risk to the public health from such burials, and estimates of the costs to licensees if § 20.304 were deleted.

If, after consideration of the factors relating to this matter including comments or suggestions submitted in response to this notice of proposed rule making, the Commission decides to promulgate the rule in effective form, a period of three (3) months would be provided for licensees currently conducting disposal by burial in soil pursuant to § 20.304 to make alternative disposal arrangements or to comply with the provisions of § 20.302.

These amendments would not require any action concerning material already buried under the present provisions of § 20.304.

It is not the intent of the proposed amendments to change procedures regarding the disposal of materials or products transferred to persons exempt or generally licensed.

The proposed amendments constitute a procedural change which is not likely to have a substantial impact on the method or number of burials of radionuclides. Information available to the Commission indicates that only a few licensees would be affected by the amendments. However, it is possible that as a result of Commission review of individual burial proposals or as a result of increased shipments to licensed burial grounds, the potential environmental impact will be reduced. Therefore, the Commission has determined that an environmental impact statement pursuant to the National Environmental Policy Act of 1969 need not be prepared in connection with the promulgation of these amendments, because their adoption will not significantly affect the quality of the human environment.

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, and section 553 of title 5 of the United States Code, notice is hereby given that adoption of the following amendments to 10 CFR Part 20 are contemplated. All interested persons who desire to submit written comments or suggestions for consideration in connection with the proposed rule should send them to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Branch, by \_\_\_\_\_.\*

1. Section 20.304, Disposal by burial in soil, is deleted.

2. Paragraph 20.301(c) is amended to read as follows:

§ 20.301 General requirement.

No licensee shall dispose of licensed material except:

\* \* \* \* \*

(c) As provided in § 20.303, applicable to the disposal of licensed material by release into sanitary sewerage systems, or in § 20.106 (Radioactivity in effluents to unrestricted areas).

3. Paragraph 20.401(b) and subparagraph (3) of paragraph 20.401(c) are amended to read as follows:

§ 20.401 Records of surveys, radiation monitoring, and disposal.

\* \* \* \* \*

\*  
A date will be inserted allowing 60 days for public comment.

(b) Each licensee shall maintain records in the same units used in this part, showing the results of surveys required by § 20.201(b), monitoring required by §§ 20.205(b) and 20.205(c), and disposals made under §§ 20.302, 20.303, and deleted 20.304.<sup>1</sup>

(c) \* \* \*

\* \* \* \* \*

(3) Records of disposal of licensed material made pursuant to §§ 20.302, 20.303, and deleted 20.304<sup>1</sup> shall be maintained until the Commission authorizes their disposition.

4. A footnote is added to section 20.401 to read as follows:

<sup>1</sup>Section 20.304 provided for burial of small quantities of licensed materials in soil. Notice of its deletion appears in (Federal Register page and date to be inserted).

5. The note following Appendix C of 10 CFR Part 20 is amended to read as follows:

Appendix C

\* \* \* \* \*

Note: For purposes of § 20.203, where there is involved a combination of isotopes in known amounts, the limit for the combination should be derived as follows: Determine, for each isotope in the combination, the ratio between the quantity present in the combination and the limit otherwise established for the specific isotope

when not in combination. The sum of such ratios for all the isotopes in the combination may not exceed "1" (i.e., "unity").

(Section 161, b. and i., Pub. Law 83-703, 68 Stat. 948; Sec. 201, Pub. Law 93-438, 88 Stat. 1243, (42 U.S.C. 2201, 5841))

Dated at \_\_\_\_\_ this \_\_\_\_\_ day of \_\_\_\_\_  
197 .

For the Nuclear Regulatory Commission.

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Secretary of the Commission