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RECORD #82

TITLE: Highlights of Recent Transport Regulatory Revisions by DOT
and NRC

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
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IE INFORMATION NOTICE NO. 84-14: HIGHLIGHTS OF RECENT TRANSPORT REGULATORY REVISIONS BY DOT AND NRC

Addressees:

All NRC licensees.

Background:

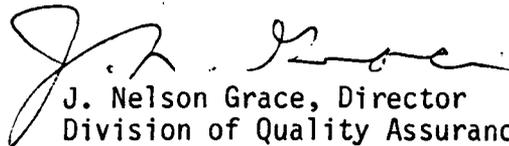
During 1983, major revisions to nuclear transportation regulations became effective in the U.S.A. Both of the major Federal agencies involved, the NRC and DOT, have published final amendments in the Federal Register which are intended to bring the nuclear transport regulations of the U.S.A. into substantial conformity with the international standards as they currently exist in the International Atomic Energy Agency's 1973 "Regulations for the Safe Transport of Radioactive Material, Safety Series No. 6," as revised. Both the DOT and NRC final amendments were based on earlier Notices of Proposed Rulemaking published by each agency in 1979.

The Statements of Consideration to those earlier notices, as well as the final amendments, contain extensive discussion and background on the specific amendments. Because of the scope and complexity of many of the changes, however, NRC feels that it would be useful and helpful to advise its licensees further on the more significant amendments. This notice, which is generally in outline form, highlights the most prominent changes to 49 CFR and 10 CFR 71. Also included is a short discussion and reference to the recent U. S. Postal Service revision to its rules on allowable mailable radioactive matter, which was also intended to conform the U.S. Postal Service requirements to the latest international standards.

Interested readers are urged to obtain and familiarize themselves directly with the revisions in the form of the Federal Register references listed in Section IV of this information notice. This notice is not intended to be complete in itself and in no case should it be considered as a substitute for the actual regulations.

Further questions on the NRC amendments may be directed to the nearest NRC Regional Office as noted in Appendix D of 10 CFR 20 or to NRC Headquarters, Office of Inspection and Enforcement 301/492-7746. Questions on the DOT revisions may be directed to 202/426-2311.

An important reference which can serve as an excellent supplement to this notice is the DOT publication "A Review of the DOT Regulations for Transportation of Radioactive Material," which has recently been revised to take account of the subject amendments. Copies of this document may be purchased from the Supt. of Documents, U.S. Government Printing Office, Washington, D.C. Single copies are available from the DOT, Materials Transportation Bureau (202-426-2301).



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Attachments:

1. Highlights of Revisions (13 pages)
2. Recently Issued IE Information Notices

HIGHLIGHTS OF REVISIONS

I. DOT Revisions (49 CFR 170-178)

1. Method of Setting Package Activity Limits ("A₁/A₂ System")

The system by which radionuclides had been divided, for the purpose of specifying the number of curies permitted in Type A packages into seven transport groups according to their radio-toxicity, has been eliminated. Under the previous system, the allowable number of curies for each radionuclide in a group of radionuclides was the same as the allowable number of curies for the most restrictive radionuclide. In some cases the least restrictive nuclides had a maximum permissible body burden more than ten times that of the most radiotoxic members.

The amendments have deleted the concept of transport groups. Instead, for each radionuclide two values, A₁ and A₂, are assigned which represent the maximum number of curies permitted in Type A packages in special form and normal form, respectively. The A₁ and A₂ values for various radionuclides are listed in §173.435. Methods by which these values were established are described in IAEA Safety Series No. 37, "Advisory Material for the Application of the IAEA Transport Regulations."

This change to the A₁/A₂ system will sometimes permit a single Type A package to replace two or more packages which previously would have been required. Conversely, some of the small Type B packages with contents near the previous lower limit for Type B could be reclassified as Type A.

For special form material, some limits are increased and some are decreased. As a result of a number of comments, DOT and NRC have retained the previously specified value for americium and plutonium contained in special form americium-beryllium or plutonium-beryllium neutron sources or in nuclear-powered pacemakers which will not be exported. Consequently, for domestic shipments the existing 20-curie limit is retained for these types of neutron sources. For import and export shipments, however, the IAEA limits, which are lower, have been adopted to foster compliance with the IAEA regulations which are applied in all other major countries. The exception for domestic special form neutron sources is found in §173.435.

In general the multiples of the A₁ or A₂ values are used to derive limited quantities, exempt articles, low specific activity limits, etc., in specific parts of the regulations.

2. Regulatory Format

- ° The shipper requirements in 49 CFR which were previously found in §173.389 through §173.398 have now been reformatted into eight new sections §173.401 through §173.478. The sequence and content of each new section is roughly equivalent to that of Sections I through VIII of IAEA Safety Series No. 6, as follows:
 - ° Scope and Definitions - §173.401 and §173.403
 - ° General Design and Authorized Packagings - §173.411 to §173.419
 - ° Limited Quantities, Articles, LSA, Empty Packagings - §173.421 to §173.427
 - ° Activity Limits for Packages and A_1/A_2 Values §173.431 to §173.435
 - ° Operational Controls - §173.441 to §173.448
 - ° Fissile Materials - §173.451 to §173.459
 - ° Testing Requirements - §173.461 to §173.469
 - ° Administrative and Quality Control Requirements - §173.471 to §173.478
- ° Although the basic format of the radioactive material portions of 49 CFR Parts 171, 172, 174, 175, 176, and 177 are unchanged, the DOT final amendments (Docket No. HM-169) do contain numerous specific revisions in those Parts.
- ° The detail of the technical requirements for Type B and fissile materials packages has been transferred entirely to NRC regulations in 10 CFR Part 71 (see §173.467).

3. Revised Radiation Level Limits

Old paragraphs - §173.393(i) and (j)
New paragraphs - §173.441; §173.403(bb)
The following changes have been made:

- Measurement of the Transport Index (TI) - TI is now measured at one meter rather than three feet from the package surface.
- Radiation level at surface of packages shipped as exclusive use - changed from 1000 mrem/hr at three feet from package surface to 1000 mrem/hr at package surface [§173.441(b)(1)]. Additionally, this limit may only be applied to packages shipped in a closed transport vehicle [§173.441(b)(1)(i)].
- Radiation level at lateral surfaces of exclusive use vehicles - changed from 10 mrem/hr at six feet to two meters from outer lateral surfaces [§173.441(b)(3)].

4. Contamination control

Old paragraph: §173.397

New paragraph: §173.443

The following changes have been made:

- Separate limits for uranium/thorium materials have been deleted.
- Method of expressing the "wipe sample" limit has been modified.
 - Old method - Limit was stated, wipe sample was then not to exceed 10 percent thereof.
 - New method - Table now expresses the "10 percent" value and consequently states the wipe sample limit.
- Packages shipped as exclusive use may still exceed regular contamination levels by a factor of 10, however, at the start of transport, levels must be at regular limit; i.e., "factor of one."
- Vehicle survey after shipment is now only required after transport of packages at the "factor of 10" limits. Previously all vehicles used for any exclusive-use shipment were required to be surveyed.
- For closed exclusive use vehicles dedicated only to radioactive materials shipments, and stenciled with "For Radioactive Materials Use Only," shipments may now contain packages bearing the the "factor of 10" limits on contamination, at start of and during transport [see §173.443(d) and 177.843(b)].

5. Low Specific Activity (LSA) Materials (§173.425)

- No major revisions to LSA requirements, as had been proposed in 1979, to conform to 1973 IAEA standards for LSA.
- NRC/DOT will propose future changes to LSA packaging requirements.

- LSA definition is now stated in terms of A_2 specific activity limits for nuclides with ranges of values, rather than transport groups, as follows:

<u>Previous transport group limits</u>	<u>New limits based on A_2</u>
0.0001 mCi/gm - Group I	0.0001 mCi if $A_2 \leq 0.05$ Ci
0.005 mCi/gm - Group II	0.005 mCi/gm if $0.05 > A_2 \leq 1.0$ Ci
0.3 mCi/gm - Group III,IV	0.3 mCi/gm if $A_2 > 1.0$ Ci

6. DOT Specification 7A (\$173.465 and \$178.350)

- Type A tests are modified somewhat:
 - Free drop distances of one to four feet are now graded on basis of weight.
 - Water spray test now precedes each test or test sequence.
 - Several other changes of testing detail.
- Existing Spec. 7A packages are "grandfathered" indefinitely.
- Engineering analysis is allowed in lieu of tests.
- Existing Spec. 7A designs may be constructed until June 30, 1985.
- Packagings designed or constructed after June 30, 1985 must conform to new Spec. 7A test requirements.

7. Use of DOT Spec. 55 Packagings [\$173.415(b) and \$173.416(a)]

- Continued use of Spec. 55 after June 30, 1985 is not authorized.
- Past DOT amendments had prohibited use of any DOT Spec. 55 constructed after March 31, 1975. Notice of Intent given at that time to eventually "phase out" DOT Spec. 55 entirely.
- Future use of Spec. 55 after June 30, 1985 only if:
 - Packaging is requalified as Spec. 7A [173.415(b)]; or
 - Packaging is certified by NRC as Type B; or
 - Spec. 55 is used as an inner component with a DOT Spec. 20 WC or 21 WC overpack [173.416(e)(f) or (g)].

8. "Empty" Radioactive Materials Packages (\$173.427)

- A new limit is established on the internal contamination of "empty" packages, set at 100 times the para 173.443(a) limits for external removable surface contamination.

- The external radiation limit on the surface of an empty package remains at 0.5 mrem/hr.
- A new DOT shipping name description is added to List of Hazardous Materials in §172.101: "Radioactive material, empty packages"

9. Proper Shipping Name (PSN) Revisions (§172.101)

- 172.101 lists about 15 different PSNs for radioactive materials.
- Deleted PSNs: "Plutonium nitrate solution" and "Radioactive device, n.o.s."
- Added PSNs: "Radioactive material, empty packages," and "Radioactive materials, instruments and articles."
- Several identification numbers are changed from NAXXXX to UNXXXX.

10. Oxidizing Radioactive Materials and Pyrophoric Radioactive Materials (§173.418 and §173.419)

- Two new regulatory provisions have been established for packaging and shipment of such materials.
- Generally Type A packaging is required.
- Passenger aircraft shipments are prohibited for either material.
- Not more than 25 pounds of oxidizing radioactive materials are allowed on cargo-only aircraft.
- Four new proper shipping names are added to §172.101.

11. Highway Route Controlled Quantity [§173.403(1)]

The term "large quantity of radioactive material" [previously paragraph 173.389(h)] has been deleted and a new, roughly equivalent term "highway route controlled quantity" has been added. The need for this term mainly relates to recently promulgated regulatory provisions (DOT Docket HM-164) for shipments which are subject to highway routing controls. Basically, a "highway route controlled quantity" is defined as:

- 3000 X A₁ for special form materials; or
- 3000 X A₂ for normal form materials; or
- 30,000 Cf, whichever is least

The carrier requirements for highway route controlled quantities are found in 49 CFR 177.825.

12. Limited Quantities, Instruments and Articles (§173.421 to §173.424)

- Package activity limits have been established in terms of sub-multiples of A_1 or A_2 .
- A new table sets limits for solids, liquids, and gases for instruments and articles (singly or as multiple instruments in a package) and packaged materials alone.
- A recent DOT rulemaking (Docket HM-166Q, Federal Register, Vol. 48, No. 127, page 30132) was published on June 30, 1983 amending the rules for packaging and shipping limited quantities of radioactive materials. Readers are encouraged to review this rulemaking if they ship limited quantities, excepted instruments, and articles. A major provision therein allows for the shipping paper and certification to be replaced by a specially worded notice which can be in or on, or accompany an excepted package of radioactive material.

13. Special Form Radioactive Materials (§173.469)

- Several changes have been made to the testing criteria:
 - A bending test for long, slender sources has been added.
 - The immersion/leaching assessment has been modified.
 - The method of limiting maximum loss by leaching has been modified.
 - Volumetric leak rate determinations are accepted in lieu of the leach test.
- A special form encapsulation must now be "so constructed that it can only be opened by destroying the capsule." NOTE: This provision now disqualifies the DOT Spec. 2R (§178.34) encapsulation as "special form".
- All existing special form sources (documented) are "grandfathered" indefinitely.
- For domestic shipments only, existing Am-Be and Pu-Be special form sources are "grandfathered" indefinitely at $A_1 = 20$ Ci.
- The special form safety analyses documentation is not required if $A_1 = A_2$ and the material has not been described as special form on the shipping papers.

14. Additional Design Requirements for Type A Packages

- The containment system features for liquids have been modified:
 - The 30 ft. drop test of the package is still required [§173.412(n)(1)].
 - If containment system is less than 50-cc volume, suitably positioned absorbents must be provided [173.412(n)(2)].
 - If containment system exceeds 50-cc Volume, either absorbents or a double containment system is required [(173.412(n)(3)].
- Containment system integrity is required under lower ambient pressure reduced from 7.3 psia (0.5 kg/cm²) to 3.5 psia (0.25 kg/cm²) [173.412(i)].
- Additional Tests for Type A packages of liquids and gases are added (173.466).
- The containment system of each package of liquids exceeding a Type A quantity, destined for air shipment, must be tested and shown not to leak under ambient pressure reduction of 0.25 kg/cm².

15. Thermal Limits

- No change to surface temperature limit of packages, e.g., in nonexclusive use shipments - 122°F, or exclusive-use shipments - 180° F (§173.442).
- A new general transportation requirement is added which applies to carriage of radioactive materials packages among other general packaged cargo. No special storage provisions are required if heat output based on package dimensions and average surface heat flux are below certain limits [173.448(b)].

II NRC Revisions to 10 CFR 71

1. Method of Setting Package Activity Limits ("A₁/A₂ System"),

§10 CFR 71, Appendix A

See discussion above under item 1 of 49 CFR revisions. Appendix A of 10 CFR 71 is identical to 49 CFR 173.435 containing the A₁/A₂ values for radionuclides.

2. Change of Format

Part 71 has essentially been totally revised. The Statement of Consideration to the August 5, 1983 revisions in the Federal Register contains a cross-index to new and old numbers. This table is included as Section V hereto. The major changes in format include:

- All previous appendices, except one, have been transferred to Subpart F.
- Several larger sections have been subdivided for clarity.
- Quality assurance requirements, formerly in Appendix E, have been shifted to Subpart H, §71.101 through §71.137.
- Package defect reporting, previously found only in 10 CFR 21, is now in 10 CFR 71. [see §71.95(b)]
- New paragraphs on radiation and contamination control [§71.87(i) and §71.47] have been added, duplicating the equivalent 49 CFR requirements.

3. Type B Package Approvals

- Previous rules made no distinction in Type B standards as related to multilateral vs. unilateral approval for purposes of international shipments.
- New rules establish criteria for Type B(M) - multilateral approvals required vs. Type B(U) - unilateral approval only required (§71.13).
- Type B(U) and Type B(M) packages are each required to meet the same level of accident resistance, except for Type B(U):
 - internal pressure must be < 100 p.s.i.
 - no reliance on pressure relief device in an accident
- As a result of new requirements, NRC staff is required to reevaluate some package certificates.

4. Quantitative Leak Rate Standards

- Previous rules specified no release from Type B packages after the normal condition tests and specified limited release (e.g., gaseous coolant) after the accident tests.
- New rule specifies 10^{-6} times A_2 release in one week after normal tests and A_2 release in one week after the accident tests [(§71.51(a))²].
- Effect of change will be to make it more difficult to demonstrate the post-test leak rates in the package approval application.
- NRC has informally applied the new leak rate standard since 1978 per NRC Regulatory Guide 7.4.

5. Low Temperature Environmental Standard [§71.71(b)]

- In previous rule:
 - -40°C used as a normal isolated environmental condition.
 - Regulatory Guide 7.8 specifies -24°C as an initial condition in combination with the mechanical test.
- In new rule:
 - -40°C used as a normal isolated environmental condition, but the:
 - -29°C is used as a initial condition to the mechanical test.
 - Result of above is more conservative than IAEA rules.

6. Air Transport of Plutonium (§71.88)

- Previous rule - Statutory restriction had been imposed by NRC Order since 1975 on air transport of plutonium except in air-crash survivable packaging or in medical devices for individual human application.
- New rule - Provisions of NRC order are replaced by 10 CFR 71 provisions requiring air crash survivable packaging, except for:
 - medical device for individual human application,
 - material of specific activity < 0.002 uCi/gram,
 - package activity less than A₂ quantity.

7. ◦ Advance Notification to State Governors of Certain Shipments (§71.97)

- Previous rule:
 - Advance notification was required for spent fuel and "large quantities" of radwaste in Type B packaging.
- New rule:
 - Advance notification is still required for spent fuel and quantities of radwaste equivalent to the old "large quantity" required to be in Type B packaging.
 - NRC rule on advance notification is not yet consistent with that of DOT which is keyed to the new "highway route controlled quantity"; i.e., 3000 A₁ or 3000 A₂ or 30,000 Ci whichever is least.

- NRC plans separate rulemaking in the near future to conform advance notification to DOT's "highway route controlled quantities."

8. Type B Accident Tests [§71.73(c)(4) and (5)]

- Tests still include an 8-hour water immersion test of three feet for fissile materials only.
- New rules require all Type B packages, fissile and non-fissile, to meet an immersion test that is equivalent to 50 feet immersion for eight hours.

9. References to DOT Requirements [71.5(a)]

- Former §10 CFR 71.5(a) required NRC licensees to meet DOT requirements in 49 CFR as they related to packaging, marking and labeling, loading and storage, vehicle placarding, monitoring requirements, and accident reporting.
- New §10 CFR 71.5(a) now itemizes more specifically by part number which of the requirements of 49 CFR that licensees must follow.

10. References to "Transport Groups" in 10 CFR 20.205

- Existing requirements for package monitoring upon receipt [see 20.205(b)(1) and (iv),(c)(1)] are based on "transport groups," per the "Table of Exempt and Type A Quantities" found in §20.205(b)(2).
- A rulechange will be processed by NRC to restate these requirements in terms of " A_1/A_2 " values rather than "transport groups."
- During the interim the NRC Office of Inspection and Enforcement has taken a flexible position, and will accept compliance with §20.205 requirements based on " A_1/A_2 " values specified in Table A-1 of 10 CFR 71 or 49 CFR 173.423.

III. U.S. Postal Service Revisions

In the 1973 IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6," paragraphs 547 and 548 address transport of radioactive materials by post. An important change to the provisions therein suggested that the previous U.S. Postal Service rules for allowable radioactive matter would be changed. In those previous rules, the rule of thumb for allowable radioactive packages was that only

packages which were excepted from DOT requirements in 49 CFR were allowable mailable radioactive matter in the U.S. mail. Therefore, if a package required a label it was non-mailable. In the 1973 revised IAEA standards, however, the allowable content of a mailable radioactive package is limited to one-tenth of the allowable exempt package quantity. In recognition of this, the U.S. Postal Bulletin of June 30, 1983 contained a change to the U.S. Postal Manual which became effective on July 1, 1983. That change meant that U.S. Postal regulations now conformed to the IAEA standards. The major substantive change therein was to limit the package activity of a mailable radioactive package containing a limited quantity or exempt device to one-tenth of the quantities specified in 49 CFR 173.423, Table 7. In the June 30 Postal Bulletin the U.S. Postal Service stated that it intends to issue a formal revision to U.S. Postal Service Publication No. 6 which deals with allowable radioactive matter.

IV. Regulatory References

- a. 49 CFR Part 100-177 "Hazardous Materials Regulations" of the U.S. Department of Transportation, revised annually as of October 1. Significant amendments to the October 1, 1982 version include:
 1. Docket HM-169, Federal Register, March 10, 1983, Part II, pp. 10218-10247, Vol. 48, No. 48.
 2. Docket HM-169, Federal Register, March 31, 1983, corrections to HM-169, pp. 13431-13432, Vol. 48, No. 63.
 3. Docket HM-169, Federal Register, July 7, 1983, corrections and clarifications to HM-169, pp. 31214-31220 Vol. 48, No. 131.
 4. Dockets HM-166Q and HM-166F, "Exemptions for Small Quantities of Material," and "Limited Quantities of Radioactive Materials," Federal Register, June 30, 1983, pp. 30132-30138, Vol. 48, No. 127.
- b. 10 CFR Part 71, "Packaging and Transportation of Radioactive Material." Federal Register, August 5, 1983, Vol. No. 152, pp. 35600-27, as corrected August 24, 1983, Vol. 48, No. 165, pp. 38449-50.
- c. U.S. Postal Service Publication No. 6, December 1975, "Radioactive Material, as amended by U.S. Postal Bulletin, June 30, 1983, pp 2-5.
- d. IAEA "Regulations for the Safe Transport of Radioactive Material," Safety Series No. 6, 1973 (as amended), IAEA, Vienna, Austria.
- e. IAEA "Advisory Material for the Application of the IAEA Transport Regulations," Second Edition, Safety Series No. 37, 1982 IAEA, Vienna, Austria.

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* Reference is to the provisions of Department of Transportation regulations in 49 CFR Part 173.
 † App. A.
 ‡ App. B.
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VI CROSS REFERENCES - 49 CFR, 10 CFR, and IAEA Safety Series No. 6

New 49 CFR §	49 CFR Heading	New 49 CFR	Related IAEA S	10 CFR Old §	71 New §
173.409	Scope	New Reference	102-104	71.2	71.0
173.403	Definitions: (a)-(z) and (aa)-(kk)	173.389	109-145	71.4	71.4
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173.415	Authorized Type A packages	173.394(a), 173.395(a)			
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173.419	Authorized packaging - oxidizing radioactive materials	New			
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173.433	Requirements for determination of A ₁ & A ₂ values for radionuclides	173.390 + new	403-411		App. A
173.434	Activity - mass relationships for uranium and natural thorium	new	Sect. IV, Tab. VIII		App. A: Table A-4
173.435	Table of A ₁ and A ₂ values for radionuclides	new	403-411	App. C	App. A: Table A-1
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173.466	Additional tests for Type A packagings designed for liquids and gases	New	715-717		
173.467	Tests for demonstrating the ability of Type B and fissile radioactive materials packagings to withstand accident conditions in transportation.	173.398(c)	718-774, 702	App. B	71.73
173.469	Tests for Special form radioactive materials	173.398(a)	732-735	App. D	71.77
173.471	Requirements for U.S. Nuclear Regulatory Commission approved packages	173.393a		71.12(b)	71.12
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LIST OF RECENTLY ISSUED
 IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
84-13	Potential Deficiency in Motor-Operated Valve Control Circuits and Annunciation	2/28/84	All power reactor facilities holding an OL or CP
84-12	Failure of Soft Seat Valve Seals	2/27/84	All power reactor facilities holding an OL or CP
84-11	Training Program Deficiencies	2/24/84	All power reactor facilities holding an OL or CP
84-10	Motor-Operated Valve Torque Switches Set Below the manufacturer's Recommended Value	2/21/84	All power reactor facilities holding an OL or CP
84-09	Lessons Learned from NRC Inspections of Fire Protection Safe Shutdown Systems (10 CFR 50, Appendix R)	02/13/84	All power reactor facilities holding an OL or CP
83-63 Supp 1	Pontential Failures of Westinghouse Electric Corporation Type SA-1	2/15/84	All power reactor facilities holding an OL Or CP
84-08	10 CFR 50.7, "Employee Protection"	2/14/84	All power reactor facilities holding an OL or CP; and NMSSS & AE
84-07	Design-Basis Threat and Review of Vehicular Access	02/03/84	All power reactor facilities holding an OL or CP; and certain fuel fabrication & processing facilities using or possessing a formula quantity of SNM
84-06	Steam Binding of Auxiliary Feedwater Pumps	01/25/84	All power reactor facilities holding an OL or CP

OL = Operating License
 CP = Construction Permit

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

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