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NUREG-0383 Volume 2 Revision 18

Directory of Certificates of Compliance for Radioactive Materials Packages

Certificates of Compliance

U.S. Nuclear Regulatory Commission

Office of Nuclear Material Safety and Safeguards



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Copies of industry codes and standards used in a substantive manner in the NRC regulatory process are maintained at the NRC Library. Two White Flint North, 11545 Rockville Pike, Rockville, MD 20852–2738, for use by the public. Codes and standards are usually copyrighted and may be purchased from the originating organization or, if they are American National Standards, from the American National Standards Institute, 1430 Broadway, New York, NY 10018–3308.

NUREG-0383 Volume 2 Revision 18

Directory of Certificates of Compliance for Radioactive Materials Packages

Certificates of Compliance

Manuscript Completed: October 1995 Date Published: October 1995

Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards U.S. Nuclear Regulatory Commission Washington, DC 20555-0001



FOREWORD

The purpose of this directory is to make available a convenient source of information on packagings which have been approved by the U.S. Nuclear Regulatory Commission. To assist in identifying packaging, an index by Model Number and corresponding Certificate of Compliance Number is included at the front of Volumes 1 and 2. An alphabetical listing by user name is included in the back of Volume 3 for approved QA programs. The reports include a listing of all users of each package design and approved QA programs prior to the publication date of the directory.

Comments which would make future revisions of this directory more useful are invited and should be directed to the Spent Fuel Project Office, U.S. Nuclear Regulatory Commission.

MODEL #	CERTIFICATE #	I	MODEL #	CERTIFICATE #
A-0109	6280	ļ.	CNS 1-13C II	9152
AI 500 SU	9006	1	CNS 1-13G	9216
AI 520	9007	1	CNS 10-160B	9204
ANF-250	9217	1	CNS 14-170 II1	9249
AP-101	9071	1	CNS 14-195-H	9094
ATR	9099	1	CNS 21-300	9096
A1W-3 CB/TS DC	9789		CNS 3-55	5805
A1W-3 HD/SB SDC	9790	1	CNS 4-85	6244
A1W-3 PUSC	9787	1	CNS 6-75	9108
B-3	6058	Γ.	CNS 6-80-2	9111
BCL-2	9068	1	CNS 6-80-2A	9111
BCL-3	9067	1	CNS 8-120A	6601
BCL-4	5950	1	CNS 8-120B	9168
BETTIS WASTE	6142	1	CNSI 14-215H A	9176
BMI-1	5957	1	DHTF	9203
BS-33-180	6722	1	DIG CB-TS	9792
BU-7	9019	1	D2G POWER UNIT	6441
BUSS R-1	9511	L	E-MEH-00-00004	9011
BW-2901	9251	t i	FL 10-1	9009
C-1	9036	1	FPD-100	9057
C-8	9128	I.	FSV-1	6346
CGN 25/35 RCDP	9794	1	FSV-3	6347
CI-20WC-2	9098	1	GE-100	5926
CI-20WC-2A	9098	1	GE-21PF-1	4909
CNS 1-13C	9081		GE-500	9049

MODEL #	CERTIFICATE #	1	MODEL #	CERTIFICATE #
GE-8500	6697	Ì	M-140	9793
HFBR UNIR CONT	9853	1	M-160	9781
HN-100 SERIES 3	9151		MCC~3	9239
HN-190-1	9086	1	MCC-4	9239
HN-190-2	9224	1	MCC-5	9239
HN-1945	9089	1	MO-1	9069
IF-300	9001	1	MODEL B	6206
INNER HFIR UN	5797	1	MODEL 1 S-6213	9186
IR-100	9157		MODEL 2 S-6213	9186
IR-50	9156		MW-3000	9030
LCG-25A	4888	1	N-55	9070
LCG-25B	4888		NAC-LWT	9225
LCG-25C	4888	1	NAC-STC	9235
LL-60-150	6568	1	NAC-1	9183
LN 10-135A	9177	1	NATICK IRRADI	5362
LN 14-170 1	9151		NCI-21PF-1	9234
LN 14-170H	9159		NFS-URANYL NIT.	5059
LN 14-170L	9159	1	NLI-1/2	9010
LN 14-170M	9159		NLI-10/24	9023
LN 14-195H	9176	1	NNFD 5X22	9250
LN 14-195L	9176		NNFD-10	6357
LN 6-80H	9179	1	NONE SPECIFIED	6406
LN 6-80L	9179	1	NPI-20WC-6	9102
LN 7-100	9178		NPI-20WC-6 MKII	9215
M-130	6003	1	NRBK-41	9221

MODEL #	CERTIFICATE #	MODEL #	CERTIFICATE #
NUPAC 10/140	9177	RA-3	4986
NUPAC 14/190H	9159	RCC	5450
NUPAC 14/190L	9159	RCC-1	5450
NUPAC 14/190M	9159	RCC-3	5450
NUPAC 14/210H	9176	RCC-4	5450
NUPAC 14/210L	9176	SENTINEL-100F	5862
NUPAC 14D-2.0	9079	SENTINEL-25A	4888
NUPAC 50-1.5L	9145	SENTINEL-25B	4888
NUPAC 50-2.5L	9145	SENTINEL-25C	4888
NUPAC 50-3.0L	9145	SENTINEL-25C3	4888
NUPAC 50-4.0L	9145	SENTINEL-25D	4888
NUPAC 6/100H	9179	SENTINEL-25E	4888
NUPAC 6/100L	9179	SENTINEL-25F	4888
NUPAC 7/100	9178	SENTINEL-8	9030
OP-100	9185	SNAP-21	5830
ORNL TRU CALIF	5740	SP-1	9248
OUTER HFIR UN	5797	SP-2	9248
PADUCAH TIGER	6553	SPEC 2-T	9056
PAS-1	9184	SPEC-150	9263
PAS-2	9181	ST	9246
PAS-2A	9181	S2C REC. COMPT.	9788
PAT-1	0361	S3G CBDCA	9786
PAT-2	9150	S3W REC. COMPT.	9788
PWR-2 CORE BAR.	9791	S4W REC. COMPT.	9788
RA-2	4986	S5W POWER UNIT	5580

MODEL #	CERTIFICATE #	1	MODEL #	CERTIFICATE #
S5W REC. COMPT.	9788	1	10-142	9208
S5W REFUEL.SRCE	5757	l	10-142A	9073
T-2	5607	1	100	9127
T-3	9132	l.	100A	9127
TN-BRP	9202	1	110G-A	9247
TN-FSV	9253	l	125-B	9200
IN-RAM	9233	1	14-215	9222
TN-REG	9206	1	1500	5939
TN-8	9015	1	181361	5796
TN-8L	9015	1	181375	5796
TN-9	9016		2.7 NEW FUEL	5894
TRIGA-I	9034	1	20	9126
TRIGA-II	9037		20A	9126
TROJAN PRESSUR.	9260	1	200	9127
TROJAN STEAM	9259	1	200A	9127
TRUPACT-II	9218		2000	9228
UC-609	9932	l	235R001	6386
UNC-2600	5086	1	3-82B	5574
UNC-2901	6294	1	3206B	9167
URIPS-8A	6786	L	3218	9167
URIPS-8B	6786	1	3227B	9167
UX-30	9196	1	4.5 TON CF	6642
WAPD-40	5874	1	40G-A	9254
YNPS STEAM GEN.	9256	1	420	9245
10-135B	9210	1	50	9126

MODEL #	CERTIFICATE #	1	MODEL #	CERTIFICATE #
50A	9126	1	680BE	9035
51032-1	6581	1	680E	9035
51032-2	9252	1	683	9053
589	9139	1	684	9028
5979	5979	1	684A	9028
5984	5984		684AE	9028
6400	6400		684B	9028
650	9032	1	684BE	9028
660	9033	1	684E	9028
660A	9033	1	702	6613
660AE	9033	1	715	9039
660B	9033	1	741	9027
660BE	9033	1	741A	9027
660E	9033	1	741AE	9027
6717-B	6717	1	741B	9027
676	9029	1	741BE	9027
676A	9029	1	741E	9027
676AE	9029	1	770	9148
676B	9029	1	771	9107
676BE	9029	1	814A	51.49
676E	9029	1	820	9137
680	9035	1	850	9147
680A	9035	1	855	9165
680AE	9035	1	864	9166
680B	9035	1	865	9187

MODEL #	CERTIFICATE #	MODEL #	CERTIFICATE #
900	9141	1	
920	9143	A the second second	
927A1	6078		
927C1	6075		

0 CFR 71		FOR RADIOACTI	VE MATERIALS PACKAGES		
1 & CERTIFICATE NUR		D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d.PAGE NUMBER	e. TOTAL NUMBER PAG
	0361	5	USA/0361/B(U)F	1 1	44
of Federal Reg	ulations, Part 71, "Package does not relieve the con	ging and Transportation of Ra	cribed in Item 5 below, meets the applicable dioactive Material." any requirement of the regulations of the U.1 untry through or into which the package will	5. Department of Trans	
U.S. Nucle Commissi Washington	ar Regulatory on	EAR	OF THE PACKAGE DESIGN OF APPLICATION AND IDENTIFICATION OF REPORT OF APPLICA NUREG-0361; Safety Analy Plutonium Air Transporta No PAT-1, as supplement Thumber 71-0361	vsis Report f able Package	or the Model
4. CONDITIONS This certificate is	conditional upon fulfilling	the requirements of 10 CFR	Part 71, as applicable, and the conditions i	specified below.	
(a)	stainless are seale inside th The AQ-1 inches lo consist of within do closed. distribut	on ess steel contain steel and redwo ed within a stain be containment ver overpack is a ri ong by 24-1/2 inco of approximately buble stainless so A copper heat co er are encased w	ght circular cylinder, a hes outside diameter. T 8 inches of grain orient teel drums. The ends of inducting element and an ithin the redwood.	AQ-1). The designated P pproximately he walls of ed redwood e the drums a aluminum loa	contents C-1) 42-1/2 the overpack ncased re doubly d
	length by of the ve vessel is hemispher	6-3/4 inches ou essel is approxim a right circula rical ends. The doubly sealed w	tel is approximately 8-1/ itside diameter. The min hately 1/2 inch. The int or cylinder, 4-1/4 inches vessel is closed by 12, with a copper gasket and	imum wall th cerior cavity diameter, w 1/2-inch dia	ickness of the ith meter

NRC FORM \$15A (6-53) CONDITIONS (continued)

Page 2 - Certificate No. 0361 - Revision No. 5 - Docket No. 71-0361

- 5. (a) Packaging (continued)
 - (2) Description (continued)

The weight of the package is approximately 500 pounds. The weight of the TB-1 containment vessel, when loaded with 4.4 pounds of contents is approximately 41.7 pounds.

(3) Drawings and Specifications

The Model No. PAT-1 packaging is fabricated in accordance with the drawings and specifications in Section 9.0 of the Safety Analysis Report, NUREG-0361 as supplemented by Issue B of Drawing Nos. 1004, 1009, 1013, 1016, 1017, 1018, 1019, 1020 and 1022.

- (b) Contents
 - (1) Type and form of material

Plutonium oxide and its daughter products, in any solid form. The plutonium oxide may be mixed with uranium oxide and its daughter products, in any solid form.

- (2) Maximum quantity of material per package and additional permissible contents
 - Maximum 2.0 kg total radioactive material, plus: maximum 16 grams of water and 10 grams of polyethylene or polyvinylchloride bagging material. The maximum decay heat load of the contents may not exceed 25 watts.

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(ii) Maximum 200 grams total radioactive material, plus: maximum one gram of water, maximum 200 grams of metal canning material (in addition to the PC-1 product can, Drawing No. 1024), maximum 64 grams of aluminum foil or heneycomb (in addition to the top spacer, Drawing No. 1015), maximum 175 grams of glass and maximum 35 grams polyethylene or polyvinylchloride bagging material. The maximum decay heat load of the contents may not exceed 25 watts.

(c) Fissile Class:

- I
- The PC-1 product can (Drawing No. 1024) and the top spacer (Drawing No. 1015) need not be used when the contents include 20 curies or less of plutonium.
- Prior to first use, each packaging shall meet the acceptance tests and standards specified in Subsection 8.1 and Section 9.0 of the Safety Analysis Report.
- 8. Prior to each shipment, the package shall meet the tests and criteria specified in Subsection 8.2 of the Safety Analysis Report.
- The package shall be prepared for shipment and operated in accordance with the procedures specified in Section 7.0 of the Safety Analysis Report.

NRC FORM	618A		CONDITI	ONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
	3 - Cer	tificate No.	0361 - Revision	No. 5 - Docket	No. 71-0361
10.	The system	tems and comp a specified i	onents of each p n Subsection 8.3	backaging shall B of the Safety	meet the periodic tests and Analysis Report.
11.			ce of the packag y Analysis Repor		n accordance with Sections 8.0
	maintai	ned, and repa		nce with a qual	ted, accepted, opérated, ity assurance plan approved by
					shipper shall ensure observance oment of plutonium by air:
	100	cation that i	must be stowed a s possible for c owed aft of the	argo of its siz	on the main deck in the aft-most e and weight. No other type
	the res to	aircraft. traint again	The tie-down sys st the following the aircraft: U	tem must be cap in rtia forces	ed-down to the main deck of able of providing package acting separately relative ward, 9g; Sideward, 1.5g;
	(c) Car tra	go which bea insported abo	rs one of the fo ard an aircraft	llowing hazardo carrying a pack	us material labels may not be age(s):
			B C sly Combustible When Wet	Nop-Flammable 1 Flammable 1 Flammable 6 Qxidizer Corrosive	tquid a
	Thi as:		n does not apply	to hazardous m	aterial cargo labeled solely
		Radioactiv Radioactiv Radioactiv Magnetized	e II e III	Poison Poison Gas Irritant Etiologic A	gent
14.	The pack general	age authoriz license prov	ed by this certi isions of 10 CFR	ficate is hereb §71.12.	y approved for use under the
15.	The pack of pluto	age authorizo nium by air.	ed by this certi	ficate is hereb	y approved for transportation
16. 1	Expirati	on date: Sep	otember 30, 1998	•	

MU.M.

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 4 - Certificate No. 0361 - Revision No. 5 - Docket No. 71-0361

REFERENCES

Safety Analysis Report for the Plutonium Air Transportable Package Model Number PAT-1, NUREG-0361, June 1978.

Sandia Laboratories application dated February 20, 1980. Supplements dated: July 27, 1990 and July 20, 1993.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

CLEAR R. Chappell, Section Leader 8283 Cask Certification Section Storage and Transport Systems Branch Division of Indestrial and

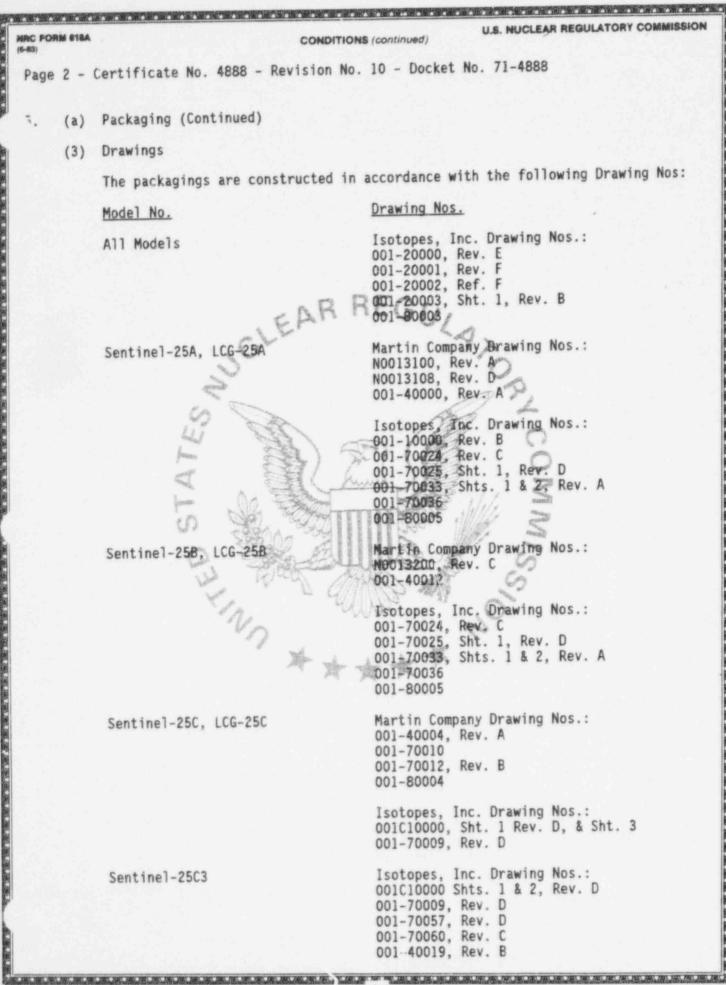
Medical Nuclear Safety, NMSS

SEP 2 7 1993

Date:

RC FORM 6 5-85) 6 CFR 71	518		TE OF COMPLIANCE	LEAR REGULATORY COMMISSIO
& CERTIFIC	ATE NUMBER	6. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/4888/B()	d PAGE NUMBER . TOTAL NUMBER PAG
of Fed	ertificate is issued to certify that th leral Regulations, Part 71, "Packag	ing and Transportation of Rac	cribed in Item 5 below, meets the applicable safet dioactive Material." ny requirement of the regulations of the U.S. De ntry through or into which the package will be	partment of Transportation or other
	TFICATE IS ISBUED ON THE BASIS C TO (Name and Address)	F A SAFETY ANALYSIS REPORT	OF THE PACKAGE DESIGN OR APPLICATION	t ,
Technic 6000 Pa	ment of the Air For cal Operations Divi atrol Road lan AFB, CA 95652-1	sion/CC d	eledyne Energy Systems app ated April 26, 1985 and Au s supplemented. 71-4888	
CONDITIO	INS ficate is conditional upon fulfilling	the requirements of 10 CFR	Part 71, as applicable, and the conditions spec	ified below.
ý.	19	2	0	
	60	San	22	
(a) Pa	ackaging	Ill -		
(1	1) Model No Sen	tinel-25A, LCG-2 tinel-25C, LCG-2	5A; Sentine1-25B, LCG-25B; 5C; Sentine1-25C3, -25D, -	25E, and -25F
(2	2) Description	Se Ban		
	main housing, t	ungsten shield,	generators. The major con housing flange, and electr weights for the various Mod	ical connectors.
	Model No.	V E	imensions (inches)	Weight (1bs.)
	Sentinel-25A, L Sentinel-25B, L Sentinel-25C, L Sentinel-25C3 Sentinel-25D Sentinel-25E Sentinel-25F	CG-258	25 OD x 25 25 OD x 25 24 OD x 32 24 OD x 32 25 OD x 27 25 OD x 34 24 OD x 32	3000 3300 2000 1300 3300 4200 1400

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NRC FORM 612 (6-83)	A	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
	Certificate No.	4888 - Revision No. 10 - Docket	No. 71-4888
	Sentinel-25D	Martin Compa 001-80004	ny Drawing No.
		001D10000 SH 001-70036 001-70033 Sh 001-70025 Sh 001-70024, R 001-40015, R 001-40006, R	lev. C
	Sentinel-25E	001-70039 B 001-70025, S 001-70024, R	ht. 1, Rev. D & Sht. 2 ev. 6 hts. 2 & 2, Rev. D
	Sentine1-25F	001F10000; S 001-70070, R 001-70060, R 001-70009, R 001-40025; R	ev. C 🛁
(b)	(1) Type and	form of material	S
	(i) Stron Unilo	ntium 90 titanate doubly encapsul by fuel capsule which meet the re pactive material; or	
	encar C-276	No. Sentinel-25F may have, stro osulated in Hastelloy or Uniloy for 7 liner which meets the requirement oactive material.	uel capsule, with a Hastelloy
	(2) The maximu	um quantity of material per packag	ge
	125,000 cu	uries	
6. A ba suff met.	icient separatio	ng the free circulation of air) mu on distance to ensure that the rec	ust be provided with quirement of §71.43(g) will be
		1	

	IN 616A	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
^{es)} Page	4 - Certificate No.	4888 - Revision No. 10 - Docket	No. 71-4888
7.	Eye-bolts shall be r tie-down devices of	removed or covered during transp packages.	ortation to prevent their use a
8.	be operated, prepare	requirements of Subpart G of 10 ed for shipment and maintained i and Maintenance Programs:	CFR Part 71, each package shall n accordance with the following
	Model No.	Operating Procedures	Maintenance Program
	Sentinel-25A, LCG-25	Appendix E of TES-3206, as revised	Appendix F of TES-3206, as revised
	Sentinel-25B, LCG-25	Appendix & of TES-3809,	Appendix F of TES-3209, as revised
	Sentinel-25C, LCG-25	Appendix E of TES-3210, as revised	Appendix F of TES-3210, as revised
	Sentinel-25C3	Appendix E of TES-3211, as revised	Appendix F of TES-3211, as revised
	Sentinel-25D	Appendix E of IES-3212, as revised	Appendix F of TF° 3212, as revised
	Sentinel-25E	Appendix E of TES-3213, as revised	Appendix F of TES-3213, as revised
	Sentinel-25F	Chapter VIII of TES-3202, as revised	Chapter IX of TES-3202, as revised
9.		zed by this certificate are her visions of 10 CFR §71.12.	eby approved for use under the
10.	Expiration date: De	ecember 31, 1996.	0
		REFERENCES	
Tele	dyne Energy Systems a	applications dated April 26, 198	5; and August 19, 1986.
Tele	dyne supplements date	ed: November 3, 1986; September	17 and December 2, 1991.
Depa	rtment of the Air For	ce supplement dated: November	12, 1993.
		FOR THE U.S	. NUCLEAR REGULATORY COMMISSION
		Cossi	P. Chappell
		Cass R. Cha Cask Certif Storage and	ppell, Section Leader ication Section Transport Systems Branch Industrial and
			uclear Safety, NMSS
Dert	DEC 1 6 1993		
Date		B	

NRC FORM (8-85) 10 CFR 71	6 618				ATE OF COM	PLIANCE	NUCLEAR REGUL	
1 CERTIF	CATE NU	MBER		D. REVISION NUMBER C. PACKAGE IDENTIFICATION NUMBER d. PAGE				. TOTAL NUMBER PAG
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of Fr	certificat ederal Re	e does not reli	71, "Packagin eve the consid	packaging and contents o ig and Transportation of pror from compliance with the government of any o	Radioactive Material'	the regulations of the L	J.S. Department of Tran	
Gener P.O.	ral E Box	ectric	Company	Ge	LE AND IDENTIFICATIO	ic Company ap	cation oplication da	ted
4. CONDITI This cet	ONS tificate is	conditional u	pon tultilling	horequirements of 10 C	FR Part 71, as applica	bie, and the cognitions	s specified below.	
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(a) F	Packag	ing	ES.	20		m?	L	
		lodel No		1PF-2)	50 (R.	C	
((2) [escript	TON	, 31(kund)]	1 3	0	
	t t t	he over hells. ire-res iccordan tepped	nack is The ann istant p ce with and garsk	inch drameter a night curcu afar volume b henore foam USAECC pectra eted horizont	ar cylinder eween the's approximatel atting Sea affeint pep	Constructed hells is fill y 6 inches th Rev. 1, and wis the teo	of two stain with wood tck. The fo Supplement K half of the	less steel blocks and am is in /TL-729. A overpack to
		/4-inch	bolt/my by 95-	the base. The tywasher asset 1/2 inches lot	e/package mblies. The ng. Maximum	overpack is	ecured with f approximatel of the pack	y 43-5/8
((3) [)rawings		A	XX,			
	1	rawing 1 the 8" x	No. 769E 2.5" ti	constructed 237 - Sheet N e-down suppor e exterior shi	os. 1 and 2, t channel ma	Rev. 4. In y be from 43	addition, th to 55 inches	e length of

NRC FORM	616A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
Page	2 -	Certificate No. 4909 - Revision No. 13 - Docket No. 71-4909
(b)	Cont	ents
	(1)	Type and form of material
		Uranium hexafluoride enriched in the U-235 isotope.
	(2)	Maximum quantity of material per package
		(i) Model No. 30A cylinder: 4,950 pounds ${\rm UF}_6$ enriched to not more than 5 w/o in the U-235 isotope.
		(ii) Model No. 30B cylinder 5, PP EGULA w/o in the U-235 is option 5, PP EGULA ile Class mum transport is dex 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0
(c)	Fiss	ile Class CLL A
		mum transport index 5.0
6.	In a	addition to the requirements of Subpart G of 10 CFR Part 71:
	(a)	Prior to each shipment, the overpack gasker must be ispected. These gaskets must be replaced if inspection ship any defects or every 12 months, whichever occurs first function and the second states of every 12 months,
	(b)	Each packaging must meet the Acceptance and Maintance Program of Sections of and of the sections of a section of the section o
	(c)	The package shall he operated for shippent and operated in accordance with the Operating Processing of State operation application.
	(d)	The loaded cylinder must be trimmed without a valve protector. The valve protector must be replaced in accordance with normal handling practice when the cylinder is tempved from the overpack.
	(e)	Prior to each shipment, the stainless steel components of the packaging must be visually inspected. Pack ring in which stainless steel components show pitting, corrosion, cracking, or pinholes are not authorized for transport.
7.	(a)	For packagings which are not seal welded, the joints between the inner and outer shells (ends) and the side (and) panel moldings must be silicone sealed. The inner and outer overpack gaskets must cover side (end) panel molding joints (unless seal welded). Except for joints covered by a glued down gasket, visually inspect all silicone sealed joints and maintain in good repair prior to each shipment or outside storage (loaded or empty).
	(b)	All body seams and joints for the inner and outer shells (ends) and the side (end) panel moldings must be continuous welds. Welding must be by a fusion process in accordance with the American Welding Society Code or American Society of Mechanical Engineers' Code.
-		

NRC FORM 618A (6-83)	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
Page 3 - Certificate No. 4	4909 - Revision No. 13 - Docket	No. 71-4909
maintained in accordar Cylinders must be fabr	UF ₆ cylinders must be fabricated nce with American National Stand ricated in accordance with Sect y of Mechanical Engineers) Boild bed.	dard N14.1 (1990 version). ion VIII, Division I, of the
presence and condition inserting a probe thro presence and rigidity inspection must be per		tion shall consist of lid and base to confirm the ings which require drying, the
 Shackles are for lifti package during transport 	ing on E ARatk Pes Fru G 64 pe	used for tying down the
11. The package authorized general license provis	by this certificate is hereby this of 10 CFR §71.12.	appoved for use under the
12. Expiration date: Gove	REFERENCES	1 CO
General Electric Company a	ppliced of the ter Withour 19	94. X
Supplement dated Outper &	1994 Good Barrier Constant	AR REGULATORY COMMISSION
41	L Case & Chappell	hopell
	Cass R. Chappell, Cask Certification Storage and Cansp Division of Indust	ort Systems Branch
NOV 3 0 1994 Date:	Medical Nuclear	Safety, NMSS
DUCCT		
		*

RC FORM 618		CERTIFICA	TE OF COMPLIANCE	NUCLEAR REGULA	TORY COMMISSI
		Th REVISION NUMBER	C PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	6. TOTAL NUMBER PA
& CERTIFICATE N	UMBER 4986	31	USA/4986/AF	1	4
of Federal F	egulations, Part 71, "Package	ng and Transportation of P	escribed in Item 5 below, meets the applicable ladioactive Material." any requirement of the regulations of the U puntry through or into which the package w	J.S. Department of Tran	
B. ISSUED TO IN	Procession and Address) Tectric Company 780		And IDENTIFICATION OF REPORT OF APPLICATION Ageneral Electric Compan March 17, 1992, as supp REE G71-4986	y application	n dated
This certificate	is conditional upon fulfilling	the requirements of 10 CF	R Part 71, as applicable, and the condition	s specified below.	
(a) Pack	aging 6	4		6	
(1)	Model Nos RA	-2 and RA-3	120	chan.	
(2)	rectangular box	les consisting	shipping container. Pac of an outer container of ated by cushioning mater	wooden const	right truction and
	is positioned with the second	vithin a Madel nches by 207 in r containers by losure is accom f (breather) va i differential.	11-1/2 inches by 18 inch No. RA-3 wooden outer co ches long. Eushioning f phenolic impregnated ho plished by bolts, latche lve is provided on the i The total weight of th	is provided be neycomb and e es, or equivation	etween the ethafoam, or lent. A er, and is
(3)	Drawings				
	The packagings GE Drawing Nos		d in accordance with the	e following	
	769E229, (for c 769E231,	Revision 6, Mod ontents describ Revision 4, Mod	el RA-3 Outer Container lel RA-3 Outer Container bed in 5(b)(l)(vii) and s lel RA-3 Inner Container lel RA-2 Inner Container	5(b)(l)(viii)	only)
(4)	Product Contai	ner			
	closure. Cont	edule 40, stair ainer shall be ess than 1475°f	less steel pipe fitted vented in the event it of .	with screw ty contains mate	pe or flang rials which

NRC FORM 618A (8-83)

CONDITIONS (continued)

Page 2 - Certificate No. 4986 - Revision No. 31 - Docket No. 71-4986

- 5. (b) Contents
 - (1)Type and form of material
 - (i) Unirradiated UO, fuel assemblies with a maximum average U-235 enrichment of 3.2% by weight. Assembly rods are clad with a nominal 0.032-inch thickness of Zircaloy and have a nominal fuel pellet outside diameter of 0.410 inch. Each assembly, made up of a maximum 8 x 8 square array of fuel rods, must have a maximum fuel length of 174 inches with a maximum fuel cross-sectional area of 25 square inches.
 - (ii) Unirradiated UO, fuel assemblies with a maximum average U-235 enrichment of 2.7% by weight. Assembly rods are glad with a nominal 0.032-inch thickness of Zircaloy and have a nominal fuel pellet outside diameter of 0.490 inch. Each assembly, made up of a maximum 7 x 7 square array of fuel rods, must have a maximum fuel length of 174 inches with a maximum cross-sectional area of 25 square inches.
 - (iii) Unirradiated UO, fuel rods with a maximum U-235 envichment of 6.5% by weight, Rods are clad with Zircaloy, Incaloy, Inconel or stainless steel such that the ratio of clad to fuel cross-sectional area be at least 0.26. and have a maximum fuel pellet outside diameter of 0.508 inch. Each rod must have a maximum length of 174 inches. The clad rods must be bundled (contained) in the product container described in 5(a)(4).
 - (iv) Unirradiated BO2 fuel assemblies in an 8 x 8 square array with a maximum fuel cross-sectional area of 25 square inches, maximum fuel length of 174 inches, and a maximum enrichment of 5% U-235. Pellet and cladding dimensions and nuclear poison specifications are to be in accordance with the limits established in Section 8.0, Appendix A, Section 1.0 of General Electric application dated March 17, 1992.
 - (v) Unirradiated VOs fuel assemblies in a 9 x 9 square array with a maximum nominal U-235 enrichment of 4.0% by weight and a maximum fuel length of 174 inches. Each fuel assembly may contain up to 74 fuel rods with a nominal pellet diameter of 0.376 inches as described in Section 7.0, Appendix C of General Electric application dated March 17, 1992.
 - (vi) Unirradiated UO, fuel assemblies in an 8 x 8 square array with a maximum fuel cross-sectional area of 25 square inches and a maximum fuel length of 174 inches. The maximum U-235 enrichment in the assembly does not exceed 4.025% by weight. Nuclear poison specifications are to be in accordance with the requirements in Section 8.0, Appendix D, of General Electric Company application dated March 17, 1992. Pellet and cladding dimensions are in accordance with the limits established in Section 8.0, Appendix A of General Electric application dated March 17, 1992.

NRC FORM 616A (6-63) CONDITIONS (continued)

Page 3 - Certificate No. 4986 - Revision No. 31 - Docket No. 71-4986

5.(b)(1) Contents (Continued)

- (vii) Unirradiated UO₂ fuel assemblies with a maximum U-235 enrichment of 5.0% by weight, and a maximum average U-235 enrichment within any axial zone of the assembly of 4.6% by weight. Each assembly is made up of 74 full and partial length fuel rods in a 9 x 9 square array, and has a maximum fuel length of 150 inches and a maximum fuel cross-sectional area of 25 square inches. Maximum pellet diameter, minimum clad thickness, poison rod specifications, and partial length rod specifications are in accordance with General Electric supplement dated April 16, 1992.
- (viii) Unirradiated UO, fuel assemblies with a maximum U-235 enrichment of 4.94% by weight. Each assembly is made up of 92 full and partial length fuel rods in a 10 x 10 square array with a maximum fuel length of 174 inches and a maximum fuel cross-sectional area of 25 square inches. Fuel pellet diameter, minimum clad thickness, and partial length rod specifications are in accordance with General Electric supplements dated October 5 and November 18, 1992.
- (2) Maximum quantity of material per package
 - (i) For the contents described in 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1)(iv), 5(b)(1)(vi), 5(b)(1)(vii):

Two (2) fuel assemblies.

(ii) For the contents described in 5(b)(1)(iii):

Two (2) fuel bundles.

(A bundle is defined as an arrangement of rods which are either contained within a product container or strapped together.)

(iii) For the contents described in 5(b)(1)(v) and 5(b)(1)(viii):

One (1) fuel assembly

(c) Fissile Class

- 6. Each fuel assembly must be unsheathed or must be enclosed in an unsealed, polyethylene sheath which may not extend beyond the ends of the fuel assembly. The ends of the sheath may not be folded or taped in any manner that would prevent the flow of liquids into or out of the sheathed fuel assembly.
- 7. Except for the contents described in 5(b)(1)(vii), polyethylene shipping shims may be inserted between rods within the fuel assemblies up to a maximum of 0.20 grams H₂O hydrogen equivalent per cubic centimeter averaged over the assembly. For contents described in 5(b)(1)(vii), polyethylene shims may be inserted between rods within the fuel assembly up to a maximum of 0.10 grams H₂O hydrogen equivalent per cubic centimeter averaged over the assembly, and polyethylene holders with a maximum average thickness of 0.338 cm, may be placed surrounding the fuel assembly up to a maximum of 0.13 grams H₂O hydrogen equivalent per cubic centimeter averaged over the assembly.

NRC FORM 515A (6-53) CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION

Page 4 - Certificate No. 4986 - Revision No. 31 - Docket No. 71-4986

- 8. In lieu of the product container specified in 5(a)(4), except for UO₂ fuel rods with U-235 enrichment greater than 3.2%, clad rods must be bundled (bound with steel strappings at two or more locations) with a maximum cross sectional area of 20.0 square inches. The total breaking strength of the strapping must be 30 times the weight of the bound rods.
- 9. The maximum spacing between adjacent rods within the bundle must be 0.012 inch. The spacing must be maintained by the product container wall, metal strappings or peripheral metallic dunnage with a melting point greater than 1475°F within the bundle.
- The contents described in 5(b)(1)(vil) and 5(b)(1)(vili) may be shipped in a Model RA-3 outer container fabricated in accordance with GE Drawing No. 769E229, Revision 6.
- Maximum average enrichment means the highest enrichme averaged over any axial zone of the assembly.
- 12. In addition to the requirements of Subpart G of 10 CFR Part 71, each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 6 of the application, and the package must be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 6 of the application.
- The package authorized by this certificate is hereby approved for use under the general license provisions of ID CFR §71.12.
- 14. Expiration date: October 31, 1997.

REFERENCES

General Electric Company application dated March 17, 1992.

General Electric Company supplements dated: April 15, October 5, and November 18, 1992; and March 18, 1993.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

nancy Dejord

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

Date:

	TO REVISION NUMBER	VE MATERIALS PACKAGES		
	11	USA/5059/AF	d PAGE NUMBER	A. TOTAL NUMBER PA
ions, Part 71, "Packagin	ng and Transportation of ha	L cribed in Item 5 below, meets the applicable s disactive Material." any requirement of the regulations of the U.S untry through or into which the package will	Department of Trans	
sued on the Basis of (Address) el Services, 337, MS 123 37650		OF THE PACKAGE DESIGN OF APPLICATION AND IDENTIFICATION OF REPORT OF APPLICA Nuclear Fuel Services dated March 27, 1981, REC 71-5059	, Inc., appl	
ditional upon fulfilling	the requirements of 10 CFF	Part 71, as applicable, and the conditions	specified below.	
nging S	NFS Unany Nitr	ate Tank Frailer	2	
Description Bulk liquid	insulated cargo	tank trailer. The 3,800 on of type 304L stainless	O gallon tan s steel.	k trailer
Drawing The tank tra MC-312.	iler is constru	cted in accordance with t	DOT Specific	ation
ents	n	00		
Uranyl nitra the uranium	must not exceed	id solution. The maximum 20% by weight. The U-22 grams per liter.	m U-235 enri 35 content o	chment in f the
The UO ₂ (NO ₃) concentratio	2-6H_0 content h will be norma	ust not exceed 357 grams must not exceed 50 weigh 11y 0.4M. The freezing than 32°F.	t percent.	The HNO,
	concentratio	concentration will be norma	concentration will be normally 0.4M. The freezing the solutions must be less than 32°F.	concentration will be normally 0.4M. The freezing temperature

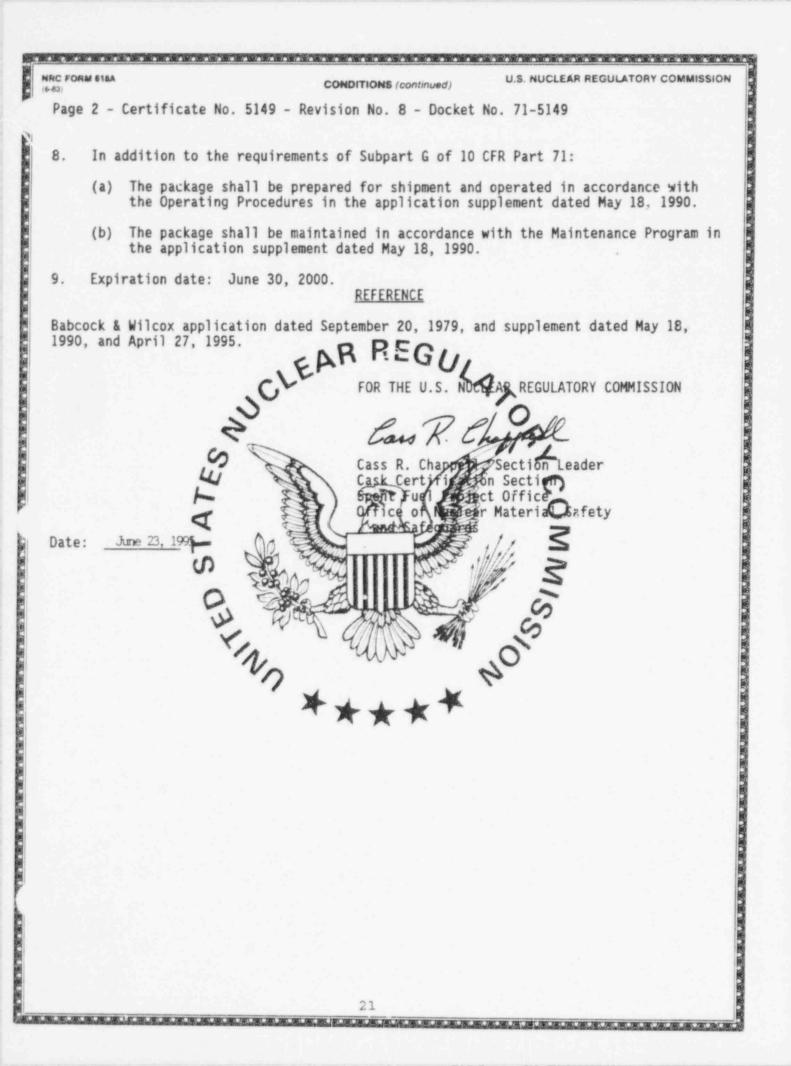
NRC P	CONDITIONS (continued)
Page	2 - Certificate No. 5059 - Revision No. 11 - Docket No. 71-5059
-	
5.	(b) Contents (continued)
	(2) Maximum quantity of material per package
	Not more than 45,600 pounds net weight of uranyl nitrate acid solution.
	(c) Fissile Class III
	Maximum number of packages per shipment One
6.	The solution must be at a temperature of 68°E or above at the time of packaging.
7.	Prior to delivery to a carrier for transport, for 0-235 enrichments greater than 4% by weight, the shipper must ensure that at no point along the proposed shipping route that the ambient temperature will be less than 32°F. In the event freezing weather is encountered, the administrative procedures and controls as specified in Nuclear Fuel Services, Inc., application dated March 27, 1981, must be complied with for all U-235 enrichments.
8.	In addition to the requirements of Subpart G of 10 CFR Part 71:
	(a) Each package must be acceptance tested and maintained in accordance with Section 8.0 of the application, as supplemented.
	(b) Each package shall be operated and prepared for shipment in accordance with the Operating Procedures in Section 7.0 of the application, as supplemented.
9.	The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
10.	Expiration date: August 31, 1996.
	REFERENCES
Nuc1	ar Fuel Services, Inc., application dated March 27, 1981.
Supp	ements dated: August 6, 1986, and July 18, 1991.
	FOR THE U.S. NUCLEAR REGULATORY COMMISSION
	SEP 8 1991 Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS
te	

IRC FORM 618 8-86) 0 CFR 71		ICATE OF COMPLIANCE		TORY COMMISSI
LA CERTIFICATE NUMBER	D. REVISION NUMBER	PACKAGE DOBE BUT HUMBER	d. PAGE NUMBER	. TOTAL NUMBER PAR
of Federal Regulations	a, Part 71, "Packaging and Transportation of relieve the consignor from compliance	nts described in Item 5 below, meets the applicable of Radioactive Material." with any requirement of the regulations of the U. ny country through or into which the package wi	S. Department of Trans	
. THIS CERTIFICATE IS ISSUE	D ON THE BASIS OF A SAFETY ANALYSIS RE	EPORT OF THE PACKAGE DESIGN OR APPLICATION TITLE AND IDENTIFICATION OF REPORT OR APPLICA	4 71/241	
A ISSUED TO (Name and Add Babcock and P.O. Box 78 Lynchburg,	Wilcox	Babcock and Wilcox Compa dated November 29, 1993. RREGU, 71-508	ny applicatio	DN
4 CONDITIONS This certificate is condition	onal upon fulfilling the requirements of 10	0 CFR Part 71, as applicable, and the conditions	specified below.	
5. (a) Packa (1) (2) (3)	Model No.: UNE-2000 Description The inner container, 1 2-5/8" high k 7" wide 22-142" ID bosto2-142 formed by nice 22-142 formed by nice 23-142 approximately 12" apa plates by angle irons 14-gauge brum lid wit one of which is threa Drawing	The agter tritainer close the local of the stand of the s	tainer is su by an inser cel plates, through the c sure is made ng with drop r bolt.	pported in a table cage spaced enter of the with a forged lugs
	The packaging is cons Drawing No. B-2600-2,	structed in accordance with , Sheets 1 through 6, Rev. 3	Thomas Gutma 3.	n Consultan
(b) Cont	ents			
(1)	Type and form of mate	arial		
	Unirradiated, uranium be enriched to any de	m-zirconium, Naval fuel elem egree in the U-235 isotope.	ments. The u	ranium may
(2)	Maximum quantity of m	material per package		
	U-235 to the weight of	of U-235 per package. The m of U-235 plus zirconium sha e contents shall not exceed	11 not exceed	weight of 0.074.

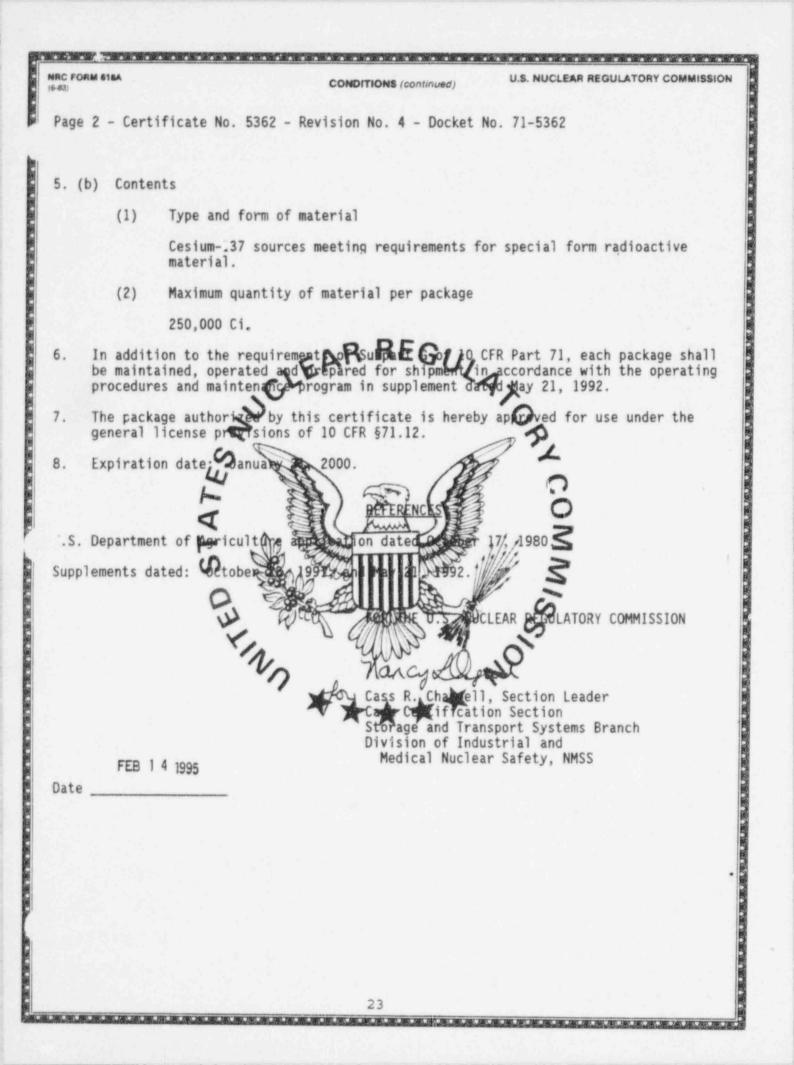
HRC FOR	A818 N				CONDITIONS (continued)	u	I.S. NUCLEAR REGULATORY COMMIS	SION
ş	age	2 - (Certificate N	o. 5086	- Revision No. 9 - 1	Docket	No. 71-5086	
	5.	(c)	Fissile Cl	ass			II	
			Minimum Tr	ansport	Index		1.4	
6	j.	Draw	wing No. D-20	354-6,		. 4, an	ited Nuclear Corporation d constructed before 995.	
7		In a	addition to t	he requ	irements of Subpart (G of 10	CFR Part 71:	
		(a)	The packag with Chapt	e must er 7 of	be prepared for shipn	nent an	d operated in accordance	
		(b)	The packag Chapter 8	of the	be acceptance tested application.	andma	intained in accordance wi	th
8		The the	package and general lice	prized l	by this certificate i visions of 10 CFR §71	s here	by approved for use under	
9		Expi	iratioHoate:	Constant of	27-31, 1999. REEERENCES	- Annan	CON	
В	abco	ck an	d Wilcox app	Satio	A Printing	1993.	MA	
S	uppl	ement	ts Dated: Sep		19, task and January	A.	95. S REPLATORY COMMISSION	
			Y1	Va	a guilton R.	chap	See	
				"	, Cask Certifica	tion Se ansport	t Systems Branch	
		JA	N 2 6 1995		Medical Nucl	ear Sat	fety, NMSS	
D	ate:			636)				
					19			

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RC FORM 818				TE OF COMPLIANCE	NUCLEAR REGULATORY COMMISS
& CERTIFICATE N	UMBER	5149	D. REVISION NUMBER	C PACKAGE IDENTIFICABON NUMBE	R d. PAGE NUMBER . TOTAL NUMBER PA
of Federal F	egulations,	Part 71, "Packag	ing and Transportation of Ri ignor from compliance with	idioactive Material."	Die safety standards set forth in Title 10, Code U.S. Department of Transportation or other will be transported.
Babcoo P.O. I	erne end Addre ck & Wi Box 785	lcox Comp	6. TITLE	Babcock & Wilcox Compa dated September 20, 19 REG//.	ny application
CONDITIONS This certificate	is condition	al upon fulfilling	the requirements of 10 CFF	Part 71, as applicable, and the cognition	ns specified below.
(a) (b)	Conte (1)	Model No. Descripti Steel con dated Sep ents Type add Unirradj Maximum q One fuel	taiper as deserver tember 201 1979 form of materia ted fuel cluste dangity of mate cluster contain	rial per package	poison fixture as
(c)	Fissi	1979.	IN BADCOCK-ON W	process applied	tion dated September 20,
(0)	Maxim		of packages pe ar	r shinment or	Five (5)
			zed by this cer visions of 10 C		roved for use under the
7. Use	of pac	kaging fa	bricated after	August 31, 1986, is not	authorized.
1					



		CERTIFICA FOR RADIOACT	ATE OF COMPLIANCE		
& CERTIFICATE N	JMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAG
5362		4	USA/5362/B()		2
of Federal A	egulations, Part 71, "Packag	ing and Transportation of P	eacribed in Item 5 below, meets the applicable sa Radioactive Material." In any requirement of the regulations of the U.S. ountry through or into which the package will i	Department of Trans	
THIS CERTIFICAT	E IS ISSUED ON THE BASIS OF	A SAFETY ANALYSIS REPOR	RT OF THE PACKAGE DESIGN OR APPLICATION E AND IDENTIFICATION OF REPORT OR APPLICAT	ION:	
U.S. Depa Agricultu Radiologi 6303 Ivy	rtment of Agricu ral Research Ser cal Safety Staff	rvice	U.S. Department of Agric October 17, 1980, as sup REGU71-5362		ication
CONDITIONS This certificate	is conditional upon fulfilling	the requirements of 10 CF	R Part 71, as applicable, and the conditions sp	ecified below.	
(a) Pack (1) (2)	Description The package is by 58" high, e 57" by 45" by 9.56" ID by 8- holder (drawer bottom and 12- 9.52" ID by 12 assembly is he bolts. A cash plywood plug f Plywood will b	anclosed in a d 90" high mount 1/4", 12" 10 b assembly) is 1/8" on tep. 2.12" is instal ald in place wi c drain line is fils the space	, steel-encased, lead-fill ouble-walled impact and fi ed on a pallet 57" by 45" y 27-1/2" and 20" iD by 12 9.48" OD by 46.625" with 9 A lead shielded cask inser led at the top of the cask th a 1" thick steel lid se sealed with a pipe plug. between the top of the ca round the circumference of	The shield (The stepp 5/8". The 1/2" shiel t assembly and the en cured with A 39" OD 1 sk and the	overpack) ed cavity i: source ding on 20" OD by tire twelve, 1" aminated overpack.
(3)		is constructed			



NRC FORM 618 (8-85) 10 CFR 71		CERTIFICAT FOR RADIOACTI	TE OF COMPLIANCE VE MATERIALS PACKAGES		ATORY COMMISSIC
1. & CERTIFICAT	NUMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMB	ER d. PAGE NUMBER	e. TOTAL NUMBER PAG
545	0	32	USA/5450/AF		1
of Federa	I Regulations, Part 71, "Packag	ling and Transportation of Ha	cribed in Item 5 below, meets the applica dioactive Material." Iny requirement of the regulations of the intry through or into which the package	e U.S. Department of Tran	
a ISSUED TO	(Name and Address)	b. TITLE	OF THE PACKAGE DESIGN OF APPLICATI		
.O. Box	use Electric Corp 355 h, PA 15230	EAR	Westinghouse Electric application dated Decr as supplemented. TNUMBER 71-5450	ember 20, 1985	,
4 CONDITIONS This certific	ate is conditional upon fulfilling	the requirements of 10 CFR	Part 71, as applicable, and the condition	ons specified below.	
5.	<		Ç		
(a) Pac	kaging 2	SE .	NO	dan.	
(1)	Model Nos.: F	RCC, REC-1, RCC-3	, and RCC-4	8	
(2)	. Bureau	七星。	Caunt 2 1	and a constant	
(3)	adjustable fue steel outer co required for t lbs., RCC-1 ar	T element clampi intainer by shear the contents as s	mbly consisting of a ing assembly, shock mo mounts. Neutron abs pecified. Gross weig lbs., and RCC-4 is 8	unted to a 14- orber plates a ht for the RCC	gauge re
	The packagings		in accordance with the tion Drawing Nos.:	he following	
	For the RCC pa		RCCL002, Sheets		
	For the RCC-1 For the RCC-3 For the RCC-4	packaging:	RCCL102, Sheets RCCL302, Sheets RCCL402, Sheet through 3, Rev.	1 through 3, 1, Rev. 3; She	Rev. 2.
(4)			13-gauge steel box comporation Drawing No.		
(5)	Dimensions and	placement of ne	eutron absorber plates Westinghouse Letter	in accordance	with

COMPLEXE NUMBER OF

Page 2 - Certificate No. 5450 - Revision No. 32 - Docket No. 71-5450

(b) Contents

- (1) Type and form of material
 - (i) Uranium dioxide as Zircaloy or stainless steel clad unirradiated fuel elements. Two neutron absorber plates consisting of 0.19" thick, full length stainless steel containing 1.3% minimum boron or 0.19" thick OFHC copper are required between fuel elements of the following specifications:

Туре	14x14 Zr <u>Clad</u>	15x15 Zr <u>Clad</u>	14x14 SST Clad	15x15 SST <u>Clad</u>	17x17 Zr Clad	16x16 Zr <u>Clad</u>	14x14 Zr <u>Clad</u>
Pellet diameter	0.344-				0.308-		
(nom), in Rod diameter	0.367	0.367	0.384	0.384	0.322	0.322	0.3805
(nom), in	0.422	0.422	0.422	0.422	0.374	0.374	0.44
Maximum fuel length, in	144	144	120	120	168	144	144
Maximum rods/ element	180	204	180	204	264	235	176
Maximum cross section,	100		100	204	0	200	
(nom), in sq	7.8	8.4	7.8	8.4	8.4	7.8	7.98
Maximum U-235/ element, kg	17.7	18.3	18.5	18.7	16.95	16.6	19.0
erement, kg	17.7	10.5	10.5	10.7	(144"L)	10.0	19.0
			Mar-	1	19.8 (168"L)		
Maximum U-235					67. T		
enrichment, w/o	4.0	3.65	4.0	3.65	3.65	4.0	3.85

(ii) Uranium dioxide as Zircaloy clad unirradiated fuel elements contained within the Model No. RCC-4 packaging. Two neutron absorber plates consisting of 0.19" thick carbon steel are required between fuel elements of the following specifications:

Type	Zr Clad
Pellet diameter, in	0.308 - 0.322
Rod diameter, in	0.360 - 0.374
Maximum fuel length, in	168
Maximum rods/element	264
Maximum cross section (nom) in sq	8.4
Maximum U-235/element, kg	19.3
Maximum U-235 enrichment, w/o	3.55

25

17x17

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.(b) (1) Type and form of material (continued)

(iii) Uranium dioxide as Zircaloy clad unirradiated fuel elements. Two neutron absorber plates consisting of carbon steel, 0.035 inches in thickness, with a cermet Gd_0, coating affixed to each side providing a total of 0.054 g-Gd_0,/cm² for both sides of the plate, are required between fuel elements of the following specifications:

Туре	14x14 Zr <u>Clad</u>	15x15 Zr Clad	14x14 SST Clad	15x15 SST Clad	17x17 Zr <u>Clad</u>	17x17 Zr <u>Clad</u>	16x16 Zr <u>Clad</u>	16x16 Zr <u>Clad</u>
Pellet diameter (nom), in	0.344-0.367	0.367	0.384	0.384	0.322	0.308	0.322	0.325
Rod diameter (nom), in	0.400-0.422	0.422	0.422	0.422	0.374	0.360	0.374	0.382
Maximum fuel length, in	144	144	120	120	168	168	144	150
Maximum rods/ element Maximum cross	180	204	180	204	264	264	235	236
section, (~om), in sq	7.8	8.4	7.8	8.4	8.4	8.4	7.8	7.98
imum U-235/ element, kg	22.1	21.5	23.1	22.0	21.75 (144"L) 25.5 (168"L)	19.9 (144*L) 23.3 (168*L)	20.7	21.1
Maximum U-235 enrichment, w/o	5.0	4.3	5.0	4.3	4.7	4.3	5.0	5.0
Туре			15x15 Z (B&W Ty					
Pellet diameter (nom), in			0.36	57				
Rod diameter (nom), in			0.42	22				
Maximum fuel length, in Rods/element Maximum cross			141. 208	8				
section, (nom), in sq			8.5					
Maximum U-235/ element, kg			17.8					
Maximum U-235 enrichment, w/o			3.95					

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(b) (1) Continued

(iv) Uranium dioxide as Zircaloy clad unirradiated fuel elements containing a minimum of 48 IFBA rods and 25 Instrument/Guide tubes per specification and loading pattern described in Westinghouse drawing SKA-89044, Sheet 1, Rev. 2. Two neutron absorber plates consisting of carbon steel, 0.035 inches in thickness, with 4 mils of Gd₂O₃ (0.02 gm-Gd₂O₃/cm²) affixed to each side of the plate are required between fuel elements of the following specifications:

Туре	17 x 17 Zr Clad
Pellet diameter	0.200
(nom), in Rod diameter	0.308
(nom), in	0.360
Maximum fuel	
length, in	168
Maximum rods/	
element	264
Maximum cross section	
(nom), in sq	8.4
Maximum U-235/	
element, kg	22.5 (144"L)
Minimum ZrB ₂	
rods/assembly	48
Minimum ZrB ₂ IFBA	108
length, in	
Maximum U-235	1.05
enrichment, w/o	4.85

(v) Uranium dioxide as Zircaloy clad unirradiated fuel elements. Two neutron absorber plates consisting of carbon steel 0.035 inches in thickness, with 4 mils of Gd_2O_3 (0.02gm- Gd_2O_3/cm^2) affixed to each side of the plate are required between fuel elements of the following specification:

Туре	17 x 17 Zr Clad
Pellet diameter (nom), in Rod diameter (nom), in Maximum fuel length, in Maximum rods/element Maximum cross section (nom), in sq Maximum U-235/element, kg Maximum U-235 enrichment, w/o	0.308 0.360 168 264 8.4 22.5 (144"L) 4.85

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- (b) (1) Continued
 - (vi) Uranium dioxide as Zircaloy or stainless steel clad unirradiated fuel rods of the following specifications:

Туре	SST Clad	Zr <u>Clad</u>	Zr <u>Clad</u>	Zr <u>Clad</u>	Zr <u>Clad</u>	Zr clad
Pellet diameter		0.344-	0.308-			
(nom), in	0.384	0.367	0.322	0.322	0.3805	0.325
Rod diameter,		0.400-	0.360-		1. A.A.	4.1.4
in	0.422	0.422	0.374	0.374	0.44	0.382
Fuel length (max),						
in	120	144	168	144	144	150
U-235 enrichment						
(max), w/o						
Note (1)	4.0	4.0	3.65	4.0	3.85	
Note (2)	4.2	4.2	4.3	4.3		4.2
Note (3)			3.55			

Notes:

- Two neutron absorber plates consisting of 0.19-inch thick, full length stainless steel containing 1.3% (minimum) Boron or 0.19-inch thick OFHC copper are required between the rod boxes.
- (2) Two neutron absorber plates consisting of carbon steel, 0.035 inch in thickness, with 4 mils of Gd_2O_3 (minimum 0.02 gm Gd_2O_3/cm^2) affixed to each side of the plate are required between the rod boxes.
- (3) Two neutron absorber plates consisting of 0.19-inch thick carbon steel are required between the rod boxes.
- (vii) Unirradiated, uranium dioxide, zircaloy clad fuel elements, with annular pellets at the top and bottom ends of the active fuel length. Two neutron absorber plates consisting of carbon steel, 0.035 inches in thickness, with a cermet Gd_2O_3 coating affixed to each side providing a total of 0.054 g- Gd_2O_3/cm^2 for both sides of the plate, are required between fuel elements. The fuel assemblies shall be held in place by at least 7 clamping frame arms. Specifications for the fuel elements are as follows:

Туре	<u>14x14</u>	14x14 CE-1
Pellet diameter (nom), in Annular pellet inner diameter (nom), in Rod diameter (nom), in Maximum active fuel length (nom), in Solid pellet stack length, in	0.3444 0.172 0.4000 144 132	0.3765 0.183 0.4400 136.25 122.65
Annular pellet stack length at the top and bottom ends of the active fuel length, in Rods/element Maximum cross section, (nom), in sq Maximum U-235/element, kg Maximum U-235 enrichment, w/o	6 179 7.8 18.1 5.0	6.8 176 8.110 18.6 4.8

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(b) (2) Maximum quantity of material per package

(i) For the contents described in 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1)(iii), 5(b)(1)(iv), and 5(b)(1)(vii):

Two fuel elements

(ii) For the contents described in 5(b)(1)(v):

One fuel element

(iii) For the contents described in 5(b)(1)(vi):

Two inner containers containing not more than 80 kilograms U-235

(c) Fissile Class I

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6.

9.

Fuel rods must be closely packed in the fuel rod container on no more than an equivalent metal-to-metal square lattice. Partially loaded fuel rod containers must be fitted with a minimum of three, equally spaced blocks, of which the noncombustible portion of the blocks and the method by which they are secured must assure that the rods are maintained on no more than an equivalent metal-to-metal square lattice within the fuel rod container.

Each fuel assembly must be unsheathed or must be enclosed in an unsealed, polyethylene sheath which will not extend beyond the ends of the fuel assembly. The ends of the sheath must not be folded or taped in any manner that would prevent the flow of liquids into or out of the sheathed fuel assembly.

Alternatively, the fuel assembly may be enclosed in an elongated plastic bag or sheath along its full length. At the bottom end of the fuel assembly, the bag will be cut off or folded back to assure that the entire cross section of the lower end of the assembly is unobstructed. When folding is used, the port of the sheath that is folded back will be cinched with tape near its end to how it in place, and the length will be such that when the assembly is loaded in the packaging, the folded sheath will be clamped in place in at least two grid locations. The top end of the bag may be gathered together and taped closed. However, the top end then will be slit on all four sides. The slits will run perpendicular to the axis of the assembly and will extend the inner distance between the top nozzle pads and spring clamps (approximately 60% of the length of each side). The slits will be made in a plane near that formed by the top of the pads and clamps.

8. Use of packaging fabricated after February 28, 1986, is not authorized.

The gross weight must not exceed 6,300 pounds for the RCC packaging, 7,200 pounds for the RCC-1 and RCC-3 packagings, and 8,400 pounds for the RCC-4 packaging.

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). In addition to the requirements of Subpart G of 10 CFR Part 71:

- (a) The package must be maintained in accordance with the maintenance procedures submitted with Westinghouse supplements dated June 20, September 16, and September 19, 1991.
- (b) The package must be prepared for shipment and operated in accordance with the operating procedures submitted with Westinghouse supplements dated June 20, September 16, and September 19, 1991.
- 11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 12. Expiration date: September 30, 1996.

REFERENCES

Westinghouse Electric Corporation application dated December 20, 1985.

Supplements dated: April 28, July 1, 21, 1986; January 4, February 14, April 18, October 5, and November 30, 1989; March 5, April 17, June 20, September 16, September 19, and September 24, 1991; February 11, March 21, and May 27, 1994.

Department of Energy supplement dated: March 1, 1984.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Lass R. Choppell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

JUN 2 9 1994

Date:

			D. REVISION_NUMBER	C PACKAGE IDENTIFICATION NUMBER		. TOTAL NUMBER PA
a CEB	580	TE NUMBER	5	USA/5580/B()	1	2
о b. Т	This cer of Fede This ce	ral Regulations, Part 71, "Packag rtificate does not relieve the cons	ing and Transportation of F ignor from compliance with	escribed in Item 5 below, meets the applicable Radioactive Material." In any requirement of the regulations of the U, ountry through or into which the package wi	S. Department of Trans	
a is U	J.S.	CATE IS ISSUED ON THE BASIS OF O (Nome and Address) Department of Ene sion of Naval Reac ington, DC 20585	rgy	Safety Analysis Repor shipping container da	t for S5W Pow	ver Unit 1968,
	i st arri	ingcon, 00 20000	EAF	71-5580		
CONE	DITION	5	c. DOO	KET NUMBER		
This	certific	ate is conditional upon fulfilling	the requirements of 10 CF	R Part 71, as applicable, and the conditions	specified below.	
		<		0		
) P	ack	aging 9	1000	27	la i	
(1)	Model No.: S5W P	ower Unit	~ 12	100 C	
(2)	Description			ő	
		assembly designed is comprised esset the inner frame, shipping contained Two trunnions well the lower end of container can be vertical (loading turn in trunnion l and shipping conta 80 elastic shock n outer frame. Approximate dimensi shipping contained	to ship and st ntially of thre and (3) the shi r is bolted to ded to the midd the container a rotated from the unioading) att bases which are ainer are suppo mounts, each of sions of the th r: 95 inches d	ainer (PUSC) is a contain one new mayal reactor por e major assemblies: (1) pping container. During the inner frame in a hor le section of the shippin and also provide the mean e horizontal (shipping) itude in the inner frame bolted to the inner frame rted by the outer frame which is secured to boti ree major assemblies of iameter by 234 inches; In by 269 inches length; Ou	wer units. T the outer fr shipment, th izontal posit ng container s whereby the attitude to t . The trunni me. The inner and pedestal h the inner f the PUSC are: nner Frame: 1	he PUSC ame, (2) e ion. support he ons r frame through rame and
ľ,	~ `	inches width by 50 loaded PUSC is app	6 inches height	by 236 inches length. I		
(3)	Drawings				
				accordance with Westingho , Rev. 3 and 936F964, Rev		

 (1) Type and form Unirradiated (i) S5W Core place by (ii) S3G Core place by (iii) DMC Powe holddown (2) Maximum quant One fuel asse 5(b)1)(iii). (c) Fissile Class Maximum number of per shipment: Expiration Date: December Safety Analysis Report for Saugust 9, 1968; Addendum to 	RO - Revision No. 5 - Docket No. 71-5580
 (1) Type and form Unirradiated (i) S5W Core place by (ii) S3G Core place by (iii) DMC Powe holddown (2) Maximum quant One fuel asse 5(b)1)(iii). (c) Fissile Class Maximum number of per shipment: 6. Expiration Date: Decem Safety Analysis Report for S August 9, 1968; Addendum to 	50 - REVISION NO. 5 - DUCKEC NO. 72 0000
Unirradiated (i) S5W Core place by (ii) S3G Core place by (iii) DMC Powe holddown (2) Maximum quant One fuel asse 5(b)1)(iii). (c) Fissile Class Maximum number of per shipment: 6. Expiration Date: Decem Safety Analysis Report for S August 9, 1968; Addendum to	
 (i) S5W Core place by (ii) S3G Core place by (iii) DMC Powe holddown (2) Maximum quant One fuel assess (b)1)(iii). (c) Fissile Class Maximum number of per shipment: 6. Expiration Date: December Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAugust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety Analysis Report for SAUgust 9, 1968; Addendum to Safety	m of material
place by (ii) S3G Core place by (iii) DMC Powe holddown (2) Maximum quant One fuel asse 5(b)1)(iii). (c) Fissile Class Maximum number of per shipment: 6. Expiration Date: Decem Safety Analysis Report for S August 9, 1968; Addendum to	fuel assemblies of the following type,
place by (iii) DMC Powe holddown (2) Maximum quant One fuel asse 5(b)1)(iii). (c) Fissile Class Maximum number of per shipment: 6. Expiration Date: Decen Safety Analysis Report for S August 9, 1968; Addendum to	e 4 power unit with control rods installed and secured in y holddown mechanism.
holddowr (2) Maximum quant One fuel asse 5(b)1)(iii). (c) Fissile Class Maximum number of per shipment: 6. Expiration Date: Decen Safety Analysis Report for S August 9, 1968; Addendum to	e 3 power unit with control rods installed and secured in y holddown mechanism.
One fuel asse 5(b)1)(iji). (c) Fissile Class Maximum number of per shipment: 6. Expiration Date: Decen Safety Analysis Report for S August 9, 1968; Addendum to	er Unit with control nods installed and secured in place by n mechanism.
5(b)1)(iji). (c) Fissile Class Maximum number of per shipment: 6. Expiration Date: Decem Safety Analysis Report for S August 9, 1968; Addendum to	tity of material per package
Naval Reactors Supplements t	III packages III one (1) mber 31, 1997. <u>REFERENCE</u> S5W Power Unit Shipping Container, WAPD-OP(R)SA-820 dated WAPD-OP(R)SA-820 dated September 28, 1987.
	Harch 2, 1992 (G#92-03388) FOR THE U.S. NUCLEAR REGULATORY COMMISSION
	Charles MacDonald, Chief Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS
APR 2 9 1992	
Date:	

RC FORM 618 1851 CPR 71		U.S. NUCLEAR REGULATORY COMMISSI VE MATERIALS PACKAGES
& CERTIFICATE NUMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER d. PAGE NUMBER e. TOTAL NUMBER PAI
5607	8	USA/5607/B()F 1
of Federal Regulations, Part 71, "Pack	aging and Transportation of Rac	cribed in item 5 below, meets the applicable safety standards set forth in Title 10, Code dioactive Material." ny requirement of the regulations of the U.S. Department of Transportation or other ntry through or into which the package will be transported.
THIS CERTIFICATE IS ISSUED ON THE BASIS a. ISSUED TO (Name and Address)	OF A SAFETY ANALYSIS REPORT	AND IDENTIFICATION OF REPORT OR APPLICATION
U.S. Department of Ener EH-33.2 Washington, DC 20585	gy EAR	T-2 Shipping Package, Safety Analysis Report, Draft: April 1980, as supplemented.
CONDITIONS	C DOCKE	TNUMBER 71-5607
This certificate is conditional upon fulfill	ing theirequirements of 10 CFR	Part 71, as applicable, and the conditions specified below.
encased in st The cask is a in the center inches long. section reduc vessel is pos gasketed and which is 36 i	eel cask, removab double-walled st portion. The cer The lead shieldin ed to 4.2 inches itioned within the bolted steel plug nches in diameter	or fuel and components consisting of a lead le containment vessel insert and shipping case. eel circular cylinder with thickened shielding atral cavity is 6.065 inches in diameter by 100 ng is 8.0 inches thick along a 45-inch center at each 36-inch end section. The containment e cask. Cask closure is accomplished by a . The cask is enclosed in the shipping case by 133 inches long welded to a 4-foot by num weight of the packaging is 18,400 pounds.
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NRC FORM SISA CONDITIONS (continued)

Page 2 - Certificate No. 5607 - Revision No. 8 - Docket No. 71-5607

- 5.(a) (3) Drawings
 - (i) The shipping case is constructed in accordance with DuPont Drawing Nos.: W716539, Rev. 0; 180191, Rev. 1; 180192, Rev. 0; 180193, Rev. 1; 180194, Rev. 0; 180197, Rev. 0; W716538, Rev. 0; 180195, Rev. 0; 180196, Rev. 0; and 180089, Rev. 0.
 - (ii) The cask is constructed in accordance with General Electric Drawing Nos.: 919D755, Rev. 0; 135C5202, Rev.0; 153F966, Rev. 0; and 106D3721, Rev. 0; or it is constructed in accordance with DuPont Drawing Nos.: W239534, Rev. 2*; 147214, Rev. 15; 147215, Rev. 2*; and 147216, Rev. 1.
 - (iii) The ANL insert is constructed in accordance with Argonne National Laboratory Drawing Nos. WOI17-0227-DD, Rev 7; W0147-0228-DD, Rev. 6; W0147-0229-DC, Rev. 6; W0147-0231-DD, Rev. 3; W0147-0234-DC, Rev. 4; and W0147-0312-DE, Rev. 2.
 - (iv) The TREAT Vessel insert is constructed in accordance with Westinghouse Hanford Company Drawing Nos.: H-3-39082, Sheets 1 through 4 and 6, Rev. 0, and Sheet 5, Rev. 1; H-3-36134, Sheet 1, Rev. 3 and Sheet 2, Rev. 2; and H-3-36823, Sheet 1, Rev. 1 and Sheets 2 through 4, Rev. 0.

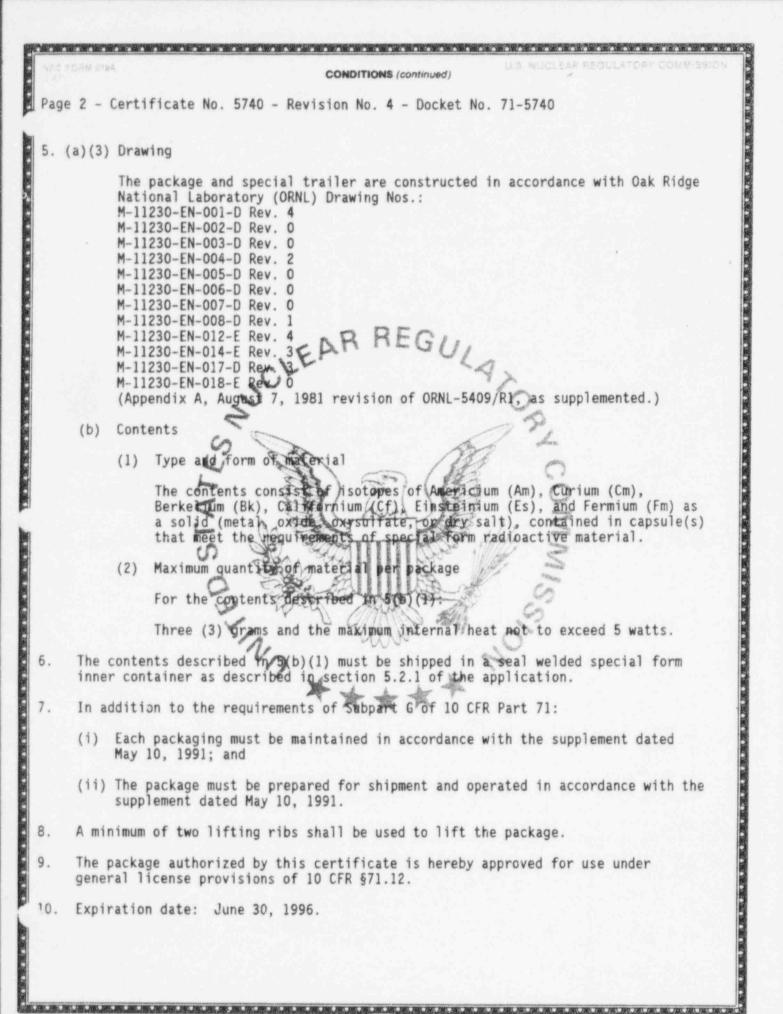
(b) Contents

- (1) Type and form of material
 - (i) Irradiated clad fuel in the form of solid metal, oxides, nitrides, and carbides of uranium, plotonium, or mixed uranium-plotonium contained within the ANL insert or TREAT Vessel insert. The clad fuel may contain small quantities of Na or NaK. The minimum cooling time must be no less than 150 days.
 - (ii) Irradiated clad fuel pins of uranium dioxide emmiched to up to 3.0 w/o in U-235 contained within the ANL insert or TREAT vessel insert. Average exposure of fuel not to exceed 18 megawatt days per kilogram. The clad fuel may contain small quantities of Na or NaK. The minimum cooling time must be no less than 90 days.
 - (iii) Irradiated reactor components held within the container shown in Drawing No. W0147-0234-DC, Rev. 4.

*As provided in the April 12, 1983, supplement.

NRC FORM	618A	co	NDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
	Page	3 - Certificate No. 5607 - R	evision No. 8 - Doc	ket No. 71-5607
5.(b)	(2)	Maximum quantity of material	per package.	
		Internal decay heat not to e	xceed 208 watts, an	nd :
		(i) For the material description 1.71 kg.	bed in 5(b)(1)(i),	fissil material not to exceed
		<pre>(ii) For the material description to exceed 300 grams.</pre>	bed in 5(b)(l)(ii),	fissile material (U-235) not
(c)		Fissile Class for the material limited in 5(b)(2)(i) and 5(b)		I(1)(i) and $5(b)(1)(ii)$, and I
	dried	contents must be shipped dry. d using Consumer Power Company edure," Proc. No. EE&I-CH2, Re	s procedure, "T-2	water, the package must be Cask Liner Assembly Drying
	annua		with the procedure	tested prior to first use and s specified in Argonne National
		r to each shipment, the packagedures specified in Appendix A		
		ddition to the requirements of this certificate.	Subpart G of 10 C	FR Part Pand the other
	(a)	The package shall be operated Operating Procedures in Chapt		shipment in accordance with the ation, as supplemented; and
	(b)	The package must be maintaine Chapter 8 of the application,		th the Maintenance Program of
10.	The p gener	backage authorized by this cer al license provisions of 10 C	tificate is hereby FR §71.12.	approved for use under the
11. 6	Expir	ation date: May 31, 1998.	REFERENCES	
DuPont	t Saf	ety Analysis Report, Draft Ap	ril 1980.	
Depart 1983;	tment Febr	of Energy supplements dated: wary 26, 1992; and February 3	February 11, Apr , 1993.	il 8 and 20, 1982; April 12,
			FOR THE U.S. NUCL	LEAR REGULATORY COMMISSION
			Charles E. MacDor Transportation Br Division of Indus	ranch
		MAY 2 0 1993	Medical Nuclear	
Date:			35	

CERTIFICAT	E NUMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFIC		d. PAGE NUMBER	. TOTAL NUMBER PA
		4	USA/5740,		1	J
of Feder	al Regulations, Part 71, "Paci	aging and transportation c	described in Item 5 below, me of Radioactive Material." with any requirement of the reg ocountry through or into whice	ulations of the U.S.	Department of Trans	
THIS CERTIFI	CATE IS ISSUED ON THE BASIS (Algene end Address)	S OF A SAFETY ANALYSIS REF	ORT OF THE PACKAGE DESIGN	OR APPLICATION EPORT OR APPLICAT	10N .	
U.S. De Oak Ric P.O. Bo	epartment of Ene lge Field Office ox 2001 lge, TN 37831	th Sh Re	fety Analysis Rep e Oak Ridge Natio ipping Container port No. ORNL-540 OCKET NUMBER 71-574	onal Labora , August 7, 09/R1, as s	tory TRU Cal 1981, Rev.	of
CONDITIONS This certific	ate is conditional upon fulfil	ling the requirements of 10	CFR Part 71, as applicable, an	nd the conditions s	pecified below.	
		the second second		0		
) Pacl	aging 🖉	10		02	6	
(1)	Model No.:	NL TRU Californ	ium Shipping Cont	tainer		
(2)	Description	(4)	(智		6	
	by a 6-inch cy l-inch thick s Shielding corrs density of app ball valves to seal the cavit and are protec the cover plat	lindrical secti tainless steel ists of 30 inch roximately 175 cated at the en y. Both of the ted with a gask es and the shel		ical cavity ches in dia imonite co nd lower le lled plugs ring seals, . Fusible	has a meter x 6 in ocrete havin vel define, isol are bolted plugs are lo	aches long. ng a ate, and in place ocated in
	The top ball v shipments. So	alve and plug m urces are conta	ay be replaced by ined in special i	y other plu form inner	gs for multi containers.	ple source
	inch NPS Sched	ule 40 pipe str	inch thick steel uts. The cask is eight is 23,500 p	s transport	by eight st ed on a spec	ceel 2-1/2



U.S. NUCLERR REGULATORY COMMISSION **CONDITIONS** (continued) Page 3 - Certificate No. 5740 - Revision No. 4 - Docket No. 71-5740 REFERENCES Safety Analysis Report for Packaging (SARP) of the Oak Ridge National Laboratory TRU Californium Shipping Container, August 7, 1981, revision of Report No. ORNL-5409/R1. Supplements dated: April 4, 1986; March 26, April 23, and May 10, 1991; and June 4, 1992. FOR THE U.S. NUCLEAR REGULATORY COMMISSION NUCLEAR Charles E. MacDonald Chief Transportation Branch Division of Safeguards and Transportation, NMSS AUG 0 7 1992 Date: STA NO 38

THE OWNER AND ADDRESS OF A DESCRIPTION OF TAXABLE ADDRESS ADDRES			TE OF COMPLIANC	GES		
. CERTIFICATE NUMBER 5757	8	5. REVISION NUMBER	C. PACKAGE IDENTIFICATION USA/5757/B(d. PAGE NUMBER	. TOTAL NUMBER PAG
of Federal Regula b. This certificate do	tions. Part 71, "Packaging es not relieve the consign	and Transportation of Ramor from compliance with a	cribed in Item 5 below, meets the dioactive Material." ny requirement of the regulation ntry through or into which the p	s of the U.S. De	epartment of Trans	
u. ISSUED TO (Name and U.S. Depa Division		rgy Sa tors So	of THE PACKAGE DESIGN OR APP ND IDENTIFICATION OF REPORT O fety Analysis Repo purce shipping cont 168 T NUMBER 71-5757	or application	55W Refueli	
This certificate is con	ditional upon fulfilling th	e requirements of 10 CFR	Part 71, as applicable, and the c	opditions speci	fied below.	
(a) Pack (1) (2)	Description The S5W Refue one nested wi inches diame shipping cont OD of 5 feet polyethylene structure, the cavity of the 79-5/8 inches by machined so bottom end pi lead, 6 inches of shielding 8-1/2 inches	ithin the other ter by 9 feet, tainer, is a mi 4 inches and 1 is canned in a ne replacement outer structu s long stainles stainless steel lug to contain es thick, encir is a attenuate thick, surroun	ource ipping container of having an overal 5-5/8 inches lengt and of polyethylene ength of approxima 1/2-inch thick ca and installation of re. This assembly s central tube, wh forging. Three of the neutron source cles the central to the gamma radiation ds the lead shield te. Gross weight	11 envelo th. The e 11-1/2 atcly 5 f arbon ste container consist ich is p cavities e assembl tube and ion. A w 1 and is	pe of 5 fe outer stru inches thi eet 2 inch el shell. , fits int s of a 6-1 lugged at are machin ies. A ja this inner all of pol canned wit	et, 5 cture, the ck with an es. The The inner o the /2 inch OD, both ends ed in the cket of most layer yethylene, h a 1/2-
(3)	Drawings					
			d in accordance wi 5D318, Rev. C; 905			

Page 2 - Certificate No. 5757 - Revision No. 5 - Docket No. 71-5757

- 5. (b) Contents
 - (1) Type and form of material
 - Radium-Beryllium special form radioactive material neutron source. These sources may be either new or irradiated and have surface contamination as a result of previous use.

U.S. NUCLEAR REQULATORY COMM

- (ii) Plutonium 238-Beryllium special form radioactive material neutron source. These sources may be either new or irradiated and have surface contamination as a result of previous use.
- (2) Maximum quantity of material per package
 - One, two, or three neutron sources as described in 5(b)(1)(i) and limited to a total content of not more than 940 curies, with radium limited to not more than 2.5 curies (gms) and total emission rate of 3.8 x 10 n/sec. These sources are limited to a combined surface contamination of not more than an A₂ quantity of radioactive material.
 - (ii) Once, two, ar three neutron sources as described in 5(b)(1)(ii) and limited to a total content of not more than 925 curies and total emission rate of 1.48 x 10^{2} n/sec. These sources are limited to a combined surface contamination of not more than an A₂ quantity of radioactive material.

(c) Fissile Class

- The package authorized by this certificate is hereby approved for use under the general license provisions of TO CFR \$71.12.
- 10. Expiration date: December 31, 1997.

REFERENCES

Safety Analysis Report for S5W Refueling Source Shipping Container, WAPD-OP(R)S-2473 dated February 14, 1968.

Supplements: Bettis Atomic Power Laboratory letter WAPD-OP(R)C-474 dated December 22, 1975; and Naval Reactors letter G#92-03738, dated October 15, 1992.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date: NOV 1 2 1992

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INC FORM (6-85) 0 CFR 71	618		and the second se	E OF COMPLIANCE	NUCLEAR REGULA	TORY COMMISSI
CERTIFIC	ATE NUMBER		b. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	R d. PAGE NUMBER	e. TOTAL NUMBER PAR
of Fee	pertificate is is deral Regulations certificate doe	ons, Part 71, "Packagin s not relieve the consis	ng and Transportation of Rad	ribed in Item 5 below, meets the applicab loactive Material." y requirement of the regulations of the I try through or into which the package of	U.S. Department of Tran	
a issued dvance 21 Nor eneva,	d Medica th Eagle OH 4404	address) al Systems In e Street 11	hc. Add dat	r THE PACKAGE DESIGN OF APPLICATION IDENTIFICATION OF REPORT OF APPLI vanced Medical Systems ted June 26, 1992, as REF 71-5796	, Inc. applic supplemented.	ation
This certi	ficate is cond	tional upon fulfilling t	herequirements of 10 CFR P	art 71, as applicable, and the constition	s specified below.	
a) Pa (1 (2) Desci Overy asser 16 gu toget inche of th weigh 34.2	ription backs that probablies or som lage steel probable ther and spaces. Skid run be Model No. ht of 3,750 p 5"W x 44.5"H	ince exchange as anels. Reinforc ced to limit the ners are provide 181375 are 43.5 bounds. Dimensio	d thermal protection f semblies. the cubical ing steel straps and a openings between them ed to facilitate fork '1 x39.75"W x 41"H wit ons of the Model No. 1 gross weight of 4,000	overpacks co ngles are well to less than lift usage. h a maximum g 81361 are 39"	vered with ded 6 Dimensions ross
	(i)	The Model No Medical Syst of the appl	tems, Inc. Drawfi	ing is constructed in ng Nos. as specified i	accordance wi n Section 1.3	th Advanced .1 (p 1-11)
	(ii)		tems, Inc. Drawin	ing is constructed in ng Nos. as specified i		

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Page 2 - Certificate No. 5796 - Revision No. 13 - Docket No. 71-5796

- 5. (b) Contents
 - (1) Type and form of material
 - (i) Cobalt 60 sealed sources that meet the requirements of special form radioactive material; or
 - (ii) Cesium 137 in the form of cesium chloride encapsulated in sealed sources that meet the requirements of special form radioactive material.
 - (2) Maximum quantity of material per package
 - (i) 13,680 curies of cobalt 60 with a radioactive decay heat load not to exceed 200 wates; or
 - (ii) 2,200 curies of cesium 137 with a radioactive decay heat load not to exceed 17 watts.
- 6. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) The packages must be operated and prepared for shipment in accordance with the Operating Procedures of Chapter 7 of the application.
 - (b) Each packaging must meet the Acceptance Tests and Maintenance program of Chapter 8 of the application.
- 7. Use of packaging fabricated after August 31, 1986, is not authorized.
- The packages authorized by this certificate are hereby approved for use under the general license provisions of 10 CFR \$71.12.
- 9. Expiration date: July 31, 1997.

REFERENCES

Advanced Medical Systems, Inc. application dated June 26, 1992.

Supplements dated: August 13 and October 15, 1992.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

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Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date: DEC 1 6 1992

8C FORM 618 -65) OFR 71			TE OF COMPLIANCE		TORY COMMISSIO
& CERTIFICATE NUMBER		b. REVISION NUMBER	USA/5797/B(U)F	d PAGE NUMBER	e. TOTAL NUMBER PAG
of Federal Regulation	ns, Part 71, "Pa	ckaging and Transportation of Ra	cribed in item 5 below, meets the applicable s	. Department of Tran	
N ISSUED TO (Nume and A U.S. Depa EH 33.2 Washingto	rtment o	f Energy L	OF THE PACKAGE DESIGN OF APPLICATION AND IDENTIFICATION OF REPORT OF APPLICA J.S. Department of Energy application dated May 30 as supplemented. 71-5797	y	
CONDITIONS This certificate is condit	ional upon fulf	illing the requirements of 10 CFR	Part 71, as applicable, and the conditions s	pecified below.	
(a) Pack (1)	aging Model N	o.: Inner HEIR Uni	irradiated Fuel Element S irradiated Fuel Element S	Shipping Con	tainer, and tainer
(2)	Descrip	(<i>1</i> 2 2		Ö	
	for the circula attache steel s rings.	High Flux Isotope r cylinders with and d to the container hell is filled with	I fissile radioactive mat Reactor (HEIR). The con 11-gauge carbon steel of with sixteen 3/8-16x1-in stacked, 1-inch high, I form a central cavity w	ntainers are shell. The rch steel bo Douglas fir	right lid is lts. The plywood
	25 inch	kaging for the inne es OD by 45 inches and a 660 pound gr	er HFIR fuel element has high, a 10-7/8-inch diar coss weight.	overall dim meter by 30-	ensions of 1/4-inch de
	31.5 in	ches OD x 45.75 inc	er HFIR fuel element has ches high, a 17-3/8-inch bound gross weight.		
(3)	Drawing	S			
		with Martin Mariett	the inner HFIR fuel is co ta Energy Systems, Inc., ev. C, and M-20978-EL-008	Drawing Nos	
		with Martin Mariett	the outer HFIR fuel is co ta Energy Systems, Inc., ev. C, and M-20978-EL-008	Drawing Nos	

Page 2 - Certificate No. 5797 - Revision No. 10 - Docket No. 71-5797

- 5. (b) Contents
 - (1) Type and form of material

Uranium as U_3O_8 -Al cermet, enriched up to 95% in the U-235 isotope, and clad in aluminum, 10-mils thick, and:

- (i) For the packaging described in 5(a)(3)(i), the contents are described in ORNL/TM-9220, "Specifications for High Flux Isotope Reactor Fuel Elements HFIR-FE-3," and in the following Oak Ridge National Laboratory Drawing Nos: E-42118, Rev. M; E-42112, Rev. H; D-42113, Rev. G; E-42114, Rev. H; and E-42117, Rev. H.
- (ii) For the packaging described in 5(a)(3)(ii) the contents are described in ORNL/TM-9220, "Specifications for High Flux Isotope Reactor Fuel Elements HEIR-FE-3," and in the following Oak Ridge National Laboratory Drawing Nos: E-42126, Rev. J; E-42120, Rev. H; D-42121, Rev. H; D-42122, Rev. H; and E-42125, Rev. J.
- (2) Maximum quantity of material per package
 - (i) For the contents described in 5(b)(1)(i) not more than 2.63 kg of U-235.
 - (ii) For the contents described in 5(b) (1)(ii) not more than 6.88 kg of U=235.
- (c) Fissile Class
- The lid lifting attachments must be blocked as shown on Martin Marietta Energy Systems, Inc., Brawing No. M-20978-EL-009E, Rev. 2, to prevent inadvertent use of the attachments during transport.
- 7. In addition to the requirements of Subpart G of 10 GER Part 71:
 - (a) Each package shall be maintained in accordance with the Maintenance Program in Chapter 8 of the application;
 - (b) Each package shall be operated and prepared for shipment in accordance with the Operating Procedures in Chapter 7 of the application; and
 - (c) The fuel element shall meet the fabrication inspection requirements of ORNL/TM-9220, "Specifications for High Flux Isotope Reactor Fuel Elements HFIR-FE-3."
- 8. Use of packaging fabricated after December 31, 1976, is not authorized.

Page 3 - Certificate No. 5797 - Revision No. 10 - Docket No. 71 5797

 The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.

10. Expiration date: October 31, 1996.

REFERENCES

U.S. Department of Energy Application dated May 30, 1991.

Supplement dated: February 26, 1992, and April 2, 1993.

FOR THE D.S. NUCLEAR REGULATORY COMMISSION

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Cass R. Chappell, Section Leader Cask Certification Section Transportation Branch Division of Industrial and Medical Nuclear Safety, NMSS

JUN 2 4 19 Date:

DIGFR 71		FOR RADIOACT	TE OF COMPLIANCE		. TOTAL NUMBER PAGES				
L CERTRECATE NU	MBER	b. REVISION NUMBER C. PACKAGE IDENTIFICATION NUMBER d. PAGE NUMBER 16 TOT							
of Federal Re	guiations, Part 71, "Package	ng ano manaponation or m	scribed in Item 5 below, meets the applicable s adioactive Material." any requirement of the regulations of the U.S untry through or into which the package will	Department of Trans	th in Title 10, Code				
THIS CERTIFICAT	E IS ISSUED ON THE BASIS OF	A SAFETY ANALYSIS REPOR	T OF THE PACKAGE DESIGN OF APPLICATION AND IDENTIFICATION OF REPORT OF APPLICA	TION					
	ar Systems, Inc idge Drive SC 29210	. EAP	hem-Nuclear Systems, Inc. ated February 25, 1994. 71-5805	. applicatio	n				
4. CONDITIONS This certificate	is conditional upon fulfilling	the requirements of 10 CF	R Part 71, as applicable, and the conditions	speci/ied below.					
5	0	3	20 C						
(a) Packag	ing 69	C.M.							
(1) M	lodel No. : CNS	3-55	50 (18)						
(2) [escription		Lung SEB	0					
	imiters. The banches in diamet 16 inches long	reduced to III	lead-shielded cask with teel cylinder 133-3/4 in cavity dimensions of 36 inches by the shield rim by 6 inches of chemical 1 iches in the closed end.	inches in d g attached t	iameter by o the lid				
	and three plates	s totaling 2-5/8 c vlinder with	s made up of two, 1/2-inc 3 inches on the end. The a 1/2-inch end plate. T ag poured to fill the ann	he shells ar	e welded				
10 a a a a a	The removable, and 1-1/4-inch of the plates is lo	outside plates a	essed base plate weldment and a 5/8-inch inside pla	consists of te. The spa	3/8-inch ce between				
	The base plate high strength b	is secured to the old secured to the old secured to the old secure distribution of the old secure distributication of the old secure distrubution of the ol	ne cask body by means of nd sealed with two silico	twelve, 1–1/ ne O-rings.	2-inch				
	through the basi	e plate. The ve	vent line at the closed e ent line is sealed by a g d with a 25 psig relief v	asketed and	in line shielded				

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Page 2 - Certificate No. 5805 - Revision No. 16 - Docket No. 71-5805

- .. (a) Packaging (continued)
 - (2) Description (continued)

Cask appendages include two, 8-inch lifting trunnions and two, 4-inch removable tilting trunnions on the cask side.

Removable impact limiters are provided at the cask ends and at the two, 8inch trunnions. The former consist of a series of 6-inch diameter closed end tubes. Each impact limiter has tubes approximately 6 inches long around the end periphery. The closure end impact limiter has 12 tubes, six about 6 inches long and six about 2 inches long, around the sides. The closed end impact limiter has six tubes about 6 inches long around the sides. A gusseted tube acts as the trunnion impact limiter.

The cask is secured horizontally to a skid which is mounted to the transport vehicle for shipment. An optional sunshade is provided.

The gross weight of the package, excluding the skid and sunshade is approximately 70,000 pounds. The skid weighs about 4,200 pounds.

(3) Drawings

The packaging is constructed in accordance with Chem-Nuclear Systems, Inc. Drawing Nos.: MOD 100, Rev. 12; C-111-D-00J1, Rev. 0; and C-111-E-0002, Rev. 1; and ATCOR Drawing Nos.: MOD 139-1, Rev. K; MOD 140, Rev. C; MOD 124, Rev. D; 0999-D-07, Rev. G; and 0999-C-08, Rev. G. An optional sunshade is constructed in accordance with Chem-Nuclear Systems, Inc. Drawing No. C-110-D-5001, Rev. 1.

- (b) Contents
 - (1) Type and form of material

Depleted Antimony-Beryllium (Sb-Be) neutron sources and irradiated metal components packaged in secondary containers.

(2) Maximum quantity of material per package

Package internal decay heat load not to exceed 250 watts. The source strength of depleted neutron sources not to exceed 2.3 curies of Antimony-124.

- 6. (a) Both the inner cask cavity and the secondary container must be free of water when the package is delivered to a carrier for transport.
 - (b) Except for close fitting items, shoring must be placed between contents, secondary container and cask cavity to minimize secondary impacts due to accident sequence.
 - (c) The maximum gross weight of the contents, secondary container and shoring is limited to 9,220 pounds.

Page 3 - Certificate No. 5805 - Revision No. 16 - Docket No. 71-5805

- 7. Prior to each shipment, the silicone O-ring seals (base plate and vent plug) must be inspected, the seals must be replaced with new seals if inspection shows any defects or every six (6) months, whichever occurs first.
- 8. Prior to delivery of the package to a carrier for transport, the package containment cavity shall be leak tested. The sensitivity of the test shall be at least 1×10^{-1} atm-cm³/sec (SiP). In addition, the packaging containment cavity shall be leak tested at least once every twelve (12) months. The sensitivity of the test shall be at least 1×10^{-3} atm-cm³/sec (STP).
- 9. The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Section 7.0 of the application.
- Each packaging must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12. Fabrication of additional packagings after December 31, 1983 is not authorized.
- 12. Expiration date: March 31, 1999.

REFERENCES

chem-Nuclear Systems, Inc. application dated February 25, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

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Cars R. Choppell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

APR 0 5 1994 Date

RC FORM 91				FOF			OF CON	s packa	E Ges		TORY COMMISSI
& CERTIFICAT		R .			NUMBE	R		DENTIFICATIO		C. PAGE NUMBER	e. TOTAL NUMBER PAG
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of Feder	al Regula	ations, Part	71, "Packag	and Tra	compliance	n of Hadioa	equirement of	the regulation	ns of the U.S	afety standards set fo b. Department of Tran be transported.	
Depar Nava	rtmen 1 Sup	t of th port Fo rancisc	ne Navy prce Al	ntarcti	ca	Minne	cation of REG	ning and	Manufa ne 28,	acturing Com	pany
CONDITIONS This certific	ate is co	nditional up	on fulfillin	the requin	ements of 1	10 CFR Par	t 71, as applic	able, and the	conditions s	specified below.	
(a)	Pack (1) (2)	packag by 68 Berylc thermo 1,900 Drawin The SN Manufa	inches and in inches a=165 belectr pounds igs AP-21 cturir	a righ high. hossio ic mod	t crec Main g with bles; struct any Dr	ular m compo flang and th ed in awing	etal pro nents of e; U-8 M e heat s accordar	tective the ge lo shiel cource.	enclos nerator ding; t Total Minnes	30 inches 10 oure 52 inche consist of thermal insu weight of the sota Mining a brawings inc	es in diamet an outer lation; ne package i and
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U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A CONDITIONS (continued) (本书的) Page 2 - Certificate No. 5830 - Revision No. 5 - Docket No. 71-5830 (b) Contents 5. Type and form of material (1)Strontium 90 titanate pellets doubly encapsulated by a thin inner liner and a 0.2-inch thick Hastelloy C primary containment capsule which meets the requirements of special form radioactive material. Maximum quantity of material per package (2)33.000 ci In addition to the requirements of Subpart G of 1000FR Part 71: 6. (a) The package must be prepared for shipment, operated and maintained in accordance with Minnesota Mining and Manufacturing Company Report No. MMM 3691-42, "SNAP-21 Program, Phase II, Deep Sea Radio Scope-Fueled Thermoductric Generator Power Supply System, Shipping and Handling Manually The package authorized bethis certificate is eby approved for use under 7. the general license provisions of TO CFR WI Expiration date: (Novembe 995 8. June 28, 1968. Minnesota Minima and Manur ted 10. 1990 Department of Navy supplements kert? IND * UCLEAR REGULATORY COMMISSION Charles E. MacDonald, Chief Eation Branch ision of Safeguards and Transportation, NMSS Date: NOV 2 1900

BRC FORM 618 8-460 0 CPSI 71			E OF COMPLIANCE		TORY COMMISSI
La CEPITIFICATE	NLRWEBER	5. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/5862/B()	d PAGE NUMBER	. TOTAL NUMBER PAG
of Federal	Regulations, Part 71, "Packa	ging and Transportation of Rac	ribed in Item 5 below, meets the applicable sa lioactive Material." ny requirement of the regulations of the U.S. ntry through or into which the package will I	Department of Trans	
A ISSUED TO	ATE IS ISSUED ON THE BASIS ((Manie and Address)	F A SAFETY ANALYSIS REPORT	OF THE PACKAGE DESIGN OR APPLICATION	ION:	
Technical 6000 Patr	nt of the Air For Operations Div col Road n AFB, CA 95652-:	ision/CC J	REG71-5862		ated
4. CONDITIONS This certifical	te is conditional upon fulfillin	the requirements of 10 CFR	Part 71, as applicable, and the conditions sp	pecified below.	
5. (a) Pack (1) (2)	Model No X Ser Description	tinel-100F			44 - baa
	diameter of 24. 2,600 pounds 13.837 OD) whit 6061-T6 mountin pallet attachme	The components is h is within the g pads at the ba	emenator, is 45.5 inches ing mounting pads), and a actude a Tungsten biologi atuminum (6061) outer pro se of the atuminum housin	weighs appro ical shield otective hou	ximately (10.705" X sing. Four
(3)	Drawings The packaging i Drawing Nos.:	s constructed in	accordance with the foll	lowing Isoto	pes, Inc.
	010-20000 Sheet 010-70003 (Rev. 010-70004 Shiel 001-90064 Sheet	s 1-2 (Rev. B), H A) Shield Body d Plug s 1-2 (Rev. A), S	Generator Assembly Sentir Fuel Capsule Assembly Shipping Crate Sentinel F Sheet 3 (Rev. H), and She	RTG	t Assembly

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	2 -	Certi	ficate N	o. 5862 ·	Revisio	on No. 6	- Docket	No.	71-5862
•	(b)	Cont	ents						
		(1)	Type an	d form o	f materia	1]			
			Hastell	um-90 ti oy or Un dioactiv	iloy HC c	capsule w	apsulated	l in s th	a stainless steel liner and e requirements of special
		(2)	Maximum	quantit,	of mate	erial per	package		
				curies.					
6.	Fabr	ricati	on of ad	ditional	packagi	Bs is no	R Gathory	zed.	
7.				and the second second	1 1		G of 10	18	
	(a)	The with	package the Ope	shall be rating P	prepared	for shi in the	pment and Supplemen	l ope it da	rated in accordance ted August 30, 1985.
	(b)	The in t	Package he Suppl	must be ement da	natutaine ted Augus	ed in acc st 30, 19	ordance w 85.	rith	the Maintenance Program
8.	The gen	packa eral 1	ge autho icense p	rized by rovision	this cen s of 10 (tificate FR §71.1	is hereb	y ap	proved for use under the
	Exp	iratio	n date:/	Septemb	er 30, 11	995.	TREE		4. 2
Tolo	duno	Enon	v Svetor		A CONTRACT	REFERENC	26, 1985.	No.	S
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						Cass R.	Chappell	, Se	ction Leader
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Conditions Conditions Decoder notation Conditions Condit Conditions Conditions Conditions Conditions	IRC FORM 61 8-66) 0 CFR 71			TE OF COMPLIANCE	NUCLEAR REGULA	
 The certificate is used to certify that the packaging and contents described in them 5 below.means the spoleable affect with and requisitions of the U.S. Department of Transportation of addressive Maternal. This certificate does not mine the consignor from compliance with any moulement of the requisitions of the U.S. Department of Transportation of addressive Maternal. This certificate is isolated on the BASIS of A BAPETY ANALYSIS REPORT of The PACKAGE DESIGN OF APPLICATION. The CONTINNATE IS ISOLED ON THE BASIS OF A BAPETY ANALYSIS REPORT of The PACKAGE DESIGN OF APPLICATION. THE CONTINUENT IS ISOLED ON THE BASIS OF A BAPETY ANALYSIS REPORT of The PACKAGE DESIGN OF APPLICATION. THE AND OBSTRUCTION OF REPORT OF APPLICATION. THE AND OBSTRUCTION OF REPORT OF APPLICATION. THE AND OBSTRUCTION OF REPORT OF APPLICATION. Safety Analysis for Radioactive Material Shipping Cashe No. WAPD-40 dated Design of APPLICATION. This certificate is conditional upon fulfilling the requirements of 10 OFR Part 71, as applicable. and the conditional specified below. 		TE NUMBER	and the second se		d PAGE NUMBER	S TOTAL NUMBER PAR
 Issue to name and Address? Instant of Energy (iston of Naval Reactors shington, DC 20585 Conditional upon fulfilling the regularments of 10 CFR Part 71, as applicable, and the conditions specified below. Conditional upon fulfilling the regularments of 10 CFR Part 71, as applicable, and the conditions specified below. Packaging Model No.: MAPD-40 Description The WAPD-40 shipping container is a cylindrical, stainless steel clad, lead shielded, shipping container is an outer Type 304 stainless steel shell 1/2-inch thick and an inner Type 304 stainless steel shell 1/2-inch thick, with 9.875 inches of lead between the shell's. The overall size of the container, including an integral skid, is 23.25 inches in leameter by 158 inches in length forms approximately 28,000 pounds. The heat removal capacity is approximately 2000 BT0/Nour. The cylindrical inner cavity is 2 inches in length. Inner container as required for all shipments. Stahless steel clad, lead shielded on plugs bolt into each end. One-half indin thick plates are bolted over the end plugs bolt into each end. One-half indin thick plates are bolted over the end plugs bolt into each end. One-half indin thick plates are bolted over the end plugs bolt into each end. One-half indin thick plates are bolted over the end plugs bolt into each end. Stained by the wapped in polyvicyl chloride when shipped in a closed truck. A special holddown cradle is used during truck shipments. This cradle weighs approximately 5,000 pounds. (3) Drawings The WAPD-40 cask is fabricated in accordance with Westinghouse Electric Drawing Nos. 936F577, Rev. 11; and 936F576, Sheet 1, Rev. 9, and Sheet 2,	of Feder b. This cer applicat	ral Regulations, Part 71, "Packa tificate does not relieve the con ble regulatory agencies, includ	iging and Transportation of Ra nsignor from compliance with ing the government of any co	idioactive Material." any requirement of the regulations of the U. untry through or into which the package will	S. Department of Trans	
 This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below. Packaging Model No.: MAPD-40 Description The WAPD-40 shipping container is a cylindrical, stainless steel clad, lead shielded, shipping container used to ship irradiated fuel and non-fuel test specimens. The container has an outer Type 304 stainless steel shell 1/2-inch thick and an inner Type 304 stainless is teel shell 1/4-inch thick, with 9.875 inches of lead between the shells. The overall size of the container, including an integral skid, is 23.25 inches in diameter by 158 inches in length Gross weight (including skid) of the container is approximately 28,000 pounds. The heat removal capacity is approximately 2000 BTW/hour. The cylindrical inner cavity is 2 inches in diameter and 135 inches steel clad, lead shielded end plugs bolt into each end. One-half inch thick plates are bolted over the end plugs to provide a total end plug flang thickness of 1.0 inch for puncture resistance. Metallic, pressure-filled 0-rings between the end plugs and the container seal the package. The cask may be wrapped in polyvinyl chloride when shipped in a closed truck. A special holddown cradle is used during truck shipments. This cradle weighs approximately 5,000 pounds. (3) Drawings The WAPD-40 cask is fabricated in accordance with Westinghouse Electric Drawing Nos. 936F577, Rev. 11; and 936F578, Sheet 1, Rev. 9, and Sheet 2,	a issued n partment vision o shingtor	o (Nerme and Address) t of Energy of Naval Reactors n, DC 20585	Sat Sh: Der	AND IDENTIFICATION OF REPORT OR APPLICA fety Analysis for Radioac ipping Cask No. WAPD-40 c cember 1984, as supplement	ctive Materia dated	1
 Packaging (1) Model No.: MAPD-40 (2) Description The WAPD-40 shipping container is a cylindrical, stainless steel clad, lead shielded, shipping container used to ship irradiated fuel and non-fuel test specimens. The container has an outer Type 304 stainless steel shell 1/2-inch thick and an inner Type 304 stainless steel shell 1/4-inch thick, with 9.875 inches of lead between the shells. The overall size of the container, including an integral skid, is 23.26 inches in diameter by 158 inches in length Gross weight (including skid) of the container is approximately 28,000 pounds. The heat removal capacity is approximately 2000 BT0/hour. The cylindrical inner cavity is 2 inches in diameter and 135 inches in length. Inner containers are required for all shipments. Stainless steel clad, lead shielded end plugs bolt into each end. One-half inch thick plates are bolted over the end plugs to provide a total end plug flang thickness of 1.0 inch for puncture resistance. Metallic, pressure-filled O-rings between the end plugs and the container seal the package. The cask may be wrapped in polyvinyl chloride when shipped in a closed truck. A special holddown cradle is used during truck shipments. This cradle weighs approximately 5,000 pounds. (3) Drawings The WAPD-40 cask is fabricated in accordance with Westinghouse Electric Drawing Nos. 936F577, Rev. 11; and 936F578, Sheet 1, Rev. 9, and Sheet 2, 	CONDITIONS This certific	s ate is conditional upon fulfillin	og the requirements of 10 CFR	Part 71, as applicable, and the conditions a	specified below.	
The WAPD-40 cask is fabricated in accordance with Westinghouse Electric Drawing Nos. 936F577, Rev. 11; and 936F578, Sheet 1, Rev. 9, and Sheet 2,	(1) (2)	Model No.: WAPD Description The WAPD-40 ship shielded, shippi specimens. The thick and an inn inches of lead b including an int Gross weight (in The heat removal inner cavity is containers are r end plugs bolt i end plugs to pro resistance. Met container seal t when shipped in truck shipments.	ping container is ng container used container has an er Type 304 stail etween the shelis egral skid, is 23 cluding skid) of capacity is appu 2 inches in diame equired for all s nto each end. On vide a total end allic, pressure- he package. The a closed truck.	d to ship irradiated fue outer Type 304 stainless less steel shell 1/4-ind s. The overall size of 1 3.25 inches in diameter f the container is approxi- roximately 2000 BTU/hour eter and 135 inches in less shipments. Stainless ste he-half inch thick plates alug Flang thickness of filled 0-rings between th cask may be wrapped in p A special holddown crad	I and non-fue steel shell the container by 158 inches imately 28,00 . The cylind ength. Inner eel clad, lea s are bolted 1.0 inch for he end plugs polyvingl chl le is used du	1 test 1/2-inch h 9.875 in length. 0 pounds. rical d shielded over the puncture and the oride
Drawing Nos. 936F577, Rev. 11; and 936F578, Sheet 1, Rev. 9, and Sheet 2,	(3)	Drawings				
		Drawing Nos. 936	is fabricated in F577, Rev. 11; a	n accordance with Westing nd 936F578, Sheet 1, Rev	ghouse Electr 9, and Shee	tic t 2,
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- 5. (b) Contents
 - (1) Type and form of material

Byproduct and special nuclear material contained within inner product containers. The contents must be dry and unmoderated (H to X atomic ratio less than 2).

(2) Maximum quantity of material per package

The fissile content of the cask must be limited to a maximum of 350 equivalent grams of U-235. The number of equivalent grams of U-235 is determined by the equation: $1.0 \times \text{grams}$ U-235 + 1.4 x grams U-233 + 1.6 x grams plutonium.

II

3.2

(c) Fissile Class

Minimum transport index to be shown on label

- 6. Maximum decay heat per package must not exceed 2,000 BTU/hr.
- As needed, shoring must be used to limit movement of contents under accident conditions of transport.
- The lifting trunnions must be covered during transport to preclude their use as tie-down devices.
- 9. The contents of the container must be limited so that the maximum measured gamma dose rate (above background) on the side of the cask for normal conditions does not exceed the value defined by $C_{\rm c} = (1000 N_{\rm o})/E_{\star}$

where C_S = the maximum permissible gamma dose rate on the side of the cask in mrem/hour for pormal conditions.

- N_A = 0.0 mrem/hour for shipments of irradiated structural materials and 37.0 mrem/hour for shipments of irradiated fuel.
- F = factor obtained directly from Table 1 or Table 2 (attached).

For non-fuel whose principal isotope is not included in Table 1, an F factor must be determined based on calculated ratios of the limiting accident radiation levels to the normal condition radiation levels for each of the principal isotopes.

For U-233 with approximately 30,000 hours of effective full power operation and greater than 17,520 hours of decay, the F factors in Table 2 for U-235 are conservative and may be used.

The maximum measured neutron level dose rate on the side of the cask must not exceed 10.7 mrem/hour for normal conditions.

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9. Continued

For mixed shipments of fuel and irradiated non-fuel, the more limiting C_S value must be employed.

If C_s is below the maximum measurable level of the gamma instrument, other methods (e.g., thermal luminescent detectors, source strength calculations) must be employed to estimate the expected level for comparison with C_s .

- The acceptance tests and maintenance program must be in accordance with Chapter 8.0 to WAPD-REO(C)-270, Rev. 3.
- 11. The packaging must be leak tested within one year prior to use to a minimum sensitivity of 1 x 10 std-cm /sec.
- Prior to each shipment, the package must be leak tested after assembly to a minimum sensitivity of 1 x 10⁻⁵ std-cm⁻/sec.
- 13. The WAPD-40 shipping container may be covered with a wrapping of polyvinyl chloride (PVC) during skipment provided that the internal heat load of the shipment does not exceed 2008 BIU/hr and the shipment is made in a closed truck. The applicable requirements of Condition No. 9 above must be satisfied prior to wrapping.

14. Expiration date: July 31, 1997.

REFERENCES

Safety Analysis for Radioactive Material Shipping Cask No. NRBK-40 dated December 1984 (WAPD-REO(C)-270, through Rev. No. 4).

Naval Reactors supplements dated: July 3, 1985 (S#85-1328), May 6, 1987 (S# 87-2721), and November 18, 1991 (S#91-02,620).

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

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Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date:

APR 1 1992

Attachment to USA/5874/B()F Rev. 6 Page 1

Table 1

F Factors¹ For Use in Formula $C_S = (1000 - N_A)/F$

For Irradiated Structural Material Shipments by

	P	rincipal Isoto	ope	
Isotope	Energy (MeV)	and	Yield	Factor
Manganese-56	(mev) 0.47 1.81 2.11		<u>Yield</u> (V/decay) 0.99 0.29 0.15	174
Cobalt-60	1.17 1.33		1.0 1.0	1492
Iron	1.095		0.56 C.44	1875

¹The F factor is a constant for each isotope because the energy spectrum of the emitted gamma radiation of each isotope does not change as a function of time.

Attachment to USA/5874/B()F Rev. 6 Page 2

				F Factors For U		3	n			
	Effective Hours Full Power Operation	<u>720</u>	<u>1440</u>	<u>2160</u>	<u>1ated U-235 Fu</u> <u>4320</u>	urs Decay 6480	<u>8760</u>	17,520	43,800	87,600
	100	339	339	330	219	200	194	192	208	698
	500	338	338	325	219	203	198	198	237	648
	1000	338	337	318	219	206	203	206	268	629
1	5000	332	317	283	230	228	229	250	382	606
	10,000	317	300	271	242	243	248	278	427	607
	15,000	310	294	269	249	253	258	292	445	610
	20,000	306	290	268	254	257	265	300	457	612
	25,000	302	286	268	256	260	267	305	464	617
	30,000	300	285	267	257	263	270	308	466	624
	40,000	295	282	266	258	264	271	310	472	637
	50,000	292	279	265	259	264	272	311	472	651

Table 2

F Factors For Use in Formula $C_s = (1000 - N_A)/F$

		E OF COMPLIANCE	ICLEAR REGULA	
1. & CERTIFICATE NUMBER 5894	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/5894/AF	d PAGE NUMBER	e. TOTAL NUMBER PAG
	and Transportation of Rac for from compliance with a the government of any court	floactive Material." ny requirement of the regulations of the U.S. ntry through or into which the package will t	Department of Trans	
3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A 6. ISSUED TO (Nume and Address) U.S. Department of Energy Division of Naval Reactor Washington, DC 20585	ay brs daR	Safety Analysis Report for Shipping Container dated as supplemented.	or 2.7 New F	uel 68,
4. CONDITIONS This certificate is conditional upon fulfilling th	e requirements of 10 CFR	Part 71, as applicable, and the conditions sp	ecified below.	
and unirradiated S additional shipment modules. The cont container which ho the inner container wide by 24.5 inchre container is octag GR.B. The outer si rails. The inner inch thick and is	New Fuel contai SW Core R2 fuel ts of S5W Care ainer assembly lds the fuel mo r. The steel o s high and 128 onal, the steel onal, the steel dell is surroun container is co 7.76 inches squ container. The	ner was designed to ship modules. Adapters are us R3, A1W Cor R2, and S1C T consists of two major com dule and an outer contain uter container is approxi- inches long. The cross s shell thickness is 0.187 ded by a framework of ste- nstructed from Type 304 (are and 99 inches long. gross weight of the pack ds.	ype I fuel ponents, an her which su mately 24.5 section of t '5 inch ASTM el stiffene CRES plates, Bolted clos	t inner pports inches he outer A 283 ers and 0.1875 ure is

Page 2 - Certificate No. 5894 - Revision No. 5 - Docket No. 71-5894

(3) Drawing

The packaging is constructed in accordance with Westinghouse Electric Corporation Drawing No. 924J152, Rev. 16.

5. (b) Contents

(1) Type and form of material

Unirradiated fuel assemblies of the following type:

- S5W Core R2 standard module or corner module;
- (ii) S5W Core R3 standard module or corner module;
- (iii) AlW Core R2 standard cluster or half cluster;
- (iv) S1C Core Type I standard cluster;
- (v) SIC Core Type I fuel subassembly;
- (vi) 55W Core 2 standard module or corner module;
- (vii) AW Core R2 subassembly
- (2) Maximum quantity of material per package
- (i) One fuel assembly as described in 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1)(ii), 5(b)(1)(iv) or 5(b)(1)(vi);
- (ii) Two fuel assemblies as described in 5(b)(1)(v).
- (iii) Four fuel assemblies as described in 5(b)(1)(vii).

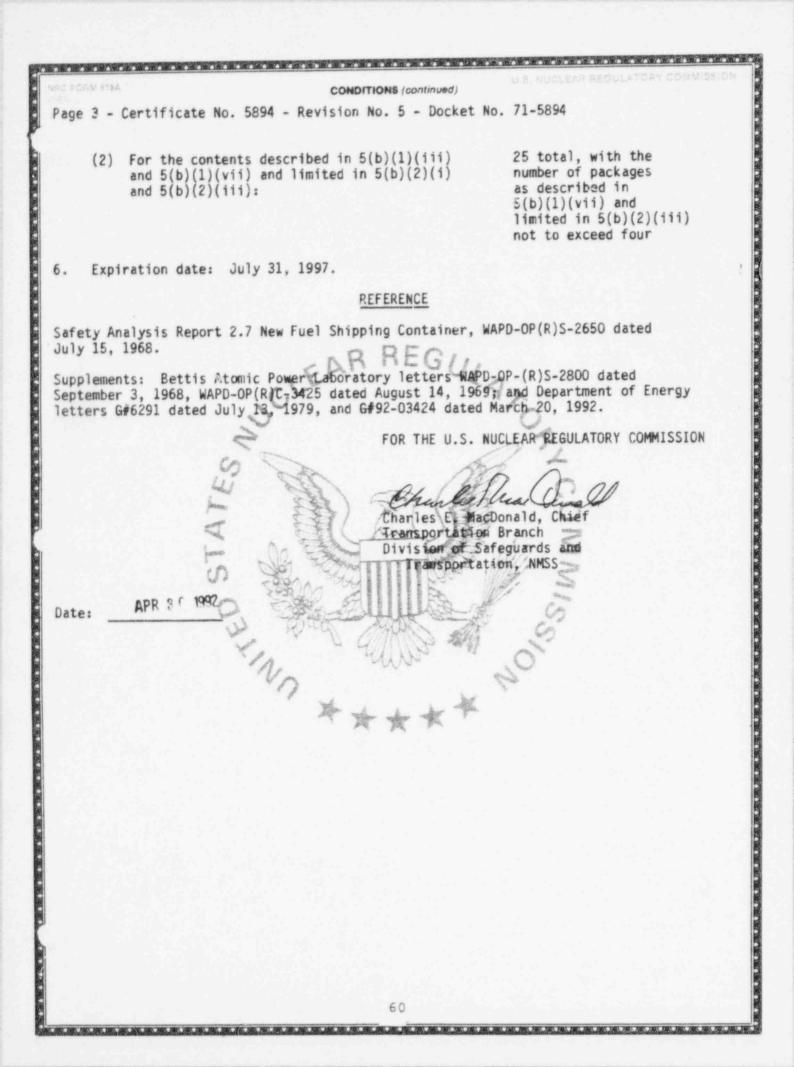
(c) Fissile Class

III

Maximum number of packages per shipment:

For the contents described in 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1)(iv), 5(b)(1)(v) and 5(b)(vi) and limited in 5(b)(2)(i) and 5(b)(2)(ii):

No more than one total core's worth



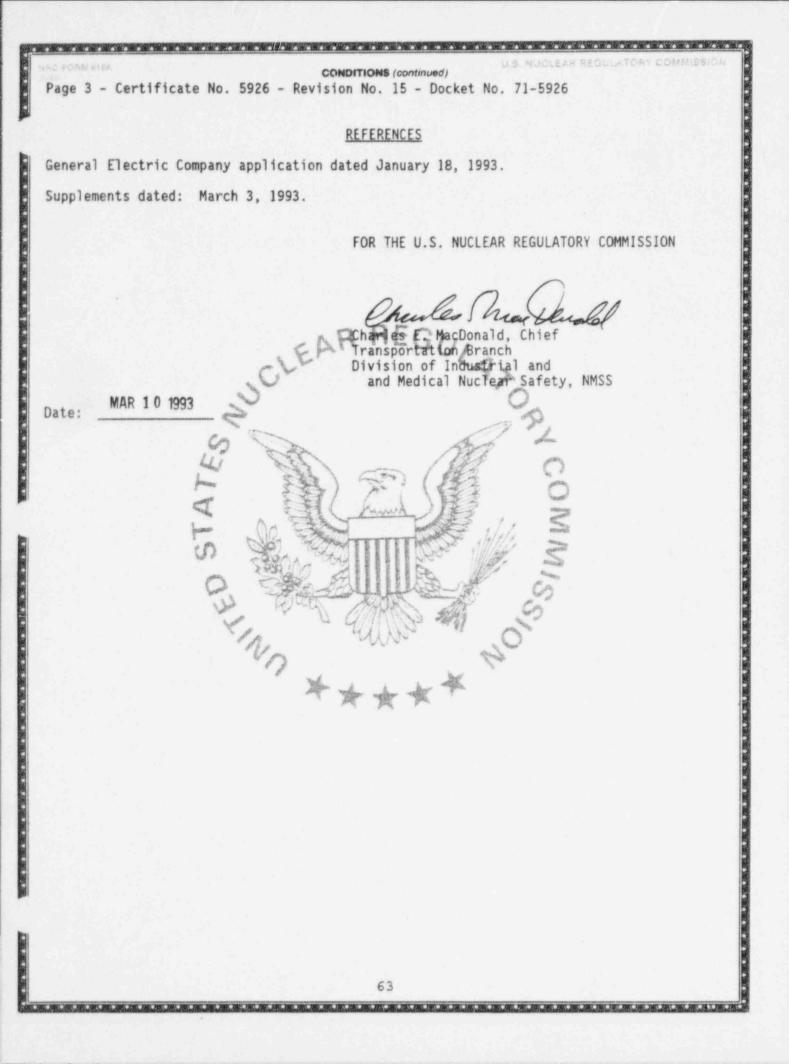
RC FORM 618 1465)) CFR 71			TE OF COMPLIANCE	UCLEAR REGULA	TORY COMMISS
CERTIFICATE	NUMBER	b. REVISION NUMBER	USA/5926/B()F	d PAGE NUMBER	. TOTAL NUMBER PA
of Federal b. This certifi	Regulations, Part 71, "Packagir cate does not relieve the consig	g and Transportation of R	scribed in Item 5 below, meets the applicable adioactive Material." any requirement of the regulations of the U. suntry through or into which the package wi	S. Department of Tran	
Gener P.O.	TE IS ISSUED ON THE BASIS OF A terme and Address al Electric Comp Box 460, Valleci anton, CA 94566	any	General Electric Con dated November 19, 1	npany applica	
CONDITIONS	is conditional user fulfilling t	C DOCK	T NUMBER 71-5926	specified below	
This certificate	is conditional upon fulfilling t	neirequirements of 10 CFF	Part /1, as applicable, and the cooking is	specified delow.	
(a)	steel circu a central c Approximate cask is equ is accomplis additional	lar cylinder, 2 avity approxima ly 5-7/8 inches ipped with a ca shed by a gaske shielding lead,	ded shipping cask. The 0-1/4-inch diameter by 2 itely 7-5/8-inch diameter of lead surround the ce wity drain line and lift ted and bolted steel lea tungsten or uranium lin mum weight of the packag	6-7/8 inch h by 10 inche htral cavity ing device. d filled plu ers may be i	high with es high. 7. The Closure ng. For nserted in
		ng is construct 129D4727, Rev 1, Rev. 1.	ed in accordance with Ge 7. 5; 129D4729, Rev. 5; 1	neral Electr 29D4730, Rev	ric Company 7. 4;

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Contract of the second second CONDITIONS (continued) Page 2 - Certificate No. 5926 - Revision No. 15 - Docket No. 71-5926 (b) Contents 5. (1) Type and form of material (i) Byproduct and irradiated special nuclear material in the form of fuel rods, or plates, fuel assemblies, or meeting the requirements of special form radioactive material; or (ii) Solid nonfissile irradiated metal hardware and reactor control rods (blades). (2) Maximum quantity of material per package Radioactive decay heat not to exceed 400 watts and 500 grams U-235 equivalent mass fissile material. (U-235 equivalent mass equals U-235 mass plus 1.66 times U-233 mass plus 1.66 times Pu mass). Plutonium, mexcess of twenty (20) curies per package must be in the form of metal metal alloy or reactor elements. (c) Fissile Class Minimum transport index to be shown on label Contents 5.(b)(1)(i): Shoring shall be provided to minimize movement of contents during accident 6. conditions of transport. At the time of delivery of the leaded package to a carrier for transport, the 7. package contents shall be dry and the fissile material unmoderated (H to X atomic ratio less than 2). In addition to the requirements of Subpart G of 10 CFR Part 71: 8. (a) The package must be maintained in accordance with the maintenance procedures submitted with GE application dated January 18, 1993. (b) The package must be prepared for shipment and operated in accordance with the operating procedures submitted with GE application dated January 18, 1993. The package authorized by this certificate is hereby approved for use under the 9. general license provisions of 10 CFR §71.12. 10. Expiration date: February 28, 1998.

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inches high	b. REVISION NUME 26 packaging and conting and Transportation pror from complian the government of A SAFETY ANALYSIS any tos Road the requirements of 1500 n cased lead ultar cylind b with a ce	BEP tents describer on of Radioac ice with any re any country to the sound of the country to the sound of the date to country to the the the the the the the the the the	d in Item 5 below tive Material." squirement of the through or into a HE PACKAGE DES DENTIFICATION C eral Elec ed Novemb REF 71-593 71, as applicable	mprication NU 939/B() , meets the app e regulations of which the pack ingn or APPLIC of REPORT OR tric Com er 19, 1 9	MBER F Hicable safety the U.S. Dep age will be the ATION APPLICATION: pany app 992, as	1 standards set fort artment of Transi ansported. plication supplemen	portation or other
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Drawings							
Com	pany Drawin	ng Nos.	tructed i 129D4748,	n accord Rev. 7;	ance wit 129D474	th General 49, Rev. 5	l Electric 5; and
fol	lowing Chem	m-Nuclea	r Systems	, Incorp	orated I	Drawing No	os.:
	protective bottom and vertically the protec wide acros inches and the packag Drawings (i) The Com 129 (ii) An fol	protective jacket con bottom and a protrudivertically down the s the protective jacket wide across the box s inches and the pallet the packaging is appro- Drawings (i) The packaging Company Drawin 129D4750, Rev (ii) An optional ca following Cher	protective jacket consisting bottom and a protruding box vertically down the sides at the protective jacket are ap wide across the box section. inches and the pallet is 59 the packaging is approximate Drawings (i) The packaging is cons Company Drawing Nos. 129D4750, Rev. 9. (ii) An optional canister following Chem-Nuclea	 protective jacket consisting of an up bottom and a protruding box section d vertically down the sides attaches to the protective jacket are approximate wide across the box section. The out inches and the pallet is 59 1/2 inche the packaging is approximately 15,500 Drawings (i) The packaging is constructed i Company Drawing Nos. 129D4748, 129D4750, Rev. 9. (ii) An optional canister insert is following Chem-Nuclear Systems 	 protective jacket consisting of an upright cl bottom and a protruding box section diametric vertically down the sides attaches to a squar the protective jacket are approximately 60 7/ wide across the box section. The outer cylin inches and the pallet is 59 1/2 inches square the packaging is approximately 15,500 pounds. Drawings (i) The packaging is constructed in accord Company Drawing Nos. 129D4748, Rev. 7; 129D4750, Rev. 9. (ii) An optional canister insert is constru- following Chem-Nuclear Systems, Incorp 	 protective jacket consisting of an upright circular of bottom and a protruding box section diametrically active vertically down the sides attaches to a square pallet the protective jacket are approximately 60 7/8 inches wide across the box section. The outer cylindrical of inches and the pallet is 59 1/2 inches square. The net the packaging is approximately 15,500 pounds. Drawings (i) The packaging is constructed in accordance with Company Drawing Nos. 129D4748, Rev. 7; 129D47474750, Rev. 9. (ii) An optional canister insert is constructed in following Chem-Nuclear Systems, Incorporated Interpretent of the packaging Chem-Nuclear Systems, Interpretent of the packaging Chem-Nuclear Systems (Chem-Nuclear Systems) 	 protective jacket consisting of an upright circular cylinder of bottom and a protruding box section diametrically across the invertically down the sides attaches to a square pallet. Dimension the protective jacket are approximately 60 7/8 inches high by wide across the box section. The outer cylindrical diameter inches and the pallet is 59 1/2 inches square. The maximum we the packaging is approximately 15,500 pounds. Drawings (i) The packaging is constructed in accordance with General Company Drawing Nos. 129D4748, Rev. 7; 129D4749, Rev. 129D4750, Rev. 9.

U.S. NUCLEAR REGULATORY COMMISSIO RC FORM SIEA **CONDITIONS** (continued) Page 2 - Certificate No. 5939 - Revision No. 26 - Docket No. 71-5939 5. (b) Contents Type and form of material (1)Byproduct material and special nuclear material meeting the (1)requirements of special form radioactive material and antimony pins encased in stainless steel, or (ii) Byproduct material as ⁹⁰SrF₂ or ¹³⁷CsCl capsules meeting Condition No. 6, below, or (iii) Solid non resile arradiated metal hardware and reactor centrol rods (blades), or tainless steel encapsulated solid metal Co-60 sources, or Byproduct material as ¹³⁷CsCl capsules meeting Condition No. 7. below. (2) Maximum abartity of material per package Not to exceed a decay heat generation of 3,120 watts and Hten (1)(1) (i) aboved 5 500 grams U-255 enviralent mass. (U-235 equivalent mass Fouls U-235 bass plus 1.66 times Pu mass). Plutonium in excess of 20 curnes per package must be in the form of metal alloy or reactor fuel elements. Item 5(b)(1)(1) above: 58.000 curies. (iii) Item 5(b) (1) (iv) about 200,000 curies. (iv) Item 5(b)(1)(v) above: 157,000 curies. III (c) Fissile Class Maximum number of packages per shipment 22

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- 6. For the contents described in 5(b)(1)(ii): The ⁹⁰SrF₂ capsules must be in accordance with Vitro Drawing Nos. H-2-66759, Rev. 0; and H-2-66758, Rev. 0. The ¹³⁷CsCl capsules must be in accordance with Vitro Drawing Nos. H-2-66760, Rev. 0; and H-2-66761, Rev. 0. After fabrication, the ⁹⁰SrF₂ and ¹³⁷CsCl capsules must be leak tested using a method having sufficient sensitivity to detect a leak rate of 10⁻⁸ atm cc/sec. Any capsule with a detectable leak may not be delivered to a carrier for transport.
- 7. For the contents described in 5(b)(1)(v): The ¹³⁷CsCl capsules must be contained in the canister insert described in item 5(a)(3)(ii), above. The ¹³⁷CsCl capsules must be constructed and tested in accordance with Section 1.2.3 of the Chem-Nuclear Systems. Encomporated supplement dated March 1, 1993. The canister insert must be operated, tested, and maintained in accordance with Chapters 7 and 8 of the Chem Nuclear Systems. Incorporated supplement dated March 1, 1993. The shipment period must be completed within 30 days following the placement of the canister Tid on the canister insert.
- 8. In addition to the requirements of Subpart G of 10 CER Part 71:
 - (a) The package shall be prepared for shipment, operated, and maintained in accordance with the "Shipping Package Assembly/Disassembly" sections of the application.
 - (b) The stlicone rubber lid gaskets must be replaced within the 12-month period preceding each swipment. Prior to each shipment the silicone rubber lid gaskets must be inspected. The silicone rubber gaskets must be replaced if inspection shows any defects. Cavity drain line must be sealed with appropriate sealant applied to threads of pipe plug.
 - (c) The packaging shall be bubble tested within the 12-month period preceding each shipment, and after each third use. The bubble test shall be performed by filling the cask cavity to approximately 1/4-inch depth with water, reducing the cavity pressure to no more than 2.5 psia and holding for at least 5 minutes. Acceptance is indicated by no continuous generation of bubbles.
- The package authorized by this certificate is hereby approved for use under the general license provision of 10 CFR §71.12.

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10. Expiration date: December 31, 1997.

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REFERENCES

General Electric Company application dated November 19, 1992.

Chem-Nuclear Systems, Incorporated supplement dated March 1, 1993.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Chief

Charles E. MacDonald, Transportation Branch Division of Industrial and Medical Nuclear Safety, NMSS

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Dated:

APR

D CAPPE 71		FOR RADIO	CATE OF COMPLIAN	AGES	La page au uner	. TOTAL NUMBER PAGE
L CERTIFICA	TE NUMBER	6	C PACKAGE IDENTIFICAT		1 PAGE NUMBER	3
of Fede b. This ce applica	ral Regulations, Part 71, "Pac rtificate does not relieve the c ble regulatory agencies, inclu	kaging and transponation consignor from compliance iding the government of a	with any requirement of the regula ny country through or into which t	tions of the U.S. he package will t	Department of Trans be transported.	
ttelle 5 King 1umbus,	co <i>(Nume and Addmas)</i> Columbus Laborat Avenue OH 43201	ories	Battelle Columbus dated August 21, 1 R R F DOCKET NUMBER 71-5950	Laboratori 981.	ies applicat	ion
This cettif	icate is conditional upon fulfi	lling the requirements of 1	0 CFR Part 71, as applicable, and 1	the conditions sp	ecified below.	
5.) Pack (1) (2)	recessed plug-t devices and re containment for material in spo shielding as for Exter Exter Cavit Lead	ead shielded s ype lid and ga ief valve, ven the contents cial form. Th	in 26.4 42.5	pre, lifti ine penetr ner can a ensions, w	ing and tie- rations. assembly or veight, and	down
(3)			in accordance with I		Annonial Inc	*******
	Drawing No. BC	4-01, Sheet 1	and 2, Rev. D.			

Page 2 - Certificate No. 5950 - Revision No. 6 - Docket No. 71-5950

5. (b) Contents

Type and form and maximum quantity of material per package.

Byproduct material, source material and special nuclear material not to exceed 400 watts decay heat in solid metal or oxide form packaged within an inner can assembly or the material meets the requirements of special form radioactive material and limitations on fissile loading for the Fissile Class as follows:

Inner can assembly:

Battelle Memorial Institute Drawing No. BCL4-49, Rev. C.

Fissile Class I

Fissile Class III

650* 2000*

*(grams U-235 equivalent mass)

(c) Fissile Class

0.

I and III

Maximum number of packages per shipment for Class III One (1)

The U-235 equivalent mass must be determined by the following method:

U-235 equivalent mass equals U-235 mass plus 1.75 times U-233 mass plus 1.60 times Pu mass.

- 7. At the time of delivery of the loaded package to a carrier for transport, the package contents must be (1) dry (contents of inner can assembly must not decompose up to a temperature of 750°F) and the fissile material unmoderated (H to X atomic ratio less than 2) and (2) so limited that the dose rate will not exceed 10 millirem per hour at three (3) feet from the external surface of the package.
- The maximum gross weight of the cavity contents must not exceed 180 pounds (inner can assembly, radioactive material, etc.).
- 9. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) Each package must meet all of the acceptance and periodic tests specified in Section 8.0 of the application.

The following item in the thermal acceptance tests (8.1.6) is changed as follows:

- (4) The acceptance criteria must be that the maximum measured temperature of any portion of the cask must not exceed the temperatures indicated in Figure 3.3 of this application by more than 25° F. In this comparison, solar heating and ambient temperature differences between Figure 3.3 and the test data must be taken into account.
- (b) Each package shall be operated and prepared for shipment in accordance with Section 7.0 of the application.

CONDITIONS (continued) Page 3 - Certificate No. 5950 - Revision No. 6 - Docket No. 71-5950 The following item in the Test Procedure (8.1.3), Section 8.0 of the Application, 10. is changed as follows: Remove pressurization line and insert plug in pressure port according to the g. loading procedure. Use teflon tape or other compatible sealant in threads. The package authorized by this certificate is hereby approved for use under the 11. general license provisions of 10 CFR §71.12. 13. Expiration date: August 31, 1996. REFERENCES Battelle Columbus Laboratories application dated August 21, 1981. Supplement dated: July 26, 1991. FOR THE U.S. NUCLEAR REGULATORY COMMISSION MacDonald, Chief Char Transportation Branch Division of Safeguards and Transportation, MMSS AUG 2 0 1991 Date: NO 85, 3985, 2085, 3865, 2085, 2085, 2085, 3985, 3985, 2085, 2085, 2085, 2085, 2085, 2085, 2085, 2085, 2085, 2085, 70

CONTRACTOR AND A TANK AND A STREET		ARE I C. PACKAGE IDENTIFICATION		E NUMBER A. TOTA	AL NUMBER PAG
CERTIFICATE NUMBER	b. REVISION NUN	USA/5957/B			9
		and many designed and a subscription of the second			and the second se
 a. This certificate is issued to of Federal Regulations, F b. This certificate does not 	art 71, "Packaging and Transportal	ntents described in Item 5 below, meets the tion of Radioactive Material." Ince with any requirement of the regulation of any country through or into which the p	s of the U.S. Departme	ent of Transportatio	
 ISSUED TO (Allored Addined Department Office of F Analysis, Washington, 	" of Energy acility Safety EH-32	Battelle Columbus c. DOCKET NUMBER 71-5957	Laboratorie		ion
 CONDITIONS This certificate is conditional 	I upon fulfilling the requirements of	of 10 CFR Part 71, as applicable, and the	conditions specified be	elow.	
5.	lands -		0		
(1) (2)	cylinder 33.37 inch concentric stainles lead. The outer 1/ welded to it, provi shell is 15.5 inche cask lid is a stain shielding. The cas which are welded to line with needle va	d shielded shipping cas es in diameter by 73.37 s steel shells whose an 2-inch thick shell has ding a 0.06-inch thick inside diameter by 54 less steel weldment hav k lid is secured to the the cask body. The ca lve and plug, pressure ask weight, including m	inches high nular region a 0.12-inch air gap insu inches insi ing 7.75 inc cask by twe sk is provid gauge, and a	formed by is filled thick plat lator. Th de length. hes of lea lve steel ed with a pressure	two with e spot e inner The d studs drain relief
		cted in accordance with (BMI) Drawing Nos.: 43 B.			

NRC FORM 518A CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 5957 - Revision No. 23 - Docket No. 71-5957

- 5. (a) Packaging (continued)
 - (4) Product Containers

The various authorized product containers are constructed in accordance with the following Drawing Nos.:

- (i) Inner can assembly as shown in BMI Drawing No. 00-000-421, Rev. C.
- Basket Assembly as shown in BMI Drawing Nos. BCL-000-500, Rev. A; BCL-000-501, Rev. A; and 0048, Rev. A.
- (iii) Fermi Fuel Epom At don per Gasting assembly as shown in BMI Drawing No. 15928-5 0049D, Rev. to May 12, 1966.
- (iv) Basket Assembly as shown in BMI Drawing No. 1020, Rev. B (or with alternate spacer shown in CI Drawing No. 334D2193) or GA Drawing 59590001, Rev. A. Failed fuel assembles must be seal welded in atuminum or stainless steel tubes with wall and end cap hicknesses of at least 0.015 method.
- (v) Basket Accept) defined by BML brawing No. BCL-000-500, Rev. A, as modified by BMI brawing WS 00-000-236 Bev. C, and BCL-000-502 Rev. Buum
- (vi S Basker Assenting and stand of the defined by BMI Drawing No. 00-000 301, Rev. Hand Alund Einternations Drawing No. AIHL, S8DR-0013-01, Ber A ness actively
- (vii) Waner can assembly fast nown inclusion Carbie Corporation Drawing
- (viii) Basker Assembly as shown in University of Missouri Research Reacter (MURR) Drawing No. 2234, Steets 1 through 5, Revision 0.
- (ix) HFBR assembly backet and spacer plate as shown in Brookhaven National Laboratory brawing Nos.: BNL 93-001, Sheets 1, 2, and 3, Rev. 2, and BNL 93-002, Sheet 1, Rev. 2.
- (x) Basket assembly as shown in General Electric Company Drawing No. 183C8253, Rev. 1.

- (b) Contents
 - (1) Type and form of material
 - (i) Intact irradiated MTR- or BRR-type fuel assemblies containing not more than 200 grams U-235 per assembly prior to irradiation. Uranium may be enriched to a maximum 93.5 w/o in the U-235 isotope. Active fuel length shall be approximately 25 inches.

NRC FORM 618A

Page 3 - Certificate No. 5957 - Revision No. 23 - Docket No. 71-5957

5. (b) Contents (Continued)

- (1) Type and form of material (Continued)
 - (ii) Intact irradiated Enrico Fermi Core. A fuel assembly containing not more than 4.77 kgs U-235 prior to irradiation. Uranium may be enriched to 25.6 w/o in the U-235 isotope.
 - (iii) Greater than Type A quantity of radioactive material which may include uranium enriched in the U-235 isotope, U-233, plutonium, as metal, oxides, or compounds which are thermally stable up to 600°F. Plutonium in excess of twenty (20) curies per package must be in the form freed, metal alloy, or reactor elements.
 - (iv) Greater than Type A quantity of byproduct material meeting the requirements of special form radioactive material.
 - (v) Greater than Type A quantity of byproduct material in normal form s metal, oxides, or compounds which are thermally stable up to
 - (vi Irradiated Triga Type fuel as the lies described in Section 6.6 of the applitudior (pp: 6-23 the section 6-27).
 - (vin Irradiated SBOR frement to 56-inch OD to 18.7 inches long by 0.010-inch 20.1 thickness of tastelloy-N. The fuel material is UZAL COLLEGE THE TRADE TO THE TO THE TRADE TO THE TRADE TO THE TO
 - (viii) Intactor adiant cress for assemptires containing not more than 176 gran 9 205 cress and proor to incluation. Uranium may the enriched to a maximum 93 wherein the 0 235 isotope. Active Sdel length shall be 28.5 interes.
 - (ix) Solid ponfissile irradiated hardward which may contain encapsylated fission monitors.
 - (x) Irradiated uran of deplaste enriched in the U-235 isotope up to a nominal 93 w/o which is thermally stable up to 800°F.
 - (xi) Irradiated uranium enriched in the U-235 isotope meeting the requirements of special form radioactive material.
 - (xii) Intact irradiated MURR fuel assemblies containing not more than 775 grams of U-235 per assembly prior to irradiation. Uranium may be enriched to a maximum 93.5 w/o in the U-235 isotope. Active fuel length shall be 24 inches.

U.S. NUCLEAR REGULATORY COMMISSION

Page 4 - Certificate No. 5957 - Revision No. 23 - Docket No. 71-5957

5. (b) Contents (Continued)

NRC FORM 618A

6-83)

- (1) Type and form of material (Continued)
 - (xiii) Intact irradiated MITR-II fuel assemblies containing not more than a nominal 510 grams of U-235 per assembly prior to irradiation. Uranium may be enriched to a maximum 93.5 w/o in the U-235 isotope. Active fuel length shall be approximately 24 inches.
 - (xiv) Intact irradiated High Flux Beam Reactor (HFBR) fuel assemblies containing not more than a nominal 351 grams of U-235 per assembly prior to irradiation. Uranium may be enriched to a maximum of 90517/0 in the U/215 isotope. Active fuel length shall be nominal 24 inches.
 - Intact irradiated MTR-type fuel assemblies containing not more than 240 grams U-235 per assembly prior to irradiation. Uranium may be enriched to a maximum 93.5 w/o_p in the U-235 isotope. (XV)CActive fuel length shall be approximately 25 inches.
 - (xvi) Irradiated MTR-type_fuel sections containing not more than 176 grams U_SS pen fuel section before to irradiation. Uranium may be enriched to a maximum 93. The in the U_SS isotope. Active fuel length for fuel section shall be approximately 11 inches. The fuel sector shall be coned only in the non-fuel bearing regression of the stand of the sector.
- (2) Maximum quality Lof mate ackao

The minimum cooling time of back fuel assembly and rod is 90 days, maximum necay heat generation pay partige not to exceed 1.5 kw, and the external done rate not to expeed 10 mrem/hr feet from the external surface of the cask and:

For the companys described in (b)(1)(i): (i)

> Twenty-four (24) fuel assemblies as contained in product containers specified in 5(a)(4)(ii) or 12 fuel assemblies as contained in product containers specified in 5(a)(4)(v).

(11) For the contents described in 5(b)(1)(ii):

> One (1) fuel assembly as contained in product container specified in 5(a)(4)(iii).

(iii) For the contents described in 5(b)(1)(iii):

480 grams U-233 or 480 grams Pu-239 or 800 grams U-235 as contained in product container specified in 5(a)(4)(i).

Page 5 - Certificate No. 5957 - Revision No. 23 - Docket No. 71-5957

- 5. (b) Contents (Continued)
 - (2) Maximum quantity of material per package (Continued)
 - (iv) For the contents described in 5(b)(1)(iv):

Gamma sources securely confined in the cask cavity to preclude secondary impacts during accident conditions of transport. Thermal heat generation rate is limited to 200 watts.

(v) For the contents described in 5(b)(1)(v):

Contained in Dr Ruct Roat Gner, specified in 5(a)(4)(i) and limited to 200 thermal watts.

(vi) For the contents described in 5(b) (1) ()

Write the system of the syste

(vif For the contense destriced on 5(b) (vii)

Twenty 1997 (21) supported to solve and six sealed cans per basket as described (10-5 (a) (2004). Each of the six cans may contain up to 816 g/U-235 and 198 g hydrogen. The cask is functed to 4.908 kg/U-235.

(viii) For the contents described in 5(b) (viii):

Twelve (12) Tue massebland.

(ix) For the contents described in 5(b)(1)(ix):

Thermal heat generation rate is limited to ?00 watts.

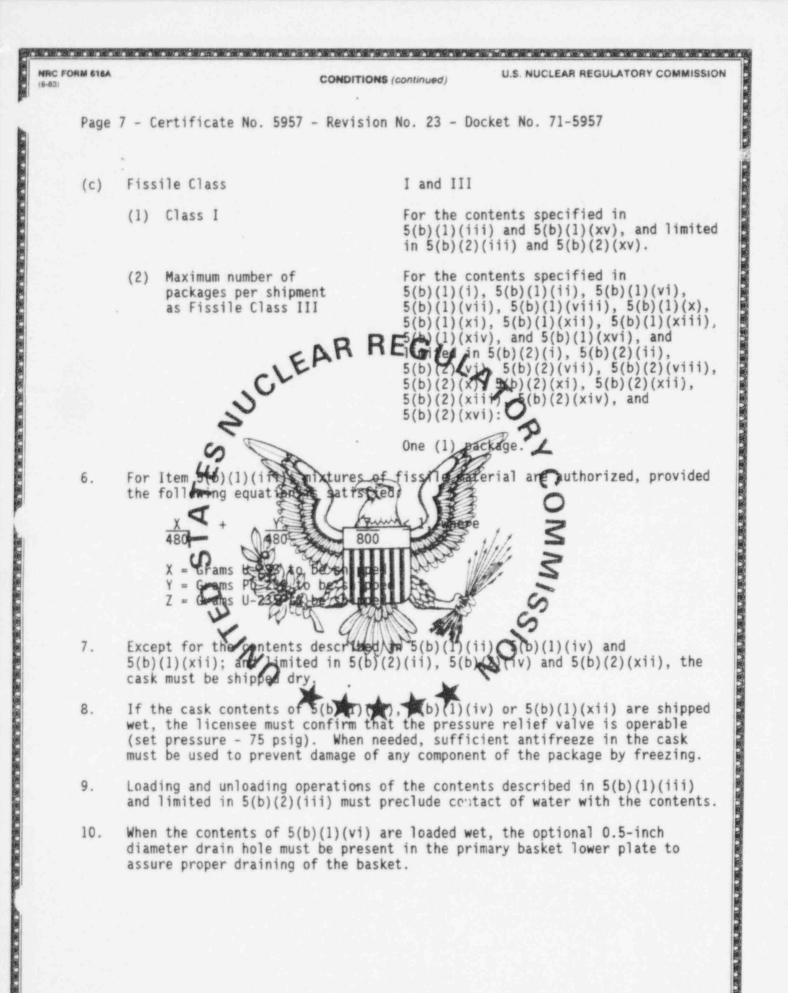
(x) For the contents described in 5(b)(1)(x):

Twenty-four (24) containers each limited to 352 grams U-235 as contained in product containers specified in 5(a)(4)(vii). The decay heat per container is limited to 20 watts. The containers must be leak tested in accordance with Union Carbide Corporation letter dated November 17, 1980.

NRC FORM 618A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSI
Page 6 -	Certificate No. 5957 - Revision No. 23 - Docket No. 71-5957
F. (b)	Contents (Continued)
(2) Maximum quantity of material per package (Continued)
	<pre>(xi) For the contents described in 5(b)(1)(xi):</pre>
	Twenty-four (24) capsules each limited to 100 grams U-235.
	(xii) For the contents described in 5(b)(1)(xii):
	Eight (8) fuel assemblies as contained in the product container specified in 5(a)(4)(viii) The maximum burnup is 150 MWD/Assembly and the intoin min/cooling time of each fuel assembly is 150 days. The maximum ractation source term is 400,000 curits
	(xiii) For the contents described in 5(b)(1) (ii):
	Fight (8) fuel assemblies, contained in the product container specifies in 5(a)(4)(viii). Homeximum decay heat per package is 200 miles.
	(xiv) For the contents described in (1) (xiv)
	Twendy (2005 rel assemblies contained in the baskets separated in a source plate assemblies to 5(a)(4)(ix). Each shipment must contain twenty the assemblies. The maximum burnup is approximately be nucleaseably, and the minimum cooling time is 470 days
	(xv) For the contents describes (b)(1)(20):
	Twelve (12) fuel assemblies contained in product container specified in $5(a)(4)(v)$.
	(xvi) For the contents described in 5(b)(1)(xvi):
	Forty (40) fuel sections contained in the product container specified in $5(a)(4)(x)$. When a shipment contains less than the maximum number of fuel sections (40), empty fuel section basket spaces must be provided with an aluminum or steel spacer in the form of an open-ended pipe with a minimum outer diameter of 2.5 inches and a minimum wall thickness of 0.125 inches. The spacer must be of sufficient length to replace the absent fuel section

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U.S. NUCLEAR REGULATORY COMMISSION

NRC FORM 618A (6-83)

CONDITIONS (continued)

Page 8 - Certificate No. 5957 - Revision No. 23 - Docket No. 71-5957

- 11. The presence and effectiveness of the Boral poison plate in the Basket Assemblies as shown in BMI Drawing Nos. BCL-000-500, Rev, A; 0048, Rev. A; and 00-000-236, Rev. C, must be verified by neutron measurements prior to first use and records maintained of such verification. Verification of the presence of the Boral must be made in each subsequent use.
- Contents 5(b)(1)(i) and 5(b)(1)(x) may be mixed provided the sum of the 12. product containers and fuel assemblies does not exceed 24.
- 13. Axial movement of fuel assemblies must be limited so that the active fuel region will remain correctly positioned with respect to the poisoned section of the basket. Removable spacers may be used in each section of the basket to limit axial movement of the tasket is antiger.

the cash cavity to minimize movement. Contents must be Securely confined in 14.

- Prior to each bee, adequacy of containment vessel must be demonstrated by performance the leak test described in Section 701.1 of the application. 15.
- Gaskets and Seals (cask and fuel canister) shop be replaced at least every 12 months or barlier works ble degradation econys. 16.
- For contents described (b)(T)(i|i) and imited in (D)(2)(i|i), the mass of fissing material contained the model of must be based on the mass prior 17. to irradiation. (
- bost Glat to CFR Part 71: In addition to requireme 18.

- (Sibin Chapter 7 of the application. (a) The nackage shows become with the Operating Procedures af
- The packaging must meet the Asceptance Testerind Maintenance Program of (b) Chapter 8 of the application.
- The package authorized by this certification is hereby approved for use under 19. 10 FR 171.12. the general license provisition
- 20. Expiration date: June 30, 1996.

NRC FORM 618A

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 9 - Certificate No. 5957 - Revision No. 23 - Docket No. 71-5957

REFERENCES

Battelle Columbus Laboratories consolidated application dated June 20, 1985.

Cintichem Inc. supplements dated December 14, 1987; May 30, July 15 and September 28, 1988; and April 17, 1990.

University of Missouri Research Reactor letters dated April 18, June 7, June 11, June 13, and August 8, 1990.

Massachusetts Institute of Je Do Rogy Musica Reactor Laboratory letters dated October 19, 1992, and January 11, 1993.

Department of Energy supplements dated: July 15 and September 16, 1993; March 2, May 2, and April 7, 1994; and January 23, 1995.

National Institute of Standards and Technology supplements dated July 15, 1994, and April 4, 1995.

THE USE HECLEAR REQUATORY COMMISSION

Section Leader

lear Material Safety

diion Section oject Office

equards

(m)

Date: July 7, 1995

RC FORM 618 (057 71			CERTIFICA	TE OF COMPLIAN	ICE	ICLEAR REGULAT	
CERTIFICATE	BER	b.	REVISION	C. PACKAGE BERTIES	79/B(B)	d PAGE NUMBER	. TOTAL NUMBER PA
of Federal Reg	uistions, Par	t 71, "Packaging an	d Transportation of H	scribed in Item 5 below, meets adioactive Material."			
 b. This certificate applicable regi 	does not rel Jiatory agen	lieve the consignor cles, including the i	government of any co	any requirement of the regula puntry through or into which t	he package will	be transported.	
THIS CERTIFICATE I	S ISSUED ON and Address	THE BASIS OF A SAI	FETY ANALYSIS REFOR	T OF THE PACKAGE DESIGN OF E AND IDENTIFICATION OF REP	ALL ON APPENDIX		
9156	Rose S	Services, Street CA 90706	Inc.	dated Jun	e 1980, a	es, Inc. app s supplement	lication ed.
			EAP	REG D-5	979		
CONDITIONS This certificate is a	conditional u	upon tulfilling there	equirements of 10 CF	R Part 71, as applicable, and	the conditions sp	ecified below.	
	D	2			0		
(â)	Packag	5	5979	13	22	-	
		Description	123	S (1)	C	2	
	1	Labipping)	container fe	Terespersor co	balt sour	ces. Config	uration
	2	steel shell	r container box rs Tin welded to ssittle bott	is box-betreas d with 4.5. of p is exterior angle is facilitate use	framework of a for	th a 0.125" K. Transver K-lift and l	outer se ifting
		lugs are pr is essentia configurati end caps pr	ovided at the ity a 24" di on. Three a ovide flexit	e field the course	rs. The led, barr ical plug date seve	inner shield el-shaped inserts and ral sizes an	vessel bolted
		Drawings		***			
		Services, I	ng is constr nc. Drawing 0; and 0093,	Nos.: 0090, Rev Rev. 0.	nce with . 0; 0091	Alpha-Omega , Rev. 0;	

6-83)	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
Page	2 - Certificate No. 5979 - Revision No. 8 - Docket No. 71-5979
5.	(b) Contents
	(1) Type and form of material
	Cobalt 60 or cesium 137 as sealed sources which meet the requirements of special form radioactive material.
	(2) Maximum quantity of material per package
	13,000 curies Co-60 or 3,000 curies Cs-137, with decay heat load not to exceed 200 watts.
6.	Lifting eyes shall be covered or REEG to prevent use as tie-down attachments.
7.	attachments. The shield vessel flosures shall be equipped with paskets.
8.	Bolts used to secure the shield vessel closure caps nall be secured against loosening by vibration during transport.
9.	In addition to the requirements of Subpart of 710 CFR Part 71:
	a) Each package must beet the Mainteningerinspection Program of the supplement dated Address 20, 1990; and
	b) The backage must be trained for brougest in accordince with the Operating Providence of the trained area August 20, 1990.
10.	The package authorized by the certificate is pereby approved for use under the general horized provide the cost \$71.12
11.	Expiration date: September 30, 2000 Station Station September 30, 2000 Station
Alph	a-Omega Services, Inc. application dated June 1980.
Supp 1995	lement dated: April 12, 1983, May 22 and August 20, 1990, and January 30,

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

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Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

Date: 03/21/95

80 FORM 616 69 CFR 71	CERTIFICATE FOR RADIOACTIVE	OF COMPLIANCE MATERIALS PACKAGES	A DACE WHEDED	e. TOTAL NUMBER PAGE
& CERTIFICATE NUMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	1	2
THIS CERTIFICATE IS ISSUED ON THE BASIS O	ing and transportation of Factor signor from compliance with any ig the government of any countr	requirement of the regulations of the U.S. ry through or into which the package will t	Department of Trans be transported.	
L. Shepherd and Associat L. Shepherd and Associat O Arroyo Avenue h Fernando, CA 91340-809	J. L. dated b E R c DOCKET	. Shepherd and Associate d September 12, 1974, as NUMBER 71-5984	es applicati s supplement	on ed.
CONDITIONS This certificate is conditional upon fulfilling	a the requirements of 10 CFR Pa	art 71, as applicable, and the conditions sp	ecified below.	
resistance is snug-fitting of a vented of the over plywood this and bottom. approximate (3) Drawings The overpac Associates I The inner s Shepherd an packaging.	e overpack which p for its contents w shielded inper T steet jacketed. I back are approxima ckness is approxima the total weight by 1.780 pounds. k is constructed f Drawing Nos. A-006 hielded container d Associates Drawi The special form	rovides impact resistant high are contained with ype A packaging. The or aminated plywood outer eely 28° in diameter by ately 4° on the sides an including weight of the maccordance with J. L. 8-2C-1 and A-0068-2C. is constructed in according No. A-0068-1B or DOT source capsule is consti d and Associates Drawing	An a single verpack cons- container. 43" high an ad 6" on the contents i Shepherd an dance with a Specificat ructed in	d Dimensions d the top is d d . L. ion 7A

U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A CONDITIONS (continued) (8-83) Page 2 - Certificate No. 5984 - Revision No. 5 - Docket No. 71-5984 (b) Contents 1 . (1) Type and form of material Cesium 137 as cesium chloride sources doubly encapsulated in stainless steel tubes which meet the requirements of special form radioactive material. (2) Maximum quantity of material per package 12,000 curies. Contents must be positioned within a single snug-fitting shielded Type A packaging within the protective overpack. The Type A packaging must have a metal outer wall and meet the requirements of DOT Specification 7A packaging. 6. Use of packaging fabricated after August 31, 1986, is not authorized. 7. In addition to the requirements of Subpart G of 10 04 Eart 71 8. The package shall be prevened for shipment and operated in accordance with "Procedures for Removel of DOT 7A Packaging from Overpacks" in the J. L. Shepherd and Associates submitted dates repruary 20, 1990. a. The package must meet the Autoptance Tesher and "Checkout and Maintenance Procedures in the day Sheeperd and Associates (subpittal dated b. February 20 1990 The package authorized by this cerent seproved ton use under the 9. PPHU general license provisions of IN CFR STL 10. Expiration date: March 31, 1995. REFERENCES otember 12, 1974. J. L. Shepherd and Associates' application dened Supplements dated: January 20, 1975; and February 20, 1990. FOR THE U.S. NUCLEAR REGULATORY COMMISSION Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS MAR 2 1 1990 Date: 83

tions, Part 71, "Pac bes not relieve the c tory agencies, inclu source on THE BASH <i>d Address</i> ant of Energiaval React IC 20585		16 contents desc priation of Rac pliance with a nt of any court ysis REPORT b. TITLE A S C S C S	oribed in Item 51 dioactive Materia iny requirement ntry through or of THE PACKAG AND IDENTIFICAT afety Ana ontainer upplement	Design of APPLIC ON OF REPORT OR Lysis Report dated Decer ed. 71-6003	()F slicable safety stal the U.S. Departu lage will be trans	ment of Transpo sported. 130 shipp 1968, as	7 n Title 10, Code rtation or other
issued to certify that tions. Part 71, "Pac bes not relieve the c tory agencies, inclu ssued on THE BASH of Address ant of Energy laval React DC 20585	keging and Transpo onsignor from comp iding the government s OF A BAFETY ANAL g.y OT'S	contents desc priation of Rac pliance with ain nt of any court ysis REPORT of b. TITLE A Si CO SI c. DOCKE	of the package and identification of the package and identification afety Ana ontainer upplement	elow, meets the app into the regulations of into which the pack DESIGN OF APPLIC ON OF REPORT OF 1ysis Report dated Decer ed. 71-6003	ATION APPLICATION: nber 30, 1	ment of Transpo sported. 130 shipp 1968, as	rtation or other
tions, Part 71, "Pac bes not relieve the c tory agencies, inclu ssued on THE BASH of Address) ant of Enery aval React IC 20585	keging and Transpo onsignor from comp iding the government s OF A BAFETY ANAL g.y OT'S	YSIS REPORT b. TITLE A C. DOCKE	of the package and identification of the package and identification afety Ana ontainer upplement	Design of APPLIC ON OF REPORT OR Lysis Report dated Decer ed. 71-6003	ATION APPLICATION: nt for M-1 nber 30, 1	ment of Transpo sported. 130 shipp 1968, as	rtation or other
e Address) ent of Energiaval React laval React C 20585 nditional upon fulfil	gy ors	A RS	afety Ana ontainer upplement	lysis Repor dated Decer ed. 71-6003	rt for M-1 nber 30, 1	1968, as	ing
nt of Energiaval React	ors	C. DOCKE	ontainer upplement	dated Decer ed. 71-6003	nber 30, 1	1968, as	ing
ig g	ling the requiremen	its of 10 CFR	Part 71, as app	cable, and the com	ditions specified	below.	
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	23	3) 6	571	Also.	0		
meter by 1 aned 1-inch eel with st elding, an eel clad wi elded clos ssel. An a	58 inches e thick oate ainless ste d a 1-inch th stainles une head wh ccess openi	er shell er shell eel clad thick i ss steel nich is ing with	height. fabricat ner spi . The to bolted to a bolted	The contain ed from ei d stainles sure vesse p of the co the conta shield pl	ner walls ther carbo s steel, l fabricat ontainer iner and s ug is prov	consist of on steel, 10 inches ted from is covered seals the	of a carbon of lead carbon d with a pressure
ntains a se inch thic nulus which ovides a sp al is conta	condary hea k carbon st remains be ace 13 inch ined in the	at excha teel bac etween t nes wide	nger (not kup cylin he backup and 130	used durin der 29 inc cylinder inches hig	ng shipmen hes in dia and the pu h for spen	nt) surro ameter. ressure v nt fuel.	unded by The essel The spen
ter relief ipment) and ring shipme essure vess	lines and a a pressure nt. The co el for seco	a fill a e sensin ontainer ondary h	nd drain ng line wi also has neat excha	line (which ich remain penetration nger lines	h are cap s open to ons which	a pressu do not o	g re gage pen to th
eaneiso enznoer etire	ameter by 1 nned 1-inch eel with st ielding, an eel clad wi ielded clos ssel. An a osure head e pressure ntains a se 2 inch thic nulus which ovides a sp el is conta re to be sh e container ter relief ipment) and ring shipme essure vess	e Model No. M-130 ship ameter by 158 inches a ned 1-inch thick oate eel with stainless ste ielding, and a 1-inch eel clad with stainless ielded closure head wh ssel. An access openi osure head for loading e pressure vessel has ntains a secondary hea 2 inch thick carbon st nulus which remains be ovides a space 13 inch el is contained in the re to be shipped. e container has extern ter relief lines and a ipment) and a pressure ring shipment. The co essure vessel for second	e Model No. M-130 shipping co ameter by 158 inches averall ned 1-inch thick oater shell eel with stainless steel clad ielding, and a 1-inch thick i eel clad with stainless steel ielded closure head which is ssel. An access opening with osure head for loading and un e pressure vessel has an insi ntains a secondary heat excha 2 inch thick carbon steel bac nulus which remains between t ovides a space 13 inches wide el is contained in the annulu re to be shipped. e container has external pene ter relief lines and a fill a ipment) and a pressure sensin ring shipment. The container essure vessel for secondary h	e Model No. M-130 shipping container i ameter by 158 inches averall height. Anned 1-inch thick oater shell fabricat eel with stainless steel clad, or soli ielding, and a 1-inch thick inner pres eel clad with stainless steel. The to ielded closure head which is bolted to ssel. An access opening with a bolted osure head for loading and unloading s e pressure vessel has an inside diamet ntains a secondary heat exchanger inot 2 inch thick carbon steel backup cylin nulus which remains between the backup ovides a space 13 inches wide and 130 el is contained in the annulus by modu re to be shipped. e container has external penetrations ter relief lines and a fill and drain ipment) and a pressure sensing line wh ring shipment. The container also has essure vessel for secondary heat excha	e Model No. M-130 shipping container is an upright ameter by 158 inches everall height. The contain- ned 1-inch thick outer shell fabricated from ei- eel with stainless steel clad, or solid stainless ielding, and a 1-inch thick inner pressure vesse eel clad with stainless steel. The top of the co- ielded closure head which is bolted to the conta- ssel. An access opening with a bolted shield pla- osure head for loading and unloading spent fuel. e pressure vessel has an inside diameter of 55 in- ntains a secondary heat exchanger (not used durin 2 inch thick carbon steel backup cylinder 29 incl- nulus which remains between the backup cylinder ovides a space 13 inches wide and 130 inches high el is contained in the annulus by module holders re to be shipped. e container has external penetrations to the pre- ter relief lines and a fill and drain line (which ipment) and a pressure sensing line which remain ring shipment. The container also has penetration	e Model No. M-130 shipping container is an upright cylind ameter by 158 inches everall height. The container walls need 1-inch thick outer shell fabricated from either carbu- eel with stainless steel clad, or solid stainless steel, ielding, and a 1-inch thick inner pressure vessel fabrica- eel clad with stainless steel. The top of the container ielded closure head which is bolted to the container and ssel. An access opening with a bolted shield plug is pro- osure head for loading and unloading spent fuel. e pressure vessel has an inside diameter of 55 inches. The ntains a secondary heat exchanger (not used during shipmen 2 inch thick carbon steel backup cylinder 29 inches in di- nulus which remains between the backup cylinder and the p ovides a space 13 inches wide and 130 inches high for spe el is contained in the annulus by module holders designed re to be shipped. e container has external penetrations to the pressure ves ter relief lines and a fill and drain line (which are cap ipment) and a pressure sensing line which remains open to ring shipment. The container also has penetrations which essure vessel for secondary heat exchanger lines (which a	e Model No. M-130 shipping container is an upright cylinder 84 incl ameter by 158 inches everall height. The container walls consist and 1-inch thick outer shell fabricated from either carbon steel, eel with stainless steel clad, or solid stainless steel, 10 inches ielding, and a 1-inch thick inner pressure vessel fabricated from eel clad with stainless steel. The top of the container is covere ielded closure head which is bolted to the container and seals the ssel. An access opening with a bolted shield plug is provided in osure head for loading and unloading spent fuel. e pressure vessel has an inside diameter of 55 inches. The centra ntains a secondary heat exchanger (not used during shipment) surro 2 inch thick carbon steel backup cylinder 29 inches in diameter. hulus which remains between the backup cylinder and the pressure v ovides a space 13 inches wide and 130 inches high for spent fuel. e container has external penetrations to the pressure vessel for s ter relief lines and a fill and drain line (which are capped durin ipment) and a pressure sensing line which remains open to a pressur ring shipment. The container also has penetrations which do not o essure vessel for secondary heat exchanger lines (which are capped

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5.(a) Packaging (cont'd)

(2) Description (cont'd)

The container is supported on its transport vehicle by an "A" frame structure. Gross weight of the loaded container without its support structure is approximately 228,000 pounds.

(3) Drawings

The packaging is constructed in accordance with General Electric Drawing Nos. 247E209, Sheet 1, Rev. R; Sheet 2, Rev. K; Sheet 3, Rev. T; Sheet 4, Rev. U; Sheet 5 of 5, Rev. F and 247E228, Rev. F.

- (b) Contents
 - (1) Type and form of material

Irradiated fuel assemblies, activated corrosion products and structural parts containing up to 40 gallons of residual contaminated water. The fuel assemblies and structural parts are of the following types:

- S3W/S4W fuel subassemblies of core type 2.
- (ii) S5W fuel modules of core types 2 or 3.
- (iii) S5W corner fuel modules of core types 2 or 3.
- (iv) D1G fuel modules of core types 1 or 2.
- (v) DIG removable fuel assemblies of core types 1 or 2.
- (vi) S1C/S2C fuel modules with control rods.
- (vii) S1C/S2C peripheral fuel modules.
- (viii) S3G-3/3A fuel module with or without control rods.
- (ix) SAD cell.

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5. (b) Contents (cont'd)

- (1; Type and form of material (cont'd)
 - (x) S3G-3/3A irradiated thermocouples and thermocouple cases.
 - (xi) S8G full size fuel cell with or without control rod.
 - (xii) S8G partial size fuel cell with or without control rod.
 - (xiii) S5W-4A recoverable irradiated fuel modules with control rod.
 - (xiv) S7G recoverable irradiated fuel cells.
 - (xv) D2W fuel cells with control rods.
 - (xvi) NR-1 fuel modules with or without control rods.
 - (xvii) ATC fuel modules with or without control rods.
 - (xviii) AlW-3 recoverable irradiated fuel modules. Fuel modules that use control rods shall have control rods inserted.
- (2) Maximum quantity of material per package.
 - (i) 52 fuel assemblies as described in 5(b)(1)(i).
 - (ii) 12 fuel assemblies as described in 5(b)(1)(ii) or 9 fuel assemblies as described in 5(b)(1)(ii) and 4 fuel assemblies as described in 5(b)(1)(iii).
 - (iii) 6 fuel assemblies as described in 5(b)(1)(iv) and 4 fuel assemblies as described in 5(b)(1)(v).
 - (iv) 9 fuel assemblies as described in 5(b)(1)(vi) and 8 fuel assemblies as described in 5(b)(1)(vii).
 - (v) 10 fuel assemblies as described in 5(b)(1)(viii).
 - (vi) 9 fuel assemblies as described in 5(b)(1)(viii) and one fuel assembly as described in 5(b)(1)(ix).
 - (vii) 9 fuel assemblies as described in 5(b)(1)(viii) and one structure as described in 5(b)(1)(x).

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5. (b) (2) Contents (cont'd)

- (viii) 4 fuel cells as described in 5(b)(l)(xi); or 2 fuel cells as described in 5(b)(l)(xi) and 2 fuel cells as described in 5(b)(l)(xii).
 - (ix) 6 fuel assemblies as described in 5(b)(1)(xiii).
 - (x) 8 fuel cells as described in 5(b)(1)(xiv).
 - (xi) 4 fuel cells as described in 5(b)(1)(xv) plus 2 corner fuel cells or 1 RFA fuel cell.
- (xii) 4 fuel modules as described in 5(b)(1)(xvi).
- (xiii) 10 fuel modules as described in 5(b)(1)(xvii).
- (xiv) For contents described in 5(b)(1)(xviii), 6 fuel modules, or 8 fuel modules, as described in supplement dated March 30, 1992.
- (3) Shipments shall be further limited by thermal requirements as follows:
 - (i) Shipment of contents specified in 5(b)(1)(iv) and 5(b)(1)(v) and limited in 5(b)(2)(iii) shall be made no earlier than 75 days after shutdown and shall have a decay heat load not to exceed 33,500 Btu/hr per shipment.
 - (ii) Shipment of contents specified in 5(b)(1)(vi) and 5(b)(1)(vii) and limited in 5(b)(2)(iv) shall be made in a stainless steel M-130 container and shall have a decay heat load not to exceed 18,960 Btu/hr per shipment.
 - (iii) Shipment of contents specified in 5(b)(1)(viii), 5(b)(1)(ix) and 5(b)(1)(x) and limited in 5(b)(2)(v), 5(b)(2)(vi) and 5(b)(2)(vii) shall be made at a time after shutdown as determined from Bettis Atomic Power Laboratory report WAPD-OP(PP)S-4401 dated June 29, 1979 and shall have a decay heat load not to exceed 28,620 Btu/hr for the shipboard core and 30,000 Btu/hr for the prototype core.
 - (iv) Shipment of contents specified in 5(b)(1)(i), 5(b)(1)(ii) shall be made no earlier than 72 days after shutdown and shall have a decay heat load not to exceed 33,500 Btu/hr per shipment.
 - (v) Shipment of contents specified in 5(b)(1)(xi) or 5(b)(1)(xii) as limited by 5(b)(2)(vii) shall have a fully loaded container heat load not to exceed 15,400 Btu/hr per shipment.
 - (vi) Shipment of contents specified in 5(b)(1)(xiii) and limited in 5(b)(2)(ix) shall have a heat load not to exceed 23,800 Btu/hr and shall be made no earlier than 92 days after shutdown.

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- 5. (b) (3) Contents (cont'd)
 - (vii) Shipment of contents specified in 5(b)(1)(xiv) and limited in 5(b)(2)(x) shall have a heat load not to exceed 22,400 Btu/hr and shall be made no earlier than 122 days after shutdown.
 - (viii) Shipment of contents specified in 5(b)(1)(xv) and limited in 5(b)(2)(xi) shall have a heat load not to exceed 19,100 Btu/hr and shall be made no earlier than 420 days after shutdown.
 - (ix) Shipment of contents specified in 5(b)(1)(xvi) and limited in 5(b)(2)(xii) shall have a heat load not to exceed 6,000 Btu/hr and shall be made no earlier than 50 days after shutdown.
 - (x) Shipment of contents specified in 5(b)(1)(xvii) and limited in 5(b)(2)(xiii) shall have a heat load not to exceed 27,400 Btu/hr and shall be made no earlier than 195 days after shutdown.
 - (xi) Shipment of contents specified in 5(b)(1)(xviii) and limited in 5(b)(2)(xiv) shall have a heat load not to exceed 43,800 BTU/hr and shall be made no earlier than 400 days, or 175 days for AlW-3E and AlW-3J fuel, after shutdown.

(c) Fissile Class

Maximum number of packages per shipment:

Except for the contents described in 5(b)(1)(viii) and limited in 5(b)(2)(v)

One (1)

III

For the contents described in 5(b)(1)(viii) Two (2) and limited in 5(b)(2)(v)

- 6. For shipments involving the contents specified in 5(b)(1)(ii) or 5(b)(1)(iii) the Model No. M-130 package shall be inspected to verify that boron poison plates are in the module holders.
- 7. For shipments involving the contents specified in 5(b)(1)(viii), 5(b)(1)(ix) or 5(b)(1)(x) the thermocouples and thermocouple cases if included or the vacant module holder shall be located in the mid-position of either cage and module holder assembly.

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- Shipments shall be made in the dry condition, except for residual water as limited in 5(b)(1).
- 9. Container number three (M-130-3) has been modified by adding two 4-inch thick by 8-inch wide steel plates welded between fins 25 and 50 and between fins 110 and 135 at approximately 14.75 inches from the bottom of the container. The cooling fins in this localized area are removed to permit attachment of the plate directly to the outer shell of the container.
- 10. Container number four (M-130-4) has been modified by adding a 2-inch thick by 4-inch wide steel plate welded between fins 32 and 49 at approximately 18.4 inches from the bottom of the container. The cooling fins in this localized area are removed to permit attachment of the plate directly to the outer shell of the container.
- 11. Containers M-130-3, M-130-4, M-130-6, and M-130-7 may be used for the contents specified in 5(b)(1)(viii) and 5(b)(1)(x) only. Containers M-130-10 and M-130-15 may be used for the contents specified in 5(b)(1)(viii), 5(b)(1)(x) and 5(b)(1)(xviii) only.
- 12. Container M-130-11 may be used for NR-1 shipments only.
- 13. For shipments involving the contents specified in 5(b)(1)(xvii) which do not contain a full complement of fuel modules (i.e. one position is occupied by either two flux thimbles or a vacant fuel module holder with pocket shield plug), that position shall be located in the middle module holder of either half of the cage assembly.
- 14. Expiration date: December 31, 1997.

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REFERENCES

Safety analysis report for M-130 shipping container, MAO-E8-703 dated December 30, 1968.

Supplements: Naval Reactors letters A#2256 dated February 24, 1969 and G#1931 dated March 3, 1969; General Electric Company letter ONP-74520-526 dated April 3, 1972; Naval Reactors letter G#3207 dated April 27, 1972; General Electric Company letter ONP-74520-528 dated April 28, 1972; Naval Reactors letter G#3250 dated June 6, 1972; General Electric Company letters ONP-74570-635 dated October 25, 1972; ONP-74570-654 dated December 4, 1972; ONP-14570-666 dated December 12, 1972; ONP-74570-682 dated January 12, 1973; ONP-74570-698 dated January 31, 1973: ONP-74570-687 dated February 6, 1973; ONP-74390-65 dated March 26, 1973; DLGN-85570-854 dated September 24, 1973; DLGN-85570-901 dated January 10, 1974; Naval Reactors letter G#4061 dated January 29, 1974; General Electric Company letters DLGN-85570-924 dated February 15, 1974; DLGN-85570-923 dated March 6, 1974; DLGN-85570-969 dated May 24, 1974; Naval Reactors letter G#4991 dated November 25, 1975; General Electric Company letters ONP-74340-JTT-73 dated December 17, 1975; CGN-85570-1145 dated September 9, 1976; CGN-85570-1146 dated September 10, 1976; CGN-85570-1148 dated September 14, 1976; Bettis Atomic Power Laboratory letter WAPD-R(K)-1378 dated August 30, 1976; WAPD-OP(PP)S-4401 dated June 29, 1979; Naval Reactors letters G#6197 dated July 13, 1979; G#7136 dated March 17, 1982; Naval Reactors letter G#7022 dated July 14, 1981 and MAPD-LD-(CES)SE-181 dated September, 1981; WAPD-LP(CES)SE-96 dated February, 1982, WAPD-LP-(CES)SE-170 dated July 1981; Naval Reactors letter G#7160 dated May 18, 1982; Naval Reactors letter G#7582 dated September 7, 1983; Naval Reactors letter G#C87-5692 dated September 2, 1987; Naval Reactors letter G#C87-5689 dated September 23, 1987; and Naval Reactors letters G#C87-8008 dated January 19, G#C88-5931 dated May 12, and G#C88-5961 dated July 25, 1988. Naval Reactors letter G#C89-2863 dated August 11, 1989; Naval Reactor letter G#C89-2825 dated March 29, 1989; Naval Reactors letter G#C92-03392 dated March 30, 1992; Naval Reactors letter G#92-03729 dated October 20, 1992; and Naval Reactors letter G#C93-10935 dated October 8, 1993.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

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Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

JAN 1 3 1994 Date:

IRC FO I-IIS) D OFR 7	INTER			E OF COMPLIANCE E MATERIALS PACKAGES	CLEAR REGULA	TORY COMMISS			
& CER		NUMBER	5 REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	-			
	6058		11	USA/6058/B()	1 1	3			
0 b. T	his certif I Federa his certif	Regulations, Part 71, "Packagin licate does not relieve the consist	ing and Transportation of Radio phor from compliance with any	requirement of the regulations of the U.S. I	Department of Tran				
	pplicable	e regulatory agencies, including	the government of any count	ry through or into which the package will b	e transported.				
a. 15	SUED TO	(Name and Address)	A SAFETY ANALYSIS REPORT OF	THE PACKAGE DESIGN OF APPLICATION					
Trai	nspor afety	nt of Energy tation and Packag Division, EH-33. on, DC 20585		Cintichem, Inc., appl March 31, 1985, as su RE (71-6058	oplemented.	eo			
CONI	DITIONS	te is conditional upon fulfilling.	he requirements of 10 CFR P	art 71, as applicable, and the conditions spe	cified below.				
		0	<u></u>	0	and a second second second second second				
a)	Раск	aging		22					
	(1)	Model No.: B-3	SS .	_ 120 -					
	(2)	Description	(3) 7		2				
		The packaging consists of a lead shielded steel weldment in the shape of a right hollow cylinder with a bottom and a recessed, plug type gasketed and bolted lid. The packaging provides a minimum of 6 inches of lead shieldin Packaging features include lifting and tie-down devices and a drain to the central cavity. The maximum weight of the loaded packaging is 30,000 poun							
		diameter and 57 1/2-inch and 1/4 steel plate. Th 43-1/4 inches hi bottom and is se	inches high. The inch in thickness internal cavity gh. The lid is o cured to the body	d steel construction and two laminates are of p ss. The inner sbell is dimensions are 26-1/2 of the same construction of the packaging by two ength bolts and sealed w	late materi of 1/2-inch inches in d as the sid elve, 1-1/4	al thick liameter and les and -inch			
	(3)	Drawing							
				d constructed in accordan 2053E, Revision E.	nce with				

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- (b) Contents
 - (1) Type and form of material
 - (i) Byproduct and uranium enriched in the U-235 isotope, U-233 or plutonium as solids, non-powder, and dry, which will not decompose at temperatures up to 525°F and packaged within DOT Specification 17H steel drums.
 - (ii) Byproduct and uranium enriched in the U-235 isotope, U-233 or plutonium which meets the requirements of special form radioactive material.
 - (iii) Byproduct material and uranium enriched in the U-235 isotope, U-233, or plutonium as solids, non-powder, and dry which will not decompose at temperatures up to 525°F, packaged within a nominal 1/2-inch thick (24inch OD) polyethylene High Intergity Container (HIC). Liquids must be solidified in Chemtree Iron Oxide mix in a steel container. Small items, including glassware, must be placed in 1-gal steel containers and compressed (as required).
 - (2) Maximum quantity of material per package

For the contents described in 5(b)(1)(i) and 5(b)(1)(ii):

Not to exceed 400 watts thermal decay.

For the contents described in 5(b)(1)(114):

The HIC must be limited to 200 A, quantities of fidified liquid radioactive material and not more that 50 A, quantities of the radioactive materials. The maximum thermal decay heat load must not exceed 15 watts.

For the fissile contents described in 5(b)(1)(i), 5(b)(1)(ii), and 5(b)(1)(iii) not to exceed the following:

Fissile Material	Maximum per Package (grams)
U-235	350
U-233	200
Plutonium*	200

or, pro-rated mixtures such that the sum of the ratios of the quantity of each fissile material to its maximum per packaging does not exceed unity.

*Plutonium in excess of 20 curies per package must be in the form of reactor fuel, fuel elements, metal, or metal alloy.

(c) Fissile Class

II

For contents containing special nuclear material:

Minimum transport index to be shown on label

10.0

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- 6. For gamma-emitting special form materials, at least 5 inches of additional lead shielding may be added as required as a lining on all sides within the internal cavity.
- 7. The total weight of the contents including additional lead shielding as may be required shall not exceed 9,000 pounds.
- Prior to each shipment, the lid O-ring shall be inspected. The O-ring shall be replaced with a new O-ring if inspection shows any defects or every twelve (12) months, whichever occurs first.
- Prior to the shipment of contents described in 5.(b)(1)(i), the package must be leak tested as specified in Section I of the application.
- 10. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) Each package shall be maintained in accordance with Section I of the application, as supplemented; and
 - (b) Each package shall be operated and prepared for shipment in accordance with Section 1 of the application, as supplemented.
- 11. Fabrication of additional packagings is not authorized.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 13. Expiration date: December 31, 1995.

REFERENCES

Cintichem, Inc. application dated March 31, 1985:

Supplements dated: August 30 and October 31, 1985, and October 2 and November 27, 1990.

Department of Energy supplements dated July 15 and December 21, 1992.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

JAN 1 3 1993

Date:

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RC FORM 618 (65)) CFR 71			CERTIFICA	IVE MATERIA	LS PACKAGE	ES		TORY COMMISS
. CERTIFICATE NUMB	ER	b.F	EVISION NUMBER	C. PACKAGE	USA/6078/		d. PAGE NUMBER	. TOTAL NUMBER PA
of Federal Regu	ations, Part 7	1. "Packaging and	iging and contents de d Transportation of R rom compliance with povernment of any co	adioactive Materia	al. of the regulations (of the U.S. D	epartment of Trans	
THIS CERTIFICATE IS a. ISSUED TO (Name) Combustion	nd Addmess) n Engine	ering, In	b. TITLE	Combu	stion Engin	neering	applicatio	on dated
1000 Pros Windsor, (EAP	R REC	5, 1990, as F7 (1 6978	s suppr	emented	
CONDITIONS This certificate is c	onditional up	on fulfilling the re	quirements of 10 CFI		1	tions spe	cified below.	
š.	caging	9				P.O.		
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(2)		ption		Find S	信	è	5	
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(3)	Draw	ng	**	**	×			
	with	lodel Nos. Combustio Igh 4, Rev	927Al and 9 n Engineerir . 11.	027Cl cont ng, Inc. D	ainers are rawing No.	constr NFM-E-	ucted in ad 4108, Sheet	ccordance ts l
(b) Con	tents							
(1)	Туре	and form	of material					
	(1)	diameter zircaloy fuel bun 5.0 w/o	<u>927A1</u> : ur uranium dic tubes in a dle consists enrichment 6 kg U-235.	xide fuel 14 x 14 s s of a max	pellets c quare arra imum of 17	lad in y with 6 fuel	0.028" thic a 0.58" pit rods with a	ck tch. Each a maximum

CONDE

CONDITIONS (continued)

NRC FORM €18A (6-83)

U.S. NOULENI REGEBETONI COMMON

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- 5.(b) (1) Contents (Continued)
 - (ii) <u>Model No. 927A1</u>: unirradiated fuel bundles consisting of 0.381" diameter uranium dioxide fuel pellets clad in 0.026" thick zircaloy tubes in a 14 x 14 square array with a 0.58" pitch. Each fuel bundle consists of a maximum of 176 fuel rods with a maximum 4.76 w/o enrichment in the U-235 isotope, and contains not more than 19.6 kg U-235.
 - (iii) Model No. 927A1: unirradiated fuel bundles consisting of 0.33" diameter uranium dioxide fuel pellets clad in 0.025" thick zircaloy tubes in a 16 pplp square array with a 0.506" pitch. Each fuel bundle consists of a maximum of 236 fuel rods with a maximum 5. We enrichment in the 225 isotope, and contains not more than 20.76 kg U-235.
 - (iv) Model No. 927A1: unirradiated fuel bundles consisting of 0.31" diamter uranium dioxide fuel pellets clad 20 0.024" thick zincalor tubes in a 16 x 16 square array with a 0.472" pitch. Each fuel bundle consists of a maximum of 231 fuel rods with a maximum 5.0 for enrichment in the 235 isotope) and contains not more than 12.50 kg U-235.
 - (v) Model No. 92701 Unitradiated full boundles consisting of 0.33" drameter granter diaxide pellocated in 0.025 thick zircaloy hobes to colle a postular large with a 0.506" stch. Each fuel bundle consists of a maximum of 236 fuel rods with a maximum 5.0 we enrichment in the U.35 in tope, and contains not more than 20.77 kg 19953.
 - (vi) Model No. 927C1: University of the bundles consisting of 0.324" diameter uranium dioxide the pellets clao in 0.0235" thick zircalor tubes in a 17 x 17 square arriv with a 0.501" pitch. Each fuel bundle consists of 264 fuel rods with a maximum 3.6 w/o enrichment in the U-235 isotope, and contains not more than 16.43 kg U-235.
 - (2) Maximum quantity of material per package

<u>Model No. 927A1</u>: Two fuel bundles weighing not more than 1400 lbs. each.

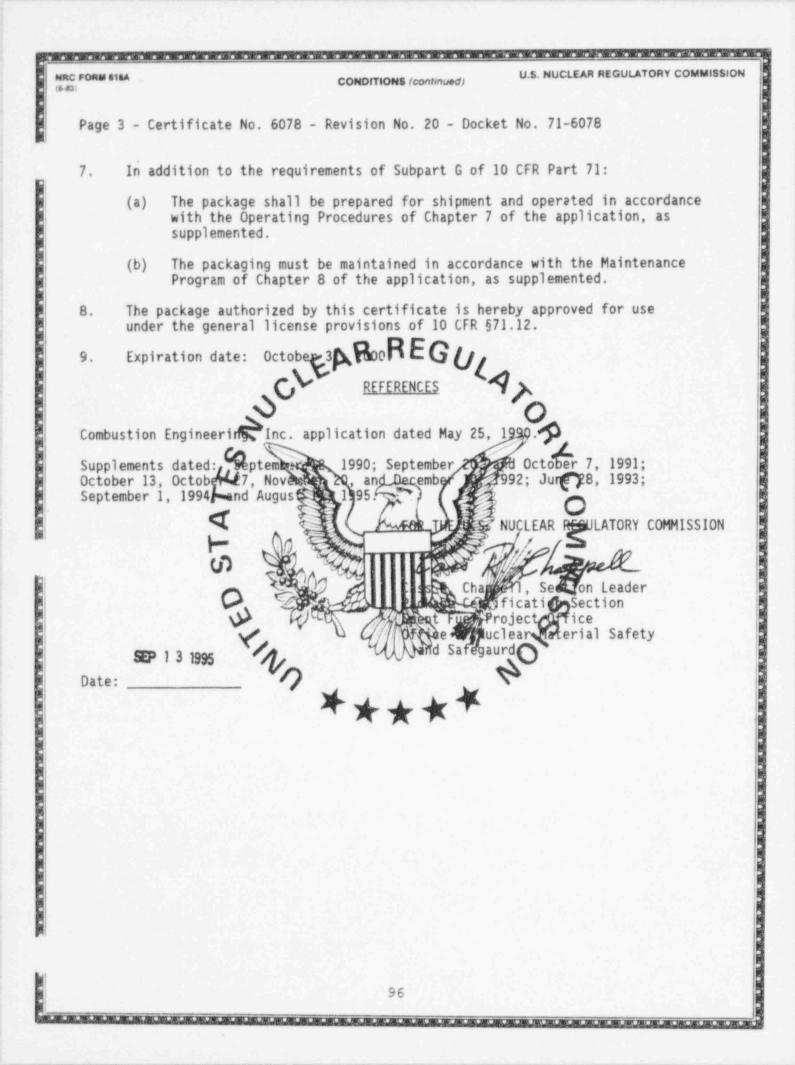
Model No. 972C1: Two fuel bundles weighing not more than 1506 lbs. each.

(c) Fissile Class

III

Maximum number of packages per shipment Eight (8)

6. Each fuel assembly shall be unsheathed or shall be enclosed in an unsealed, polyethylene sheath which will not extend beyond the ends of the fuel assembly. The ends of the sheath shall not be folded or taped in any manner that would prevent flow of liquids into or out of the sheathed fuel assembly.



0 CFR 71		-	FOR RADIOACTI	TE OF COMPLIANC	GES		
6142	NUMBER		5 REVISION NUMBER	USA/6142/B		d. PAGE NUMBER	e. TOTAL NUMBER PA
of Federal b. This certifi	Regulation	ns, Part 71, "Packagi not relieve the consi	ng and Transportation of Rac onor from compliance with a	ny requirement of the regulatio	ns of the U.S. I	Department of Trans	
applicable	regulatory	y agencies, including	the government of any cou	ntry through or into which the	package wili b	e transported.	
. ISSUED TO //	ntment	of Energy al Reactors	Safety	Analysis Report hipping contained NUMBER 91-6142	for Bett	is Disposab	le), 1969.
CONDITIONS This certificate	e is condit	ional upon futfilling	the requirements of 10 CFR	Part 71, as applicable, and the	conditions spe	cified below.	
5.		and and	5		0		
(a)	Packa	ging 🥠	Ser .	E.	7 Pala		
	(1)	Model No.:	Bettis Disposal	ole Waste	Ċ	5	
		reusable st measuring 5 vault and m by 28" deep concrete on is surround overpack is steel plate vault. The	ng consists of a eet overpack. 1" square by 49 hay be one of two Ibe smaller of the bottom and ed by 12" on the a weldment of and is sized an lid is similar	a disposable conci The concrete vault high. The inner sizes: 15" square avity is surround sides and by 15" bottom and sides 2-1/2" by 5" rectand constructed to ly constructed ages losure. The over	is a pro- cavity are by 10 ded by 10 on the s and by angular snugly of is seco	bured concre is centered 5" deep or 2 3" of struct top; the lan 9" on the 1 steel tubes enclose the ured to the	te block d in the 27" square tural rger cavity top. The to 1/2" concrete overpack
		are 64" squ pounds.	are by 60.57 his	the gross we	ight is i	approximate	ly 16,000
	(3)	Drawing					
		The packagi Corpr ation Rev.	ng is constructo Drawing Nos. 94	ed in accordance (15F976, Rev. 4; 9)	with Wes 30C940, 1	tinghouse E Rev. 4 and 9	lectric 976C870,

-----CONDITIONS (continued) Page 2 - Certificate No. 6142 - Revision No. 5 - Docket No. 71-6142 (b) Contents

(1) Type and form of material

Radioactive material in the form of waste material packaged in smaller cans or pails or as unpackaged solid waste sealed in poured concrete.

(2) Maximum quantity of material per package

Total radioactivity per package shall not exceed five times an A2 quantity and the plutonium activity per package shall not exceed two times an A2 quantity. The total fissile material per package must be less than the exempt quantities defined in 10 CFR §71.53.

Only reusable steel overpacks fabricated before August 31, 1986, are authorized for 6. use.

The lid of the vaults shall be poured in such a manner that both packaged and unpackaged waste are sealed in concrete. In addition to the 9 inches of structural concrete specified in section 5(a)(2) of this certificate for the top (lid) of a large cavity vault an additional concrete thickness of at least 3 inches shall be poured so that the wault cavity and its contents are surrounded by at least 12 inches of structural concrete,

Expiration date December 31, 1997.

Safety Analysis Report for Bettes Disposable Waste shipping container, WAPD-O(AO)-5029 dated September 30, 1969.

REFERENCE

July 27, 1982, and June 8, and December 18, 1992. Supplements dated:

NO

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Un

Charles E. MacDonald, Chief Transportation Branch Division of Industrial and Medical Nuclear Safety, NMSS

Date:

7.

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6206 19 USA/6206/AE PPEXMILE The certificate is issued to certify that the packaging and contents described in them 5 below, means the applicable safety standards set forth in Titler of Federal Regulations. Part 71, "Perkaging and Transportation of Redicactive Material." 10 This certificate is issued to certify that the packaging and contents described in them 5 below, means the applicable safety standards set forth in Titler of Federal Regulations, Part 71, "Perkaging and Transportation of Redicactive Material." 11 This certificate does not reliable of A BAPETY AMALYSIS REPORT of the regulations of the U.S. Department of Transportation applicable regulation, set Advance. 11 This certificate is BOURD ON THE BABES OF A BAPETY AMALYSIS REPORT of the Package will be transported. 12 This certificate does not reliable of A BAPETY AMALYSIS REPORT of the Package OF APPLICATION. 12 This certificate is conditional upon fulfilling the valuements of 10 CFR Part 71, as applicable, and the codditions specified below. 13 Call Packaging (1) (1) Model, No.: RODET A. 2) Description A fuel assembly ship poing contrainer consisting of a steel strongbac fuel material. 3) Off inch thick, S-595 thich in high and full length stainless steel plates codd finding T.S. The bill be the steel container. Two of accel the full stainless the full length stainless steel plates codd finding T.S. The bill couther container is constructed in accordance with Babc		LEAR REGULAT	E OF COMPLIANCE MATERIALS PACKAGES	CERTIFICAT			FORM 618		
PREMARKING ** The outflictus is issued to certify the the machaging and contents described in them 5 below. meets the applicable satery standards set forth in The- of Forder Miguations, Pert 71. "Packaging and Transportation of Radioactive Material." ** The certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation applicable regulatory species. Including the government of any country through or into which the package will be transported ** The certificate of controls the state of the regulation of APPLICATION ** SEME TO (Market Material Controls and Controls of the Control of APPLICATION ** SEME TO (Market Material Controls and Controls of the Control of APPLICATION ** SEME TO (Market Material Controls and Controls of the Control of APPLICATION ** SEME TO (Market Material Controls and Controls of the Control of APPLICATION ** SEME TO (Market Material Controls and Controls of the Control of APPLICATION ** SEME TO (Market Material Controls and Controls of the Control of APPLICATION ** Controls of the Control of the Material Control of the Control of APPLICATION ** Controls and Control of the Material Control of the Control of the Control of APPLICATION ** Controls and Control of the Material Control of the Control	NUMBER PA	d. PAGE NUMBER			1. & CERTIFICATE NUMBER				
 of redeen Hequilitions, Pert 71, "Packaging and Transportation of real-balance waters. b. This certificate does not relieve the consignor with any requirement of the regulations of the U.S. Department of Transportation applicable regulatory agencies, including the government of any country through or into which the package will be transported. a THIS CERTIFICATE IS ISSUED ON THE BASE OF A SAFETY AMALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION. b. This certificate is conditional upon fulfilling the veglemements of 10 CFR Pert 71, as applicable. and the codditions specified below. c. CORUTIVEE c. CORUTIVEE (a) Packaging (b) Model No.: c. Booker B (c) Description A fuel assembly shipping container consisting of a steel strongba clamping assembly shock mounted to a steel outer container. Two 3/DE inch. Hills, 2: 75% THEE THAN and fulfilling the veglete and the codditions specified below. c. Camping assembly shipping container is approximately 40 inches diameter by 200 time the sound container is approximately 40 inches diameter by 200 time to solve container. Two 3/DE inch. Hills, 2: 75% THEE THAN and fulfilleng that analysis. The container is approximately 40 inches diameter by 200 time to solve container is approximately 40 inches diameter by 200 time to solve container. Is approximately 40 inches diameter by 200 time to solve container is approximately 40 inches diameter by 200 time is constructed in accordance with Babcock and Wilco Company Drawing los. PE-52F, Rev. 4: PE-53F, Rev. 3; and PE-54F, Rev. 2. (b) Contents (1) Type and form of material Unirradiated, sintered UO, pellets in fuel rods with a minimum Zircaloy clad thickness of 0.020 inches. The rods are assembled fuel assembles. The fuel assembles in fuel rods with a minimum Zircaloy clad thickness of 0.020 inches. The rods are assembled fuel assembles. 	-4	1	and an international state of the second state	a subsequences are sense and subsequences of the sense of the subsequences of the subsequences of the subsequences of	any local performance of the local set of the local set of the local set of the	Concession of the owner			
 A BOURD TO Mane and Address A BOURD TO Mane and Address B&W Fuel Company application dated April 23, 1990, as supplemented. (a) Packaging (a) Packaging (b) Contents (c) Description (a) Packaging (b) Contents (c) Drawings (c) D		epartment of Transp	requirement of the regulations of the U.S.	g and Transportation of Had	, Part 71, "Packaging	Regulations	of Federal R		
 10. Box 11646 ynchburg, VA 24506-1646 CONDITIONES This continuents is conditional upon fulfilling the vector mumber is conditional upon fulfilling the vector members of 10 CFR Part 71, as applicable, and the conditions specified below. (a) Packaging Model No.: Booser B Description A fuel assembly stripping container consisting of a steel strongba clamping, assembly stripping container consisting of a steel strongba clamping, assembly stripping container consisting of a steel strongba clamping assembly stripping container is approximately to inches diamater by 200 sinches long. Gross weight of the loaded containe not to exceed 7,500 pounds. (3) Drawings The container is constructed in accordance with Babcock and Wilco Company Drawing les. PE-52F, Rev. 4; PE-53F, Rev. 3; and PE-54F, Rev. 2. (b) Contents Type and form of material Unirradiated, sintered UO, pellets in fuel rods with a minimum Zircaloy clad thickness of 0.020 inches. The rods are assembled fuel assemblies. The fuel assemblies may contain inserted control 		IN:	THE PACKAGE DESIGN OR APPLICATION D IDENTIFICATION OF REPORT OR APPLICATI	A SAFETY ANALYSIS REPORT C b. TITLE A	ED ON THE BASIS OF A Small	TE IS ISSUEL	IS CERTIFICA		
 (a) Packaging Model No.: Bore B Description A fuel assembly shipping rontainer consisting of a steel strongba clamping assembly. Sheck mounted to a steel outer container. Two 3/DG-inch thick, 8.578 inch high and full length stainless steel plates containing 1.5% minimum boron are positioned between adjac fuel assemblies. The outer container is approximately 40 inches diameter by 200 inches. Jong Gross weight of the loaded containe not to exceed 7,600 pounds. (3) Drawings The container is constructed in accordance with Babcock and Wilco Company Drawing Mes. PE-52F, Rev. 4: PE-53F, Rev. 3; and PE-54F, Rev. 2. (b) Contents Type and form of material Unirradiated, sintered U0, pellets in fuel rods with a minimum Zircaloy clad thickness of 0.020 inches. The rods are assembled fuel assemblies. The fuel assemblies may contain inserted control 		ion supplemented	ated April 23, 1990, as	EAR	506-1646	1646	. Box 11		
 (a) Packaging Model No.: Born B Description A.fuel assembly shipping container consisting of a steel strongba clamping assembly. Sheck mounted to a steel outer container. Two 3/DG-inch thick, 8-578 inch high and full length stainless steel plates containing 1.5% minimum boron are positioned between adjac fuel assemblies. The outer container is approximately 40 inches diamater by 200 inches. Jong. Gross weight of the loaded containe not to exceed 7,600 pounds. Drawings The container is constructed in accordance with Babcock and Wilco Company Drawing Mos. PE-52F, Rev. 4: PE-53F, Rev. 3; and PE-54F, Rev. 2. (b) Contents Type and form of material Unirradiated, sintered U0, pellets in fuel rods with a minimum Zircaloy clad thickness of 0.020 inches. The rods are assembled fuel assemblies. The fuel assemblies may contain inserted control 		cified below.	art 71, as applicable, and the consitions sp	havequirements of 10 CFR #	onal upon fulfilling th	e is conditio	ONDITIONS his certificate		
 (2) Description A fuel assembly shipping container consisting of a steel strongba clamping, assembly, sheck mounted to a steel outer container. Two 3/16-inch Hick, 8-5/5 inch high and full length stainless steel plates containing 1.5% minimum boron are positioned between adjac fuel assemblies. The outer container is approximately 40 inches diamater by 200 inches long. Gross weight of the loaded containe not to exceed 7,600 pounds. (3) Drawings (3) Drawings (4) The container is constructed in accordance with Babcock and Wilco Company Drawing Mes. PE-52F, Rev. 4; PE-53F, Rev. 3; and PE-54F, Rev. 2. (b) Contents (1) Type and form of material Unirradiated, sintered U0, pellets in fuel rods with a minimum Zircaloy clad thickness of 0.020 inches. The rods are assembled fuel assemblies. The fuel assemblies may contain inserted control 			20	Contraction of the second seco	aging	Packa	(a)		
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CONDITIONS (continued)

Page 2 - Certificate No. 6206 - Revision No. 19 - Docket No. 71-6206

5. (b) Contents (continued)

(i) Fuel assemblies as described above, with uranium enriched to a maximum 4.6 w/o in the U-235 isotope. The assemblies have the following specifications:

							15.15
Type	15x15	<u>15x15</u>	<u>17x17</u>	<u>15×15</u>	<u>15x15</u>	<u>17x17</u>	<u>15x15</u>
No. fuel rods	208	208	264	204	204	264	204
No. non-fuel tubes	17	17	25	21	21	25	21
Fuel rod pitch, in.	0.568	0 66R	REG	0.563	0.563	0.496	0.5625
Maximum fuel pellet OD, in.	0.3742	6.3622	0.3252	od367	0.3622	0.3232	0.3672
Cladding OD, in.	2. As	0.416	0.379	0.422	00.416	0.374	0.422
Tube material	Ser-4	Zr-4	Zr-4	Zr-4	Der-4	Zr-4	SS-304
Maximum active fuel	S 144	144	144	200	144	144	119
Maximum U-235 Loading (kg)	23.39		Trez . 42	208	21ON	22.15	18.24
(ii) Fue a max foll		assess prin He Leatron		tope. The	assemblie	ched over s have to	4.6 to
Type	V5x15	15×154	SIXTE .	5x15	15x15	<u>17×17</u>	15×15
No. fuel rods	202	208	264	204	204	264	204
No. non-fuel tubes	17	17	25	21	21	25	21
Fuel rod pitch, in.	0.568	01568	50%	0.563	0.563	0.496	0.5625
Maximum fuel pellet OD, in.	0.3742	0.3622	0.3252	0.3671	0.3622	0.3232	0.3672
Cladding OD, in.	0.43	0.43	0.379	0.422	0.416	0.374	0.422
Tube material	Zr-4	Zr-4	Zr-4	Zr-4	Zr-4	Zr-4	SS-304
Maximum active fuel length, in.	144	144	144	144	144	144	119
Maximum U-235 Loading (kg)	25.93	24.27	24.86	24.48	23.81	24.55	20.22

 Maximum Number of packages per shipment Each fuel assembly wist be unsheathed or must be enclosed to an unsealed, polyethylene sheath which will not extend beyond the ends of the fuel assembly. The ends of the sheath must not be folded or taped in the manner that would prevent the flow of liquids into or out to be sheathed fuel assembly. There must be a now clamp sociestrain each species or id end fitting. The ratio of assembly weight to the number of clamp bounds more exceed 16m pounds per clamp. The weight of the contents (fuel assemble of the species of t	NRC FORM (6-63)	6164	CONDITION	(continued)	U.S. NUCLEAR REGULATORY COMMISSION
 (2) Maximum quantity of material per package For the contents described in 5(b)(1)(1) Two fuel assemblies For the contents described 1. (b)(1)(11) One fuel assembly (c) Fissile Class (c) Fissile Class Maximum Number of packages per shipment (c) Fissile Class Each fuel assembly wist be unsheathed or must be enclosed to an unsealed, polyethylene sheat which will not extend beyond the ends of the fuel assembly. The ends of the sheath must be the folded or taped in the manner that would prevent the flow of liquids into or other ble sheathed fuel ends of the fuel assembly. The ends of the sheath must be according be sheathed fuel ends of the fuel assembly. The ends of the sheath must be according be sheathed fuel ends of the fuel assembly. The ends of the sheath must be the folded or taped in the manner that would prevent the flow of liquids into or other bits the fuel ends by the fuel assembly. The ends of the sheath must be according to the number of class much must be according to the number of classes much must be according to the number of classes much must be according to the number of classes much must be according to the number of classes much must be acceed its pounds per class. Fabricatior of additional symptometers of the sheather of CFR Pact 71, the package shall be operated and maintainer in accordance with Section 7.0 of the application, as supplemented. 	Page 3	- Certificate No	o. 6206 - Revision No.	19 - Docket No.	71-6206
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11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 Ok 51,12			in and the	THE MAN	S
general license provisions of 10 CPK 576-1274	10. In ol	n addition to th perated and main upplemented.	ital and in accordance w	the Section 7.0	Part 71, the package shall be the application, as
12. Expiration date: September 30, 2000.	11. TI 9	he package autho eneral license p	prized by this certific provisions of 10 Oct 51	ate is hereby ap	proved for use under the
	12. E	xpiration date:	September 30, 2000.		

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U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A CONDITIONS (continued) (6-83) Page 4 - Certificate No. 6206 - Revision No. 19 - Docket No. 71-6206 REFERENCES B&W Fuel Company application dated April 23, 1990. Supplements dated: July 23, 1990; May 4, August 18, August 25, and October 14, 1992; September 24, 1993; and April 3, May 2, and November 23, 1994; and February 26, March 17, April 7, and July 31, 1995. FOR THE U.S. NUCLEAR REGULATORY COMMISSION NUCLEAR Spent Fuel Project Office Office of Nuclear Materi Safety and Safeguards C, SEP 2 5 1995 Date: ED STAT NOIS 、後に後に後に後に後に後にはに法と後に後に後に後に後に後に後に後に後に後に後に後に INN 102

RC FORM 618			TE OF COMPLIANCE	UCLEAR REGULAT	ORY COMMISSIC
CERTIFICATE NUM	BEA	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	E TOTAL NUMBER PAG
PREAMBLE 8. This certificate of Federal Reg	is issued to certify that the p ulations, Part 71, "Packaging does not relieve the consid	g and Transportation of F	escribed in Item 5 below, meets the applicable s Radioactive Material." h any requirement of the regulations of the U.S ountry through or into which the package will	Department of Trans	
a issued to Mana Chem-Nucle	ar Systems, Inc idge Drive	Ch	TOF THE PACKAGE DESIGN OF APPLICATION E AND IDENTIFICATION OF REPORT OF APPLICAT em-Nuclear Systems, Inc. a ted May 14, 1984, as suppl REC1-6244 KET NUMBER	application	
CONDITIONS This certificate is	conditional upon fulfilling th	neuroquirements of 10 CF	FR Part 71, as applicable, and the conditions s	pecified below.	and the
(1) (2)	Description The package of positioned way material. The The mild stee inches in dia plate. Shiel inch thick st body by twent compressible and body of t The cask is p overall lengt material is of steel shell of construction eight, 5/8-in shell of the	thin an overp re gross weigh an cask is app meter. The w ding is provi- eel walls of a-four, 3/4-i polyurethane the cask. the and 89-3/8 confined by an of 1/4-inch th as the rest o	steel and lead shielded ca ack constructed of steel a t of the package is 46,000 roximately 111-1/2 inches alls, top, and bottom are ded by 2 inches of lead wit the cask. The cask lid is nch diameter bolts and is seal. Lifting devices are him an overpack approximat inches in diameter. Alumi outer steel shell 3/8-ind ickness. The overpack cov f the overpack and is secu- olts. Lifting devices are r.	in length ar of 2-inch th ithin the wal secured to sealed by a attached to tely 139-1/2 inum honeycom th thick and yer is of the ured to the wal	d 58 lick steel ls and 2- the cask the lid inches in b an inner same valls by
(3)	Drawing No. [)-6930-1, Rev.	in accordance with Nuclea F (Sheet 1 of 2) and Cher E. (Sheet 2 of 2).		
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NRC FORM 618A CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
(6-63)

Page 2 - Certificate No. 6244 - Revision No. 9 - Docket No. 71-6244

5.(b) Contents

6.

- (1) Type and form of material
 - Greater than Type A quantity of byproduct material as process solids, either dewatered, solid, or solidified, in secondary container(s) which meet the equirements for DOT Specification 7A packaging; or
 - (ii) Greater than Type A quantity of byproduct material as solid metal components in secondary containers, as required.
- (2) Maximum quantity of mapra Bradaly

Not to exceed 10 thermal watts of byproduct aperial. The contents may include fissive materials provided the mass limits of 10 CFR §71.53 are not exceeded. Not to exceed a Type A quantity of transuranic materials.

- (a) For any package containing water and/or organic subscances which could radiolytically contate combustible gases of termination must be made by tests and measurements or by analysis of terpersentative package such that the following contenia are met overlapperiod of time that is twice the expected shipment line:
 - (i) The hydrogen generated must be settled to a moth quantity that wild be not more year start before (or equivalent limits for other inflammatic gases) of the econdary continer is void if present at STP (100 po more than 0.512 g-mores/ft3 at 14.7 psia and 700; or 0.51
 - (ii) The secondary container and eask prity must be inerted with a diluent to assure that outgoin must be lighted to 5% by volume in those populars of the package which could have hydrogen greater than 5%.

For packages to be delivered tora corrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

(b) For any package containing materials with radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days of separation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

C FORM 6	164		CONDITIONS (continued	() U.S	NUCLEAR REGUL	TORY COMMISSI
Page 3	- Certificat	e No. 6244 - Re	evision No. 9 - Do	ocket No. 7	1-6244	
7.	The lifting l port to preve	ugs on the outs nt their accide	side of the overpa ental use for the	ck shall b purpose of	e covered dur tie-down or	ing trans- lifting.
8.	Shoring shall ponents) and transport.	be placed betw the cask cavity	veen the secondary / to minimize move	container ment durin	rs (or activat ng normal cond	ed com- litions of
			ed for shipment ar oter 7 of the appl			
	Chapter 8 of	the application	ined in accordance as supplemented.			
11.	Fabrication of	f additional ea	paRng RaE GA	lgust 31, 1	984, is not a	uthorized.
12.	The package a general licer	uthorized by the	nis certificate is of 10 CFR §71.12.	hereyyap	proved for us	e under the
13.	Expiration da	te April 30,	2000.	P	P.	
	ements dated	C OJ LIND	Cast R. Chappel Cast Cast Cast Cast Cast Cast Cast Cast	T, Sector	Leader tems Branch	
Date _	04/13/95					
			105			

6-85) 0 CFR 71		CERTIFICAT	TE OF COMPLIANCE	s		ORY COMMISSI
A CERTIFICATE NUMBER		D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NI USA/6280/B(PAGE NUMBER	e. TOTAL NUMBER PAG
of Federal Regulatio b. This certificate does applicable regulator	ns, Part 71, "Packaging not relieve the consign y agancies, including t	and transportation of Ha	cribed in Item 5 below, meets the ap dioactive Material." any requirement of the regulations of intry through or into which the pao OF THE PACKAGE DESIGN OR APPLI AND IDENTIFICATION OF REPORT OR	of the U.S. Depa kage will be tra	intment of Trans	
a. ISSUED TO INterne and A	erd and Assoc Avenue	iates	J. L. Shepherd and J dated September 5, 1 REG71-6280	Associate	es applica supplemen	ation nted.
CONDITIONS This certificate is condi	tional upon fulfilling th	evequirements of 10 CFR	Part 71, as applicable, and the cos	additions specifie	d below	
(a) Paci (1) (2) (3)	A-0109 irra A-0117 over diameter by overpack is and thermal lbs/cu ft. held in pla wall of the cover is se package are shielded ir 3,400 lbs, Drawings The overpac Shepherd an A-0109-10, A-0117-B, c	ng consists of diator) enclas pack). The ir 36 inches hig a double wall insulation co density, 12 in ce at each end overpack is f cured by 30, 5 50.5 inches d radiator is 7, totaling 10,40 k and irradiat d Associates D dated February	or are constructed i rawing Nos.: A-0109 3, 1970; A-0109-20, ated); A-0117-C, dat	led, stee protectiv cylinder o plug cl nclosing ayers of ides). T the irra spacers. its. The s long. ght of th in accord O-Al, dat	e enclosu osure. 1 a shock a balsa woo he irradi diator ar The ove dimensio The weigh e overpac ance with ed June 6 ebruary 5	ire (Model hes bsorbing od (11 iator is od inside erpack ons of the it of the k is J. L. 5, 1969; 5, 1970;

NRC FORM 616A 15-83

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 6280 - Revision No. 6 - Docket No. 71-6280

5. (b) Contents

(1) Type and form of material

Cobalt-60 as metal, doubly encapsulated and heliarc welded in stainless steel. The source(s) is in an annular configuration approximately 6 inches in diameter by 6 inches long. The source(s) must meet the requirements for special form radioactive material.

Maximum quantity of material per package (2)

30,000 curies

- The overpack must be modified by the addition of not less than 14-1/4-inch diameter vent holes in the outer shell (two each in ble top cap and cap side, two in the bottom, and in two side tiers of 4 holes each, at 90' separation, with each tier located about one foot from each end). The holes must be sealed to prevent the inlettage of water but not so as to affect their capability of 6. venting in the event of fires.
- In addition to the requirements of Subpart G of Mart R Part 74 7.
 - The package must be main and in accordance with the Maintenance Program described in the J. L. Stepherd and Associates submittal dated February 2, 1990. (a)
 - The package must be prepared for shipped and operated is accordance with the Operating Processings descripted in the J. L. Shepherd and Associates (b)
- by approved for use under the The package authorized by this service ate is w 8. NO general license provisions of 10 CFR(11)
- 9. Expiration date: Januar 81, 2000.

J. L. Shepherd and Associates' application dated September 5, 1979.

Supplements dated: November 29 and December 31, 1984, January 16, 1985, November 22, 1989, February 2, 1990, and December 6, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cars R. Choppell

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Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

Date: 01/11/95

NRC FORM 618 (8-85) 10 OFR 71		CERTIFICAT	TE OF COMPLIANCE	NUCLEAR REGULA	TORY COMMISSI
A CERTIFICATE	NUMBER	5. REVISION NUMBER	C. PACKAGE IDENTIF CATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAG
6294		20	USA/6294/AF	1 1	3
of Faderal	Regulations, Part 71, "Pack	eging and Transportation of Ra	cribed in Item 5 below, meets the applicable dioactive Material." any requirement of the regulations of the U untry through or into which the package w	.S. Department of Tran	
Comb P.O.	ATE IS ISBUED ON THE BASIS (Norme and Address) Ustion Engineer Box 107 tite, MO 63047	ing. Inc.	of the package design of application and identification of Report of Applic Combustion Engineering, dated July 27, 1990, as	Inc. applica	tion
		C DOCKE	T NUMBER 71-6294		
4 CONDITIONS This certifice	te is conditional upon fulfilli	ng the requirements of 10 CFR	Part 71, as applicable, and the conditions	specified below.	
a) Pack (1) (2)	minimum 14-gau sealed werded 22.5-inch TD I Specification	30-inch square by uge steel, with b bottom sheet. I by 34-inch high I 17H closure by a	30-inch long inter cont bitted and gasketed top in meer container is center 8-gauge steel drum with sbestos or ceramic sheet	Flange closur red and suppo 16-gauge hea L, plywood, h	e and rted in a d and DOT
(3)	and insulation	material. Gross	s weight of package is a	560 pounds.	
-	The packaging Inc. Drawing	is constructed in Nos. D-5007-8086,	n accordance with Combus Rev. 6, and 8-5007-8112	stion Enginee 2, Rev. 1.	ring,
b) Cont	ents				
(1)	Type and form	of material			
	(i) Sintered maximum	d uranium oxide p 5.0 w/o in the U	ellets and rejected pell -235 isotope.	lets enriched	to a
	(ii) Uranium isotope		enriched to a maximum 5.	.0 w/o in the	U-235
	into ble	ocks, with a maxim	lyethylene bags then pr mum enrichment of 4.5 w/ njected into the blocks.	o in the U-2	

age 2 - Certificate No. 6294 - Revision No. 20 - Docket No. 71-6294

(b) Contents (cont'd.)

(2) Maximum quantity of material per package

Maximum weight of contents within the inner container is 427 pounds, including radioactive material, secondary containers, and other packaging material.

(i) For the contents described in 5(b)(1)(i):

320 pounds of pellets, with the U-235 content not to exceed 6.4 kg. Pellets must be packaged in trays in accordance with Combustion Engineering, Inc. Drawing Nos. D-5018-2001, Rev. 1, and NFM-D-4263, Rev. 2, or NFM-E-4661, Rev. 2 and NFM-D-4721, Rev. 1. Trays containing pellets must contain a maximum of 9.07 kg and a minimum of 6.7 kg of pellets with a maximum pellet diameter of 0.4 inch.

(ii) For the contents described in 5(b)(1)(ii):

220 pounds of powder, with the U-235 content not to exceed 1.5 kg. Powder must be packaged in secondary containers in accordance with Combustion Engineering, Inc. Drawing Nos. NPM-C-3389, Rev. 0 or Rev. 3, and NFM-D-4750, Rev. 1.

(iii) For the contents described in 5(b)(1)(iii):

30.4 kg of U_3O_8 , with the U-235 content not to exceed 1.15 kg per package. The U_3O_8 blocks shall be placed in perforated aluminum cans, which shall then be packaged in secondary containers in accordance with Combustion Engineering, Inc. Drawing Nos. NPM-C-3389, Rev. 0 or Rev. 3, and NFM-D-4750, Rev. 1.

TT and TTT

(c) Fissile Class

(2)

Finally Class

For the material described in Items 5(b)(1)(i) and 5(b)(1)(ii):

FISSILE CLASS	11 and 111
Minimum transport index to be shown on label for Class II	0.5
Maximum number of packages per shipment for Class III	216
For the material described in Items 5(b)(1)(iii)):
Fissile Class	II
Minimum transport index	1.3

re 3 - Certificate No. 6294 - Revision No. 20 - Docket No. 71-6294

Prior to each shipment the insert (containment vessel) gasket shall be inspected. This gasket shall be replaced if inspection shows any defects or every twelve (12) months, whichever occurs first.

7. For the contents specified in 5(b)(1)(i), the pellet trays and wood spacers must provide a snug axial and cross sectional fit in the inner container. For packages with fewer than 16 loaded pellet trays, wood spacers or pellet trays with wood spacers inside must be substituted for pellet trays.

8. For the contents specified in 5(b)(1)(ii), powder cans and wood spacers must provide a snug axial and cross sectional fit in the inner container. For packages with fewer than two loaded powder cans, a wood spacer or a powder can with a wood spacer must be substituted for the powder can.

9. In addition to the requirements of Subpart G of 10 CFR Part 71:

- Each packaging must meet the acceptance tests and be maintained in accordance with Chapter 8 of the application; and
- (ii) The package must be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.

Expiration date: September 30, 1995.

REFERENCES

Combustion Engineering, Inc. application dated July 27, 1990.

Supplements dated: October 19, 1990; January 27, and July 28, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

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Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

AUG 0 1 1994

Date:

6.

8-66) 0 CFR 71		TE OF COMPLIANCE		
6346	5. REVISION NUMBER	C PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAG
PREAMBLE a. This certificate is issued to certify that the p of Federal Regulations, Part 71, "Packagin b. This certificate does not relieve the consig applicable regulatory agencies, including	g and Transportation of Ran nor from compliance with a	dioactive Material"	Department of Trans	
THIS CERTIFICATE IS ISSUED ON THE BASIS OF A a ISSUED TO (Name and Address) Fublic Service Company of Colorado 2420 W. 26th Avenue, Suith Denver, CO 80211 CONDITIONS		ic Service Company of Col ication dated April 11, 1 upplemented.	orado 990,	
depending on solid, non-ri outer lid cor 2.25-inch thi body by twent silicone elas Configuration a supplementa Configuration plate. Configuration reactor (HTGR steel inner co 1. Rev. C. an	SV-1 teel encared of sec inclusion experiences of experiences of experiences of experiences of experiences of experiences of sile irradiate sisting of a 3- ch depleted ura y-four 1.25-inc tomeric searri B does not req 1 stainless ste D uses a suppl E is used to s) fuel elements ontainer (as sh d GADR 55-2-2.	epfeted userium shielded and to the pes in diame dres in diameter. The manager and 182 b inch	A through G are used to gurations us steel plate bolted to t he primary s and cask bo Configurati plate. eld ring and high temper es the stair awing Nos. G nt vessel.	for the ship e an and a he cask eal is a on C uses l cover ature gas less ADR 55-2- The inner
inches thick. twelve 0.5-in elastomeric s	The inner lid ch diameter fas eal ring betwee	is secured to the inner teners. The primary sea in the inner lid and inne with an impact limiter o	container t l is a silic r container	body by cone body.

NRC FORM	616A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSI
	2 - Ce	rtificate No. 6346 - Revision No. 24 - Docket No. 71-6346
		Configurations F and G are used to ship solid non-fissile irradiated and contaminated hardware from the FSV HGTR. These configurations use a 4.75-inch thick steel outer lid. The lid is secured to the cask body by twenty-four 1.25-inch diameter fasteners. The primary seal is a molded silicone elastomeric seal ring between the outer lid and cask body. Configurations F and G both use an impact limiter on the upper end. Configurations F and G also use a burial canister with a 12-inch thick carbon steel plug. The shielded spacer in the burial canister is used only in Configuration G.
		The overall weight for the FSV-1 package is 46,025 pounds for Configurations A,B,C and D and 47,600 pounds for Configurations E, F, and G.
	(3)	and G. Drawings The FSV-1 package is constructed in accordance with the following
		The FSV-1 package is constructed in accordance with the following drawings:
		Configuration
		National Lead Company Drawing Nos.: 70000 Rev. 7; 7296F, Rev. 2; and General Atomics Drawing No. 7501-003
		Configuration B
		Same autor Consiguration and a state of the same is not required.
		Configuration Capital States of States
		In addition to the drawings for configuration A, Seneral Atomics Drawing Nos. GADR 55-210, Issue D and GASR 55-2-14, Isse N/C (optional). Configuration uses a supplemental stainless steel shield ring and cover plate constructed in accordance with Drawing No. GADR 55-2-11, Issue B. Configuration D uses a supplemental cardon steel shield ring and cover plate constructed in accordance with Drawing No. GADR 55-2-11, Issue B.
		Configuration E
		In addition to the drawings for Configuration A, General Atomic Drawings Nos. GADR 55-2-1, Issue C; GADR 55-2-2, Issue A; and GADR 55-2-3, Issue B.
		Configurations F and G
		In addition to the drawings for Configuration A, General Atomic Drawings Nos. GADR 55-2-1, Issue C; GADR 55-2-2, Issue A; GADR 55-2-12, Issue C; and GADR 55-2-13, Issue A.

CARCORECTER CONTROL

C

NRC FORM 818A (6-65) Page 3 - Certificate No. 6346 - Revision No. 24 - Docket No. 71-6346 5. (b). Contents (1) Type and form of material

of material per

exceed 4.11 km

above:

(i) Irradiated fuel elements consisting of graphite body, hexagonal in horizontal cross section, approximately 31.2 inches high and 14.2 inches across the flats. Prior to irradiation, each fuel element contains thorium and uranium enriched to a maximum of 93.5 w/o in the U-235 isotope, or

(11) Solid, irradiated and contaminated hardware, which may include fissile material, provided the quantity of fissile material does not exceed a Type A quantity and does not exceed the parts limite of OCFR §71.53, and neutron source components, or

(iii) Solid, nonfissile, irradiated and contaminated hardware which has been removed from the Fort St. Indin High Temperature Gas Looled Reactor and the surface contamination does not exceed 55 millicuries per package.

(2)

animum quantity

cay heat

NOTEL

Item 5 AFF

Strand unactument with a maximum of 1.4 kg of entitied unactument of the component in ratio greater than 8.125000 more and the component shares weight of the cask cay to contents including the component shares, inner contained and invade cal fuel elements shall not exceed 30 pounds. Lontents must be shipped in Configuration E.

(ii) Item b(b)(1)(ii) above:

The gross weight on the cask cavity contents, including appropriate component spacers, liners, inner containers, shield rings and solid, nonfissile irradiated and contaminated hardware shall not exceed 3,720 lbs. Contents must be shipped in Configuration A,B,C or D.

(iii) Item 5(b)(1)(iii) above:

The gross weight of all of the cask cavity contents, including burial canister and spacers, with or without supplemental shielding shall not exceed 4,430 pounds. Contents must be shipped in Configuration F or G.

NRC FORM 6	184	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
	- Ce	rtificate No. 6346 - Revision No. 24 - Dock	et No. 71-6346
			111
5.	(c).	Fissile Class	
		Maximum number of packages per shipment	
6.	shipp	eded, appropriate component spacers must be ing the contents described in paragraph 5(b g shipment.	used in the cask cavity when) to limit movement of contents
7.	rate purpo consi	ransport of the contents of Item (b)(l)(ii) measured on the surface of the package must use of this requirement, the surface of any dered the surface of the package.	personnel barrier may not be
8.	The M the c gener	odel No. FSV-1 cask may perhappet Gn(rei contents described in them 5(b)(1)(ii) or (ation rate does not exceed 500 watts. The 71.87 must be satisfied prior to wrapping t	oforced plastic when shipping ii) provided the heat applicable requirements of 10 he cash
		of packaging Cabricated after August 31, 198	<u> </u>
9.			
10.	In ad	dition to the requirements of Subpart G of	C. I I I I
	(a)	Configurations A, See and Def the Marin prepared for shipmen and operated in Procedures of Section .0. Volume I of The parage shall be pertained in access Program of Section 8:32 wolfness of the section of the Program of Section 8:32 wolfness of the section of	application, as supplemented.
	(b)	Configurations and state the FS prepared for shipped and state to be a Procedures of Section 2.0, volume 1, of supplemented. The package shall be main Maintenance or gram in Section 2.0, Volume supplemented.	dance with the Operating he application, as lined is accordance with the II, of the application, as
	(c)	The main flange seals thust be replaced at use of the packaging and dest replaced	hin (12) months prior to any if inspection shows any defect.
	(d)	The silicone O-ring on the inner container E must be replaced within the twelve (12) packaging and must be replaced if inspecti	months prior to any use of the

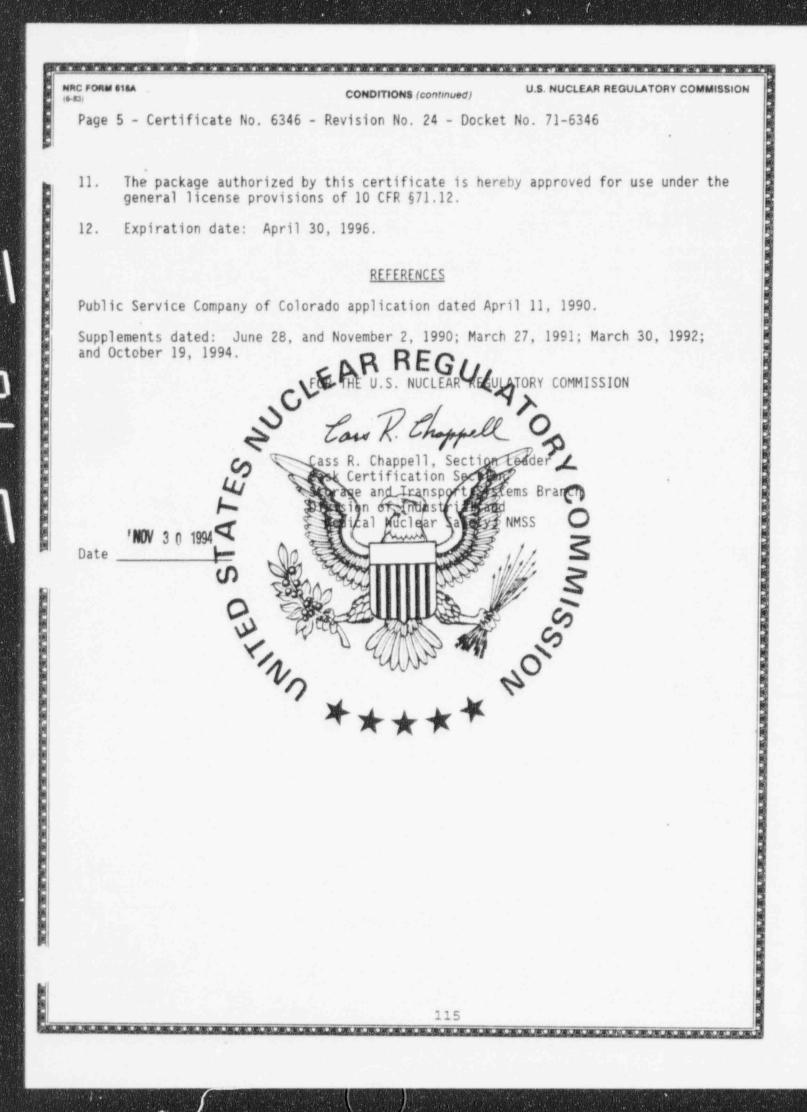
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10 CFR 71	FOR RADIOACT	VE MATERIALS PACKAGES			
6347	b. REVISION NUMBER C. PACKAGE IDENTIFICATION NUMBER C. PAC 7 USA/6347/AF 1			AGE NUMBER . TOTAL NUMBER PAG	
 PREAMBLE a. This certificate is issued to certify that the p of Federal Regulations, Part 71, "Packagin b. This certificate does not relieve the consig applicable regulatory agencies, including 	g and Transportation of Rad	dioactive Material." ny requirement of the regulations of the	U.S. Department of		
THIS CERTIFICATE IS ISSUED ON THE BASIS OF a. ISSUED TO (Name and Address) neral Atomics 0. Box 85608 n Diego, CA 92186	E AR	General Atomic Compa February 19, 1982, a TNUMBER 71-6347	ny Applicat s supplemen	ion dated ted.	
This certificate is conditional upon fulfilling,	he requirements of 10 CFR	Part 71, as applicable, and the conditio	ns specified below.	en de la companya de	
container is cente steel drum. Void inner container ar contents, is 500 p (3) Drawing	e filled with pounds.	A" high, 18-gage stee ed is a 22.5" ID x 38 the inver and outer co remnicultite. Total we accordance with Genera	ight, includ	o-gage within the ling	

NUC TONM 6184	CONDITIONS (continued)
Page 2 - Cer	tificate No. 6347 - Revision No. 7 - Docket No. 71-6347
5. (b) Cer	ntents
(1) Type and form of material
	Fuel element consisting of a graphite body, hexagonal in transverse cross-section approximately 14.2" across the flats and 31.2" high. Disposed in columns within the fuel element body there is a maximum 1.41 kg U-235 plus U-238 and Th-232. The U-235: U-238: Th-232 atomic ratio is about 1:0.07:8.3. The atomic ratio of carbon to the U-235 is in the range of 1800 to 1.
(2) Maximum quantity of material per package One fuel element containing not more than 1.41 kg U-235 and weighing not more than 320 pounds.
(c) Fi	ssile Class S II and III O
(1	be shown on label for Class 44
(2)) Maximum number of packages per shipment as Class III
(i) The	tion to the requirements of Subpart G of 10 CFR Part 71: e package must be operated and prepared for shipment in accordance with the erating procedures of Chapter 6 of the application.
(ii) Ead Chi	ch packaging must meet the Acceptance Tests and Maintenance Program of apter 7 of the application.
 The pack general 	kage authorized by this certificate is hereby approved for use under the license provisions of 10 CFR §71.12.
8. Expirat	ion date: March 31, 1997.
	REFERENCE
General Atom	ic Company application dated February 19, 1982.
Supplements of	dated: March 9, 1982, and February 24, 1992.
	FOR THE U.S. NUCLEAR REGULATORY COMMISSION
	Charles S Mar And Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS
MAR	1 8 1992

Date:

RC FORM 618 1461 D CFR 71	EOR	ERTIFICATE OF	COMPLIANCE TERIALS PACKAGES		TORY COMMISSION
& CERTIFICATE NUMBER			ACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAGE
6357	5		USA/6357/AF	11	2
of Federal Regulations, Part	71, "Packaging and Tran eve the consignor from co les, including the govern	ompliance with any requi	rement of the regulations of the U. bugh or into which the package will	5. Department of Trans II be transported.	
a ISSUED TO (Name and Address) Babcock & Wilcox (P.O. Box 785 Lynchburg, VA 245)	Company	Ba	abcock & Wilcox Com ated February 28, 19 Ph 71-6357	pany applicat	tion
4. CONDITIONS This certificate is conditional u	pon fulfilling the requirer	ments of 10 CFR Part 71.	as applicable, and the conditions	specified below.	
 (2) Desc The 22-3 with vess or 6 The (3) Draw The 	1 No.: NNFD-I ription packaging cons /8 inches high a screw-type el is centered C steel drum b nominal gross ing	ists of a con , constructed cap and a well and supporte y industrial weight of the	taimment vessel, 5- from a 5-inch sche ded bottom plate. d in a 55-gallon DO cane fiberboard. packaging and cont accordance with Ba 7E.	duled 40 stee The containme I specificat ents is 350 p	el pipe ent ion 17C pounds.
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NAC FO	RH E1EA	CONDITIONS (continued)
Pag	e 2 -	Certificate No. 6357 - Revision No. 5 - Docket No. 71-6357
())	Cont	ents
	(1)	Type and form of material
		Uranium metal, alloys or compounds. Uranium may be enriched to any degree in the U-235 isotope.
	(2)	Maximum quantity of material per package
		Contents shall not exceed 100 pounds, and the U-235 content shall not exceed 350 grams.
(c)	Fiss	ile Class - DR REGUI and III
	(1)	ile Class Minimum Transport index Exp Be shown on label for Class (1) 2.8 >
	(2)	Maximum number of packages per shipment 48
6.	In a	ddition to the requirements of Subpart G of 10 CFR Part 71:
	(a)	Each package must meet the Acceptance Tests and Maintenance Program in Chapter 8 of the application.
	(b)	Each package shall be operated and prepared for shipment in accordance with the Operating Procedures in Chapter 7 of the application.
7.	The gene	package authorized by this certificate is hereby approved for use under the ral license provisions of 10 CFR 570.12.
8.	Expi	ration date: April 30, 1996: 400 Million April 30, 1996: 4
Babo	ock &	Wilcox application dated February 28, 1991:
		FOR THE U.S. NUCLEAR REGULATORY COMMISSION
		Charles Vac Quale
		Charles E. MacDonald, Chief Transportation Branch Division of Safeguards
	1	and Transportation, NMSS APR 1 6 1991
Date		

486) OFR 71			FOR RADIOACTIV	E MATERIALS PACKAGES	d. PAGE NUMBER	e. TOTAL NUMBER PAGES
A CERTIFICATE	6		13	USA/6386/B(U)F	1	4
of Federal b. This certifi applicable	Regulation cate doer regulato	ons, Part 71, "Packagin s not relieve the consig ry agencies, including	g and Transportation of Hab pror from compliance with an the government of any coun	ey requirement of the regulations of the U.S. try through or into which the package will i	Department of Trans	
. ISSUED TO A U.S. Depa Division Washingto	Autore and of Na on, DO	Addamas) nt of Energy aval Reactors 2 20585	San Shi as EAR	FTHE PACKAGE DESIGN OF APPLICATION NO IDENTIFICATION OF REPORT OF APPLICAT fety Analysis Report for ipping Container dated A supplemented. TNUMBER 71-6386	235R001 ugust 11, 19	170,
This certificen	te is cond	itional upon fulfilling	the requirements of 10 CFR I	Part 71, as applicable, and the conditions sp	pecified below.	
s. (a)	Packa (1) (2)	Model No.: Description The 235R001 cross section The container empty. The high by 33.0 unirradiated container has partial Alw- or partial S3G- unrodded D10	m and is fabric er is 313 inches oblong cross se 0 inches wide. I fuel modules e as been adapted R3 fuel modules 596 fuel modules -3 refueling mod 6 fuel modules.	ner structure is horizon ated from 0.104-inch this long and has a maximum ction dimensions are app The container was origin F the AIC/A4W type. Sub to ship AIW-3 fuel modul using module support as by use of a special fra ules using cell support rodded ASNPP fuel cells container maximum weigh	ck carbon sh weight of 4, noximately 3 ally designe sequently, t es using a s semblies, st me assembly assemblies, and rodded of	heet steel. 640 pounds, 5.5 inches ed to ship the strongback, candard size and cradle rodded or or unrodded
		The packagin Corporation Rev. 0. and	Drawing Nos. 23 Westinghouse El	d in accordance with Con 5R001, Rev. C, 235R004, ectric Corporation Drawi et 1, 2 and 3 of 3, and	Rev. C, and ng Nos. 973D	235R005,)425,

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(b) Contents

AC FORM RISE

(1) Type and form of material

Unirradiated fuel assemblies of the following types:

- AlG and A4W reactor cell without upper mechanism and with control rod, leadscrew and shipping fixture installed on rodded type modules.
- (ii) AlW-3 rodded-type module without upper mechanism and with control rod, leadscrew, and control rod holddown device installed.
- (iii) AlW-3 unroded eype module. ()
- (iv) Standard size S8G reactor cluster with regular or substitute support adapters and regular control rods or Boral poison rods with control rod holddown devices installed. If only one cell is shipped per container, a dummy load shall be installed for balance.
- (v) Partial size S8G reactor cluster with regular or substitute support adapters and regular control rods or Boral poison rods with control rod holddown devices installed. If only one cell is shipped per container, a durage load shall be installed for balance.
- (vi) S3G-3 refueling cells, with a maximum of one 0-1 reactor cell assembly per container.
- (vii) DVG fuel module, rodded.
- (viii) DIG removable fuel assembly (RFA), unrodded.
- (ix) AlG fuel cluster, fueled end only of full AlG reactor cell, rodded.
- (x) ASNPP fuel cell with control rod, and control rod holddown device installed.
- (xi) D2W side or central fuel cells with control rod and control rod holddown device.
- (xii) D2W corner fuel cells, unrodded.
- (xiii) STC fuel cells, unrodded.
- (xiv) D2W fuel cell and shear block with control rod inserted in rodded fuel cell.

	CONDITIONS (continued)	UCLEAR REGULATORY COMMISSIO
ige 3 - Certi	ficate No. 6386 - Revision No. 13 - Docket No. 71-6	386
(2)	Maximum quantity of material per package	
	(i) One fuel assembly as described in 5(b)(1)(i 5(b)(1)(iii), 5(b)(1)(x), or 5(b)(1)(xiv).	i), 5(b)(l)(ii),
	<pre>(ii) Two fuel assemblies as described in 5(b)(1) 5(b)(1)(vi), 5(b)(1)(vii), 5(b)(1)(ix), 5(b 5(b)(1)(xiii).</pre>	(iv), 5(b)(1)(v), b)(1)(xi), 5(b)(1)(xii),
	(iii) Four fuel assemblies as described in 5(b)(1)(viii).
(c) Fig	ssile Class	III
Max	kimum number of packages per shipments UL	
(1)) For the contents described in 5(b)(1)(ii) and limited in 5(b)(2)(i):	1
(2)) For the contents described in 5(b)(1)(iii) and limited in 5(b)(2)(i):	L 18
(3)) For the contents described in $5(b)(1)(13, 5(b)(1))(13, 5(b)(13, 5(b)(1))(13, 5(b)(13, 5(b)(1))(13, 5(b)(1))(13, 5(b)(1$	(ix), 5(b)(1)(x),
that the be shipp	ling of packages For Fissile Class III shipment is a e sum of the ratios of the number of packages of an ped to the maximum allowable number of packages of t t exceed unity.	individual type to
7. Expirat	ion date: July 31, 1997.	
	平安黄素	

Page 4 - Certificate No. 6386 - Revision No. 13 - Docket No. 71-6386

REFERENCE

Safety Analysis Report for 235R001 Shipping Container, WAPD-OP(R)RD-357 dated August 11, 1970.

Supplements: Knolls Atomic Power Laboratory letter AlG 25-159, dated October 2, 1970. Bettis Atomic Power Laboratory letters WAPD- OP(R)RD-444, dated October 9, 1970; WAPD-OP(R)RD-476, dated October 26, 1970; and WAPD-OP(R)RD-488, dated October 30, 1970. Knolls Atomic Power Laboratory letters AlG 25-181, dated April 9. 1971; and AlG 25-191, dated May 11, 1971. Bettis Atomic Power Laboratory letters WAPD-OP(R)C-94, dated May 16, 1972; WAPD-OP(R)C-199, dated December 13, 1972; and WAPD-OP(R)C-229, dated March 6, 1973. Naval Reactors letters G#5078, dated January 26, 1976; G#5776, dated September 8, 1977; G#5995, dated January 23, 1978; G#5923, dated February 22, 1978; G#6095, dated August 17, 1978; G#6208, dated March 8, 1979; G#6373, dated September 4, 1979; G#6813, dated October 17, 1980; E#C85-0467, dated July 17, 1985; G#C88-8112, dated October 18, 1988; G#90-03655, dated August 10, 1990; and G#92-03560, dated June 15, 1992.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDenild. Chief Transportation Branch Division of Safeguards and

ransportation, NMSS

Dated: JUL 2 3 1992

(8-86) 10 OFR 71			TE OF COMPLIANCE	UCLEAR REGULATORY COMMISSI
1. & CERTIFICATE N 6400	UMBER	5. REVISION NUMBER	(C. PACKAGE IDENTIFICATION NUMBER USA/6400/B()F	d PAGE NUMBER 0. TOTAL NUMBER PAG
of Federal F	tegulations, Part 71, "Packa ate does not relieve the con	ging and Transportation of R signor from compliance with	scribed in Item 5 below, meets the applicable s adioactive Material." any requirement of the regulations of the U.S buntry through or into which the package will	Department of Transportation or other
a. ISSUED TO IN	erne end Address) e Electric Corpo j	oration We	t of the package design of ap ication and identification of Report of Applicat stinghouse Electric Corpo ted August 7, 1981, as su REF NUMBER 71-6400	ration application
4. CONDITIONS This certificate	is conditional upon fulfilling	g the requirements of 10 CFF	R Part 71, as applicable, and the conditions s	pecified below.
(its contents 172" constru- the cavity gasket which and supports 32" of poly A removable foam insulat bolted to the package are the sides an outer conta	s. The inner shucted of 3/16" t is by a 1/4" thin is boilted to the ed in an outer 3 arethane foam in section or cap tion encased in the main outer st approximately 8 and ends of the c iner are standar	provides impact and then ell (cavity) is approxima- bick and 10-gauge mild st ck aluminum plate with st he main immer shell. The /16" thick steel jacket b sulation at the end and 1 consisting of approximate steel with a silicowe rub eel jacket. The overall ' x 8' x 20". Vent holes omtainer. Set into each d I.S.O. steel castings. tents is 45,000 pounds.	tely 76" x 76" x eel. Closure of ficone rubber cavity is centered y approximately 0" on the sides. ly 34" of polyurethane ber gasket is dimensions of the are provided on corner of the
(of drawings Sheet 1, Re Corporation and Wilcox 1 Packaging, Sheet 2, Re 60-01D, She Drawing No. Laboratorie	: (1) Protectiv v. F and 32106, Drawing No. 202 Company Drawing Inc., Drawing No v. O, as modifie ets 1 and 2, Rev 32395, Sheets 1 s letter dated M boratory Drawing	accordance with one of t e Packaging, Inc, Drawing Sheet 2, Rev. 0; or (2) W ODO8, Sheet 1 and 2, Rev. No. 11-D-2130, Rev. 0; or s. 32106-1, Sheet 1, Rev. d by Nuclear Packaging In . 0; or (5) Protective P through 9, Rev. B, as mo lay 8, 1980; or (6) Lawren Nos. AAA81-108683-00, Re	Nos. 32106, estinghouse Electric 0; or (3) Babcock (4) Protective F and 32106, c. Drawing No. EG- ackaging, Inc. dified by Sandia ce Livermore

Page 2- Certificate No. 6400 - Revision No. 21 - Docket No. 71-6400

. (b) Contents

 Large, decontaminated equipment waste of such size as not to fit into a 55-gallon drum (with legs or other readily removable appendages removed). Not to exceed 200 grams plutonium within the package.

Equipment waste surfaces containing more than 0.5 Ci must be decoptaminated to a smearable level of no more than 150,000 dpm/100 cm² prior to fixation or until successive decontamination cleaning operations do not reduce the smearable contamination levels by more than ten percent. After fixation, equipment waste surfaces must have a smearable level of contamination of no greater than 10,000 dpm/100 cm². Outer surfaces must have a smearable level of contamination of no greater than 20 dpm/100 cm². Prior to fixing of contamination, large equipment waste must be inspected to insure that: (a) all sharp or protruding objects have been removed, blunted or protected with packaging material, and (b) pipe caps, gasketed blind flanges, covers, etc., have been installed wherever possible. Following such inspection, the inner surfaces containing more than 0.5 Ci must be fixed with "strip"/ or "clear" coating. The inner surface(s) may alternatively be fixed with a polyporchase foam.

The large equipment waste must be enclosed in a tight-fitting, 1-inch thick plywood bex constructed in accordance with Westinghouse Electric Corporation's Drawing No. 1620E43, Sheets 1, 2, 3, and 4, Rev. 3; a tight fitting 3/16" thick corregated steel box constructed in accordance with Rockwell Hanford Operations' Drawing No. H-2-91888, Sheet 1, Rev. O (modified or unmodified); or enclosed in a tight fitting box constructed in accordance with General Electric Company Drawing Nos. 908E614, Rev. 1, and 908E619, Rev. 2 or 908E648, Rev. 0 or 908E649, Rev. 0; or enclosed in a tight fitting box constructed is accordance with Babcock and Wilcox Company Drawing No. LRC-70019 H, Rev. 2. The space between the equipment and the box must be filled with foam (1" minimum foam thickness) and between equipment (1/2" minimum foam thickness).

Alternatively, gloveboxes contaminated and fixed as described above may be broken down as follows:

Glovebox windows are removed and separately packaged in 12-mil thick PVC bags and sealed. The inner bag is tape sealed and the outer bag is heat sealed.

Glovebox panels are cut to dimensions to fit inside the 3/16" thick corrugated steel burial crates constructed in accordance with Rockwell Hanford Operations' Drawing No. H-2-91888, Sheet 1, Rev. 0 (modified or unmodified). All sharp or protruding objects are removed, blunted, or protected with packaging material. The glovebox panels are bundled such that internal box surfaces are facing inward. Cut glovebox panels from not more than one glovebox are banded with metal strap banding such that two metal strap bands in each direction are placed around the length and width of the glovebox sections. The glovebox window and cut panel packages are enclosed and foamed in place within the box.

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Blocking or dunnage is placed within the box to ensure a one inch foam barrier on the sides and bottom of the box. Likewise, dunnage is provided between the banded glovebox sections to maintain a 1/2" thick foam barrier between banded packages.

(2) Decontaminated hard waste items, such as equipment, metal cans, tools, etc., must be double bagged within 12-mil thick PVC with each bag heat sealed. The total fissile quantity of all the sealed packages in one container must not exceed 200 grams.

Hard waste surfaces must be decontaminated to a smearable level of no more than 150,000 dpm/109 cm prior to fixation or until successive decontamination cleaning operations do not reduce the smearable contamination tevels by more than 10 percent. After fixation, hard waste surfaces must have a smearable level of contamination of no greater than 10,000 dpm/100 cm2. Prior to fixing of contamination, hard waste must be inspected to insure that sharp or protruding objects have been removed, blunted, or protected with packaging material Following such inspection, the outer surfaces must be fixed with "strip" or "clear" coating. Hard waste items such as furnace shells, muffles, or other items with large cavities not accessible for decontamination must be filled with feam within the cavities. Surfaces that are not easily accessible, e.g., interiors of small diameter tubing and piping which were in contact with process materials, must have been swabbed or immersed in cleaning solution to insure removal of residual material. Open ends of the tubing and piping must be sealed using mechanical fittings.

Alternately, large beavy walled process glassware must be painted inside and outside to fix contamination and double bagged in 12-mil thick PVC with each bag heat sealed. The glassware must be secured in a box constructed in accordance with General Electric Company Drawing No. 272E81-4, Rev. 0. The box must be filled with foam and total activity limited to less than two (2) Di in a box.

Alternately, stainless steel transfer tubes and HEPA filters must be double bagged in 12-mil thick PVC with each bag heat sealed. The tubes/filters must be secured in a box constructed in accordance with General Electric Company Drawing No. 272E81-28, Rev. O. The box must be filled with foam and total activity limited to less than 0.5 Ci in a box.

Alternately, round steel ducting must be capped and secured in a box constructed in accordance with General Electric Company Drawing No. 272E81-29, Rev. 0; 272E81-30, Rev. 0; or 272E81-31, Rev. 0. Outer surfaces ducting will have a smearable level of contamination no greater than 20 d/m/100 cm². The box must be filled with foam and total activity limited to less than 0.5 Ci in a box.

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INC FORM HIBA

Sealed packages and boxes of hard waste must be enclosed in a tightfitting, 1-inch thick plywood box constructed in accordance with Westinghouse Electric Corporation's Drawing No. 1620E43, Sheets 1, 2, 3, and 4, Rev. 3; a tight-fitting 3/16" thick corrugated steel box constructed in accordance with Rockwell Hanford Operations' Drawing No. H-2-91888, Sheet 1, Rev. 0 (modified or unmodified); enclosed in a tight fitting box constructed in accordance with General Electric Company Drawing Nos. 908E614, Rev. 1 and 908E619, Rev. 2 or 908E648, Rev. 0 or 908E649, Rev. 0; or enclosed in a tight fitting box constructed in accordance with Babcock and Wilcox Company Drawing No. LRC-70019 H, Rev. 2. The space between the packages and the box must be filled with foam to a minimum thickness of 1 inch. Void spaces between the sealed packages must be filled with foam (1/2" minimum foam thickness).

(3) Glove box absorbute (HEPA) filters must be double bagged within 12-mil thick PVC, with each bag heat sealed and packaged within DOT Specification 17H or 17 steel drums (maximum size of 55 gallons). Each drum must be lined with a sealed plastic liner and equipped with a standard drum closure. Each drum must not exceed a fissifie quantity of 60 grams.

Sealed drums must be enclosed in a tight-fitting l-inch thick plywood box constructed in accordance with Vestinghouse Electric Corporation's Drawing No. 16200431 Sheets 1, 2, 3, and 4, Rev. 3; e tight-fitting 3/161 thick corrugated speel box constructed in accordance with Rockwell Hanford Operations' Drawing No. 142-91888, Sheet 1, Rev. 0 (modified or unwodified conclosed in a tight fitting box constructed in accordance with General Electric Company Drawing Nos. 908E614, Rev. 1 and 908E619, Rev. 2, or 908E608 Rev. 0, or 908E699, Rev 0; or enclosed in a tight fitting box constructed in accordance with Babcock and Wilcox Company Drawing No. LRC-70019 H, Rev. 2. The space between the drums and the box must be filled with foan to a minimum thickness of 1 inch. Void spaces between drums must be filled with foan (1/2" minimum foam thickness). (4) Soft waste items such as sheeping, gloves, paper, prefilter media, polyethylene bottles, shoe covers, etc., must be double bagged in 12mil thick PVC, with each bag heat sealed (bag size must not exceed 22" x 16" x 10") and packaged within DOT Specification 17H or 17C steel drums (maximum size of 55 gallons). Each drum must be lined with a sealed plastic liner and equipped with a standard drum closure. Each drum must not exceed a fissile quantity of 60 grams.

Sealed drums must be enclosed in a tight-fitting 1-inch thick plywood box constructed in accordance with Westinghouse Electric Corporation's Drawing No. 1620E43, Sheets 1, 2, 3, and 4, Rev. 3; a tight-fitting 3/16" thick corrugated steel box constructed in accordance with Rockwell Hanford Operations' Drawing No. H-2-91888, Sheet 1, Rev. 0 (modified or unmodified); or enclosed in a tight fitting box constructed in accordance with Babcock and Wilcox Company Drawing No. LRC-70019 H, Rev. 2. The space between the drums and the box must be filled with foam to a minimum thickness of 1 inch. Void spaces between drums must be filled with foam (1/2" minimum foam thickness).

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AC LORM SIBA

(5) Liquid waste (decontamination solutions only) must be solidified in concrete in a 30-gallon drum which must be sealed in a plastic bag and centered and supported in a DOT Specification 17H or 17C 55-gallon steel drum by absorbent material. The 55-gallon drum must be lined with a sealed plastic liner and equipped with a standard drum closure. Each drum must not exceed a fissile quantity of 60 grams.

Alternatively, liquid waste is solidified in concrete in maximum size one (1) gallon packages which are double bagged and heat sealed in 12mil thick PVC and placed with a DOT Specification 17H or 17C steel drum (maximum size of 55 gallons). The drum is lined with a sealed plastic liner and equipped with a standard drum closure. Each 55-gallon drum must not exceed a filssile quantity of 60 grams. For drums smaller than 55-gallons, the total fissile quantity of all the sealed packages (drums) in one container must not exceed 200 grams.

Sealed drows must be enclosed in a tight-fitting 1-inch thick plywood box constructed in accordance with Westinghouse Electric Corporation's Drawing No. 1520E43, Sheets 1, 2, 3, and 4, Rev. 3; or a tight-fitting 3/16" thick corrupted steel box constructed in accordance with Rockwell Hanford Operations' Drawing No. H-2-91888, Sheet 1, Rev. 0 (modified or unmedified); enclosed in a tight-fitting box constructed in accordance with General Electric Company Drawing Nos. 908E614, Rev. 1 and 908E619, Rev. 2 or 908E648, New. 0, or 908E649, Rev. 0; or enclosed in a tight fitting box constructed in accordance with Babcock and Wilcox Company Drawing No. LRC 70019 H; Rev. 2. The space between the drums and the box most be fitted with foam to a minimum thickness of 1 inch. Void spaces between drums must be fitted with foam (1/2" minimum foam thickness).

- (6) Uranium 200 oxide and thorium oxide in the form of intact LWBR-type fuel rods with the following limitations:
 - (i) Rods must be packaged within the Model No. 6400 packaging as described in Section 1 of WAPD-LP(FE)-220, Rev. 3 (February 1983);
 - (ii) The fuel content must not exceed 50 kg U-233 per shipment;
 - (iii) All rod storage containers must be filled to capacity (at least 70% of cross-sectional area) with rods or alumninum shim stock;
 - (iv) Each rod storage container must contain not more than one subcontainer of 5/9 or 12 w/o BMU seed rods;
 - (v) Each rod storage container must weigh not more than 2,000 pounds;
 - (vi) The fuel rod heat generation must not exceed 30 watts; and
 - (vii) Operating Procedures and Acceptance Tests and Maintenance Program must be modified to meet the requirement of Item 11 of this approval.

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(7) Liquid analytical residues from the dissolution of spent reactor fuel rods, solidified in cement (see table, p. 3 of application*). The cement is contained in 1.5-gal steel can closed with a slip cover lid. The two primary cans are packed in a secondary steel can sealed with a press fit lid (see Figure 2 of application*). The secondary containment package contents are placed within a radiation shield (lid secured with six (6), 1/2"-13UNC bolts with welds in accordance with application*) centered in a DOT Specification 17-C 55-gal steel drum (see Figure 1 of application*). The drums are sealed with styrene-butadiene rubber gasket contained with a standard drum closer. Total weight of the drum will be less than 1.450-lb, and each drum will not exceed a fissile quantity of l& grand 435 (i) of fission products.

Six (6), 55-gat sealed drum assemblies with be enclosed in a tightfitting 3/10-in thick corrugated steel box constructed in accordance with Rockwerd-Hanford Operations' Drawing No. H-2-91888, Sheet 1, Rev. 0 (modified or unmodified). The space between the drums and the box must be filled with foam to a minimum thickness of 1 inch. Void spaces between drums must be fitted with foam to a minimum thickness of 1/2 inch. Two (2) corrugated steel box assemblies may be transported in the packaging steel box assemblies may be transported * U.S. Department of Energy letter dated April 15, 1983.

- (8) Uranium 233 oxide and thorium oxide in the form of intact LWBR-type fuel rods with the following limitations:
 - Rods must be packaged as shown in Figure 4, Application dated July 8, 1983, and contained within the Model No. NNFD-SA-2 packaging (Certificate of Compliance No. 5910);
 - (ii) The fuel content must not exceed 2.0 kg U-233 per shipment;
 - (iii) Each loaded LWBR Rod Transport Box must weigh not more than 99 pounds;
 - (iv) The fuel rod heat generation rate must not exceed 2 watts; and
 - (v) Operating Procedures and Acceptance Tests and Maintenance Program must be modified to meet the requirement of Item 11 of this approval.

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- (9) Maximum of four (4) Cf-252 sources with the following limitations:
 - Each source must be doubly encapsulated with the inner capsule meeting the requirements for special form radioactive material;
 - (ii) The total Cf-252 content must not exceed 6.1 mg;
 - (iii) The sources must be packaged in a shielded container as described in Chapter 1 of WAPD-LP(CE)POB-591 (January 1984); and
 - (iv) The decay heat generation from the source material must not exceed one watt.
- (10) Compressed krypton-85 gas in mixture with othe non-radioactive gases that are chemically compatible with the 3AA2015 cylinder. No fissile material (Requirement of 5.(c) does not apply). Shipment of krypton-85 gas in subject to the following limitations:
 - (i) Radioactivity not to exceed 10,000 curies. Maximum internal decay heat not to exceed 15 watts. Maximum volume of krypton-85 and other non-radioactive gases shall not exceed 1480 liters at STP (1 atm, 25°C);

- (ii) The maximum initial fill pressure shall not exceed 500 psig at 25°C;
- (iii) The DOT Specification 3AA2015 gas cylinder shall be certified for an operating load of 2,015 psig, at least once every 5 years by testing to 3,360 psig;
 - (iv) A minimum of 24 hours after loading with krypton-85 gas the krypton packaging primary containment shall have a leak rate of less than 0.0014 microcuries per second. The leak test shall be performed with the containment vessel within the lead shield container prior to placement within its thermal overpack;
 - (v) Content of the package shall be verified by mass spec analysis;
 - (vi) Acceptance, maintenance and use of the krypton package shall be in accordance with the procedures and requirements of Chapter 7 and 8 of Westinghouse Idaho Nuclear Company, Inc. Report No. WIN-236, Revision 1, March 1988. The retaining ring shall be tightened around the gas cylinder to a 40 to 50 inch-pound torque:
 - (vii) The position and securement of the krypton package within the Model No. 6400 is as specified in Westinghouse Idaho Nuclear Company, Inc. Drawing No. 059888;

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(viii) Krypton package must be enclosed within a tight fitting plywood box constructed in accordance with Westinghouse Idaho Nuclear Company, Inc. Drawing No. 059886.

(c) Fissile Class

III

One (1)

Maximum number of packages per shipment

6. The polyurethane foam must be Instapak 200, or equivalent.

- 7. The maximum weight of the contents including secondary packaging, dunnage, shoring and bracing must not exceed 30,000 pounds.
- 8. Sufficient dunnage, shoring and/or bracing must be utilized to minimize secondary impact of the secondary packaging within the cavity under accident conditions.
- 9. Protrusions from secondary packaging such as lifting eyes, etc., must be positioned such that they will not contact the cavity walls, or shoring must be provided to prevent puncture of the cavity walls by the protrusions under the accident conditions.
- Contents must be positioned in the cavity such that the center of gravity of the loaded package is substantially the same as the center of gravity of an empty package.
- 11. The cavity of the overpack must be vented through an absolute filter to equalize pressure between the outside and inside of the overpack.
- 12. Contents packaged under the conditions of this certificate of compliance are exempt from the requirements of 10 CFR §71.63. Condition 5(c) of this certificate of compliance is not applicable where the fissile material is excluded as provided by 10 CFR §71.53.
- 13. In addition to the requirements of Subpart G of 10 CFR Part 71, the package must be prepared for shipment, operated, and maintained in accordance with "Operating Inspection and Maintenance Procedure No. CSK-003, Rev. 0," included in the Westinghouse Electric Corporation supplement dated April 14, 1992.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.

15. Expiration date: June 30, 1997.

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REFERENCES

Westinghouse Electric Corporation application dated August 7, 1981.

General Electric Company supplement dated: October 1, 1981.

Babcock and Wilcox Company supplements dated: March 8, 1982; and January 10, 1985.

Department of Energy, Division of Naval Reactors, supplements dated: April 22, and July 8, 1983; and March 5, 1984.

Department of Energy, Chicago Operations Office, Supplement dated: April 15, 1983.

Department of Energy, Washington, DC, supplement dated: June 6, 1988.

Westinghouse Electric Corporation supplement dated: April 14, 1992.

FOR THE U.S. MUCLEAR REGULATORY COMMISSION

U.S. NUCLEAR REGULATORY COMM

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

* P

Date: JUN 10 1992

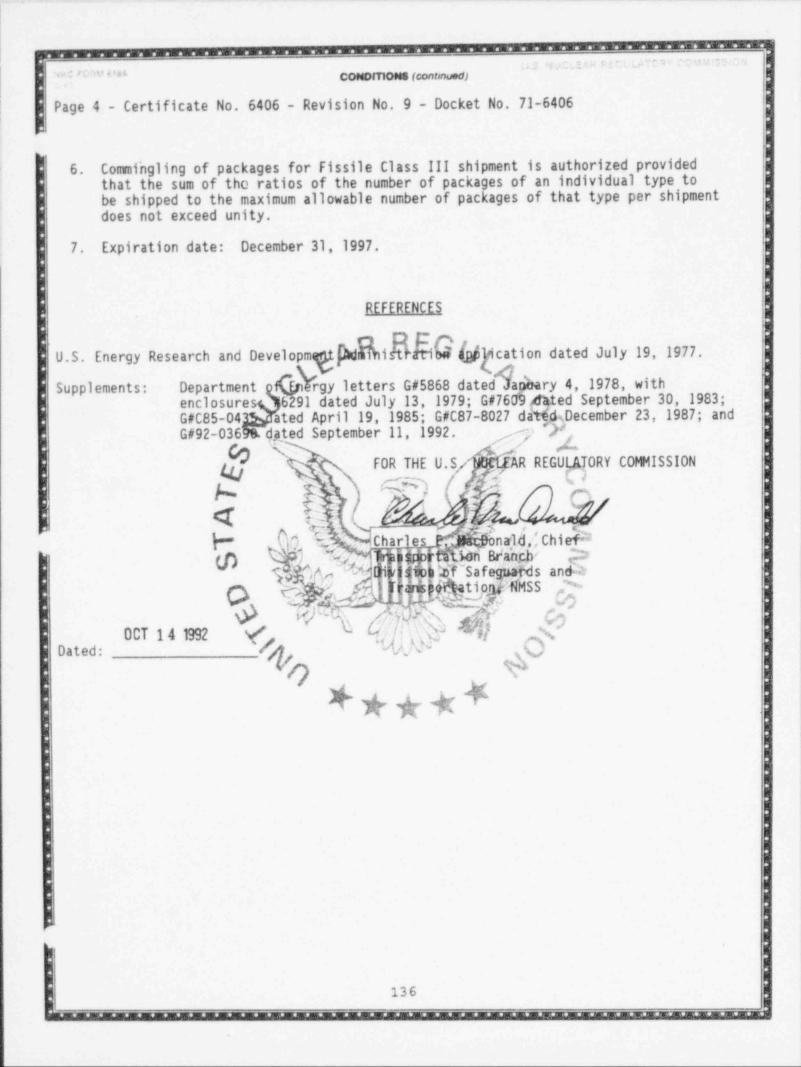
NRC FORM 618 (8-85) 10 CFR 71			E OF COMPLIANCE	NUCLEAR REGULA	TORY COMMISSION
1 CERTIFICATE NUMBER		D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBE	A DAGE NUMBER	6. TOTAL NUMBER PAGES
6406		9	USA/6406/AF		4
of Federal Regulati	ons, Part 71, "Packaging	and Transportation of Radi	ibed in Item 5 below, meets the applicat oactive Material." y requirement of the regulations of the		
applicable regulato	ry agencies, including th	e government of any coun	try through or into which the package	will be transported.	
3. THIS CERTIFICATE IS ISS a. ISSUED TO (Name and		b. TITLE A	F THE PACKAGE DESIGN OR APPLICATION ND IDENTIFICATION OF REPORT OR APPLI	CATION:	
U.S. Departme Division of N Washington, D	aval Reactors	Adr	S. Energy Research and ministration Applicati ly 19, 1977, as supple	on dated	
		C. DOCKET	NUMBER 71-6406		
4. CONDITIONS This certificate is cond	litional upon fulfilling the	requirements of 10 CrR P	art 71, as applicable, and the condition	is specified below.	
5.	Curry .		0	A	
(a) Packaging	19	Sal.	2	da i	
(1) Mode	1 No.: None s	pecified		(2)	
(2) Desc	ription	31/2	** ((信 注	Ö :	
Spec	ific packaging	is not require	ed. Safety is indepen	dent of packag	ging.
b) Contents	42 3		See aller	and a second	
(1) Type	and form of n	naterial	We .		
Unir	radiated fuel	assemblies of 1	the following types:		
(i)	S5G Fuel Expe container.	riment Assembly	r (FEA) in the Model N	lo. FEA shippin	ng
(ii)	S5G Double Fu shipping cont		Assembly (DFEA) in the	Model No. DFI	EA
(111)		le Uninstrument ping container	ted Subassembly (RUS)	in the Model	
(iv)		pe "A" Module o /3.6 shipping o	or AlW-3 Shipboard "A" container.	Module in the	9
(v)	Rodded instru shipping cont		module in the Model	No. 7481E12	
(vi)		le or S1C perip pping container	oheral assembly in the ^.	Model No. Slo	0

NRC FORM PIER	CONDITIONS (continued)
Page 2 - Certif	icate No. 6406 - Revision No. 9 - Docket No. 71-6406
o.(b) Contents	(Continued)
(vii)	S1W-3 Removable Subassembly (RSA) in the Model No. S1W RSA/Metal Box.
(viii)	S5W-2 Removable Subassembly (RSA) in the Model No. S5W RSA/Bird Cage.
(ix)	S5W-R2/R3 or S5W-2 module in the Model No. S5W New Module container.
(x)	A1W-2/R2 cluster or half cluster in the Model No. 658C shipping container.
(xi)	S3G-2A/2B fuel module in the Model No. 7481E12 or Model No. 95K218 shipping container. REGUL
(xii)	D2W rodded fuel cell or unrodded corner type D2W fuel module in a Model No. 65841AB shipping and storage container. Rodded type fuel module shall have a control rod and control rod holddown device installed.
(xiii)	S7G unit cell or reactor cell assembly in a Model No. 658E1AB shipping and storage container, with shipping clamp installed.
(xiv)	Advanced Test Core (ATC) welded fuel cluster or ATC cage assembly fuel cluster in a Model He, 660BI7660C1 container.
(xv)	DIG fuel module to a model 572AT or 572BT shipping container and DIG Removable Fuel Assembly (RFA) in a model No. 573A1 or 573BT shipping container. A control rod and control rod holddown device need not be installed in the DIG fuel module.
(xvi)	DIG Removable Fuel Assembly (RFA) is a Model No. 573Al or 573Bl shipping contained.
(xvii)	PWR Core 1 (Seed 2, 3 or 4) unrodded seed fuel assembly or PWR Core 2 (Seed 1 or 2) unrodded seed fuel assembly, in unspecified shipping containers.
(xviii)	PWR Core 1 (Seed 2, 3 or 4) uprodded seed fuel subassembly or PWR Core 2 (Seed 1 or 2) unrodded seed fuel subassembly, in unspecified shipping containers.
(xix)	S8G rodded fuel cell in unspecified shipping container with control rod holddown device installed.
(xx)	S5G type unit cell in a Model No. 658E1AB shipping container.
(xxi)	AlW-3 Prototype Peripheral Subassembly or AlW-3 Prototype Center Subassembly in the Model No. 2.7/3.6 shipping container.
(xxii)	S7G Partial Fuel Cell Subassembly in a DOT specification (Type 20 WC-3) container.

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VAC FORM 6184	CONDITIONS (continued)	RECULATORY COMMISSION
Page 3 - (Certificate No. 6406 - Revision No. 9 - Docket No. 71-6406	
5.(b) Cont	tents (Continued)	
(x)	ciii) S5G Central Subassembly	
()	(xiv) S3G-3 Removable Noninstrumented Fuel Assembly (RNFA) in No. 95K-218 shipping container.	a Model
	(2) Maximum quantity of material per package	
	<pre>(i) One fuel assembly as described in 5(b)(1)(i), 5(1 5(b)(1)(iii), 5(b)(1)(iv), 5(b)(1)(v), 5(b)(1)(v 5(b)(1)(viii), 5(b)(1)(ix), 5(b)(1)(x), 5(b)(1)(x) 5(b)(1)(xiii), 5(b)(1)(xiv), 5(b)(1)(xvi), 5(b)(1) 5(b)(1)(xviii), 5(b)(1)(xix), 5(b)(1)(xx), 5(b)(1) 5(b)(1)(xxiii), and 5(b)(1)(xxiv).</pre>	i), 5(b)(1)(vii), xi), 5(b)(1)(xii), 1)(xvii),
	(ii) Two fuel assemblies as described in 5(b)(1)(xv).	
	(iii) Three fuel assemblies as described in 5(b)(1)(xxi	i).
(c) Fiss	ile Class 2 2 0 0 0 0 0	III
Maxi	mum number of packages per skipment:	
(1)	For the contents describes in 5(b)(1)(iv), 5(b)(2)(vi), 5(b)(1)(xi), 5(b)(1)(xii), 5(b)(1) 5(b)(1)(xiv), 5(b)(2)(xv), 5(b)(1)(xvii), 5(b)(1)(xix), 5(b) 5(b)(1)(xxi), 5(b)(1)(xxii), 5(b)(1)(xxii), and 5(b)(1)(xxiv), and familied in 5(b)(2)(1), 5(b)(2)(i1) and 5(b)(2)(11):	(xiii), (1)(xx), 1 (one)
(2)	For the contents described in 5(b)(1)(iii), 5(b)(1)(v), 5(b)(1)(ix), 5(b)(1)(x) or 5(b)(1)(xviii) and limited in 5(b)(2)(i):	2 (two)
(3)	For the contents described in 5(b)(1)(viii) and limited in 5(b)(2)(i):	3 (three)
(4)	For the contents described in 5(b)(1)(vii) and limited in 5(b)(2)(i):	4 (four)
(5)	For the contents described in 5(b)(1)(xvi), and limited in 5(b)(2)(i):	8 (eight)
(6)	For the contents described in 5(b)(1)(i) and 5(b)(1)(i) and 5(b)(1)(ii) and 1imited in 5(b)(2)(i):	3 (three) of 5(b)(1)(i) plus 1 (one) of 5(b)(1)(ii

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. & CERTIFICATE NUMBER	b. REVISION NUMBER	CTIVE MATERIALS PACKA		d PAGE NUMBER	. TOTAL NUMBER PA
6441	5	USA/6441/B(1	3
 PREAMBLE a. This certificate is issued to certify the of Federal Regulations, Part 71, "Part b. This certificate does not relieve the applicable regulatory agencies, inclu- 	ckaging and Transportation o consignor from compliance w	Padioactive Material."	ons of the U.S. D	epartment of Transp	
THIS CERTIFICATE IS ISSUED ON THE BAS a. ISSUED TO (Name and Address) U.S. Department of Division of Naval W Washington, DC 2058	Energy Reactors	Safety Analysis R Shipping Contained as supplemented. CKET NUMBER 71-644	eport for dated A	D2G Power	
CONDITIONS This certificate is conditional upon fulfil	lling the requirements of 10 C	FR Part 71, as applicable, and the	conditions spec	ified below.	
assemblic cover, (4 To prepar unit, the cover is in the co installed shipment it is at center ra inches in	ion Power Unit shipp es; (1) the barr 4) the main ship re the power uni- e container barr removed and the ontainer with eig d and the container tached to a gover ailroad car; the n the shipping co	it ing container assembled assembly, (2) the bing skid, and (5) t shipping container ef is rotated to the power unit is loaded that (8) shipping stu- her is rotated to the assembly is 31 feet rument owned permanent maximum height above onfiguration. The p and mechanisms inst	e upper co the bance r for shi e vertica ed into t uds. The he horizon t long and ently ass we the ra power uni	over, (3) t l trunnion pment of a l position, he barrel a upper cove ntal positi d 8-1/2 fee igned depre ils is 13 f	he lower supports. power the upper nd secured r is then on for t wide and ssed eet, 10

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Page 2 - Certificate No. 6441 - Revision No. 5 - Docket No. 71-6441

5.(a)(2) Description (continued)

The closure head in a Type A and Type B power unit contains an integral bolting flange. This type of power unit is retained in the container by means of eight shipping bolts which clamp the power unit to the barrel upper flange of the shipping container. The control rods in a Type A or B power unit are restrained in the power unit by means of control rod hold down latch pawls located in the upper control rod drive mechanism. The Type C, D, or E power unit is also retained in the container by means of eight shipping bolts but because the closure heads on these power units do not include a bolting flange, a special shipping ring is used to clamp the closure head and core cartridge assembly to the barrel upper flange of the shipping container. The control rods in a Type C, D, or E power unit are restrained in the power whit by means of rebound and outmotion latches located in the latching portion of the control rod drive mechanisms. The container assembly weighs about 100,000 pounds empty and about 270,000 pounds loaded.

(3) Drawings

The packaging is constructed in accordance with Baldwin-Lima-Hamilton Corporation Drawing Nos. R-126361, Rev. E, and R-126347, Rev. K, and Westinghouse Electric Corporation Drawing Nos. 955F632, Rev. 5, and 972D940, Rev. 5.

Contents (b)

(1) Type and form of material

Unirradiated enriched Uranium as contained in Naval Reactors Type A, B, C, D, or E power units consisting of core barrel, unirradiated fuel assemblies, closure head, mechanisms and associated hardware, with all design control rods and mechanisms installed.

- (2) Maximum quantity of material per package One power unit as described in 5(b)(1).
- (c) Fissile Class

III

one (1)

Maximum number of packages per shipment

6. Expiration date: December 31, 1997.

U.S. NUCLEAR REGULATORY COMMISSI

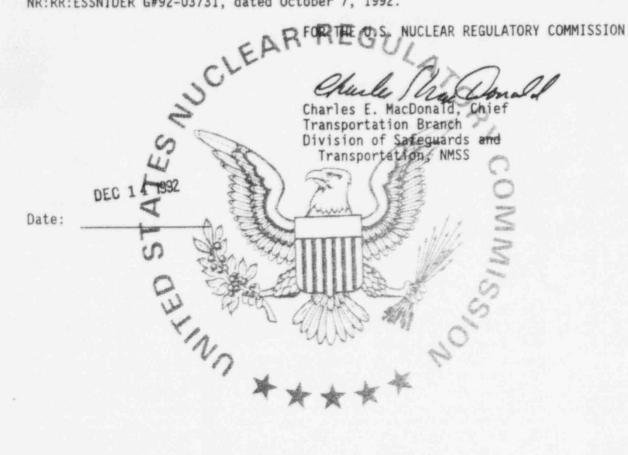
Page 3 - Certificate No. 6441 - Revision No. 5 - Docket No. 71-6441

NAC FORM ETBA

REFERENCES

Safety Analysis Report for D2G Power Unit Shipping Container, ONP-74252-13 dated August 4, 1969.

Supplements: Bettis Atomic Power Laboratory letters WAPD-DP(CH)-1252, dated November 30, 1973; WAPD-DP(CH)-1466, dated October 18, 1974; Knolls Atomic Power Laboratory letter CGN 85542-250, dated February 5, 1981; and Naval Reactors letter NR:RR:ESSNIDER G#92-03731, dated October 7, 1992.



	CE FOR F		OF COMPLIANCE MATERIALS PACKAGES		TORY COMMISSI
CERTIFICATE NUMBER	b. REVISION	NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	. TOTAL NUMBER PAG
6553		6	USA/6553/AF	1	2
of Federal Regulations, P	art 71, "Packaging and Transp	noliance with any	ed in Item 5 below, meets the applicable in active Material." requirement of the regulations of the U.S v through or into which the package will	. Department of Trans	
u.ssued to (Name and Address U.S. Department EH-33.2 Washington, DC	of Energy 20545	Safety Protect Uraniun 1975, Suppler c. DOCKET N	A Madada	e "Paducah T on Cylinders No. KY-665, d May 20, 19	of June 16,
This certificate is conditional	I upon fulfilling the requirement	ents of 10 CFR Par	1 71, as applicable, and the conditions i	specified below.	
(a) Pack (1) (2)	for the Model steel, and is 5/8-inch thick rated at 200 p overall dimensi inches. The ov which are clamp binders, and e high strength of an outer 1/8	verpack wh No. 48X 10- 48 Twches wall. The sig service ions of ap verpack comped and sec ight, I-3/4 latch pins 8-inch stee	ich provides impact an ton cylinder. The cy in diameter, 121 inche a cylinder has a 108.9 a pressure. The prote proximately 153 inches prists of two parts, a cured by four, 1-3/8-i 1-inch guide pins, fit . The closed, assemble	linder is a s long, and ft ³ volume, ctive overpa x 76 inches body and a nch ratchet	welded has a , and is ck has x 72 lid,
	valve end is pr plate. A centr diameter x 128 fire retardant overpack by rut provided on the each of the lic 2-inch bolts an	rotected by rally locat inches lor polyurethat ober shock body for d and body re used in	el shell backed on bot stainless steel breaka a 3/8-inch stainless ted 3/16-inch steel sh ng is separated from t ane foam. The cylinde isolators. Four mild lifting. The four IS sections may be used conjunction with the ge gross weight is 37,	ed overpack h long sides way plates. steel break ell, 60 inch he outer she r is held in steel brack 0 corner fit for lifting. ISO corner f	-inch consists , top and The away es in 11 by the ets are tings on Four,
(3)	valve end is pr plate. A centr diameter x 128 fire retardant overpack by rut provided on the each of the lic 2-inch bolts an	rotected by rally locat inches lor polyurethat ober shock body for d and body re used in	el shell backed on bot staipless steel breaka a 3/8-inch stainless ted 3/16-inch steel sh ng is separated from t ane foam. The cylinde isolators. Four mild lifting. The four IS sections may be used conjunction with the	ed overpack h long sides way plates. steel break ell, 60 inch he outer she r is held in steel brack 0 corner fit for lifting. ISO corner f	-inch consists , top and The away es in 11 by the ets are tings on Four,
(3)	valve end is pr plate. A centr diameter x 128 fire retardant overpack by rut provided on the each of the lic 2-inch bolts ar for tie-down. Drawings The Paducah Tic Protective Pack Rev. B; Union (EM-1209-B, Rev. E, Rev. 4; EM-1	rotected by rally locat inches lor polyuretha ober shock body for d and body re used in The packag ger overpac kaging, Inc Carbide Cor 10; EM-12 1209-F, Rev Rev. 1; ar	el shell backed on bot staipless steel breaka a 3/8-inch stainless ted 3/16-inch steel shi ing is separated from t ane foam. The cylinder isolators. Four mild lifting. The four IS sections may be used conjunction with the ge gross weight is 37, ck is constructed in an c. Drawing Nos. 32301, rporation Drawing Nos. 209-C, Rev. 7; EM-1209- 7. 8; EM-1209-G, Rev. and Martin Marietta Ene	ed overpack h long sides way plates. steel break ell, 60 inch he outer she r is held in steel brack 0 corner fit for lifting. ISO corner f 500 pounds. ccordance wi Rev. B and EM-1203-A, I -D, Rev. 8; 6; EM-1209-H	-inch consists , top and The away es in 11 by the ets are tings on Four, ittings th 32302, Rev. 9; EM-1209- , Rev. 3;

NRC FORM 618A 16.85

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7.

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

.ge 2 - Certificate No. 6553 - Revision 6 - Docket No. 71-6553

(b) Contents

(c)

(1)Type and form of material

> Solid uranium hexafluoride (UFe) at not more than 4.5 w/o U-235 isotope enrichment, and an H/U ratio of no more than 0.088.

(2) Maximum quantity of material per package.

> The maximum weight of UFe not to exceed 21,030 pounds (9,540 kg). The maximum U-235 content not to exceed 619 pounds (280 kg). e Class EARREGU/I

Fissile Class

The Model No. 48X or Winder must be fabricated, inspected, tested, maintained, assembled, and used in accordance with American National Standards Institute N14.1-1990. The Winders must be fabricated in accordance with Section VIII, Division I, of the ASME American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code and should be ASME Code stamped. 6.

In addition to the requirements of Suppart Ger 10 CFR Part 71, each package shall be maintained, operated and prepared not spipment in accordance with Paducah Gasears Diffusion Flant Standard Operating Procedure CH-423, Rev. 0, dated June 10, 1992.

Use of the 400 cylin 8.

- The package a porized within general license provisions of 9. by approved for use under the
- Expiration date: Movember 30. 10.

Safetý Analysis Report on the "Pasical Jighr" Protective Overpack for 10-Ton Cylinders of Uranium Hexafluoride, Union Carbide Corporation Report No. KY-665, June 16, 1975, and Supplement 1, May 20, 1977.

REFERENCES

Supplements dated: June 10 and 14, 1988; July 1, 1993; and August 15, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Caso R. Chappell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

04/21/95 Date:

141

CERTIFICAT	ENUMBE	R	b. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	e. TOTAL NUMBER PAG
6568			8	USA/6568/A	1	3
of Feder b. This cert applicab	el Regula ificate d le regula	ations, Part 71, "Packaging oes not relieve the consign atory agencies, including t	and transportation of Pado for from compliance with an the government of any coun	ty requirement of the regulations of the U.S. try through or into which the package will	Department of Trans	
ennesse 101 Mar	e Va	nd Address) lley Authority Street	Tenr	nessee Valley Authority ed August 16, 1976, as si	application	
naciani	oya,	TN 37402	EAH	пимвея 71-6568		
CONDITIONS		nditional unon fulfilling th	e requirements of 10 CFR I	Part 71, as applicable, and the conditions s;	becified below.	
This certific	ate is co	mattonal upon turning o		0	and the second	
(a)	Dack	aging 6		2.32		
(a)	1	held	221	130 -		
	(1)	1.000	-60-150			
	(2)	Description		hund) 12 -	eggel fotoso	
		diameter. Let inner and out plate assembly flange by 36 length steel seals at the circular stee	ad shielding, 3- er steel shells . The cover is steel bolts. Er shell of 1/2-ind top cover and at L cylinder with	hape 93 inches long and 8 -1/2 inches thick, is en- that are welded to a lar s a steel plate assembly acircling the top of the ch thickness. Silicone (t all plugs. The inner a capacity of 150 cu ft y 73,000 pounds.	cased within inated stee secured to cask is a p O-rings prov container is	the base the top partial vide s right
	(3)	Drawings	× tr	***		
		Drawing Nos .:	0568-B-0005, F B-0016, Rev. D;	in accordance with the Rev. H; 0568-C-0008, Rev 0568-B-0018, Rev. A; 050	. E; 05268-E	COR Inc. 3-0010,

Page 2 - Certificate No. 6568 - Revision No. 8 - Docket No. 71-6568

- (b) Contents
 - (1) Type and form of material

Process solids, either dewatered, solid, or solidified waste, meeting the requirements for low specific activity material in sealed containers.

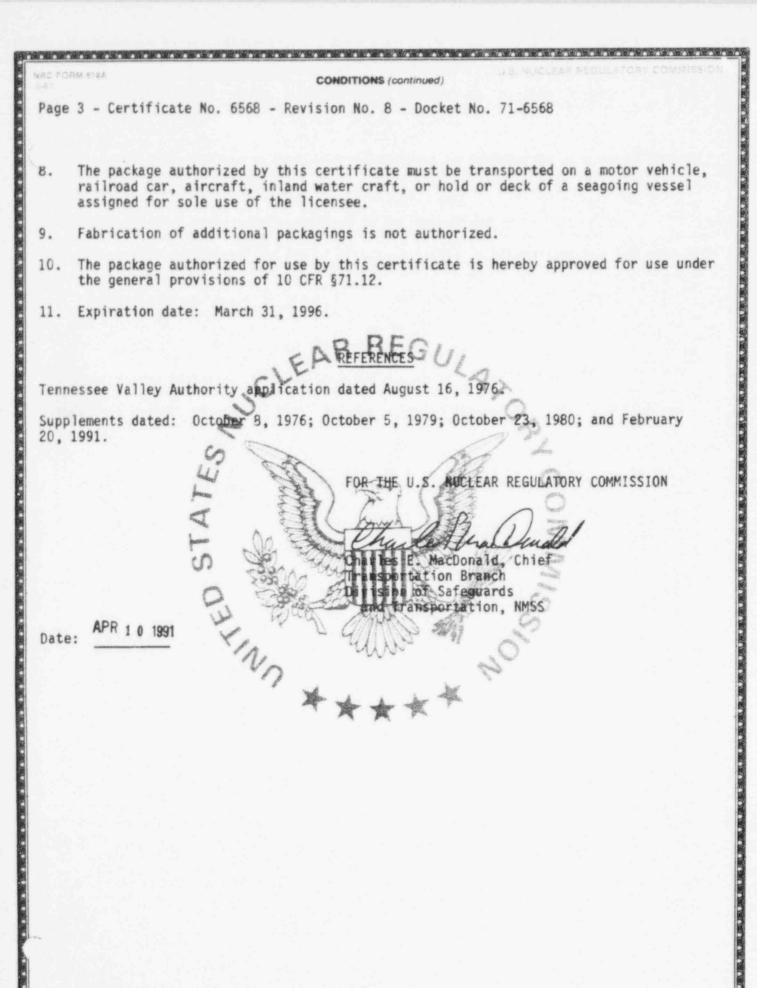
(2) Maximum quantity of material per package

Greater than Type A quantity of radioactive material with the weight of the package contents and secondary containers not exceeding 12,500 pounds.

- 6. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more trace 5% by volume (or equivalent finits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles ft at 14.7 psea and 70°F); or
 - (ii) The secondary container and cash cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have a my oregen concentration greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for this ment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

- (b) For any package shipped within 10 days of preparation, or within 10 days after venting of droms or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
- 7. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (i) Each package must be maintained in accordance with Reactor Cleanup Cask Maintenance Program in the supplement dated February 20, 1991.
 - (ii) The package must be prepared for shipment and operated in accordance with the Reactor Cleanup Cask Operating Procedure in the supplement dated February 20, 1991.



and the second se	atomic and an other		-	A REAL PROPERTY AND INCOME.	C. PACKAGE IDENTI	ICATION N	UMBER	C. PAGE NUMBER	. TOTAL NUMBER P
& CERTIFICATE N 6574	UMBER		b. REVISION NU 22	MBER	USA/65)	1	3
of Federal F	legulatio	ued to certify that the pans, Part 71 "Packaging not relieve the consign y agencies, including th	and Transport	ation of Radioa	requirement of the re	gulations	of the U.S. D	epartment of Trans	
Scienti 1560 Be	fic E ar Cr	cology Group	1.1	Sci	ientific Eco plication da plemented.	ology ated D	Group,	Inc.	as
CONDITIONS This certificate	is condi	tional upon fulfilling th	e requirements	of 10 CFR Par	1 71, as applicable, i	and the co	orditions spe	cified below.	
		100					0		
(a)	Pack	aging 🔗	ar			B	2		
	(1) (2)	Model No.: Description	3-82B) 5	A (4		. 0		
		The packagin the form of containers. the other, the cask wall co shielding, o two shells. insulating t	a right The shi s 66.25 onsists cone-inch The cas	circular elded ca inches i f a 3/8- outer st k outer	cylinder a sk, closed n diameter inch inner wel shell, shell is su	nd th at on by 74 steel and a rroun	ree dif e end a .5 inch shell, steel ded by	ferent type nd a lid cl es in heigh 3-3/4 inch flange conr	es of inner losure at it. The les of lead necting the
		The lid, sea A cylindrica is sealed by attached to of shock abs	a silic the cask	plug is one flat body.	located in gasket. L Impact skir	the iftin ts, c	center g and t onsisti	of the cash ie-down dev ng of remov	lid and vices are vable rings
	(3)	Drawing							
		The package Ecology Grou Revision 7.							

Page 2 - Certificate No. 6574 - Revision No. 22 - Docket No. 71-6574

(b) Contents

NRC TORM STRA

6.

(1) Type and form of material

Byproduct material consisting of dewatered, solid radioactive waste, including spent ion exchange resins, filter sludges, solidified evaporator concentrates, spent filter cartridges, and contaminated or irradiated solid materials.

LIG NUCLEAR RECULATORY COMMISSION

(2) Maximum quantity of material per package

Greater than Type A quantity of byproduct material, which may contain not more than a Type A quentity of fissile material, provided the fissile material does not exceed the limits specified in 10 CFR §71.53. The cask contents must be contained within one of the following inner containers and limited as follows:

- (a) Single disposable cylindrical containers constructed of metal or high integrity plastic with tightly fitted covers. A maximum decay Heat load of 205 Btu/hr.
- (b) Two pallets with four, 30-gallon from size containers per pallet. Drums to be constructed of metal or high integrity plastic with a tightly fitted caver. A maximum decay heat load of 84 Btu/hr.
- (c) One patter with three, 55-gallon drum size containers. Drums to be constructed of metal or high integrity plastic with tightly fitted covers. A maximum decay meat load of 116 Btu/hr.
- (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft' at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have a hydrogen concentration greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

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- (b) For any package containing materials with radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
 The total weight of the package must not exceed 50,000 pounds and the weight of
- the contents (including dunnage, etc.) must not exceed 8,195 pounds.
- 8. In addition to the requirements of Subpart 6 of 10 CFR Part 71:
 - (a) The package shall be prepared for shipment and operated in accordance with the operating procedures in the supplement dated March 13, 1991.
 - (b) The package shall be maintained in accordance with the maintenance program in the supplement sated March 13, 1991.
- Except for close fitting contents, sufficient dunnage, shoring, and/or bracing must be utilized to minimize secondary impact of the contents within the cavity under accident conditions of transport.
- 10. Prior to each shipment, the seal on the main cover and the seal on the shield plug cover, if opened, or if the security seal is broken, must be inspected. The seals must be replaced if the inspection shows any visible defects or every 12 months, whichever occurs first.
- 1. The packaging must be leak tested in accordance with Section 8.2.2 of the application.
- Model No. 3-82B shipping containers constructed in accordance with Scientific Ecology Group, Inc. Drawing No. STD-02-075 Sheets 1 through 3 Rev. 6 are not authorized after May 31, 1991.
- The package authorized by this certificate is hereby approved for use under the general provisions of 10 CFR §71.12.
- 14. Expiration date: April 30, 1996. 🗮 🛒

REFERENCES

Scientific Ecology Group Incorporated application dated December 27, 1990.

Supplement dated: March 13, 1991.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date: APR 1 1 1991

7.

RC FOR	8 818		CERTIFIC FOR RADIOAC	ATE OF COMPLIANCE	UCLEAR REGULA	TORY COMMISSIO
. CERTIF	ICATE NU 6581	MBER	6 REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	C. PAGE NUMBER	. TOTAL NUMBER PAGE
PREAMS a. This of F	LE	te is issued to certify that the guiations, Part 71, "Packagin	packaging and contents on and Transportation of	tescribed in Item 5 below, meets the applicable t Radioactive MateriaL"	safety standards set for	th in Title 10, Code
		to does not relieve the consid	nor from compliance wit	th any requirement of the regulations of the U.S country through or into which the package will	 Department of Trans I be transported. 	portation or other
sieme 2101	ens Nu Horn	ts issued on the basis of in and Address Aclear Power Cor Rapids Road WA 99352-0130	b. TIT	Advanced Nuclear Fuels C dated October 15, 1990,	orporation a	pplication ted.
CONDIT This ce	IONS Itificate i	s conditional upon fulfilling	the requirements of 10 C	FR Part 71, as applicable, and the conditions a	specified below.	
5.		leng.		0,		
(a)	Pack	aging	and a second	23) Las	
	(1)	Model No.: 510 Description	132-1	So All	0	
	(2)	A steel shippir fuel bundle cla Minimum 3/8" th between fuel bu	mping assembly nick wall, 6" males. Outer	or fuel bundles, consistin y, shock mounted to a stee x 8" x 8-1/2" long steel s container is approximatel the package, including co	e outer cont eparators ar y 43" diamet	e bolted er by 216"
	(3)	Drawings The packaging	is constructe	d and assembled in accorda	nce with:	
		Jersey Nuclean	Company Draw	ing No.:		
		JN-200002, Rev	1,	M M		
		and Exxon Nuc	lear Company,	Inc., Drawing Nos.:		
		XN-NF-303,359 XN-NF-303,360 XN-NF-303,898 XN-300,607, R XN-300,609, R XN-NF-303,364	, Rev. 1 , Rev. 1 ev. 1 ev. 1			
		and Siemens N Drawing No.:	uclear Power C	orporation/Advanced Nuclea	ar Fuels Corp	oration
		EMF-303,897,	Rev. 2			

Page 2 - Certificate No. 6581 - Revision No. 22 - Docket No. 71-6581

- (b) Contents
 - (1) Type and Form of material

Unirradiated fuel rods consisting of uranium dioxide fuel pellets clad in zircaloy or stainless steel tubes. Uranium is enriched to a maximum of 5.0 w/o in the U-235 isotope. Cladding must have a minimum wall thickness of 0.02 inch and a minimum nominal pellet-clad radial gap of 0.003 inch. The maximum length of the active fuel region is 196 inches. Fuel rods must be in one of the following configurations:

- (i) Fuel assemblies consisting of a maximum of 204 fuel rods in a 15 x 15 square array with a maximum nominal fuel rod pitch of 0.563 inch and a maximum assembly cross section of 8.445 inches square. The fuel rod cladding must have an OD not less than 0.410 inch and not greater than 0.430 inch. The fuel rod arrangement is as shown in Figure 11.1 of the application.
- (ii) Fuel assemblies consisting of a maximum of 264 fuel rods in a 17 x 17 square array with a maximum nominal fuel rod pitch of 0.496 inch and a maximum assembly cross section of 8.432 inches square. The fuel rod cladding must have an OD not less than 0.355 inch and not greater than 0.380 inch. The fuel rod arrangement is as shown in Figure 11.2 of the application.
- (iii) Fuel assemblies consisting of any number of fuel rods in a square array with maximum assembly cross section of 8.25 inches square. The fuel rod cladding must have an OD not less than 0.260 inch and not greater than 0.500 inch.
 - (iv) Any number of fuel rods positioned in a rod container. The rod container consists of a schedule 40 steel pipe with a maximum nominal diameter of 5 inches. The fuel rod cladding must have an OD not less than 0.260 inch and not greater than 0.500 inch.
- (2) Maximum quantity of material per package

Total weight of fuel assemblies, or fuel rods and rod containers, not to exceed 3400 pounds, and

(i) For the contents described in 5(b)(1)(i), 5(b)(1)(ii), and 5(b)(1)(iii):

Two full length fuel assemblies. Two short fuel assemblies may be substituted for each full length fuel assembly provided the two short assemblies are shipped end-to-end and the total fuel length does not exceed the maximum fuel length for a full length assembly.

1

ii) For the contents described in 5(b)(1)(iv):

Two rod containers.

'c) Fissile Class

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- 6. Each fuel assembly must be unsheathed or must be enclosed in an unsealed polyethylene sheath which will not extend beyond the ends of the fuel assemblies. The ends of the sheaths must not be folded or taped in any manner that would prevent the flow of liquids into or out of the sheathed fuel assemblies.
- 7. Hydrogenous shims are not permitted within the fuel assemblies.
- Separator blocks, shock mounts, and fuel element clamp assemblies must be in accordance with Tables 2.2, 2.3, 2.4, and 2.5 of the application.
- 9. The fuel assembly cross section is defined as the rod pitch times the number of rods on the edge of the assembly.
- 10. Rods containing gadolinia or other neutron poison are authorized but not required.
- 11. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) The package shall be prepared for shipment and operated in accordance with the procedures in Chapter 3.0 of the application.
 - (b) Each packaging shall be maintained in accordance with the procedures in Chapter 3.0 of the application.
 - (c) Each packaging shall meet the acceptance tests in Chapter 4.0 of the application.
- 12. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.

13. Expiration date: May 31, 1999.

REFERENCES

Advanced Nuclear Fuels Corporation application dated October 15, 1990.

Siemens Nuclear Power Corporation supplements dated September 18, 1991, April 22, 1992, and January 25, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cass R. Choppell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport System Branch Division of Industrial and Medical Nuclear Safety, NMSS

MAR 1 5_1994

88C FORM 616 8-85) 0 CFR 71			TE OF COMPLIANCE	UCLEAR REGULA	
1. & CERTIFICATE NUMBER		D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/6601/A	d PAGE NUMBER	e. TOTAL NUMBER PA
of Federal Regula	tions, Part 71, "Packagin es not relieve the consig	g and Transportation of Ra	cribed in item 5 below, meets the applicable s dioactive Material." Iny requirement of the regulations of the U.S intry through or into which the package will	. Department of Trans	
 A ISSUED TO (Nerror and Chem-Nucle 140 Stoner Columbia, 	ar Systems, I idge Drive	nc.	Chem-Nuclear Systems, dated August 23, 1985, REG 71-6601	Inc. applica	nted.
 CONDITIONS This certificate is cor 	ditional upon fulfilling t	he requirements of 10 CFR	Port 71, as applicable, and the conditions a	pecified below.	
(a) Packa (1) (2)	Model No.: 0 Description The packaging weighs approv- in diameter by diameter by 7 lead is provi- two, 3/4-inch thick plates, bolts and a s cask. A stee Shackles are accomplished package. The	imately 70,000 by 92 inches hig 5 inches long. ded by lead and thick steel pl The cavity is ilicone 0-ring l collar encirc used for liftin through a steel	ased, lead shielded ship pounds when loaded. The h, with an effective can Gamma shielding equival steel. The outer shell ates and the inner shell sclosed and sealed by th within a recessed groove les the outer shell in t ing the packaging and the structure which is not several threaded and seal	<pre>cask is 73. rity 62 inche ent to 4.5 i is fabricat of 1/2-and nirty-two, 1- e on the flar he lid area. lid. Tie-do attached to</pre>	5 inches es in nches of ed of 1/4-inch 3/4-inch nge of the own is the
(3) Draw	ings				
	The package Drawing No. 2 Rev. 2.	s constructed 29008-1, Sheet 1	in accordance with Chem-N Rev. 2, and Drawing No.	luclear Syste 29008-1, St	ems, Inc. neet 2,
			151		

Page 2 - Certificate No. 6601 - Revision No. 24 - Docket No. 71-6601

5. (b) Contents

C POAM RISS

- (1) Type and form of material
 - Process solids, either dewatered, solid, or solidified in a secondary container, meeting the requirements for low specific activity material; or
 - Solid reactor components in secondary containers, as required, that meet the requirements for low specific activity material.
- (2) Maximum quantity of material per package

Greater than Type A quantity of radioactive material, not to exceed 2,000 times a Type A quantity, 40 thermal watts, and 20,000 pounds including weight of the contents, secondary container(s) and shoring. The contents may include fissile materials provided the mass limits of 10 CFR §71.53 are not exceeded.

- 6. Except for close fitting contents, wood shoring must be placed between the secondary container(s) (or activated components) and the cask cavity to prevent movement during normal conditions of transport.
- Prior to each shipment, the lid gasket must be inspected. The gasket must be replaced if inspection shows any defect or every 12 months which ever occurs first.
- Prior to each shipment, a determination must be made that closure seal replacement is current with the seal replacement schedule in Section 8.2.2 of the application.
- The packaging must be leak tested once every 12 months in accordance with Section 8.1.3 of the application.
- The drain line and access plugs must be appropriately plugged and sealed prior to transport.
- 11. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

Page 3 - Certificate No. 6601 - Revision No. 24 - Docket No. 71-6601

11. (continued)

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

- (b) For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
- 12. The package authorized by this certificate must be transported on a motor vehicle, railroad car, aircraft, inland water craft, or hold or deck of a seagoing vessel assigned for sole use of the licensee.

13. In addition to the requirements of Subpart G of 10 CFR Part 71:

- (i) Each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application; and
- (ii) The package must be operated and prepared for shipment in accordance with the Operating Procedures of Chapter 7 of the application.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 15. Expiration date: February 28, 1996.

REFERENCES

Chem-Nuclear Systems, Inc.) application dated August 23, 1985.

Supplements dated: December 30, 1985, January 16, 1991, October 29, 1991 and January 7, 1992.

Northeast Nuclear Energy Company supplement dated: February 9, 1984.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date: FEB 2 7 1992

RC FORM 018 -060 - 05R 71	CERTIFICATI	E OF COMPLIANCE E MATERIALS PACKAGES	ICLEAR REGULA	
A CERTIFICATE NUMBER 6613	6 REVISION NUMBER	USA/6613/B(U)	d PAGE NUMBER	e. TOTAL NUMBER PA
PREAMBLE a. This certificate is issued to certify that the of Federal Regulations, Part 71, "Packag b. This certificate does not relieve the cons applicable regulatory agencies, includin	ing and Transportation of Radi	pactive Material	Department of Trans	
THIS CERTIFICATE IS ISSUED ON THE BASIS O a. ISSUED TO (Nonne and Address) mersham Corporation O North Avenue Jurlington, MA 01803	Ame Nov	ersham Corporation appli vember 27, 1991, as supp	cation dated lemented.	1
This certificate is conditional upon fulfilling	the requirements of 10 CFR P	art 71, as applicable, and the conditions sp	ecified below.	
stainless steel a central cavit, Closure is acco stainless steel closure is equi is mounted on a and a tie-down which connect a to the skid. A and perforated surrounds the c	weldment contain which is 2.26 i nplished by a neo stepped plug con pped with an eye 19" x 21" rectan system consisting clamp ring at th protective cage 18 gauge steel sh ask and is bolted	ns are 19" x 21" x 20". ing depleted uranium shi aches in diameter by 3.2 prene gasket, six, 3/8-1 taining depleted uranium bolt and two drain and w gular steel skid with for of four, 1/2-inch diame e top of the cask to cha constructed of 1-1/4-inc eets tack welded to the to the skid by four, 1/ aging is 410 pounds.	5 inches lo 5 inches lo ach bolts a shielding. ent plugs. our, 1/2-inc ter threade nnel bracke th square st tubular fra	e cask has ng. The The cask h bolts d rods ts welded eel tubing me
		154		

1			
NR:	e foike sta c	6	CONDITIONS (continued)
Pa	ige 2 -	Certi	ificate No. 6613 - Revision No. 6 - Docket No. 71-6613
A)	(a)	Pack	(Continued)
		(3)	Drawing
			The cask and other system components are constructed in accordance with Technical Operations, Inc. Drawing Nos.: 70290, Sheet 1 to 4, Rev. D.
	(b)	Cont	tents
		(1)	Type and form of material
			Metailic iridium 192 sources which meet the requirements of special form radioactive material.
		(2)	Maximum quantity of material per package
			10,000 curies.
		(3)	Maximum decay heat per package
			100 wates
6.			plate must be fabricated of materials capable of resisting the fire test Part 71 and maintaining their legibility.
1	In a	dditi	on to the requirements of Subpart G of 10 CFR Part 71-
	(a)		package shall be operated and prepared for shipment in accordance with ion 7.0 of the application, as supplemented.
	(b)	The 8.0	package must meet the Acceptance Tests and Maintenance Program, Section of the application, as supplemented.
8. 9.	The gene	packa ral l	ge authorized by this certificate is hereby approved for use under the icense provisions of 10 CFR §71.12.
9.	Expi	ratio	on date: March 31, 1998. 🖈 🛧 🗡
			REFERENCES
Am	ersham	Corpo	ration application dated November 27, 1991.
Su	pplemen	ts da	ted: April 20, December 1, 1992; and March 19 and 26, 1993.
			FOR THE U.S. NUCLEAR REGULATORY COMMISSION
			01. 1. The den all
			Charles E. MacDonald, Chief Transportation Branch Division of Industrial and
	۵	PR 1	Medical Nuclear Safety, NMSS 1993
Da	te:		
			155

9-86) D CIFR 71	FOR RADIOACTI	TE OF COMPLIAN	AGES	L augusta la super l	e. TOTAL NUMBER PAGES
A CERTIFICATE NUMBER	1. REVISION NUMBER	C. PACKAGE IDENTIFICAT USA/6642/B()	d. PAGE NUMBER	2
A CONDITIONS This certificate is conditional upon fulfilling A CONDITIONS (1) Model No.: 4.5-T	and transportation of the gnor from compliance with a ine yovernment of any cou A SAFETY ANALYSIS REPORT b. TITLE Sat Tor Dec 25 c. DOCKI the requirements of 10 CFF	cribed in Item 5 below, meets dioactive Material." any requirement of the regula intry through or into which the of THE PACKAGE DESIGN OF AND IDENTIFICATION OF REPO fety Analysis Rep h Californium Sh cember 1974, Rev supplemented. ET NUMBER 71-1	APPLICATION APPLICATION DAT OR APPLICATION DOT - Pac ipping Cas . 1, March 6642	Department of Trans te transported. ON Ckages SRL 4 Sk, DPSPU 74 1976,	h in Title 10, Code portation or other
(2) Description A shielded packag 3/4-inch thick, 6 water extended po (9) fusible plugs material. The cy by 6-3/8 inches h lead of 2 inches, and top, respecti outer container, to a 3/4-inch thi container closure accomplished by a 27-inch long, 4-i and is gasketed a 22-1/2-inch diame A hexagonal shape the spherical she around the upper pounds.	1-1/2-inch OD si Tyester (WEP) si and i yent val lindrical conta igh is central 1.9 inches and vely. The conta and is held by ck 22-1/2-inch assembly. Clo flange plate a nch OD tube fil nd bolted to th ter protective d assembly, app 11 as a base.	pherical steel s nielding. Outer we for relief of imment cavity ap y located in the 1.75 inches thi ainment vessel i a 31-1/2-inch lo diameter top pla sure of the cont rd sleeve insert led with lead an e top closure as cover bolts to t roximately 5 fee Four equally spa	hell fille shell is gases ger proximate sphere ar ckness on s an integ ng 4-1/2- te mounted ainment ve assembly d water ep sembly of he closure t across ced liftin	ed with bora fitted with merated in t ly 4-inch di nd surrounde the bottom, gral part of inch OD tube d to the out essel is . The sleev xtended poly the contain e assembly s the flats mo ng lugs are	ted nine he WEP ameter ed by sides the welded er vester her. A leeve. bunts, to provided

Page 2 - Certificate No. 6642 - Revision No. 5 - Docket No. 71-6642

(3) Drawings

The SRL 4.5-Ton Californium shipping cask is as described, and is constructed in accordance with E.I. duPont de Nemours Company Drawing Nos.: ST5-15813, Rev. 33; ST5-15814, Rev. 29; ST5-15815, Rev. 0; ST5-15816, Rev. 0; ST5-15817, Rev. 0: and ST5-15818, Rev. 5.

(b) Contents

(1) Type and form

Californium 252, as sealed source which meets the requirements of special form radioactive material. 4

(2) Maximum quantity of marterial per package.

- 46 curies (85 mg
- Prior to each shipment, the WEP shielding space shall be vented, using the 6. 1/4-inch angle varve which is then closed.
- In addition to the requirements of Subpart 6 of 10 CFR Part 71: 7.
 - (a) The package must be prepared for shipment and operated in accordance with the Operating Procedure described in the application, as supplemented dated September 18, 1991
 - (b) The package must be maintained in accordance with the Maintenance Program described in the application, as supplemented dated September 18, 1991.
- Use of packaging fabricated after August 31, 1986, is not authorized. 8.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12. 9.
- 10. Expiration date: October 31, 1996.

REFERENCES

Safety Analysis Report - Packages SRL 4.5-Ton Californium Shipping Cask, DPSPU 71-124-6. December 1974. Revision 1. March 1976.

Supplements dated: September 18, 1991.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

OCT 0 9 1991

Date:

659 OFR 71		and the second se	MATERIALS PACKAG		d PAGE NUMBER	. TOTAL NUMBER PAGES
E CERTIFICATE NUMBER 6697		5. REVISION NUMBER	USA/6697/B()	1	3
of Federal Regulations,	Part 71, "Packaging	and transportation of Macioa	ed in Item 5 below, meets the a active Material." requirement of the regulations y through or into which the pa	of the U.S. D	epartment of Trans	
THIS CERTIFICATE IS ISSUED n. ISSUED TO (Name and Adda U.S. Departme EH-33 Washington, D	nt of Energ		General Electric dated November 2 71-669	Compan 9, 1979	y Applicati	
. CONDITIONS This certificate is conditio	al upon tutilling d	e requirements of 10 CFR Pa	rt 71, as applicable, and the co	oditions spe	cified below.	
The shi sti and sti Cl Ne po wh ja le	lel No.: Gi cription packaging aminated p shielded all, 2-7/8 inless ste denclosed eel outer s osure is by oprene rubb sitioned in ich is bolt cket is 15- llet, weigh ak tight, s	twood protective case is an uprig inches ID * 6-1/4 el which is surra- in a 7-inch OD x hell. means of six, 3, er gasket between a two-piece pro- ed to a rectangu 1/4 inches OD x 1 s 80 pounds. The	nium strielded shi e jacket. ht circular cylin B-inches high, ma bunded by 1-13/16 10-1/2=inch high /8-inch diameter n body and lid. tective jacket of lar pallet made o 20-1/2 inches hig e cavity of the s iner. The gross	der, co de of 1 inches x 1/8- bolts a The shi solid f alumi h and t hielded	nsisting of /8-inch th of deplete inch thick nd a 1/8-in elded cask plywood lar num. The ogether with cask cont	f an inner ick ed uranium stainless nch thick is minations protective th the ains a
(3) Drawing	S					
E1 17 16	ectric Comp 4F482. Rev.	any Drawing Nos. 5: 289E795. Rev	accordance with : 277E696, Rev. . 3; 195F169, Rev Rev. 4; or 106D3	6; 277E . 2; 28	712, Rev. 9E796, Rev	6; . 5;

Page 2 - Certificate No. 6697 - Revision No. 9 - Docket No. 71-6697

- 5. (b) Contents
 - (1) Type and form of material

Byproduct material as a liquid or solid within an inner container shown in General Electric Drawing Nos. 161F443, Rev. 5; or 135C5982, Rev. 4; or 106D3830, Rev. 8, used with the liner shown in 153C4613, Rev. 1.

(2) Maximum quantity of material per package

Greater than a Type A quantity of byproduct material as a solid with the decay heat load not exceeding 50 watts.

Byproduct material as a liquid is finited to 100 ci of Mo-Tc.

- 6. Liquids must be Further packaged in a leak tight polyethylene bottle within the inner container. Each polyethylene bottle must be sealed and tested in accordance with Attachment D of General Electric's letter dated November 29, 1979, or Appendix A in the September 3, 1991, supplement.
- 7. Prior to each shipment, the package lid Neoprene gasket must be inspected. The gasket must be replaced with a new Neoprene gasket if inspection shows any defect or every twelve (12) months, whichever occurs first. In each shipment, a new Viton O-ring must be used to seal the inner container.
- The inner container must be pretested to ensure leak tightness prior to each use in accordance with Attachment D of General Electric's letter dated November 29, 1979, or Appendix B in the September 3, 1991, supplement.
- 9. The radiation dose rate must not exceed 1,000 millirem per hour, at a distance of 3 feet from the surface of the depleted uranium cask, when the wooden protective jacket is not in place.
- 10. In addition to the requirements of Subpart 6 of 10 CFR Part 71:
 - (a) Each package must be maintained in accordance with the Maintenance Program in the October 4, 1990, and September 3, 1991, supplements; and
 - (b) Each package shall be prepared for shipment and operated in accordance with the Operating Procedures in the October 4, 1990, and September 3, 1991, supplements.
- 11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 12. Expiration date: September 30, 1996.

Page 3 - Certificate No. 6697 - Revision No. 9 - Docket No. 71-6697

REFERENCES

General Electric Company application dated November 29, 1979.

General Electric letter dated February 21, 1985.

DOE supplements dated: February 27, 1985; January 31 and October 4, 1990; and September 3, 1991.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

CLEAR

E. MacDonald, Chief Charles Transportation Branch Division of Safeguards and Transportation, NMSS

Date:

SEP 1 9 1991

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9466) 9 CPR 71		TE OF COMPLIANCE		
& CERTIFICATE NUMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBE	A DAGE NUMBER	e. TOTAL NUMBER PAG
6717 PREAMBLE	9	USA\6717\B(U)		4
 a. This certificate is issued to certify that of Federal Regulations, Part 71, "Pac b. This certificate does not relieve the c 	kaging and Transportation of Ra onsignor from compliance with a	cribed in Item 5 below, meets the applicat idioactive Material." any requirement of the regulations of the untry through or into which the package	U.S. Department of Trans	
Amersham Corporatio 40 North Avenue Burlington, MA 018		mersham Corporation application ctober 10, 1990, as sup	olication date	d
CONDITIONS This certificate is conditional upon fulfil	ling the requirements of 10 CFR	Part 71, as applicable, and the condition	ns specified below.	
5.	Cardo	0		
of an outer co (approximatel) minimum 20-gau closure. The with 1-1/2" th top and bottom the radiograph package not to The maximum gr polyurethane f	device within a proportion of the property of	secondary packaging (d	steel drum height) havin amp-ring type ontainer is f and 1 inch of sition and sec s weight of t device and mole	g a head illed n the ure he
Century S	S Universal, Centu	ry SA Universal, C-10,	35, 35S and 3	5SA;
ii) 60 pounds	s for the Model No	s.: 20V, 40V, 20VS, 40	DVS and U-110;	
iii) 45 pounds and Marin		s. Pipeliner Model 1, H	Pipeliner Mode	1 201
iv) 54.5 pour	nds for the Model	No. MX-IC-100.		
(3) Drawings				
The overpack m Drawing Nos. 9 and 93990, Rev	93590, Rev. C; 936	d in accordance with An 90, Rev. C; 93790, Rev	nersham Corp. . D; 93890, Re	v.B;

Page 2 - Certificate Nc. 6717 - Revision No. 9 - Docket No. 71-6717

- a) Packaging (continued)
 - (3) Drawings (continued)

The radiographic devices, as secondary packaging, authorized for use in the overpack are constructed in accordance with the following Drawing Nos.:

For the Model No. Century: Gamma Industries Drawing Nos. 821-1001-101, Rev.- dated 7/2/76; and 821-1001-005, Rev. 4;

For the Model Nos. Century S and Century SA: Gamma Industries Drawing Nos. 821-1001-439A, Rev. A; 821-1001-101, Rev. - dated 7/2/76; and 821-1001-005, Rev. 4;

For the Model Nos. Century S Universal and Century SA Universal: Gamma Industries Drawing No. 821-1001-441A, Rev. - dated 2/15/82; and 821-1001-101 Rev. - dated 7/2/76;

For the Model No. C-10: Gamma Industries Drawing Nos. 821-1005-018 Rev.dated 9/27/93; and 821-1001-101, Rev. - dated 7/2/76;

For the Model Nos. 35 and 35S: Gamma Industries Drawing Nos. 821-1001-105, Rev.- dated 9/15/70; and 821-1001-002, Rev. 2C;

For the Model No. 35SA: Gamma Industries Drawing Nos. 821-1001-105, Rev. - dated 9/15/70; and 821-1001-003, Rev. 2C;

For the Model Nos. 20V and 40V: Gulf Nuclear, Inc., Drawing Nos. 1000-51-03, Rev. - dated 12/14/83; A-31, Sneets 3 & 4, Rev. 1; A-31-21 Sheets 1, 2 and 3, Rev. 1; and A-31-34 Sheet 1 and 2 of 4, Rev. 1.

For the Model Nos. 20VS and 40VS: Gulf Nuclear, Inc. Drawing Nos. A-31 Sheets 3 and 4, Rev. 1; A-31-1 Sheet 1, Rev. 1 and Sheet 2, Rev. - dated 1/15/83; A-31-12, Rev. - dated 1/4/84; A-31-16, Rev. 2; A-31-18, Rev. 1; A-31-20, Rev. 1; A-31-21 Sheets 1, 2, and 3, Rev. 1; A-31-31 Sheets 1,2 and 3, Rev 2; A-31-32, Rev.2; A-31-34 Sheet 1, Rev. 1 and Sheet 2, Rev. - dated 1/11/84; 1000-50-14, Rev. -; and 1000-50-13, Rev. 2;

For the Model No. U-110: Amersham Corp. Drawing No. 93691, Rev. - dated 10/9/90; 93692, Rev. A; and Gulf Nuclear, Inc., Drawing No. A-31-21 Sheets 1, 2 and 3, Rev. 1,

For the Model No. Pipeliner Model 1: Amersham Corp. Drawing No. 93591, Rev. A; SK 2473, Rev. - dated 4/1/88; and SK 2473-1, Rev. - dated 1/21/88; and Gamma Industries Drawing No. 811-1001-287, Rev. 1;

For the Model No. Pipeliner Model 201: Gamma Industries Drawing Nos. 821-1001-019B, Rev. 5; and Drawing No. 821-1001-235, Rev. 5;

For the Model No. Mariner: Gamma Industries Drawing Nos. 821-1001-024, Rev. 1; and 821-1001-351, Rev. 1; and

For the Model No. Magnaflux Model MX-IC-100: Magnaflux Corp. Drawing No. C-211626, Rev. - dated 2/9/78.

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Contents

6.

(1) Type and form of material

Iridium-192 as sealed sources which meet the requirements of special form radioactive material.

- (2) Maximum quantity of material per package.
 - (i) 35 Curies contained in the Model Nos. 35, 355 or 35SA.
 - (ii) 100 Curies contained in the Model No. MX-IC-100.
 - (iii) 120 Curies contained in the Model Nos. Century, Century S, Century SA, Century S Universal, Century SA Universal, Pipeliner Model 1, 20V, 20VS or U-110.
 - (iv) 220 Curies contained in the Model Nos. 40V or 40VS.
 - (v) 240 Curies contained in the Model Nos. C-10, Pipeliner Model 201 or Mariner.

The source shall be secured in the shielded position of the radiographic device by the shipping plug, source assembly, and locking device. The shipping plug and source assembly used must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintaining their positioning function. The ball stop of the source assembly must engage the locking device. The flexible cable of the source assembly and shipping plug must be of sufficient length and diameter to provide positive positioning of the source in the shielded position.

In addition to the requirements of Subpart G of 10 CFR Part 71:

- (a) The package must be prepared for shipment and operated in accordance with the operating procedures in Chapter 7 of the application, as supplemented.
- (b) The drum should be assembled without a gasket and with the clamping ring tightened until the maximum gap between the lug nuts is 3/16-inch.
- (c) The package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application.

The packaging authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.

Expiration date: September 30, 1998.

Page 4 - Certificate No. 6717 - Revision No. 9 - Docket No. 71-6717

REFERENCES

Amersham Corporation application dated October 10, 1990.

Supplements dated: December 3, 1990; March 12, April 1, July 18, October 25, and December 20, 1991; May 14, July 2, September 21 and 27, 1993; May 20, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cars R. Choppell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

JUN 0 8 1994 J

Date:

IRC FORM 61 8-65) 0 CFR 71			E OF COMPLIANCE	UCLEAR REGULA	TORY COMMISS
1. & CERTIFICATE NUMBER		6 REVISION NUMBER	USA/6722/A	d PAGE NUMBER	. TOTAL NUMBER PA
of Feder b. This cer	al Regulations, Part 71, "Packi tificate does not relieve the co	aging and Transportation of Rad nsignor from compliance with ar	ribed in Item 5 below, meets the applicable si loactive Material." In requirement of the regulations of the U.S. Itry through or into which the package will	Department of Trans	
Tenness 1101 Ma	CATE IS ISSUED ON THE BASIS) (Numme and Address) See Valley Author arket Street 100ga, TN 37402	ity Te	ND IDENTIFICATION OF REPORT OF APPLICATION ND IDENTIFICATION OF REPORT OF APPLICAT INDESSEE Valley Authority ted July 9, 1975, as sup NUMBER 71-6722		1
This certific	ate is conditional upon fulfillin	ng the requirements of 10 CFR F	art 71, as applicable, and the conditions sp	ecified below.	
a) Deci	anina S		0		
	kaging 6	22 100	the h		
(1)	Model No.: BS- Description	33-180	D (L C	5	
	84 inches in di 76-1/2 inches i fabricated of c inch thick carb from the one-in is three inches silicone O-ring 320, Grade L7 I mounted to the tie-down frame features includ reinforcing ste installed on th	ameter and 97-1/4 n diameter by 79- oncentric layers on steel plates. ch thick shells b thick, with 36 t . The top cover -1/2-inch bolts. top cover to act by sixteen, 1-1/4 e a drain line, ac el shell to protecte e top of the line	al steel weldment with o inches in length. The 1/4 inches long. The ou consisting of three, one The inner half-inch thi y a 1/4-inch thick asbes apped holes and a groove is secured to the flange A 10-inch deep steel im as a shock absorber. Th inch high strength stee cess port to the inner ct the cask seal. Threa r. A bottom side drain ately 51,100 pounds.	effective ca ter shell is inch thick ck shell is tos sheet. to accommod ring by 36, pact limiter e cask is mo l bolts. Ot container(s) ded access p	and 1/2- separated The flange late a ASTM-A- is ounted to a her cask and a lugs are
(3)	Drawing				
	The packaging i Drawing Nos.: 0568-C-0026, Re	0568-C-0024, Rev.	accordance with the foll F; 0568-D-0022, Rev. F;	owing ATCOR 0568-D-0023	Inc. , Rev. D;

Page 2 - Certificate No. 6722 - Revision No. 11 - Docket No. 71-6722

- (b) Contents
 - (1) Type and form of material

Solids or solidified waste, meeting the requirements for low specific activity material.

(2) Maximum quantity of material per package

Greater than Type A quantity of radioactive material with the weight of the contents (including containers and shoring) limited to 18,000 pounds and 20 thermal watts.

- 6. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft² at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have a hydrogen concentration greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

- (b) For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
- 7. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) The package shall be prepared for shipment and operated in accordance with the operating procedures in the supplement dated March 21, 1991.
 - (b) The package shall be maintained in accordance with the maintenance program in the supplement dated January 17, 1991.

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 Dunnage must be provided in the shipping cask cavity sufficient to prevent significant movement of the inner container(s) relative to the outer packaging under normal conditions of transport.

CONDITIONS (continued)

- Prior to each shipment all threaded pipe plugs in the cask are sealed using an appropriate sealant.
- 10. The space between the inner container(s) and cask cavity must be dry prior to delivery to a carrier for transport.
- 11. Prior to each shipment, the package lid seal must be inspected. The seal must be replaced with a new silicone O-ring if inspection shows any defects or every twelve (12) months, whichever occurs first. After seal replacement the package must be leak tested to 1 ×10⁻³ std cm³/sec.
- 12. All eight (8) lifting shackles must be shrouded by the appropriate covers prior to transport to prevent its use as tie-down devices.
- 13. Fabrication of addicional packagings is not authonized.
- 14. The package authorized by this certificate must be transported on a motor vehicle, railroad car, aircraft, inland water craft, or hold or deck of a seagoing vessel assigned for the sole use of the licensee.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.

16. Expiration date: April 30, 1996.

REFERENCES

Tennessee Valley Authority apprication dated July 9, 1975.

Supplements dated: February 10, 1977, September 17, 1990; January 17 and March 21, 1991, and September 4, 1992.

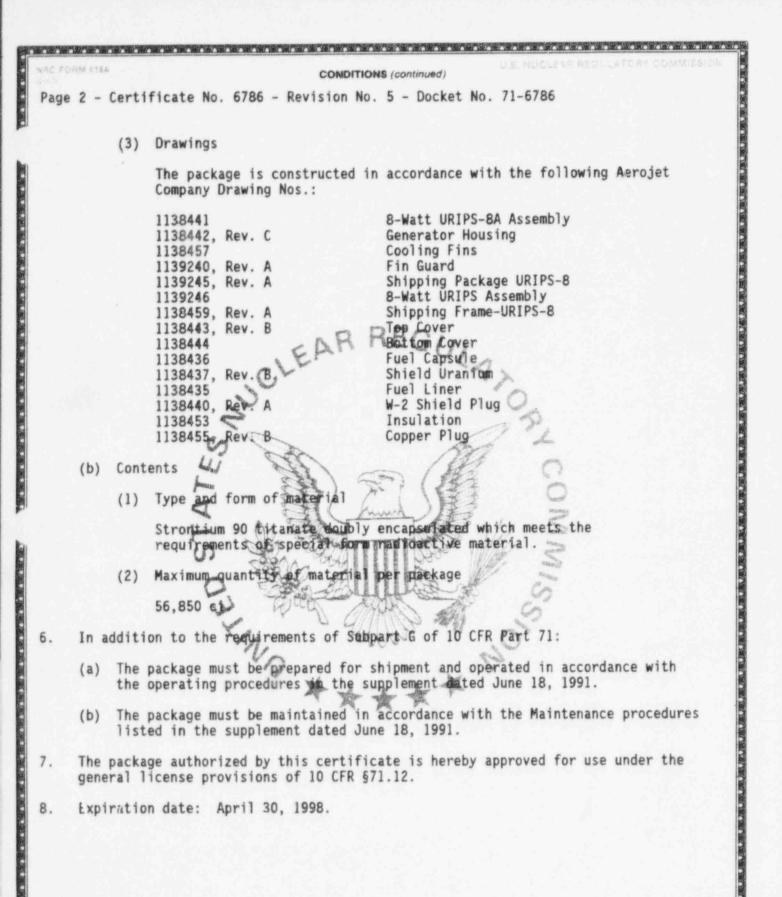
FOR THE U.S. NUCLEAR REGULATORY COMMISSION

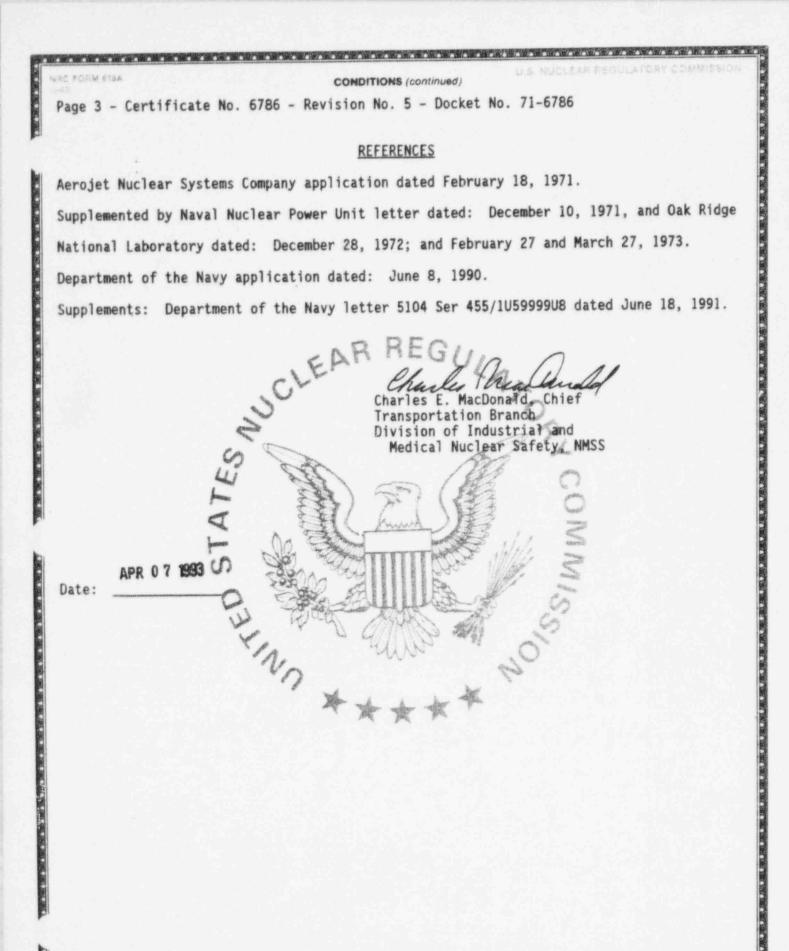
Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

NOV 1 0 1992. Date:

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NRC FORM 618 (8-65) 10 CFR 71		CERTIFICA	TE OF COMPLIANC	E U.S. NL		TORY COMMISSION
1.6 CERTIFICATE NUMBE	8	5	USA/6786/B		d PAGE NUMBER	. TOTAL NUMBER PAGE
6786 PREAMBLE a. This certificate is i of Federal Regula b. This certificate do applicable regula a. THIS CERTIFICATE IS II a. ISSUED TO (Name an Department of Naval Support FPO San Franc 4. CONDITIONS This certificate is con 5.	asued to certify that the p dons. Part 71. "Packagin es not relieve the consig tory agencies, including to sued on THE BASIS OF A Navy Force Antarct isco, CA 96601 additional upon fulfilling to kaging Model Nos.: Description The packages height, with approx. 1,60 (470 Pbs.), electrical a stiffewed by with lifting Model No. U	5 ackaging and contents de g and Transportation of Ri nor from compliance with the government of any co SAFETY ANALYSIS REPOR b. TITLE A ia c. DOCK WRIOS-8A and c. DOCK WRIOS-8A and c. DOCK WRIOS-8A and c. DOCK No requirements of 10 CFF an outer diam 10 pounds. The a steel housin daptor, coolin y eight ribs or and tie down RIPS-8A in the ay be secured in	USA/6786/B(scribed in Item 5 below, meets the adioactive Material." any requirement of the regulation untry through or into which the ror THE PACKAGE DESIGN OR AF AND IDENTIFICATION OF REPORT terojet Application is supplemented. TI-6786 A Part 71, as applicable, and the URIPS-88 Tic generators, arc eter of 19.14 inclu- s components inclu- ing fin system, and the inside surfa- devices. The Mode electric converted in a shipping fram) F applicable sense of the U.S. package will perform on application of application of application of applications spectrum conditions spectrum te a dep accessed cylindx ce. The el No. Un system	1 Department of Trans be transported.	ath in Title 10, Code aportation or other , 1971, erall ht of um shield over), an ard, re equipped fers from moelectric
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BC PORBI®18 1861 10FR 71	CERTIFICA FOR RADIOACT	TE OF COMPLIANC	E		ORY COMMISS
. CERTIFICATE NUMBER 9001	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION		d PAGE NUMBER	6. TOTAL NUMBER PA
PREAMBLE a. This certificate is issued to certify that the pair of Federal Regulations, Part 71, "Packaging b. This certificate does not relieve the consigned applicable regulatory agencies, including the	and transportation of H or from compliance with a government of any co	any requirement of the regulation untry through or into which the	ns of the U.S. package will t	Department of Trans	
THES CERTIFICATE IS ISSUED ON THE BASIS OF A S a ISSUED TO (Name and Address) VECTRA Technologies, Inc. 6203 San Ignacio Ave. Suite San Jose, CA 95119		VECTRA Technologie dated March 30, 19 RE 7149001	s, Inc.	, applicati	
CONDITIONS This cettificate is conditional upon fulfilling the	requirements of 10 CF	R Part 71, as applicable, and the	conditions sp	ecified below.	
cylindrical in st with maximum cava long. Shielding stainless steel a ethylene grycol m Two closure heads assemblies. The encase the 3-inch be used for packa The closure heads studs and nuts. The cavity is per bottom. These li valved quick-disc lieu of the quick	encased, dep ape, 64 incha is provided i is provided i ind a minimum nixture. are provided heads are 304 thick deplet aging solid in are secured The cask is s netrated by a nes are seale connect coupli c-disconnect o	pleted upanium shield of 37-1/2 inches by 4 inches of depl of 4-1/2 inches (S for the shipment stainless steel f ed uranium shield radiated hardware. to the cask body t ealed with a metal vent line at the t ed by bellows stain ngs. Stainless st couplings. The ver lisk. All valves a	a maxim in diam eted ur 50 gall of BWR orgings ng. Ei y means lic rin op and less st eel pip t line	um of 210 in eter by 180- anium, 2-1/8 ons) of a war and PWR fue and end pla ther closure of 32, 1-3, g gasket. a drain line eel globe va e caps may l is also equ	nches long -1/4 inches B inches of ater ates which e head may /4 inch e at the alves and be used in ipped with

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NRC FORM #18A

CONDITIONS (continued)

Page 2 - Certificate No. 9001 - Revision No. 30 - Docket No. 71-9001

5.(a) Packaging (continued)

(2) Description (continued)

Neutron shielding is provided by a liquid-filled, thin-walled, corrugated containment on the cask exterior. This cylindrical structure is separated into two longitudinal compartments, each equipped with two expansion tanks, fill and relief valves. The fill line from each compartment is terminated by a stain-less steel globe valve in a protected box (separate from cavity boxes) on the cask exterior. The stainless steel globe valves may be replaced by stainless steel blind flanges. The vent line from each compartment goes to an expansion take which is provided with a pressure relief valve set at 200 kmg.

The cask has three types of fuel baskets which can be interchanged to accommodate various fuels. The PWR basket holds even assemblies, the unchannelled box basket holds eighteen assemblies, and the channelled BWR basket holds seventeen assemblies. The channelled and unchannelled BWR fuel baskets make be provided with supplementary stielding depleted uranium) near the cask closure.

The cask is shipped social ontail with the bottom supported in a tipping cradle between two pedes as and the upper end resting in a semi-circular saddle; the upper end to hand to the state. The cask supports are welded to the framing of a 37-36 most long to soot wide structural steel skid. The skidting also have the state of the support wide structural steel skid. The skidting of two present end as a truth are auxiliary cooling system, consisting of two present end as a truth of two prevers which discharge cooling air to the corrugate support of the state of this auxiliary cooling. Neither installation nor openation of the parkage approval.

The entire case and cooling system is covered by Oretractable aluminum enclosure. Access to the enclosure is via locked panels in the side and a locked door in one end. Although the Model No. IF-300 cask can be transported for short dictances on the highway, its principal mode of transportation is by railroad.

The gross weight of the cask is approximately 140,000 pounds. The skid and other external components weigh approximately 45,000 pounds.

(3) Drawings

The Model No. IF-300 shipping cask is described by the following General Electric Company Drawing Nos.: 159C5238 - Sheet 1, Rev. 9; Sheet 2, Rev. 3; Sheet 3, Rev. 9; Sheet 4, Rev. 8; Sheet 5, Rev. 5; Sheet 6, Rev. 8; Sheet 7, Rev. 4; Sheet 8, Rev. 5; Sheet 9, Rev. 8; Sheet 10, Rev. 5; and Sheet 11, Rev. 2, and Pacific Nuclear Systems, Inc. Drawing Nos.: 420-11-3000, Sheets 1, through 9, Rev. 1; 420-11-3001, Sheet 1, Rev. 1; 420-11-3002, Sheets 1 and 2, Rev. 1; 420-11-3003, Sheets 1 and 2, Rev. 1; 420-11-3004, Sheets 1 and 2, Rev. 1; 420-11-3005, Sheets 1 and 2, Rev. 1; 420-11-3006, Sheet 1, Rev 1.

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CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

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5.(a)(4) Basic Components

The basic components of the Model No. IF-300 shipping cask that are important to nuclear safety are listed in Section IX, Table IX-1.

(b) Contents

- (1) Type and form of material
 - Irradiated PWR and BWR uranium oxide fuel assemblies. PWR assemblies (1) may be shipped with or without control rods. Partial fuel assemblies, that is, assemblies from which further pins are missing, must not be shipped unless dumby fiel pins are used to displace an amount of water equal to that displaced by the original pins. The specific power of each fuel assembly must not exceed 40 kW/kgU and the burnup of each fuel assembly most not exceed 35,000 MWD/MTU. The minimum cooling time of each assembly must be no less than 120 days. Mier to irradiation, the BWR and PMR fuel assemblies must have the following dimensions and specif Gations: Group fuel as BWR UO, pellets Fuellform Cladding mat Zr or SS Maximum Juiti 198 conten assem Maximum in 1 U-235 4.0 enrichment Maximum bundle cross 8 75 5.75 section, in 14x14/15x15 7x7 Fuel pin array 0.380-0.460 0.500-0.600 Fuel diameter, in Fuel pin pitch range, 0.647-0.809 in 0.502-0.582 Maximum active fuel 145 146 length, in

NRC FORM 618A

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CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

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5. (b) Contents (continued)

Group II fuel assemblies

PWR

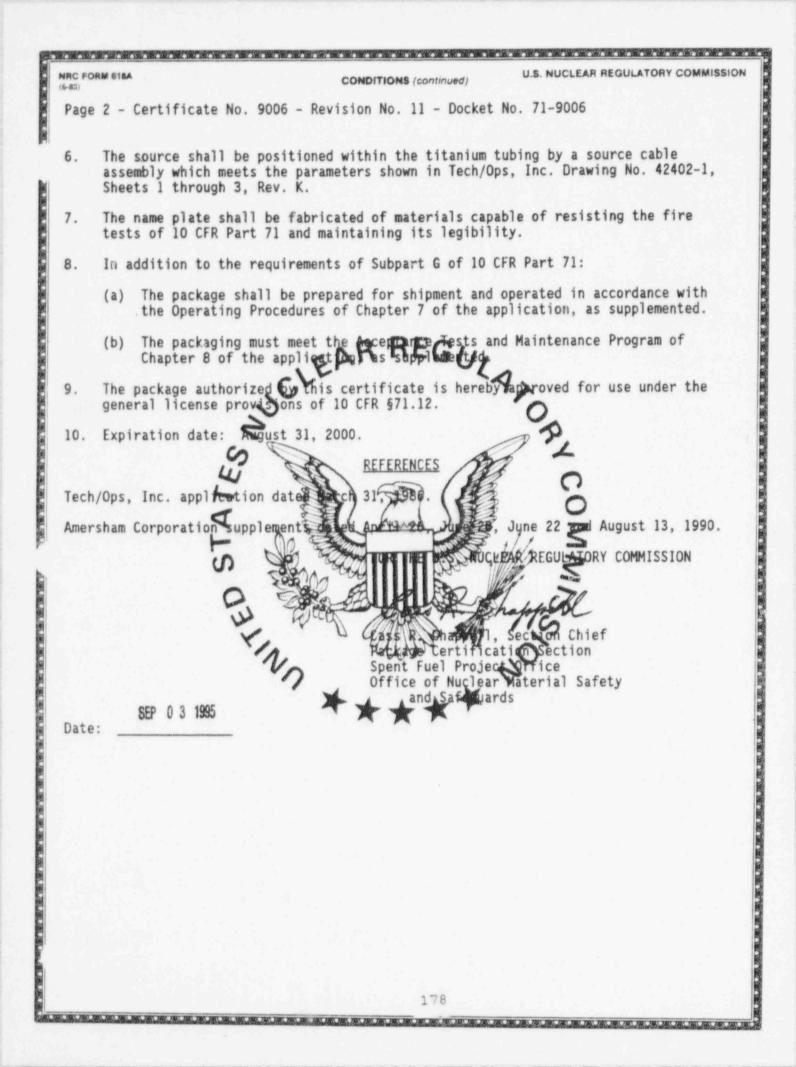
BWR

- Clad UO₂ pellets Fuel form Clad UO, pellets R REGUNSATOR Zr or SS Cladding material Maximum initial U content/assembly 198 Maximum init of U-235 4.0 enrichment, w/o Maximum bundle cross 5.75 section. 111 8x8 FuelLoin array 0.475-0.505 Fuel iameter. 0.630-0.645 Fuel Maximum act 150 lengt
- (ii) Solid irradiated hardware: which may include fissile material, provided the quantity of fissile material does not exceed a Type A quantity and does not exceed the mass limits of 10 CFR 11.53. As needed, appropriate component spacers must be used when loading irradiated hardware into the cask swith to mill movement of the contents during accident conditions of transport. Use of a steel liner is authorized provided: (1) its outside dimensions are approximately those of the cask cavity inside dimensions, (2) constructed of single thickness of steel plate with full penetration welds, (3) thickness of steel plate does not exceed one inch, and (4) the liner is provided with a drain and vent to insure water removal.
- (2) Maximum quantity of material per package
 - Maximum decay heat per package not to exceed 40,000 Btu/hr. Maximum 5,725 Btu/hr/PWR assembly. Maximum 2,225 Btu/hr/BWR assembly.
 - Seven PWR fuel assemblies, seventeen channelled BWR assemblies, or eighteen unchannelled BWR fuel assemblies.
 - (iii) Above fuel assemblies to be contained in their respective fuel baskets as shown in GE Drawing No. 159C5238 - Sheet 6, Rev. 8, or PNSI Drawing No. 420-111-3000, Sheet 1 through 9, Rev. 1.

RC FORM	618A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSI
Page	5 - C	ertificate No. 9001 - Revision No. 30 - Docket No. 71-9001
5.	(c)	Unloaded package - contents and maximum quantity of material
	1	Greater than a Type A quantity of residual radioactive material consisting o mixed-fission and activation products adhering to interior cavity and fuel basket surfaces.
	(d)	Fissile Class I
6.	fuel	nd of life total calculated residual gas that could become available from the pins must not exceed 0.50 lb moles for content 5.(b).
7.	The ma	aximum gross weight of the Ravity con Gn & must not exceed 21,000 pounds.
	vesse The ca helium volume	he shipment of irradiated fuel assemblies, the cask cavity (containment 1) must be promotly inerted following removal of the water from the cavity. ask cavity must be purged at least three times with argon, nitrogen, or m. Each purge volume must be equivalent to or greater than the cask cavity e. After the final purge, the cavity must be promptly filled with argon, gen, or helium at the term pressure.
9.	Known greate	or suspected failed free, assemblies (for and fuel with cladding defects er than in holes and har ine gracks are bet authorized.
10.	Group maximu 60 mor	I fuel assemblies which use 15x15 type of the fuel, assemblies and have a um inition contact of 429 tipe and assembly and minimum cool time of nths may have a maximum assembly auroup of 45 2000 MWD/MEV.
11.	Prior than] for st	to each shipment, the processing continue that the Dask contains no more I cubic foot of water in the cavity and the license pust prepare the cask hipment, in accordance with Subjection 10.17 of the application.
	transp not ex	ask contents sharing so limited that under normal conditions prior to port, 62 times the neutron dose rate plus 6.3 times the gamma dose rate will acceed 560 mrem/hr at a starre of sit feer from the side of the cask (ten from the cask center-line).
	The ne percen May.	eutron shielding tanks must be filled with approximately a 50/50 volume nt mixture of ethylene glycol and water during the months of October through
	Sheet	cement globe valves other than the valve specified on Drawing No. 159C5238- 4, Rev. 8. must be tested as stated in Subsection 6.6.3.2 of the cation.
	10.2 o freque	ackaging must be maintained in accordance with the requirements of Subsection of the application. During inactive periods, the maintenance and testing ency may be disregarded provided that the package is brought into full iance with these requirements prior to the next use of the package.
16.	The ca within	ask cavity must be equipped with a rupture disk device with a burst pressure n the range of 350-400 psig (443°F) including all tolerances.
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	NORDEOROROROROROROROROROROR	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
Page	e 6 - Certificate M	o. 9001 - Revision No. 30 - Docket	No. 71-9001
17.	minimum copper th	ding material must be separated front ickness of 4-mils, except that the to top of the unchannelled BWR bas of copper.	stud bolts attaching the
18.		nust not be installed between each n 11 expansion tank.	neutron shield tank and its
19.	decay heat of the wrap the cask mus	rapped with reinforced plastic dur contents does not exceed 1.5 KW. t not be greater than 0.015 inches than 0.0242 Bturr-D-DE The re the cask currect for purposed of o	The reinforced plastic used to thick or have a thermal
20.	The package authors general license p	prized by the certificate is hereby provisions of 10 CFR §71.12.	pproved for use under the
21.	Expiration date:	September 30, 2000.	7P1
	TRA Technologies	POR THE MUCH I	95. REGULACORY COMMISSION
		Package Dert Project Of Spent Fuel Project Of Office of Nuclear Mate and Safeguards	fice
	SEP 2 1 1995		
Dat	e:		
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NRC FORM 618 (8-65) 10 CFR 71				ATE OF COMPLIANCE	S. NUCLEAR REGUL	
1. & CERTIFICATE N	MBER	9006	D. REVISION NUMBER	C PACKAGE IDENTIFICATION NUME USA/9006/B(U)	d PAGE NUMBER	e. TOTAL NUMBER PAG
of Federal R	agulation	ed to certify that the parts, Part 71, "Packaging not relieve the consigned	okaging and contents o and Transportation of or from compliance wit	sescribed in Item 5 below, meets the applic	e U.S. Department of Tran	
Amershat 40 Nort	m Cor h Ave	poration	AFETY ANALYSIS REPO	RT OF THE PACKAGE DESIGN OF APPLICAT LE AND IDENTIFICATION OF REPORT OF APP Tech/Ops Inc. applica dated March 31, 1986, REEGIMP006	tion	ed.
4 CONDITIONS	s conditi	onal upon fulfilling the	requirements of 10 C	FR Part 71, as applicable, and the copies	ons specified below.	
5 (a)	Pack (1) (2)	Model No.: Description A radiogram steer box, changer has uranium shiv depleted uri assemblies. threaded no Drawings The packagin Drawing Nos Sheets 1 thi and optional	ng is constru- Alfoosure down caps Alfoosure and a source down caps and a source and a source down caps and a source and a	anien indes are position free the source capsules annos are chosed by lo	1" Jong. The steep over and a coned in the certain the source with assemblic broximately 69 of the source of the s	source depleted nter of the e cable es and 5 pounds.
(b)	Cont	within the Tech/Ops, In	titanium tubi	ing shall be fabricated No. SK2334-2, Rev. D.		
(0)			m of materia			
	(1)	form radioa	as a sealed ctive materia	source which meets the	requirements (of special
		120 curies				
				177		



BAC FORM 6 9-050 0 CFR 71	16	CERTIFICAT	TE OF COMPLIANCE	LEAR REGULAT	
. CERTIFIC	TE NUMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9007/B(U)	d. PAGE NUMBER	9. TOTAL NUMBER PA
a. This of of Fed	eral Regulations, Part 71, "Packa	ging and Transportation of Rac	ribed in Item 5 below, meets the applicable safe	epartment of Trans	
An 40	FICATE IS ISSUED ON THE BASIS TO fflorme and Address ersham Corporation North Avenue rlington, MA 0180		OF THE PACKAGE DESIGN OR APPLICATION ND IDENTIFICATION OF REPORT OR APPLICATION Tech/Ops, Inc. applicati October 7, 1985, as supp REC 71-9007	on dated	
4. CONDITIO	N5	a the requirements of 10 CFR	Part 71, as applicable, and the conditions spec	ified below.	
5. (a)	 1/8" thrick : on each plathouses the : The two end is provided is approximation (3) Drawings The packaging Nos. AI 5205 	steel tube welded te gives access to source capsule, so openings are clo- at the source cal stely 40 pounds.	hic device consisting of a to two, 10-gauge end plat to the "S"-shaped titanium burce cable assembly, and sed with threaded end caps ble attachment. Gross wei in accordance with Tech/O ugh 4 and AI 52091, Sheets Drawing No. 100-520-014, R	es. An ope tubing whi the end plu . A lock m ght of the ps, Inc. D 1 and 2;	ening ch ug. mechanism package rawing

C FORM STRA						CONDITIONS (continued)							
	Page	2 -	Certificate	No.	9007	÷	Revision	No.	7	-	Docket	No.	71-9007
	5.	(b)	Contents										

(1) Type and form of material

Iridium 192 as sealed sources which meets the requirements of special form radioactive material.

Maximum quantity of material per package.

120 curies

- The source shall be positioned within the titanium tubing by a source cable assembly which meets the parameters shown in Tech/Ops, Inc. Drawing Nos. 42402-1, Rev. L and 42402-4, Rev. B.
- 7. The nameplate shall be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining its legibility.
- 8. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) The package shall be prepared for shipment and operated in accordance with Section 7 of the application.
 - (b) Each package must be tested and maintained in accordance with the acceptance tests and maintenance program in Section 8 of the application.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 10. Expiration date: December 31, 1995.

REFERENCES

Tech/Ops, Inc. application dated October 7, 1985. Supplement dated: November 26, 1985; October 19, and December 21, 1990.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Late

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date: JAN 1 = 1991

65 GFR 71			TE OF COMPLIANCE	8. NUCLEAR REGULA	TORY COMMISSIO
OCERTIFICATE NUMBER		D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9009/B()		e. TOTAL NUMBER PAG
of Federal Regulation	s, Part 71, "Packaging not relieve the consign	g and Transportation of Ra nor from compliance with a	L cribed in Item 5 below, meets the applica dioactive Material." any requirement of the regulations of the mtry through or into which the package	U.S. Department of Trans	
THIS CERTIFICATE IS ISSUE a. ISSUED TO (Name and Ad		SAFETY ANALYSIS REPORT	OF THE PACKAGE DESIGN OF APPLICATIO		
General Electr P.O. Box 780 Wilmington, NO			REG1(9099		
CONDITIONS This certificate is condition	onal upon fulfillingath	equirements of 10 CFR	Part 71, as applicable, and the countio	ns specified below.	
(2) De Tv 10 ac 10 50 51 10 10 10 10 10 10 10 10 10 1	odel No: F escription o, ho-gauge ong and 22-0 complished gs, one of lt and lock ports ste ssel, and f nished dens pounds peo the outer he containme proximately ick welded ange and bl e flange cl essure tap oove pressu flon tape. ange of the chreads wrap ection 5-inc ckaging has awings he Model No.	55-gallo grun Actinchessen Broat least a Hinch is threa and is threa eliginet steev ire resistant ity of at least cubic foot for steel drum. nt vessel is a 53-1/2 inches bottom plate ar ind flange whice osure is gasket between the two re tap is seale A 1/4-inch sta containment vo ped with Teflor h Schedule 40 p a maximum gros	And not rive to recent menolic term, formed a pounds per cubic for the cap. Gas refer and a 304L stainless steel to the state of the stainless steel to a 304L stainless steel to by two fluoroelast of 0-ring grooves. Dur ed with a pipe plug with ainless steel valve is essel. The valve is so tape) and is protect of per welded to the top ss weight of 515 lbs.	um Dosure sha ring with drop t 5/8-inch d echanism consi: The the contain in place to an bot for the ma holes shall be 5-inch Schedul inless steel 1 eel 300 pound t, 3/4-inch st omer 0-rings w ing shipment, th threads wra screwed into ealed by a pip ed by a 2-1/2 of the flange	<pre>11 be -forged iameter sts of wood nment average in body and e provided e 40 pipe, /2-inch slip-on eel bolts. ith a the 0-ring pped in the blind e cap inch high . The</pre>
E	ectric comp	any brawing No.	. 112D3018, Rev. 2.		

NRC FORM 6 (6-83)	18A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
Page	2 - Ce	ertificate No. 9009 - Revision No. 13 - Docket No. 71-9009
(b)	Conte	ents
	(1)	Type and form of material
		(i) Uranyl nitrate solutions enriched in the U-235 isotope, provided the U-233 content is not more than 1% of the U-235 content; or
		(ii) Uranyl nitrate solutions having a combined concentration of uranium- 233 and uranium-235 not exceeding 250 grams per liter and an H to fissile material atomic ratio not less than 80 provided the U-233 content is not greater REC 00 of the combined U-233 and U-235 content; or COR REC 00.
		(iii) Uranyl solution (UO2SO4) containing uranium-235; or
		(iv) Dry compounds and mixtures of uranium-230 or
		(v) Upanium oxide interspersed with graphite or selicon carbide plus plastic packing material.
	(2)	Maximum quantity and terian package package
		(i) For the content tescriber in 5 (i) and 5 (i) (i) (ii):
		Nat to ented some many soile material 21 watts decay heat,
		and 10 many officer and the second se
		(ii) For the consideration of the state (iii): C
		Not to exceed 950 grans fissele rial and 18 watts decay heat.
		(iii) For the contents described in 5(b)(1)(1).
		Not to exceed 15 kilograms fissing material and 30 watts decay heat.
		(iv) For the contents described in 5(b)(1)(v):
		Not to exceed 300 grams fissile material and 10 watts decay heat.
(c)	Fiss	ile Class I

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RC FORM	1 518A CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMI	SION
	3 - Certificate No. 9009 - Revision No. 13 - Docket No. 71-9009	
6.	The solution contents of the package shall be contained within a bottle havin one of the following specifications:	I
	(i) Slit vent polyethylene bottle per Drawing No. CAPE-1170-37,	
	 Duo-vent polyethylene bottle per Nuclear Fuel Services, Inc., Specification U-1 and Drawing No. 5B-U-740, or per General Electric Company Drawing No. 112D3013, Rev. 0, or 	
	(iii) Stainless steel bottle as shown on General Electric Company Drawing Nos FRO-140 and FRO-140A.	
7.	The polyethylene bottles may be Backaged Gthin the metal inner container described by Chester-Jensie Company, Inc., Draving Nos. 1092M-1, 1093M-1, 1095M-1 and 1096M-1, Issue 1, dated April 26, 1975	
8.	The packaging for the polyethylene bottles shall include a flexible restraining device (such as recommended in ARH-1819 "Vibration Testing of L-3 and L-10 Shipping Containers" placed between the cap assembly of the polyethylene bott and the closure flange of the pressure vessel in assure that the polyethylene bottle will vibrate at the same frequency as the pressure vessel during transport.	
9.	Dry compounds and mixturestanich shalk be backaged within scaled metal cans of DOT Specification 2R containers and placed at ton an inner Sontainer construct and leak tested as specified on General are bric if fustration AFL 1105. Following the gas leave estimation are bric if fustration, all inner container welds shall be lester using a Dawid practrant method in accordance with Article Sections ASAF for a terms of 300 series steinless steel pipe with an outside diameter of 4.500 ± 0.031 increasion a wall thickness ranging between 0.095 and 0.140 inch.	ed
10.	Appropriate steps shall be taken to assure that from the time of sealing to the time of delivery to the contignee, the pressure in the containment vessel will not exceed 40 psig.	e
11.	Prior to each shipment of more than a Type A quantity of radioactive material the space between the double O-ring shall be tested at 100 psig and leak detection performed by a method capable of detecting a leak greater than 10 ⁻³ atm cc/sec at standard temperature and pressure. No package with a detectable leak shall be delivered to a carrier for transport.	
12.	In addition to the requirements of Subpart G of 10 CFR 71, a test shall be performed on each containment vessel and associated $1/4$ -inch stainless steel valve (without its associated pipe cap) initially and once each year at 300 p and the leak detection performed by a method capable of detecting a leak great than 10^{-6} atm cc/sec at standard temperature and pressure. Any chamber that fails to pass the test shall be withdrawn from service and repaired to meet the test. For shipment of contents of not more than a Type A quantity of radioactive material, this test shall not be required.	er

U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A CONDITIONS (continued) (6-83) Page 4 - Certificate No. 9009 - Revision No. 13 - Docket No. 71-9009 The fire resistant phenolic foam shall be in accordance with AEC Materials and 13. Equipment Specification SP-9 or as modified by ORGDP Reports K/TL-729 and K/P-6567S. Prior to release of the package for shipment, a radiation survey should be 14. performed including a determination of surface contamination to assure compliance with 10 CFR §§71.47 and 71.87. In addition to the conditions in this certificate, each packaging must meet the 15. Acceptance Test Section 8.0 of the current Safety Analysis Report of January 27, 1984 as revised April 26 and May 16, 1984. In addition to the conditions in this certificate, the packaging shall be prepared for shipment and operated in accordance with the Operating Procedures of Section 7.0 of the current Safety Analysis Report of January 27, 1984 as revised April 26 and May 16, 1984. 16. The package authorized by this certificate is hereby approved for use under the 17. general license provisions of 10 CFR §71.12. June Expiration date: 18. 1984/ dated Janu General Electric Gempany applicates Supplements dated: Aprile February app. June 7, 1994. 8 Westinghouse Electric 15. Corpo REGULATORY COMMISSION NUCI FAR opell, Section Leader ass fication Section erti torage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS JUN 2 9 1994 Date:

URC FORM 618 12-069 10 CFR 71		TE OF COMPLIANCE	ICLEAR REGULATORY COMMISS
9010	D. REVISION NUMBER	C PACKAGE IDENTIFICATION NUMBER USA/9010/B()F	d PAGE NUMBER 0. TOTAL NUMBER PA
of Federal Regulations, Part 71, "F b. This certificate does not relieve th	ackaging and Transportation of Ra a consignor from compliance with a	cribed in Item 5 below, meets the applicable se disactive Material." any requirement of the regulations of the U.S. untry through or into which the package will t	Department of Transportation or other
3. THIS CERTIFICATE IS ISSUED ON THE BI 8. ISSUED TO (Nume and Address)	SIS OF A SAFETY ANALYSIS REPORT	OF THE PACKAGE DESIGN OR APPLICATION AND IDENTIFICATION OF REPORT OR APPLICATI	ION:
Nuclear Assurance Cor 6251 Crooked Creek Ro Norcross, GA 30092		Nuclear Assurance Corpora dated November 1, 1990, a	
CONDITIONS This certificate is conditional upon fu	filling the requirements of 10 CFR	Part 71, as applicable, and the conditions sp	ecified below.
steel, and eq 195-1/4 inches 3/4 inches of water-ethylen A 7/8-inch th steel forging surrounded by end forgings. inner cask can shell; welded circular plate	ipped with balsa in clong by 47-1/8 inc depleted uranium, 2 glycol mixture. A glycol mixture. A stainless steel at each end of the a 1/4-inch thick st A water expansion t vity is formed by a at its top end to t	ad shielded shipping cash mact limiters. The cylin thes OD. The principal sh 2-178 inches of lead, and outer shell is welded to cask. The outer shell of cel water jacket that is ank is welded to the water 1/2-inch thick, stainless the upper cask forging and	adrical cask body is hielding consists of 2 5 inches of (borated) a solid stainless f the cask is also attached to the er jacket shell. The s steel cylindrical
Configuration shell, 12-5/8 within the inn 5-inch thick, bolts, and sil used to secure cask cavity is bolts, and el supported with	inches ID by 178 in her cask cavity. The composite steel and ver plated, metalling the containment version by a 1-1/2-inch the stomer O-ring. The	ent vessel is a right circ inches inside length by 1/4 he containment vessel is of i uranium closure head, the co-ring. Eight of the the essel to the upper cask for hick steel closure head, es e radioactive contents are vessel (inner container)	4-inch thick, located closed and sealed by a welve, 1-inch diameter welve closure bolts are orging. Closure of the eight, 1-inch diameter e positioned and
		185	

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5. (a) Packaging (continued)

NRC FORM ETEL

(2) Description (continued)

Configuration (B): The containment vessel is the 1/2-inch thick inner cavity shell. The 1/4-inch thick inner container is not used. The cask cavity is closed by two closure heads. The inner head is a 6-inch thick, composite steel and uranium plate secured to the upper cask forging by twelve, 1-inch diameter bolts and sealed with a silver plated, metallic O-ring. The outer head is 1-1/2inch thick steel plate secured to the top of the upper cask forging by eight, 1inch diameter bolts and sealed with an elastomer O-ring. The radioactive contents are positioned and supported within the containment vessel (inner cask cavity) by a modified aluminant basket and internal support structure.

Configuration (C): Same as Configuration (B), above, except the radioactive contents are positioned and supported within the containment vessel (inner cask cavity) in a standless steel structure containing Boral sheets positioned so as to provide necessary neutron absorption.

Configuration (D): Same as Configuration (B) above, except that the radioactive contents are positioned and supported within the containment vessel (inner cask cavity) in a 3-element standless steel structure as shown in NAC Drawing No. 347-291-F12, Rev. 2, and the cask must be enclosed in a closed shipping container.

The package, including impact finiters, has an overall length of 237 inches and an outside diameter of 75 inches. The maximum weight of the contents is 3,000 pounds. The weight of the package is approximately 49,250 pounds.

(3) Drawings

The Model No. NLI-112 shipping case is constructed in accordance with the following National Lead Company Drawing Nos.:

General

70514F.	Sheet	1.	Rev.	8.	Cask and Trailer General Arrangement
					Cask and Trailer General Arrangement
70885F,	Sheet	1,	Rev.	3,	Spent Fuel Cask Details
70885F,	Sheet	2,	Rev.	2,	Spent Fuel Cask Details
70885F,	Sheet	3,	Rev.	2,	Spent Fuel Cask Details
70885F,	Sheet	4,	Rev.	1,	Spent Fuel Cask Details
70887F,	Sheet	1,	Rev.	1,	Outer Closure Head

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- 5. (a) Packaging (continued)
 - (3) Drawings (Continued)

Configuration (A)

70516F, Sheet 1, Rev. 8, Spent Fuel Cask General Assembly 70562F, Sheet 1, Rev. 10, Inner Container 70562F, Sheet 2, Rev. 6, Inner Container 70562F, Sheet 3, Rev. 0, Inner Container* 70562F, Sheet 4, Rev. 0, Inner Container*

Configuration (B)

70888F, Sheet 1, Rev. 3, Spent Fuel Cask General Assembly 70886F, Sheet 1, Rev. 2, Basket Concept 70884F, Sheet 1, Rev. 2, Inner Closure Head

Configuration (C)

70888F, Sheet T, Rev. 3, Spent Fuel Cask General Assembly 460-052-F8, Sheet 1, Rev. 6, Rockwell Fuel Basket-NLI-1/2 Cask* 460-052-F9, Sheet 1, Rev. 3, Container - Fermi Fuel, Rockwell Basket, NLI-1/2 Cask, Assy of*

Configuration (D)

70688F, Sheet 1, Rev. 3, Spent fuel Cask General Assembly 347-291-F12, Rev. 2, Einer - 3 Element, NCI-1/2 Cask, Fuel Movement Project*

*Nuclear Assurance Corporation drawings.

U.S. NUCLEAR REDULATORY COMMISSION C FORM BIEA CONDITIONS (continued) Page 4 - Certificate No. 9010 - Revision No. 35 - Docket No. 71-9010 j. (b) Contents (1) Type and form of material Irradiated PWR or BWR uranium oxide fuel assemblies of the following (i) specifications Consolidated Fuel Rods BWR PWR Clad UO, pellet Clad UO, pellets Clad UO2 pellet Fuel form Zr or SS Zr or SS Cladding material Zr or SS ILA Maximum initial fuel pin pressure at 100°F 550 200 550 psig Maximum initial U 4 950 197 content/assembly, kg 475 Maximum average initial 3.70 2.65 3.10 U-235 enrichment, w/o Maximum bundle cross 5.75 8.75 8.75 section, inches Fuel pin array size 7x7 Pins from 7x7, 14x14/15x15 8x8, 14x14, 8x8 15x16/17x17

15x15, 16x16,

pitch

17x17 in triangular

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AC FORM DYBA	CONDITIONS	(continued)	IUCLEAR REGULATORY COMMISSION
Page 5 - Certificate No. 9010	- Revision No.	35 - Docket No. 71-	-9010
. (b) (1) (i) (continued)			
	PWR	BWR	Consolidated Fuel Rods
Maximum active fuel length, inches	144	145.25	144
Maximum specific power, kw/kgU	40	27	40
Maximum average burnup, MWD/MTU	40,000**R R	EG ^{34,000}	40,000
Maximum decay heat, kw	10.5 AN	10.6	0.6
Minimum cooling time days	150*	120 0	4,380
rods or control rods. *Four (4) fuel rods may have PWR fuel assembly may have provided the minimum coolin neutron shield fluid contat may be left in the shieldin (ii) Inradiate Fuel form Cladding Materia Max. initial U content/assembly kg Max. avg. initia U-235 enrichment w/o	a maximum average of time prior to as 1.0 weight ne of tanks during t d metallic fuels <u>Fermi-1</u> Uranium-Mo alloy pins 1 Zr 18.7/assy. 300/16 ass 1 26.0	e burnup of 56,000 shipment is 450 day rcent boron. (The he shipment of othe of the following s <u>EBR-</u> lybdenum Uran cyli Alum 292/ y. cask load 0.21	MWDDMIU vs and the borated fluid er contents.)

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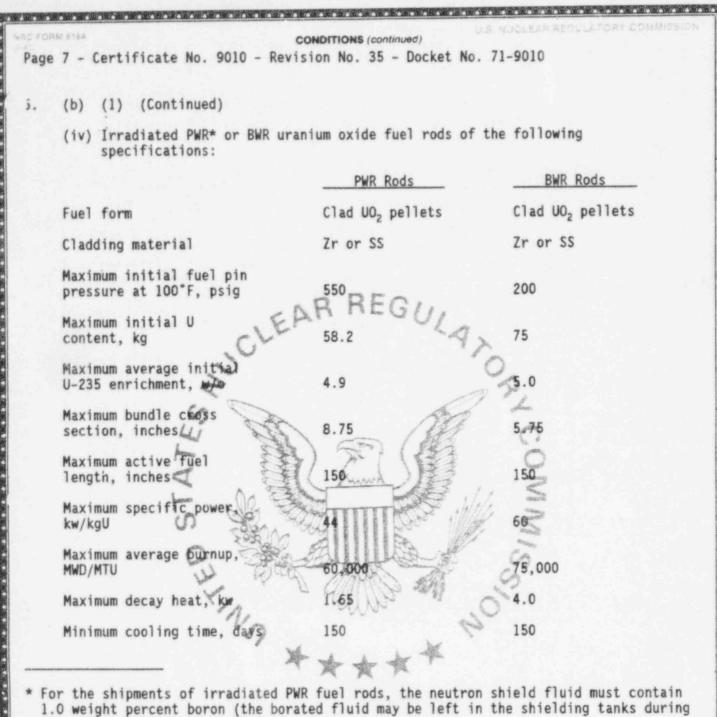
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FORM \$184		CONDITIONS (continued)	
age 6 -	Certificate No. 9010 - F	levision No. 35 - Docket No	. 71-9010
. (b)	(1) (ii) (continued)		
		Fermi-1	EBR-II Blanket
	Max. bundle cross section, inches	2.93 sq	4.875 dia
	Fuel rods per canister	140	41
	Max. active fuel length, inches	30.5 / assy 122 / ASEGULA, 2,840	157
	Max. Average Burnup, MWD/MTQ	2,840	2,400
	Max. Decay Beat, watts	20	300
	Min. Cooring Time days (iii)	5,000	Research Reactor
	Fuel Form	uter that	Uranium metal rods
	Maximum and Content//	and all the se	S54.5
	Markingum ave entrichmer	erage initial U-235	Natural
	Maximum bu	the cross-section, inches	1.36
	Intact Fue	Rods per canister, maximu	ım 7
	Canisters (ber cask	3 intact fuel
	Max. Activ	e fuel length, inches	120.5
	Maximum av	erage burnup MWD/MTU	1,600
	Maximum de	cay heat, watts	750
	Minimum Co	oling Time, days	365

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For the shipments of irradiated PWR fuel rods, the neutron shield fluid must contain 1.0 weight percent boron (the borated fluid may be left in the shielding tanks during the shipment of other contents).

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CONDITIONS (continued)

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5.

(b) (1) (v) Solid, non-fissile, irradiated hardware and neutron source components.

- (vi) Byproduct and special nuclear material in the form of irradiated uranium and plutonium oxide fuel rods. Prior to irradiation, the maximum average enrichment in U-235 plus plutonium not to exceed 3.70 w/o and the maximum enrichment not to exceed 4.0 w/o.
- (vii) Irradiated PWR uranium oxide fuel assemblies including additional irradiated fuel rods inserted and secured in the guide thimbles. The fuel assemblies must conform to the maximum active dimensions as described in Item 5 (b) (i) except that maximum initial U content must be 495 kg and the maximum average initial U-235 enrichment shall be 3.35 w/o.
- (viii) Irradiated Connecticut Yankee fuel assembly with a maximum average initial U-235 enrichment of 4.0 w/o and each of the 15 x 15 fuel rods clad by stainless steel. 204 rods/ assembly; active length of 121.4 inches.
 - (ix), Irradiated Filk 42 fuel assemblies consisting of three concentric fuel tubes with Pu0, Al powder metaflurgy cores clad with type 5063 aluminum, containing a total of 3.35 kg of plutonium. The plutonium was initially enriched to contain 78.38 w/o Pu-239, 2.27 w/o Pu-241 and 0.15 w/o Pu-238.
 - (x) Irradiated MARK 22 fluel assemblies consisting of two concentric fiel tables with uranium-aluminum cores clad with type 2001 aluminum, containing a total of 3.2 kg of uranium-235. The uranium was initially enriched to contain 66 w/o to 80 w/o uranium-235. The irradiated MARK 22 fuel assembly has an active length of 150 inches, a maximum burn-up of 1226 MWD and a minimum cooling time of 150 days.
- (2) Maximum Quantity of material per package
 - (i) Items 5(b)(1)(i) or 5(b)(1)(vii) above: one PWR fuel assembly; two BWR fuel assemblies; or one consolidated fuel canister. Fuel assemblies to be contained in their respective fuel baskets as shown on National Lead Company Drawing No. 70562F, Sheet 1, Rev. 10 or 70886F, Sheet 1, Rev. 2. The consolidated fuel canister to be contained in Configuration (A) fuel basket as shown on National Lead Company Drawing No. 70562F, Sheet 1, Rev. 10.
 - (ii) Item 5(b)(1)(ii) above: four canisters per cask. The fuel canisters and fuel basket must be in accordance with Configuration (C) above.

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- 5. (b) (2) (continued)
 - (iii) Item 5(b)(1)(iii) above:
 - (a) three canisters of unfailed fuel containing up to seven fuel rods per canister. The fuel canisters and fuel basket must be in accordance with Configuration (D) above; or
 - (b) up to six canisters containing one defective fuel rod per canister. The canisters are 2.75-inch I.D. failed fuel rod canisters as shown on Nuclear Assurance Corporation Drawing No. 340-108-D2, Rev. 10, and are placed in the six-rod capacity liner as shown on Nuclear Assurance Corporation Drawing No. 347-029-20, Rev. 1. The maximum decay heat load for a defective fuel rod is limited to 5 watts; or
 - (c) up to three canisters containing either one defective fuel rod per canister or up to 10 failed fuel filters per canister. The canisters are 4.00-inch I.D. failed fuel rod canisters as shown on Nuclear Assurance Corporation Drawing No. 340-108-D1,
 - Rev. 10. The fuel basket is in accordance with Configuration (D) above. The weight of the filters is limited to 125 pounds per canister. The maximum decay heat load for the defective fuel rods and the failed fuel filters is limited to 5 watts per capister. Plutonium content of the filters not to exceed 20 curies platonium per package.
 - (iv) Item 5(b)(1)(iv) above: up to 25 PWR feel roots or up to 25 BWR fuel roots per cask, in Configuration (A) or (B). Up to 2 of the 25 PWR roots may have a maximum burnup of 65,000 MWD/MTU. PWR fuel roots with burnup in excess of 45,000 MWD/MTU and BWR fuel rcds with burnup in excess of 50,000 MWD/MTU will be shipped in Configuration (A) only. The maximum initial uranium content is limited to 58.2 kg per package for PWR roots and 75 kg per package for BWR roots.
 - (v) Item 5(b)(1)(v) above, weight for to exceed 1,600 pounds.
 - (vi) Item 5(b)(1)(vi) above, the maximum mass of U-235 plus plutonium must not exceed 4.0 kg. Fuel rods must be contained in fuel baskets as shown on National Lead Company Drawing No. 70562F, Sheet 1, Rev. 10 or 70886F, Sheet 1, Rev. 2.
 - (vii) Item 5(b)(1)(viii) above: One Connecticut Yankee intact irradiated fuel assembly.
 - (viii) Item 5(b)(1)(ix) above: One irradiated MARK 42 fuel assembly in either intact or sectioned form, using Configuration (C) above. If sectioned, each section must be seal welded in a shipping can as shown on Martin Marietta Energy Systems Drawing Nos. M-12821-CP-105E, Rev. 0 and M-12821-CP-106E, Rev. 1. Four shipping cans will

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be loaded into a MARK 42 Segment Dry Shipping Canister as shown on Martin Marietta Energy Systems Drawing No. M-12821-CP-102, Rev. 1, along with a shipping canister spacer, as shown on Martin Marietta Energy Systems Drawing No. M-12821-CP-103, Rev. 1. The shipping canister will be loaded on top of a carrier spacer as shown on Martin Marietta Energy Systems Drawing No. M-12821-CP-112, Rev. 0. A maximum of 2 shipping canisters may be loaded into a cask. Intact fuel assemblies will be shipped in a MARK 42 Element Wet Shipping Canister as shown on Martin Marietta Energy Systems Drawing No. M-12821-CP-114, Rev. 0. A maximum of one intact assembly may be loaded into a cask.

- (ix) Item 5(b)(1)(x) above: Two MARK 22 fuel assemblies or one MARK 22 fuel assembly with the two cores separated, using Configuration (C) above. Each assembly or core will be shipped in a shipping canister as shown on Sandia National Laboratory Drawing No. R21563, Sheet 1, Iss. B.
- (c) Fissile Class

Maximum number of packages per shipment

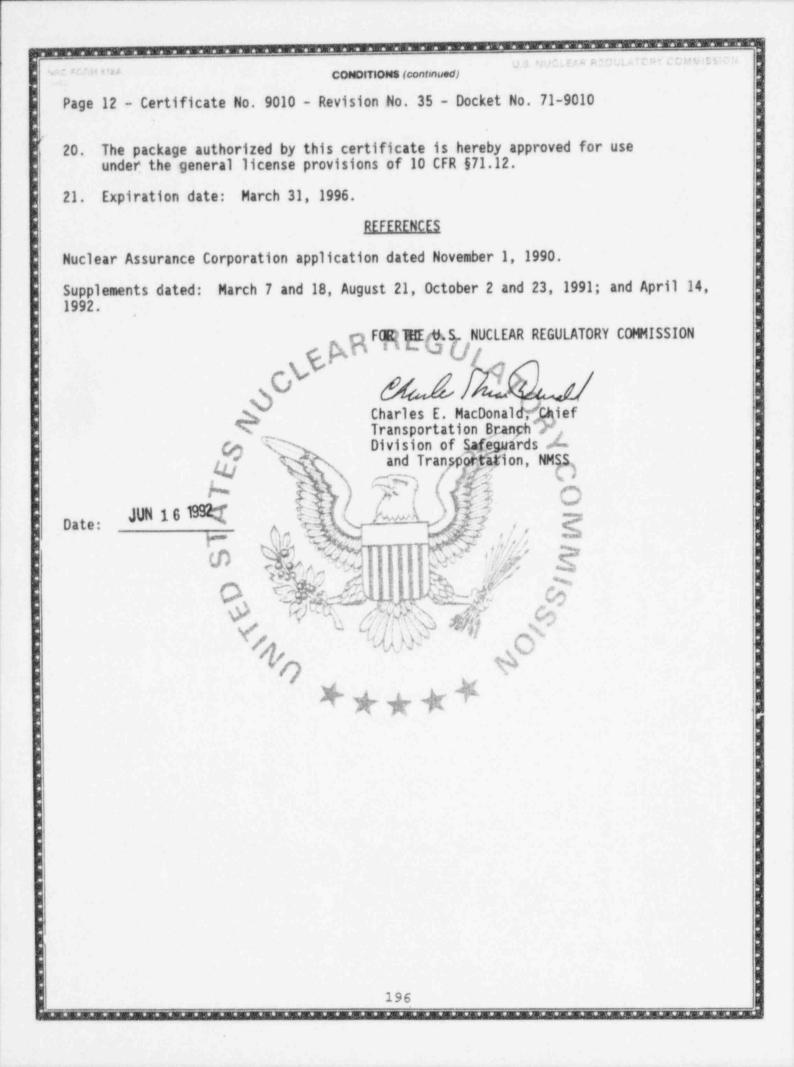
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- 6. Irradiated fuels described in items 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1)(iii) and 5(b)(1)(iv) above may not have a maximum burnup which exceeds 1.25 times the specified maximum average burnup.
- 7. The cask cavity and containment vessel (inner container) must be dry (no free water) when delivered to a carrier for transport. Residual moisture must be promptly removed from the cask cavity and containment vessel by the methods described in Section XV of the Application. Removal of the residual moisture from cask cavity when package is used in Configurations (B), (C), or (D) is not required providing the decay heat load does not exceed 2.0 kw.
- 8. For the shipment of irradiated fuel assemblies or a canister of consolidated irradiated fuel, the cask cavity canister of consolidated irradiated fuel (if present), and containment vessel must be promptly inerted following removal of the water from the cavity. For contents not vacuum dried, the cask cavity and containment vessel must be purged at least three times with argon, nitrogen, or helium. Each purge volume must be equivalent to or greater than the cask cavity and containment vessel volume. After the final purge, or following vacuum drying, the cavity and containment vessel must be promptly filled with argon, nitrogen, or helium at 1.0 atm pressure.
- 9. Known or suspected failed fuel assemblies (rods) and fuel with cladding defects greater than pin holes and hairline cracks must be shipped in Configuration (A).
- The consolidated fuel canister must be provided with vent and drain lines (openings) to permit free draining of the canister. No valves can be installed on the vent and drain lines.

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- 11. The cask may be shipped in a closed shipping container (Configuration D) provided that the closed shipping container, and the transport vehicle (trailer) meet the applicable requirements of the Department of Transportation. Tie-down devices which are a structural part of the cask and the cask support structures must comply with 10 CFR 71.45.
- When the cask is shipped in a closed shipping container the center of gravity of the combined cask, closed shipping container and trailer must not exceed 75.0 inches.
- When the cask is shipped in a closed shipping container, the internal heat load must not exceed 750 watts.
- 14. The neutron shielding tank must be filled with a mixture of water and ethylene glycol (52% by volume). This mixture must not freeze or precipitate in a temperature range from 40°F to 330°F. The neutron shield tank may be empty when the cask is in Configuration D.
- 15. The structures used to support the package on the transport vehicle must be as described in the Application.
- 16. Any system used for cooling down the package must be provided with a pressure relief device set so that during the cool-down process, the maximum pressure in the containment wessel cannot exceed 310 psig when the package is used in Configuration (A) or 365 psig when the package is used in Configuration (B).
- 17. As needed, appropriate companent spacers must be used in the cask cavity to limit movement of contents during shipment.
- Shipping cans used for sectioned MARK 42 trradiated fuel assemblies must be seal welded and must be leak tested to 1x10⁻⁷ std cm³/sec.
- 19. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) The package shall be prepared for shipment and operated in accordance with the operating procedures in Section XV of the application, as supplemented.
 - (b) The package shall be maintained and tested in accordance with the maintenance program in Section XVI of the application, as supplemented.



ulations. Part 71, "Packagin closes not relieve the consig ulatory agencies, including is issued on THE BASIS OF e and Address I Medical System idon Road id, OH 44110 conditional upon fulfilling to ckaging Model No.: E Description	b. REVISION NUMBER 5 packaging and contents design and Transportation of Rai phor from compliance with the government of any but A SAFETY ANALYSIS REPORT b. TITLE	dioactive Material in y requirement of the re- intry through or into wh OF THE PACKAGE DESIGN AND IDENTIFICATION OF Picker Corp September 2 REGU ET NUMBER	IL/B (Hereits the ap- igulations of ich the pactor N OR APPLI REPORT OF Oratic 5, 197 71	UMBER) pilcable sat of the U.S. ckage will b ckage will b cation Application 3. -9011	1 fety standards set fo Department of Transe transported.	aportation or other
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) Model No.: E) Description	E-MEH-00-00804		Ì	0.82		
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) Description	E-MEH-00-00004	F) (A	Ch .			
bunut		1 189	20			
An overpack t	A Presser & A	Kund) Et	and the second			
head assembly maple panels Reinforcing s limit the ope provided to f	enings between t facilitate fork	overpack cons and covered angles are w Nem to less t lift usage. D	ists o with 1 elded han 6 imensi	of lami 6 gage togeth inches ons of	inated 2 x 4 steel pane and space Skid run the overpa	4 hardwood els. ced to nners are
) Drawings	1		Land			
Advanced Medi through 10, F and Picker Co	ical Systems, In Rev. F.; Advance orporation telet	nc. Drawing No ed Medical Sys	. D-ME tems,	H-00-0 Inc.,	Drawing No.	ts 2 and 3 . C-200004;
	limit the ope provided to 36" x 42" x) Drawings The packaging Advanced Med through 10, 1 and Picker Co	 limit the openings between 1 provided to facilitate fork 36" x 42" x 40.5" with a max Drawings The packaging is constructed Advanced Medical Systems, In through 10, Rev. F.; Advanced 	 limit the openings between them to less to provided to facilitate fork lift usage. B 36" x 42" x 40.5" with a maximum gross we Drawings The packaging is constructed in accordance Advanced Medical Systems, Inc. Drawing No through 10, Rev. F.; Advanced Medical Systems and Picker Corporation teletherapy Head D 	 limit the openings between them to less than 6 provided to facilitate fork lift usage. Dimensi 36" x 42" x 40.5" with a maximum gross weight of Drawings Drawings The packaging is constructed in accordance with Advanced Medical Systems, Inc. Drawing No. D-ME through 10, Rev. F.; Advanced Medical Systems, and Picker Corporation teletherapy Head Drawing 	 limit the openings between them to less than 6 inches provided to facilitate fork lift usage. Dimensions of 36" x 42" x 40.5" with a maximum gross weight of 4,00 Drawings The packaging is constructed in accordance with the fadvanced Medical Systems, Inc. Drawing No. D-MEH-00-0 through 10, Rev. F.; Advanced Medical Systems, Inc., and Picker Corporation teletherapy Head Drawing Nos. 	The packaging is constructed in accordance with the following d Advanced Medical Systems, Inc. Drawing No. D-MEH-00-00004, Shee through 10, Rev. F.; Advanced Medical Systems, Inc., Drawing No and Picker Corporation teletherapy Head Drawing Nos. E-182545A,

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5. (b) Contents

(1) Type and form of material

Cobalt 60 sealed sources that meet the requirements of special form radioactive material. The sources are to be packaged in a secondary inner container (teletherapy head) as described in Item 5(a)(3).

U.S. MUCLEAR REGULATORY

(2) Maximum quantity of material per package

13,680 curies, with a radioactive decay heat load not to exceed 200 watts.

6. In addition to the requirements of Subpart 6 of 10 CFR Part 71, each package shall be maintained, operated and prepared for shipment in accordance with the operating procedures and maintenance program in supplement dated June 26, 1991.

REFERENCE

- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 8. Expiration date: August 31, 1996.

Picker Corporation application dated September 25, 1973.

Supplements dated: April 25, 1986; and May 16 and June 26, 1991

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date:

AUG 0 8 1991

66) CFR 71	FOR RADIOACTIV	E OF COMPLIANCE E MATERIALS PACKAGES		. TOTAL NUMBER PAGES
. CERTIFICATE NUMBER 9015	b. REVISION NUMBER	USA/9015/B()	d. PAGE NUMBER	5
PPEAMBLE a. This certificate is issued to certify that t of Federal Regulations, Part 71, "Packa b. This certificate does not relieve the co applicable regulatory agencies, includ THIS CERTIFICATE IS ISSUED ON THE BASIS	aging and Transportation of Hadi nsignor from compliance with an ing the government of any count	y requirement of the regulations of the I try through or into which the package i	U.S. Department of Trans will be transported.	
a BISURD TO (Numme end Address) ransnuclear, Inc. Wo Skyline Drive lawthorne, NY 10532-212		ISNUClear, Inc. applic h 25, 1991, as supple NUMBER 71-9015	ation dated mented.	
CONDITIONS This cettificate is conditional upon fulfilli	ng the requirements of 10 CFR F	Part 71, as applicable, and the condition	s specified below.	
casks appro 5,516 mm lo pressure ve flange, sep B4C + Cu pl main shield resin. A w shell. Rad surface of rows of fin The lid is shields. T 1-1/4-inch located wit the cask is radial guss limiter, co drum with f penetrate t addition, a The lid of the cavity removed. T	and resin shielde ximates a right co ng. The cavity co ssels welded to an arated by a T-shap ates. Each cavity ing consists of 13 et cement layer is ial copper fins ar the cask between e s and the Model No a welded stainless he pressure vessel diameter bolts and hin recessed groov surrounded by cir et plates and fill nstructed of carbo our, 1-1/4-inch bo he inner cavity ar 11 access ports ar the cask may be re length to 4,362 mm his arrangement wi	d irradiated fuel shi rcular cylinder 1,718 asists of three stain end plate and a circu is 230 x 230 mm and a 5 mm of lead, 26 mm of located between the e welded to the outer ach end drum. The Mod . TN-8L has 104 rows of steel shell containing s are closed and seal two silicone rubber es on the top flange. cular stainless steel ed with balsa wood. In steel and balsa wood of the vent and dra e equipped with posit e protected by the im cplaced with a modifien for to 4,394 mm with and tie-down of the contained and the contained the contained the contained the contained the contained the contained the contained the contained the contained the contained the contained the contained the	mm in diamete less steel squ ular stepped f arrounded with 4,280 mm long. 5 steel and 19 lead and the o shell and cov del No. TN-8 h of fins. mg lead and re ed by sixteen, or Viton O-rin Each extrem drums reinfon A disk shaped d is fastened ain lines which ive closures. pact limiters. d lid which in the lid plate "Configuration	er and lare cop The 00 mm of outer ver the has 150 esin ngs ity of rced by impact to each ch In horeases n X."

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(3) Drawings

The Model No. TN-8 packaging is constructed in accordance with Transnuclear Drawing No. 9317.01, Rev. J. The Model No. TN-8L is constructed in accordance with Transnuclear Drawing No. 9317.138. Rev. A. The materials of construction and welds shall be in accordance with Annex A. B. and C to Chapter II of the Application.

The lid for Configuration X is constructed in accordance with Transnuclear Drawings Nos. 9040-500-1, Rev. 1,9040-500-2, Rev. 1 and 9040-500-3, Rev. 0. REGULA

- (b) Contents
 - (1) Type and form of material
 - specifications: Fuet form Clad UO, Pellets Zr or SS Qladding Material 469 Maximum initial U content/assembly, kg Maximum average initial 8-235 enrichment with Zr cladding, w/o 3.6 Maximum average initial U-235 enrichment with 35 cladding, w/o 4.0 Maximum berodle cross section, in 8.5 Maximum active fuel length, in 146 Minimum cooling time, day 150 Maximum weight/fuel-assembly 733: and Group I fuel assemblies Initial fuel pin pressure at 100°F, psig 250 Maximum average burnup, MWD/MTU 38,500; or Group II fuel assemblies

(i) Irradiated PWR uranium oxide fuel assemblies of the following

Maximum average burnup, MWD/MTU

36,000

For the casks in Configuration X, the minimum cooling time of the fuel assemblies shall be 1,460 days with the lid plate installed and 2,190 days with the lid plate removed.

(ii) Solid non-fissile irradiated hardware. As needed, appropriate component spacers must be used when loading irradiated hardware into the cask cavity to limit movement of the contents during accident conditions of transport.

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ARC ROOM FILE

- (iii) Intact BWR and PWR fuel rods. The rods shall be constrained by a basket or grid structure; initial U-235 content shall be less than 15.0 kg per rod bundle; cross sectional area of the rods, tubes, and full length structural material shall not be less than 29.6 square inches; and the bundle cross section shall not be greater than 8.5 inches. Maximum weight per bundle shall not exceed 733 kg. The Group I and Group II burnup limits of paragraph 5.(b)(1)(i) apply.
- (2) Maximum quantity of material per package
 - (i) For the contents described in Item 5.(b)(1)(i), Group I fuel assemblies:

Three PWR assemblies. The maximum decay heat load is not to exceed 35.5 kilowatts per package and 12 kilowatts per assembly for the Model No. TN-8 packaging and 23.7 kilowatts per package and 7.9 kilowatts per assembly for the Model Ne. TN-8L packaging.

(ii) For the contents described in Item 5.(b)(1)(i), Group II fuel assemblies:

Three PWR assemblies. The maximum decay heat load and the maximum free gas volume are not to exceed the limits listed in the table below:

Decay Heat per Shipment, kw(a)	Maximum Free Gas for 3 Assemblies m ³ (NTP) ^(D)	Configuration X Maximum Free Gas for 3 Assemblies m (NTP)
1.5	0.558	0.601
3.0	0.543	0.585
9.0	0.483	0.520
15.0	0.441	0.475
21.0	0.408	0.439
27.0	0.384	0.413

Notes: (a) Decay heat load per assembly must not exceed 7.9 kilowatts for Model No. TN-8L packaging.

(b) NTP conditions are 25°C and one (1) bar.

*****	BIS NUCLEAR REDUCTORY COMMISSION
NRC FOR	CONDITIONS (continued)
Page	4 - Certificate No. 9015 - Revision No. 17 - Docket No. 71-9015
5.	(b)(2) (Continued)
	(iii) For the contents described in Item 5.(b)(1)(iii): Three rod bundles. The maximum decay heat load and maximum free gas volume are not to exceed the limits listed in Paragraph 5.(b)(2)(ii).
	(c) Fissile Class III
	Maximum number of packages per shipment One (1)
6.	Group I and Group II fuel assemblies, either Zr or SS clad, and bundles of PWR and/or BWR fuel rods that individually meet all the appropriate specifications of $5.(b)(1)(i)$, $5.(b)(2)(i)$, $5.(b)(2)(i)$, $5.(b)(2)(i)$, and $5.(b)(2)(ii)$ above may be packaged in any combination.
7.	PWR assemblies may be shipped either with or without burnable poison rod, thimble plug, or control rod assemblies.
8.	As needed, appropriate component spacers may be used in the eask cavity to properly position the fuel assemblies.
9.	The maximum weight of the concerts (fuel assemblies, component spacers, inserts, irradiated hardware, etc.) must not exceed 2,200 kg.
.0.	The cask cavity must be dry the free water) when delivered to a carrier for transport. Residual menoture must be promotly removed from the cask cavity by the methods described in Andex I to Chapter Will of the Application. For contents 5.(b)(1)(i) and 5.(b)(1)(its), the cavity must be promptly backfilled with 1.0 atm of helium, nitrogen, or argon gas.
11.	Known or suspected failed fuel assemblies (rods) and fuel cladding defects greater than pin holes and have ine cracks are not authorized.
12.	For contents 5.(b)(1)(ii), the dryness verification test is required but leakage tests for containment assembly verification are not required.
13.	The package contents must be so limited that under normal conditions of transport, the total dose rates must not exceed 17 mrem/hr at one meter from the surface of the package.
14.	Any system used for cooling down the package must be provided with a pressure relief device set so that the maximum pressure in the containment vessel cannot exceed 7 atmospheres during the cool-down process.
15.	The systems and components of each packaging must meet the periodic tests and criteria specified in Chapter VIII of the Application. The K verification and shielding efficiency verification tests in Chapter VIII of the Application must be performed on each packaging within the two year period preceding any shipment of contents listed in $5(b)(1)(i)$ and $5(b)(1)(iii)$. The K verification and shielding efficiency verification tests need not be performed on packaging during periods (which may exceed two years) when only irradiated hardware as specified in $5(b)(1)(ii)$ is shipped.
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NRC FORM	
	5 - Certificate No. 9015 - Revision No. 17 - Docket No. 71-9015
rage	
16.	In addition to the requirements of 10 CFR Part 71:
	(a) The package must be prepared for shipment and operated in accordance with the Operating Procedures in the application dated March 25, 1991.
	(b) Each package must be tested, repaired and maintained in accordance with the Acceptance Tests and Maintenance Procedures in the application dated March 25, 1991.
	All valves, fittings, seals and relief devices must be of the type, size, model and manufacture as indicated on the design drawings. The resin material must be of the specifications stated in Annex A to Chapter II of the Application.
	In accordance with Annex L to Chapter VIFF, at periodic intervals not to exceed two years, the thermal performance of the cask must be analyzed to verify that the cask operation has not degraded below that which is hicensed*. Following the initial acceptance tests, the heat source may be that provided by the decay heat from the loading of the package, provided that the heat source is equal to at least 25% of the design heat load for the package. Each cask that fails to meet the thermal acceptance criteria given in Annex L of the Application must be withdrawn from service until corrective action can be completed or the license amended to limit the package to a lower heat load.
19.	The Configuration X lid shall be operated and maintained in accordance with Annex N to Swapter VIII, in the application dated March 25, 1991.
20.	The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR \$71.12.
21.	Expiration date: May 31, 1996.
Trans	nuclear, Inc. application dated March 25, 1991
Supp1	ements dated: April 22, 1991.
	FOR THE U.S. NUCLEAR REGULATORY COMMISSION
	Charles Reconcerned Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS
Date:	MAY 1 7 1991
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D CIFR 71		FOR RADIOACTIV	E OF COMPLIAN	KAGES		
+ CENTIFICATE NUMBER	2	b. REVISION NUMBER	C. PACKAGE IDENTIFICA	TION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAGE
& CENTIFICATE NUMBER		9	USA/9016/B()F	1 1	4
of Federal Regula b. This certificate do applicable regula	tions, Part 71, "Packaging was not relieve the consign tory agencies, including t	ackaging and contents desc and Transportation of Rad nor from compliance with an the government of any cour	ny requirement of the regulation of the regulati	ations of the U.S. I the package will b	Department of Trans	
Transnuclear, Two Skyline I Hawthorne, N	d Address) , Inc.)rive / 10532-2120	Tra Mar EAR c DOCKE	nsnuclear, Inc. ch 25, 1991, as RE 71-9016	applicati supplemen	on dated ted.	
4. CONDITIONS This certificate is co	nditional upon fulfilling th	e requirements of 10 CFR	Part 71, as applicable, and	the conditions spe	ecified below.	
5. (a) Packa (1) (2)	Model No.: T Description A lead, steel casks approxin 5,756 mm long pressure vess flange, separ total of seve main shieldin resin. A wet shell. Radia surface of th The lid is a shields. The 1-1/4-inch di located withi the cask is s radial gusset limiter, cons drum with fou penetrate the	And resin shie mates a right c The cavity c els welded to e ated by thin co n square compar g consists of 1 cement layer i 1 cepper fins a e cask between welded stainles pressure vesse ameter bolts an n recessed groo urrounded by ci plates and fil tructed of carb r, 1-1/4-inch b inner cavity a access ports a used for lifti	ircular cylinde onsists of thre nd plates and a oper plates. Th twents, 150 x 1 28 mm of lead, s located betwe re welded to th each end drum. s steel shell c ls are closed a d two silicone ves on the top rcular stainles led with balsa on steel and ba olts. The vent re equipped wit	r 1,718 mm e rectangu circular e bays are 50 mm and 26 mm of s en the lea e outer sh ontaining nd sealed rubber or flange. E s steel dr wood. A d lsa wood i and drain h positive the impac	in diamete far, stainl stepped top divided in 4,520 mm lo teel and 15 d and the o ell and cov lead and re by sixteen, Viton O-rin ach extremi ums reinfor isk shaped s fastened lines whic closures. t limiters.	r and ess steel to a ng. The 0 mm of uter er the sin gs ty of ced by impact to each h In

NAC FO	DRM 6184			CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
Page	2 -	Certi	ficate	e No. 9016 - Revision No. 9 - Docket No.	71-9016
5.	(b)	Cont	ents		
		(1)	Туре	and form of material	
			(1)	Irradiated BWR uranium oxide fuel assemb specifications:	lies of the following
				Fuel form Cladding material Initial fuel pin pressure at 100°F, psig Maximum initial U content/ assembly, kg Q REC/	Clad UO, Pellets Zr or SS 200 201
				assembly, kg Maximum average initial U-235 enrichment, W/o Maximum bundle cross section, in Maximum active fuel length, in Average burnup, MWD/MTD Minimum cooling time, day	2.65 5.52 144 36,500 150
			(11)	Maximum weight/fuel assembly, kg Solid non-fissile irradiated hardware. appropriate component spacers must be us thradiated hardware into the cask cavity movement of the contents during accident irransport.	ed when loading
		(2)	(i)	num quantity of material per package Seven BWR assemblies. The maximum decay not to exceed 24.4 kilowatts and 3.5 kil needed, appropriate component spacers ma cavity to properly position the fuel ass The maximum weight of the contents (fuel spacers, inserts, isradiated bardware, e	owatts per assembly. As be used in the cask emblies. assemblies, component
				2,110 kg.	
		(c)	Fiss	ile Class	III
			Maxin	num number of packages per shipment	One (1)
6.	tran meth 5.(b	sport ods d (1)(1)(. Rei lescril i), tl	y must be dry (no free water) when delive sidual moisture must be promptly removed bed in Annex I to Chapter VIII of the app he cavity must be promptly backfilled wit rgon gas.	from the cask cavity by the lication. For contents

THE REAL PROPERTY.

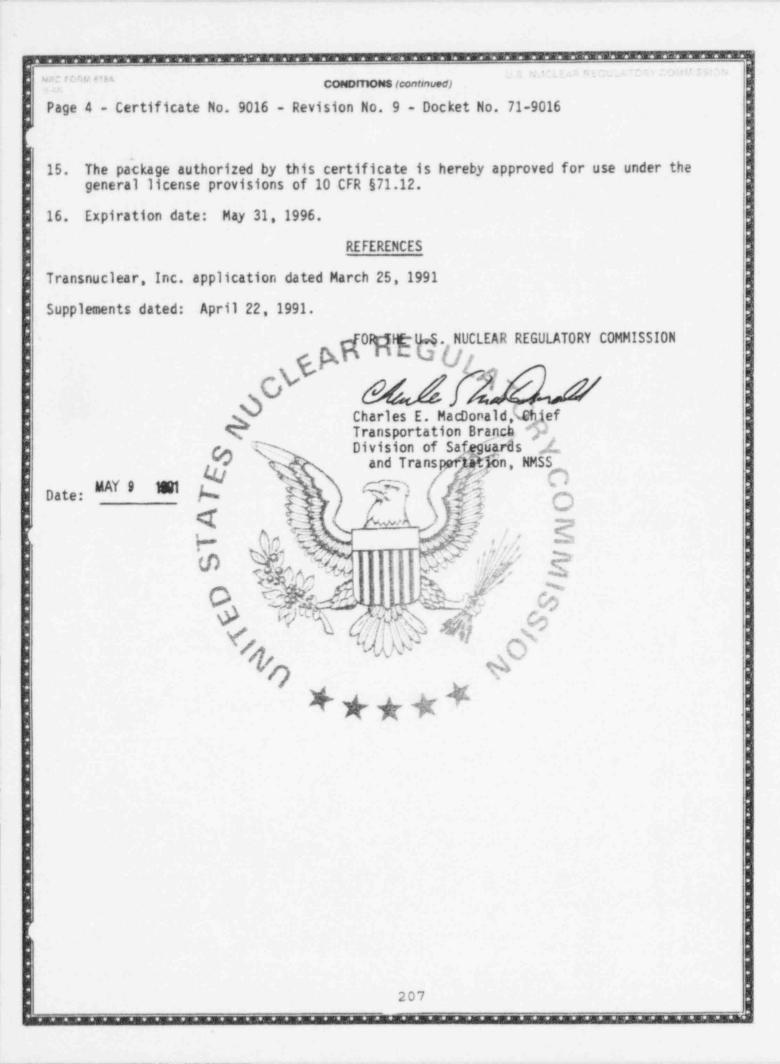
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Page 3 - Certificate No. 9016 - Revision No. 9 - Docket No. 71-9016 7. In addition to the requirements of Subpart G of 10 CFR Part 71:

- (a) The package must be prepared for shipment and operated in accordance with the Operating Procedures in Chapter VIII of the Application.
- (b) Each package must be tested and maintained in accordance with the Acceptance Test and Maintenance Procedures in Chapter VIII of the Application.
- 8. Known or suspected failed fuel assemblies (rods) and fuel with cladding defects greater than pin holes and hairline cracks are not authorized.
- For contents 5.(b)(1)(ii), the drmess reciffication test is required but leakage tests for assembly verification are not required.
- 10. The package contents must be so limited that under normal conditions of transport, the total dose rates must not exceed 14 mrem/hr at one meter from the surface of the package.
- 11. Any system used for cooling down the package must be provided with a pressure relief device set so that the maximum pressure in the containment vessel cannot exceed 7 atmospheres during the cool-down process.
- 12. The systems and components of each packaging must meet the periodic tests and criteria specified in Chapter WIN of the Application. Each packaging that fails to meet these criteria must be withdrawn from service until corrective action has been completed.

- 13. All valves, fittings, seals and period devices must be of the type, size, model and manufacture as indicated on the design drawings. The resin material must be of the specifications stated in Annex Arto Chapter II of the Application.
- 14. In accordance with Annex L to Chapter WIN, at periodic intervals not to exceed two years, the thermal performance of the cask must be analyzed to verify that the cask operation has not degraded below that which is licensed*. Following the initial acceptance tests, the leat source may be that provided by the decay heat from the loading of the package, provided that the heat source is equal to at least 25% of the design heat load for the package. Each cask that fails to meet the thermal acceptance criteria given in Annex L of the Application must be withdrawn from service until corrective action can be completed or the license amended to limit the package to lower heat load.

* The thermal performance test is not required at periodic intervals when the maximum decay heat load per package does not exceed 25% of the design heat load.



OFR 71		FOR RADIOACT	TE OF COMPLIANCE TIVE MATERIALS PACKAGES	La puer un uner l	6. TOTAL NUMBER PAG
CERTIFICATE	NUMBER	b. REVISION NUMBER	USA/9019/AF	C PAGE NUMBER	4
of Federal	Regulations, Part 71, "Package	ng and Transportation of R	ascribed in Item 5 below, meets the applicable sa tadioactive Materia:" I any requirement of the regulations of the U.S. buntry through or into which the package will	Department of Transp	
A ISSUED TO I	NTE IS ISSUED ON THE BASIS OF Nerve and Address!	A SAFETY ANALYSIS REPOR	IT OF THE PACKAGE DESIGN OR APPLICATION E AND IDENTIFICATION OF REPORT OR APPLICAT		
P.O. Box	Electric Company 780 on, NC 28401	EAF	General Electric Company September 14, 1993, as su REG 71-9019		dated
CONDITIONS	e is conditional upon fulfilling	the equirements of 10 CF	R Part 71, as applicable, and the cognitions sp	ecified below.	
	kaging <	>	0		
(1)	Model No. : BU.	7 0	22	*	
(2)	Description	200		~	
(2)	-		x) (43	-	
	The packaging (consists of up	to two 5-gallenfor up to ge steel parts contained i	hree 3-gallo	on,
	11.25-1060-10, 14.05-inch.diat	my a mountaine gard	1 27-inch baigs inner/conta	Aner. The	
	container is c	instructed of 1	B gauge Min mum, or 14 gaug	e maximum st	
	bolted and gas		nd supported in 22.5-in		
	55-gallon canad	ity steel and	the solution instating mate	rial compose	ed of fire-
	retardant phen	olic foam (7-9	a 12-gauge this ure ring wi)rum closure	is provide
	by a 16-gauge	frum cover and	a 12-gauge sure ring wi	ith drop for	ged lugs
	located between	the inner con	8-tinen-diameter bottand r tainer and steel arts is	required for	r the
	contents as sp	ecified he ma	ximum weight of the package	ge, including	g contents,
	not to exceed	370 poures.	444		
(3)	Drawing	~			
		is constructed 2D1592, Rev. 12	in accordance with General	l Electric Co	ompany
	brawing no. 11		*		

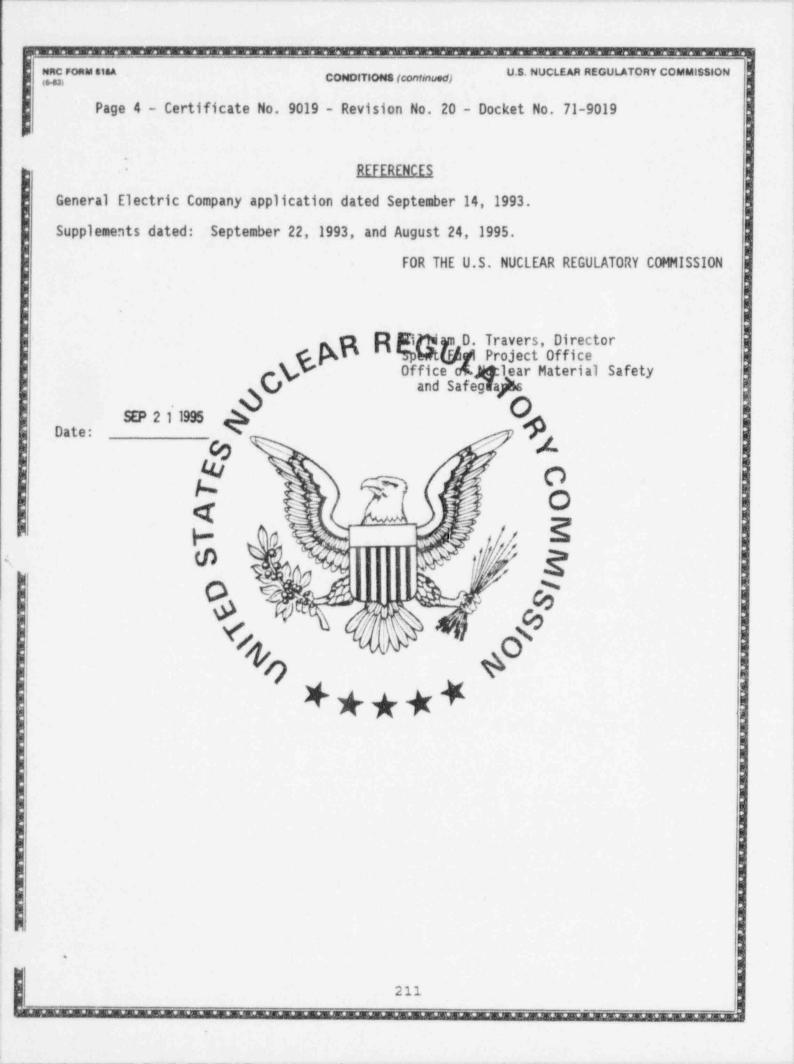
NRC FORM 618A (6-63)		U.S. NUCLEAR REGULATORY COMMISSION
(6-83)	CONDITIONS (continued)	

Page 2 - Certificate No. 9019 - Revision No. 20 - Docket No. 71-9019

- 5. (b) Contents
 - (1) Type and form of material
 - (i) Uranium oxide powder enriched to not more than 5.0 w/o in the U-235 isotope. The maximum H/U atomic ratio shall not exceed 1.6. Exclusive of the boral liner, the mass of moderating materials within the inner container when added to the total mass of moderator within the fuel shall not exceed 5.2% of the weight of the uranium oxide.
 - (ii) Uranium oxide as pellets or a mixture of powder and pellets enriched to not more than 4.10 w/o in the U-235 isotope. The maximum H/U atomic ratio shall not except pr455 to the boral liner, the mass of moderating materials within the inner container when added to the total mass of moderator within the fuel shall not exceed 3.7% of the weight of the uranium oxide.
 - (iii) Uranium materials in the form of solids or solidified or dewatered materials. Uranium may be enriched to not more than 5.0 w/o in the U-225 isocone. Uranium-bearing managerals may include oxides, carbres, silicate, or other compound of uranium. The uranium compound density shall not ceed 19.90 g/cm³ frompounds of uranium may be mixed with other non-siscine materials. Any degree of maderation may be present.
 - (2) Maximum quigitity of mater and stor pairs shall at exceed 209 pounds Weight of content of and all liner and stor pairs shall at exceed 209 pounds
 - (i) For the contents described in 5(b) (Party, the maximum contents per package shall be limited to accordance with the following table:

Maximum U-235 Enrichment w/o	Maximum 02 With at the rand iner kgs	Per Package with boral liner kgs
2.85	46.0	70.0
3.06	42.0	65.0
3.50	33.0	50.0
4.10	27.0	40.0
4.31	25.0	38.0
4.60	23.0	35.0
4.85	21.0	31.0
5.00	20.0	30.0

NRC FOR	080808 M 616A			COND	ITIONS (continued	115	S. NUCLEAR REGULA	TORY COMMISSIO
6-83)	Page	3 -	Certificate	No. 9019 - Re			No. 71-9019	
		1						
5.(b)(2)	Maxi	mum quantity	of material (per package	(Cont'd)		
	(ii)	package, wi	tents describ th the boral in accordance	liner insert	ed inside	e maximum conte the inner cont ble:	ents per tainer, shall
							m UO ₂ Per	
			Maximum U-2 Enrichment,	35			le, with liner,	
			w/o			inclusion of the objects	kgs	
			3.06 4.10		DEC	2	0.0	
				EAR	REG ed in 5(b)(1	41		
	(111)	For the con	CV		YY		
			Maximum 17.	53 kg uranium	per package	with the	boral liner.	
	(c)	Fiss	ile Class		I		P	
6	Powd	or or	nelle	when any	quantity of	Bium	oxide, provid	led the total
0.	mass	of u	ranium xide	plus undolin	ium_oxide do	e not exc	eed the uraniu	m oxide mass
	limi	ts in	5(b)(2).		711		0	
7.	For	conte	nts describe	d in the	i fundapilio	alate a	nd/or mmonium	bicarbonate
	addi	tives 1 C H	(or ther a density in	dantings and	hich the days	end ours	greater than 1 grams/cm ³) are exceed 1.27.	.0 and the permitted in
	the	UO ₂ p	owder to the	Stephen that I	ne du bret	o does fot	exceed 1.27.	
8.	In a	dditi	on to Ra re	quiting the		EROCFR P	arter 1:	
			Y	with	MARK	Sim.	Ca	and the second
	(a)	oper	ating proced	gres in section	on shoot th	e appljoat	in accorda	ince with the
	(b)			5		Carl	tenance progra	
	(0)	5.2,	5.3, and 5.	4 of the accord	ication.		cenance progra	IN OF SECTION
9.	The	nacka	ae authorize	d by this cert	tificate is	hereby ann	roved for use	under the
				sions of 10 Cl		nereby app	loted for doc	under ene
10.	Expi	ratio	n date: Nov	ember 30, 1998	8.			



URC FORM 511 (5-85) 10 CFR 71			TE OF COMPLIA	NCE	LEAR REGULA	TORY COMMISSIO
1. CERTIFICAT	E NUMBER	6 REVISION NUMBER	C. PACKAGE IDENTIFIC USA/9023/B(d. PAGE NUMBER	6. TOTAL NUMBER PAG
of Feder	al Regulations, Part 71, "Pack	the packaging and contents desc aging and Transportation of Rac onsignor from compliance with a ding the government of any coul	licactive Material." ny requirement of the regu	lations of the U.S. De	partment of Trans	
LISSUED TO Iclear As 51 Crook iite 200	CATE IS ISSUED ON THE BASIS (Name and Address) Surance Corporat (ed Creek Road GA 30092	tion Nuc	DE THE PACKAGE DESIGN O IND IDENTIFICATION OF REF lear Assurance ed November 18, Package 71-9023	Corporation	, applicat	
4. CONDITIONS This certific	ate is conditional upon fulfill	ing the requirements of 10 CFR	Part 71, as applicable, and	the conditions speci	fied below.	
 Packa (1) (2) 	Model No.: MLI Description A lead, water, shipping cask, limiters, and mu of the packagin inches long by of lead and 9 i bottom end forg sheet is encased closure heads a The lead shield 2-inch stainless 0.75-inch stain stainless steel	depleted uranium a encased in stainle ounted to a railca g for normal condi 96 inches in 00. nches of water. D ing and cask inner d in the bottom ep	ss steel, equip r which is cons tions of transp The principal s epleted uranium closure head. d and positione 0.75-inch sta 1. The outer s acket shell. ends. Four wa	pped with ba sidered to b port. The c shielding co n plates are High tempe ed between t inless steel shell is sur The three sh ter expansio	lsa impact e an integ ask body i nsists of encased i rature pol he inner a inner she rounded by ells are w n tanks ar	ral part s 204.5 6 inches n the ymer and outer ell and a ra welded to re

Page 2 - Certificate No. 9023 - Revision No. 6 - Docket No. 71-9023

5. (a) Packaging (continued)

(2) Description (continued)

The primary containment vessel is comprised of the 0.75-inch inner shell and the inner closure head. It is 179.5 inches long and has a 45-inch incide diameter. The inner closure head is held in place by sixteen bolts, and is sealed with a metallic O-ring. Secondary containment is provided by the outer closure head which is bolted, and has a Viton or silicone O-ring seal. There is no direct penetration between the containment cavity and the ambient. The two penetrations into the containment cavity are from the space between the inner and outer closure heads, which has a single penetration through the cask body connecting it with the ambient. The two lid penetrations are sealed with 1.5-inch quick-disconnect valves and metal O-ring seals each in a valve box arrangement.

The radioactive contents are positioned within the containment cavity using neutron poisoned aluminum baskets and internal support structures. The PWR and BWR fuel basket cavities are lined with neutron absorber sleeves composed of a silver-indium-causium (80-15-5 w/o) allog

An auxiliary cooling system, mounted to the railcar, is used to maintain the cask and fuel temperatures so as to facilitate handling and cooldown.

The fully loaded cask, excluding the railcar, is approximately 194,000 pounds, which includes a maximum gross weight of the cavity contents of 34,100 pounds (fuel, spacers, fuel basket, etc.).

(3) Drawings

The Model No. NL1-10/24 shipping cask is constructed in accordance with the NL Industries, Inc. and National Lead Company Drawing Nos. as specified on page XVIII-1, Rev. 9 and page XVIII-2, Rev. 8, in Section XVIII of the application.

5. (b) Contents

(1) Type and form of material

Irradiated PWR and BWR uranium oxide fuel assemblies of the following specifications:

* * * * *

RC FORM FIEA	c	ONDITIONS (continued)	D.S. NUCLEAN	REGULATORY COMMISSIO
Page 3 - Certificate I	No. 9023 - Revis	ion No. 6 - Docket No	. 71-9023	
5. (b) Contents (1) (continued)			
Fuel form		Clad UO2 pellets	C1 ad	BWR U02 pellets
Cladding ma	terial	Zr or SS		Zr or SS
Maximum ini content/ass		475		200
Maximum ave U-235 enric	rage initial hment, w/o	0 BEO.		2.8
Maximum ini content/ass	tial U-235 EP	R REGUL	1>	5.6
Maximum bun section, in	Charles -	9.00	00	5.75
Fuel pin ar number of p		14x14/15x15 16x16/17x17	72	7x7/8x8
Maximum act length, ine		244	0	144
Maximum spe kw/kgU	cific power,	40	MM	27
Maximum ave MWD/MTU	mage burnup	35,500	S	29,700
Minimum coo days	ling time,	- 440-150	0	150
The PWR typ	e assemblies may	be shipped either w	ith or witho	ut control rods.
(2) Maximum qua	antity of materia	l per package		
The maximum	n decay heat load	per package not to	exceed 70 ki	lowatts, and:
Ten PWR fue	assemblies or	twenty-four BWR fuel	assemblies.	
Above assem on NL Indus	mblies must be co stries, Inc. and	ontained in their res National Lead Compan	pective fuel y Drawing No	baskets as shown
70653F, She	eet 1, Rev. 7 PWF eet 2, Rev. 5 10, eet 1, Rev. 7 BWF eet 2, Rev. 5 10,	/24 Rail Cask R Fuel Basket,		

Page 4 - Certificate No. 9023 - Revision No. 6 - Docket No. 71-9023

5. (c) Fissile Class

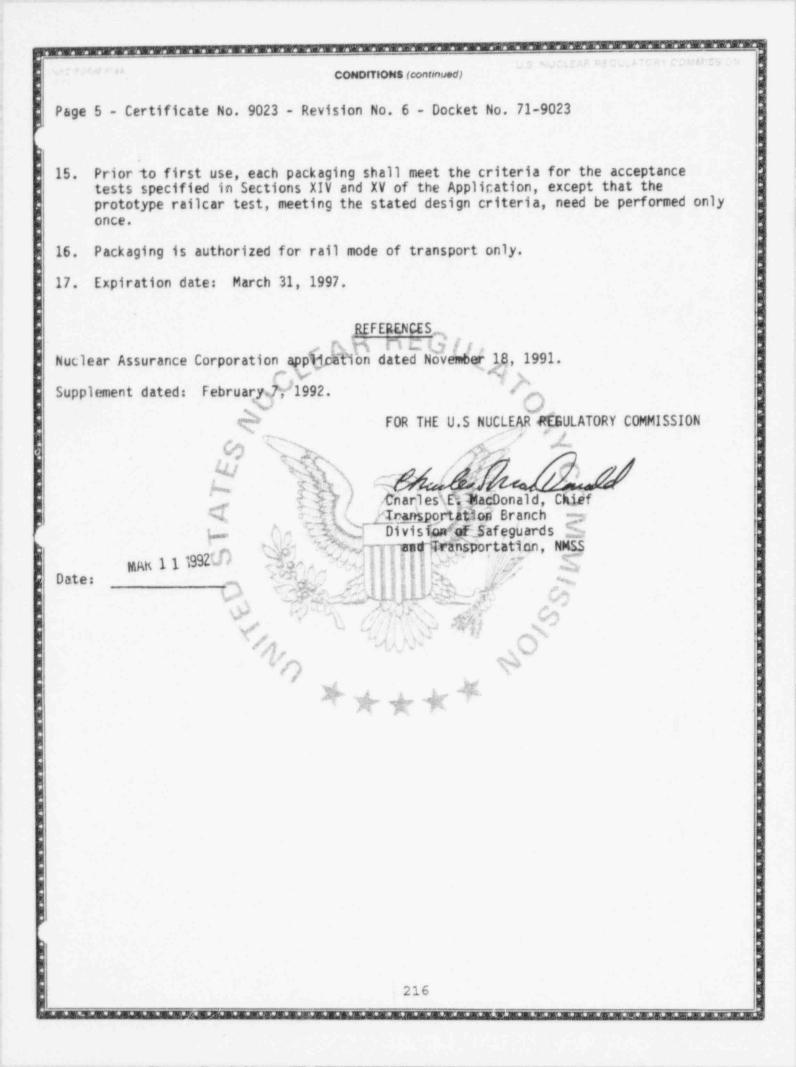
ARC FORM STAN

III

Maximum number of packages per shipment for Class III One(1)

 The maximum gross weight of the cavity contents must not exceed 34,100 pounds (fuel, spacers, basket, etc.).

- 7. The containment vessel must be dry (no free water) when delivered to a carrier for transport. Residual moisture must be promptly removed from the containment vessel by the methods described in Sectin XVI of the Application. The containment vessel must be promptly filled with helium to 1.0 atm pressure.
- Known or suspected failed fuel assemblies (rods) and fuel with cladding defects greater than pin holes and hairline cracks are not authorized.
- 9. The cask contents must be so limited under normal conditions of transport that the following measured dose rates be satisfied:
 - a) at one meter from the external radial midplane surface of the package: 625 times the newtron dose rate plus 2.5 times the gamma dose rate will not exceed 1,000 millirems per hour; and
 - b) at one meter from the external surface of the bottom of the package; 115 times the neutron dose rate plus 2.0 times the gamma dose rate will not exceed 1,000 millirems per hour.
- The neutron shielding system and auxiliary cooling system must be filled with a mixture of water and ethylene glycol (53% to 58% by weight ethylene glycol).
- The neutron shielding system must be equipped with two pressure relief valves (one on the cask and one on an expansion tank) set at 220 psig.
- 12. Any system used for cooling down the parkage must be provided with a pressure relief device set so that the maximum pressure in the containment vessel cannot exceed 233 psig during the cooldown process.
- The systems and components of each packaging must meet the criteria for the periodic tests specified in Section XVII of the Application.
- 14. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (i) Each packaging must meet the acceptance tests and be maintained in accordance with Section XVII of the Application, and
 - (ii) The package must be prepared for shipment and operated in accordance with the Operating Procedures of Section XVI of the Application.



IRC FOR	618			CERTIFIC	ATE OF CO	MPLIANCE		CLEAR REGULA	TORY COMMISSI
CERTI	9027	MBER	6	REVISION NUMBER	C. PACKAO	USA/9027	B(U)	d PAGE NUMBER	Te TOTAL NUMBER PAG
of F	s certifica Federal R	egulations, Part 7	1, "Packaging a	kaging and contents nd Transportation of from compliance wi government of any	Radioactive Mate	rial." It of the regulations	of the U.S. (Department of Tran	
		E IS ISSUED ON TI	HE BASIS OF A SA	AFETY ANALYSIS REPO	ORT OF THE PACKA	GE DESIGN OF APPL	ICATION	DN:	
A) 4	mersh O Nor	am Corpor th Avenue gton, MA			Amersham	Corporation ptember 16	on appl		
CONDIT This of	TIONS	is conditional up	on fulfilling the	requirements of 10 C	CFR Part 71, as ap	plicable, and the co	pations spe	cified below.	
5.			0				00		
(a)	Pack	aging	5	R		(B)	2 2		
	(1)	Model No	5741,	7418 741A	, 241AE, 7	418 and 74	IBE C	2	
	(2)	Descript	Ten		hund)自己	C	2	
		consist material position Tamper-p shipping	of an out deplete in the root seal plate is on during	s ane provi	e pi, mcer bield, ac dec.ow the r the source	Cable Jock	king de and a mechan f the p	vice and sh 1/4-inch th ism for add	are securel, hipping plug hick steel
	(3)	Drawings		××	++	*		Jandara Taral	
				constructed Drawings:	1 MPGaccime	lance with	the toi	lowing lect	nnicai
				ll and 741E Sheets 2 and			Sheets	1-5, Rev.	6; Drawing
		(ii) Mod Rev	el No. 74 . 6; Draw	VIA, 741B, 7 ving No. 857	41AE, 7418 90, Sheets	BE - Drawin s 1 and 2,	g No. 7 Rev. B.	4190, Shee	ts 1-5,
		Mod	el Nos. W	with an E su	iffix have	an electri	cal cir	cuit.	

E.

NRC FORM 6154 16.831

COMDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

age 2 - Certificate No. 9027 - Revision No. 9 - Docket No. 71-9027

5. (b) Contents

(1) Type and form of material

Cobalt 60 or iridium 192 as sealed sources which meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package.

33 curies of cobalt 60; or 240 curies of iridium 192.

The source shall be secured in the shralped position of the packaging by the source assembly. The source assembly nust be fapricated of materials capable of resisting a 1475 'F fire end forment for one-halt howr and maintaining their positioning function. The source assembly must engage the locking device. The source assembly must be of sufficient length and diameter to provide positive positioning of the source within the depleted uranium scield assembly. 6.

In addition to the requirements of Subpart G of 10 CFR Part 11: 7.

- (a) The package shall be prepared for shipment operate on accordance with the operating Propared for shipment operate on accordance of the apprication; and the section 15.2. (dated September 1991) eptember 1991)
- Stand Main Main Program of Section (b) The package must meet the sceptance 8.0 of the appl totolon.
- The package authorized by this general license provisions approved for use under the 8. herek ton

REFERENCE

Expiration date: Wovember 30, 41995 9.

Amersham Corporation application deted September 16, 991

Supplements dated: February 20, April 16, August 27, and September 4, 1992 and February 3, 1995.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cars R. Chappel

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

Date:

FFR 0 3 1995

RC FORM 618		CERTIFIC	CATE OF COMPLIANCE	UCLEAR REGULA	TORY COMMISSIC
A CERTIFICATE NA 9028	MBER	E REVISION NUMBER	USA/9028/B(U)	C PAGE NUMBER	e. TOTAL NUMBER PAG
of Federal Ri	eguistions, Part 71, "Packagin	ng and Transportation o			
 b. This certification applicable relationships 	ste does not relieve the consi- igulatory agencies, including	onor from compliance w the government of any	ith any requirement of the regulations of the U.S country through or into which the package will	 Department of Trans be transported. 	sportation or other
THIS CERTIFICAT	E IS ISSUED ON THE BASIS OF	A SAFETY ANALYSIS REP	ORT OF THE PACKAGE DESIGN OF APPLICATION TLE AND IDENTIFICATION OF REPORT OR APPLICAT	TION	
mersham Co O North Av urlington,		E A	Amersham Corporation, Inc. dated September 16, 1991, REGISTRIANS	application as supplement	n nted.
CONDITIONS This certificate i	s conditional upon fulfilling i	the requirements of 10 (CFR Part 71, as applicable, and the conditions a	pecified below.	
5.			0		
(a) P	ackaging		199	1	
(1) Model Nos.:	684, 684E, 6	584A, 684AE, 684B, and 684B	E	
(2) Description	(1)	27(醇)	ő	
(consist of a potting mate contents are locking devi the packagin the source	in puter steel rial, deplete securely po- ice and shipp og, and a 1/4- ocking mechan	shielded Gamma Ray Projecto I shell, Internal bracing, ed uranium shield, and an " sitioned in the "S" tube by ing plug. Tamper-proof sea inch thick steel shipping hism for additional protect backage is approximately 22	polyurethan S" tube. The a source ca ls are provi plate is bo ion during	e he able ided on lted over
	The packagin Corporation	ng is construct Inc., Drawin	cted in accordance with the	following /	Amersham
	68490,	Sheets 1 thro	ough 5 of 5, Rev. G, and		
		and <u>684E:</u> Sheets 2 and	3 of 3, Rev. A		
			4B and 684BE: 2 of 2, Rev. 0.		

Page 2 - Certificate No. 9028 - Revision No. 8 - Docket No. 71-9028

- 5. (b) Contents
 - (1) Type and form of material

Cobalt-60 or iridium-192 as sealed sources which meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package

11 curies of cobalt-60; or 240 curies of iridium-192

- 6. The source shall be secured in the shipided position of the packaging by the shipping plug, source assembly, and locking device. The shipping plug and source assembly must be fabricated of materials capable of resisting a 1475°F fire environment for one-half-hour and maintaining their positioning function. The ball stop of the source assembly must engage the locking device. The flexible cable of the source assembly and shipping plug must be of sufficient length and diameter to provide positive positioning of the source in the shielded position.
- The name plates shall be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and material their legibility.
- 8. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) Each packaging must meet the Acceptance Jests and Maintenance Program of Chapter B of the application, and
 - (b) Each package must be prepared for shipment and operated in accordance with the Operating Procedures of Section J.5.1 (dated September 1991) of the application.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 10. Expiration date: January 31, 1996

REFERENCE

220

Amersham Corporation, Inc. application dated September 16, 1991.

Supplements dated: February 20, April 16, August 27 and September 4, 1992.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

SEP 1 1 1992

Date:

BC FORM 618 (65) (2FR 71	And the second		E OF COMPLIANCE		ATORY COMMISSI
CERTIFICATE NUMBE		REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9029/B(U)	d PAGE NUMBE	R I. TOTAL NUMBER PAG
PREAMBLE a. This certificate is of Federal Regula	issued to cartify that the pack tions, Part 71, "Packaging at bes not relieve the consignor	aging and contents descr nd Transportation of Radio from compliance with any	bed in Item 5 below, meets the applicabl	J.S. Department of Tra	
Amersha 40 Nort		b. TITLE AN	THE PACKAGE DESIGN OR APPLICATION ID IDENTIFICATION OF REPORT OR APPLIC rsham Corporation, app tember 16, 1991, as su REG (19029	lication dat	ed
CONDITIONS		Cr.	10 L	enerified below	A CONTRACTOR OF A CONTRACTOR OF A CONTRACTOR
	nditional upon fulfilling the	equirements of 10 CFR P	art 71, as applicable, and the constitions	specified below.	
(a) Pack	aging			C	
(1)	Model Nos. 67	6 and 676E, 67	6A, 676AE, 676B and 67	CEBE	
(2)	Description	() 5		0	
	polyupethane The contents locking devic the packaging the source lo The total wei	potting matern are securely p e and shipping and a 1743 uc cting mechanis	ter steet shell, inter al depletes uracium s osti oned in the "S" t lug Tamper proof s hinck steet shipping for additional prote kaging is approximated	the d, and a uppe by a sou s are pro plate is bo oction during	n "S" tube. rce cable vided on lted over transport.
(3)	Drawings	2	20		
	The package i Operations, I		in accordance with the	following T	echnical
			E - Drawing No. 67690, eets 2 and 3, Rev. Al.		Rev. H;
	(ii) Model N Rev. H;	o. 676A, 676AE Amersham Corp	, 676B and 676BE - Dra . Drawing No. 85790, S	wing No. 676 Sheets 1 and	90, Sheets 1 2, Rev. B.
	Model Nos. wi	th an E suffix	have an electrical ci	rcuit.	
5. (b)	Contents				
(1)	Type and form	of material			
	Cobalt-60 as radioactive m		which meet the requir	rements of sp	ecial form
(2)	Maximum quant	ity of materia	l per package		
	330 Curies.		221		

U.S. NUCLEAR REGULATORY COMMISSION NRC FORM SIBA CONDITIONS (continued) (6-83) Page 2 - Certificate No. 9029 - Revision No. 11 - Docket No. 71-9029 The source shall be secured in the shielded position of the packaging by the 6. shipping plug, source assembly, and locking device. The shipping plug and source assembly used must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintaining their positioning function. The ball stop of the source assembly must engage the locking device. The flexible cable of the source assembly and shipping plug must be of sufficient length and diameter to provide positive positioning of the source in the shielded position. The nameplates shall be fabricated of materials capable of resisting the fire 7. test of 10 CFR Part 71 and maintaining their legibility. In addition to the requirements of Subert G of 10 CFR Part 71:
 (a) The package shall be prepared for shipment and operated in accordance with the Operating Procedures in Section 7.9.1 (dated September 1991) of the application; and 8. The package must meet the Acceptance Tests and Merotenance Program of (b) Section & 0 of the application. ereby approved for use under The package addhorized by this certificate is the general provisions and of R 571.12. 9. Expiration date: October 90 10. Amersham Corporation applic September 4 and 11, 1992; April 16 Coruary 20. Supplements dated: ANOU 9 1995 September 6, 1994; and Peruary 3, FOR THE U.S. NUCLEAR REGULATORY COMMISSION asa Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS FEB 0 6 1995 Date:

RC FORM 618 965) 9 CFR 71			OF COMPLIANCE		LEAR REGULA	TORY COMMISSIC
& CERTINGATE NUMBER	b. REVISION		C PACKAGE IDENTIFICATION		S. PAGE NUMBER	. TOTAL NUMBER PAG
h This cadificate does not rel	171, "Packaging and Transp	ortation of Radioac	tive Material.	of the U.S. De	partment of Tran	
THIS CERTIFICATE IS ISSUED ON a ISSUED TO (Hume and Address)	THE BASIS OF A SAFETY ANAL	LYSIS REPORT OF T	HE PACKAGE DESIGN OF APPL DENTIFICATION OF REPORT O	ICATION R APPLICATION	¢	
epartment of the N aval Support Force 51 Lyon Street ort Hueneme, CA 93	, Antarctica	Teledy	MBER 71-9030	ms appli	cation dat	ted
CONDITIONS This certificate is conditional u	pon fulfilling the requirement	nts of 10 CFR Part	71, as applicable, and the co	montions speci	fied below.	
(a) Packagi (1) M	0	3000 and Se	ntinel-8	, sz		
(2) D	escription		SI AB	0		
e	nclude: the main Tectrical connec odel Nos. are as <u>Model No.</u>	s follows:	approximate di ension (inch)	wensions Weigh	and weigh t (1b)	nts for the
	MW-3000 Sentinel-8	- ally	24 0D x 23 24 0D x 25		700 200	
(3) D	rawings		6	2		
	he packagings an os.:	re construc	ted in accordan	ce with	the follow	ving Drawing
	<u>Model No.</u> MW-3000 Sentinel-8	Martin	<u>g Nos.</u> Co. Drawing No es, Inc. Drawin			10000
(b) Cont	ents					
(1)	Type and form	of materia	1			
			ubly encapsulat nts of special			
	The maximum qu	uantity of	material per pa	ckage		
(2)		The second				
(2)	Model No.	Quanti	ty			

Carlana and

Preventer 1

Page 2 - Certificate No. 9030 - Revision No. 6 - Docket No. 71-9030

- 6. Eye-bolts shall be removed or covered during transportation to prevent their use as tie-down devices of packages.
- 7. The MW-3000 and Sentinel-8 shall have their top steel cover plate bolted to the outer wrought steel shield at all times except when maintenance operations are being performed on the generator which require removal of the top steel cover plate.
- 8. Fabrication of additional units is not authorized.
- 9. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) The package shall be prepared for shipment and operated in accordance with the operating procedures in the supplement dated February 1, 1991.
 - (b) The package shall be maintained in accordance with the maintenance program in the supplement dated February 1, 1991.
- The packages authorized by this certificate are hereby approved for use under the general license provisions of 10 CFR §71.12.
- 11. Expiration date: October 31, 1995.

REFERENCES

Teledyne Energy Systems application dated November 12, 1990.

Teledyne supplement dated: February 1, 1991.

Department of the Navy supplement dated: February 7, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Caso R. Choppell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

FEB 1 7 1994

Date:

10 CFR 71			TE OF COMPLIANCE	NUCLEAR REGULA	
S. CERTIFICATE NU	MBER 9032	b. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAG
of Federal Rep b. This certificat	guiations, Part 71, "Packa e does not relieve the cor	ging and Transportation of Ra	scribed in Item 5 below, meets the applicabl	J.S. Department of Tran	
Amersham Co 40 North Av Burlington,	orporation Venue	b. TITLE	Amersham Corporation application September 24, 1993, as REG 6766932	plication dat	ed
4. CONDITIONS This certificate is	conditional upon fulfillin	acherequirements of 10 CFR	Part 71, as applicable, and the conditions	s specified below.	
5.	<	2	0	4	
(a)	(3) Drawin The pa	l encased ocanii y components com graterial ucan own assembly assembly if pos seals and a pada of the package	um shiended tridium-192 ist of an outer/steel s um shield, Titantum "U e source hold down asse tion within the crimped oct are provided on the is no greater than 90 pc nucted in accordance with No. 5500c, Rev. F, St	shead, polyur bebe, and s y secures "U" tube. Dackaging. bunds.	ethane ource the Tamper- Total
(b)	Contents				
		d form of materia	al sources which meet the r	requirements	of
	specia	l form radioactiv	ve material.	-	
			terial per package		
	240 cu	ries			
			225		

Page 2 - Certificate No. 9032 - Revision No. 7 - Docket No. 71-9032

- 6. The source shall be secured in the shielded position of the packaging by the source assembly. The source assembly must be fabricated of materials capable of resisting a 1475* F fire environment for one-half hour and maintaining its positioning function. The cable of the source assembly must engage the source hold-down assembly. The flexible cable of the source assembly must be of sufficient length and diameter to provide positive positioning of the source at the crimp of the "U" tube.
 - The nameplates shall be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining their legibility.
- 8. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) Each package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application, and
 - (b) the package shall be prepared for shipment in accordance with the Operating Procedures of Chapter 7 of the application, as supplemented.
- 9. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 10. Expiration date: October 31, 1999.

REFERENCES

Amersham Corporation application dated September 24, 1993.

Supplements dated May 10, and August 1, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cars R. Choppell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

Date:

SEP 2 0 1994

7.

RC FOR	NM 618				TE OF CO	ALS PACKA	E GES		TORY COMMISSI
. CERT	FICATE NUMBER		b. REVISIO	N NUMBER	C. PACKAGE	IDENTIFICATION	NUMBER	d. PAGE NUMBER	e TOTAL NUMBER PA
	9033			10	US	A/9033/B(U)	1	2
of	is certificate is issue Federal Regulation	s. Part 71, "Packag	ing and Trans	portation of Ra	dioactive Materi	1L."			
b. Th ap	iis certificate does i plicable regulatory	not relieve the cons agencies, includin	ignor from co g the governm	mpliance with a nent of any cou	ny requirement ntry through or	of the regulation into which the	is of the U.S. D backage will be	epartment of Trans transported.	portation or other
	ERTIFICATE IS ISSU		F A SAFETY AN	ALYSIS REPORT	OF THE PACKAG	E DESIGN OR AP	PLICATION OR APPLICATIO	N	
	40 North	Corporation Avenue n, MA 018		AR	Contombo		3 25 511	ication da pplemented	
			ch	C. DOCKE	TNUMBER	071-90	33		an la su danis at mar a suit a suit dan
This o	TIONS entificate is conditi	onal upon fulfilling	therequirem	ents of 10 CFR	Part 71, as appl	icable, and the	constions spec	ified below.	
h.		0	8				0		
a)	Packaging	69	3	2		A	7 da		
	(1)	Model N	o.: 560	660E.	660A, 660	ATE 660B	or 66085)	
	(2)	Descrip	tion		mind)	E	C		
		compone materia securel and shi	ntsi con 1 angani y poster oping pi	sist of um shiel oned in ug and	the SA	steel be, and ube by a seats an	shell, end plug source e provid	Projector The constant Projection Projection Projection Projector Projector Projector Projector Projector Projector The constant Projector The constant Projector The constant Projector The constant Projector The constant Constant Projector The constant Constant Projector The constant Constant Projector Pr	e potting ntents are ing device packaging.
	(3)	Drawing	ev.	Y	w		C		
				s constru Draving		ccordance	with the	e following	Technical
		(i) M	odel No.	660B - 1	Drawing N	o. 66025,	Sheets	1, 2 and 3	, Rev. F;
					awing No. 030, Shee			2, 3, and Rev;	4, Rev. B;
					rawing No , Sheets			, 2 and 3, D.	Rev. A; or
		Model N	os. with	an Esu	ffix have	an elect	rical ci	rcuit.	
(b)	Contents								
	(1) Typ	e and form	of mate	erial					
		dium-192 s erial.	ources w	which mee	t the rec	uirement	s of spec	ial form r	adioactive

E

FC FO 5-83)	RM 618A	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
age	2 - Certificate No. 9033	- Revision No. 10 - Docket	No. 71-9033
5.	(b) Contents (continu	ed)	
	(2) Maximum qua	ntity of material per packag	je
	(i) 140 C	uries for the Model No. 660E	or 660BE package.
			660E, 660A or 660AE package.
6.	assembly. The source as a 1475 °F fire environ function. The source as must be of sufficient 1	sembly must be fabricated of ment for one-Diffeor and sembly must endage the ock	of the packaging by the source materials capable of resisting maintaining their positioning ng device. The source assembly positive positioning of the
7.	The source assembly for Inc. Model No. 424-9 a Rev. C.	use with this packaging is 1 s shown in Technical Operat	imited Technical Operations, ions, Mc. Drawing No. 42409,
8.	The name plate, must be of 10 CFR Part 71 and m	fabricated of materia's the	ble of resting the fire test
9.	In addition to the requ	irecent as subpart a	CFR Part Z
	(b) The package shall Procedures in Cha	pter 7.0 of the application,	
10.	The package authorized	by this certificate is hereby	approved for use under general
11.	Expiration date: Octob	er 31 10000	
		REFERENCES	
Amer	sham Corporation Applicat	ion dated September 24, 1993	
Supp	lement dated: March 31,	1994; June 28, 1995.	
		FOR THE U.S. NU	ICLEAR REGULATORY COMMISSION
		Cars R. C	happell
		Cass R. Chappel Cask Certificat Spent Fuel Proj Office of Nucle	ll, Section Leader tion Section ject Office ear Material Safety
	AUG 1 0 1995	and Safeguard	is
Date	:	220	
		228	

NRC FORM 618 (8-66) 10 CFR 71				TE OF COMPLIANCE IVE MATERIALS PACKAGES		
1. & CERTIFICATE 9034	NUMBER		D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	e. TOTAL NUMBER PAR
of Federal b. This certif applicable	Regulatio	ons. Part 71, "Packagin s not relieve the consig ry agencies, including	g and Transportation of Ri mor from compliance with the government of any co	any requirement of the regulations of the L untry through or into which the package w	J.S. Department of Trans vill be transported.	
General At P.O. Box 8	Name and A tomics 85608	Address /	6. TITLE	eneral Atomic Company a ated December 26, 1974, et. JUMBER 71-9034	pplication	ted.
4. CONDITIONS This certificat	e is condi	tional upon fulfilling th	ne requirements of 10 CFP	P rt 71, as applicable, and the conditions	specified below.	
5. (a)	Packa (1) (2)	Model No.: Description TRIGA fuel e fabricated t are approxim vessel is a inner vessel wall and a 5 threaded pip	to DOT Specific nately 22.5 inc 5-inch Schedul are approxima inch inside d be cap and the	g container. The outer ation 6J requirements. hes in diameter by 36 in e 40 carbon steel pipe. tely 31 inches in heigh iameter. The top of the bottom is a welded 1/4- ed and supported within	The outer di nches high. Dimensions t with a 1/4- e inner vesse inch thick fl	The inner of the inch thick l is a at disc.
	(3)	by eight, 3/ between the vermiculite weight inclu Drawing The packagin	8-inch diamete inner vessel a tamped to a mi iding contents	r braced, support space nd the outer packaging nimum density of 4.5 lb is approximately 235 point ed in accordance with G	r rods. The is fjlled wit s/ft ³ . Maximu unds.	void h um gross

Page 2 - Certificate No. 9034 - Revision No. 9 - Docket No. 71-9034

- (b) Contents
 - (1) Type and form of material

TRIGA fuel elements containing uranium-zirconium-hydride or erbium-urarium-zirconium-hydride with nominal fuel composition (excluding erbium content) as described in Table A.1-1 of the June 9, 1992, submittal, and clad with stainless steel, aluminum or incoloy. Uranium enriched to a maximum 93.5 w/o in the U-235 isotope. The H to Zr atomic ratio within the fuel meat must not exceed 1.65.

(2) Maximum quantity of material per package

U-235 content not to exceed 1.39 kg, contained in a maximum of 7 1.5-inch diameter fuel elements, or a maximum of 25 0.5-inch diameter fuel elements, with nominal fuel composition (excluding erbium content) as described in Table A.1-2 (Rev. 1) of the July 14, 1992, submittal. For enrichments of 20 w/o or greater U-235, uranium content not to exceed an A_2 quantity.

- (c) Fissile Class
- 6. In addition to the requirements of Suppart G of 10 CFR Part 71:
 - (a) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 8 of the application.
 - (b) The packaging must meet the Acceptance Tests and Maintenance Program of Chapter 9 of the application.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 8. Expiration date: May 31, 1995.

OCT 2 9 1992

REFERENCES

General Atomic Company application dated December 26, 1974.

Supplements dated: February 7, 1975; January 16 and March 20, 1990; and June 9, July 14 (Enclosure dated July 10, 1992), August 25 and October 19, 1992.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date:

AC FORM	618			ATE OF COMPLIANCE	I. NUCLEAR REGUL	
. CERTIFIC	ATE NUMBER		D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBE	R d. PAGE NUMBE	R . TOTAL NUMBER PA
5	035		11	USA/9035/B(U)		1 2
of Fer	ertificate is issu teral Regulation	ns, Part 71, "Packag	ging and Transportation of			
b. This (applie	certificate does i cable regulatory	not relieve the con agencies, includir	isignor from compliance wing the government of any	ith any requirement of the regulations of the country through or into which the package	will be transported.	
THIS CERT	TIFICATE IS ISSU	ED ON THE BASIS C	DF A SAFETY ANALYSIS REPO	ORT OF THE PACKAGE DESIGN OR APPLICATION		
40 Not	nam Corpo th Avenu ngton, MA	e	EA	Amersham Corporation a September 6, 1994, as R REG	pplication da supplemented.	ted
CONDITIC	X 45		CLYCO		os enacified below	
	ificate is conditi	ional upon futfillin	or requirements of 10 C	CFR Part 71, as applicable, and the coordinate		
		-			D	
(a)	Packaging	0	A.	A.	La	
Ч,	(1) Mode	1 No 1: 68	0. 680F 5680A.	680AE, 680B and 580BE	<i>(</i> 1)	
1.1.1	(1) Hour	I HO PARA	(13 × 1	50 (14)	0	
$\{1, \dots, n\}$	(2) Desc	ription	1	6 1 183	0	
	mate posi Tamp ship prot	rial, depl tioned in er-proof s ping plate ection dur	the states tube a seals are prove is bolted ove	ell internal bracing, p hield, and an "S" tube. y a source cable facking bed an the space spin and r the source facking men The maximum weight of	The contents device and s a 1/4-thick manism for ad	are securel hipping plug steel ditional
	(3) Draw	rings	2	0		
	Draw	ing No. RE	58090, Rev. B 2; 85791, Rev.	n accordancebooith Sentin Shorts 55 and lock Draw A, Sheets 1 and 2; 67691	ing No. R8579	10, Rev. A,
	Mode	1 Nos. wit	th an E suffix	have an electrical circu	iit.	
5. (b) Cont	ents				
	(1)	Type and	form of materi	al		
			0 as sealed sou ive material.	rces which meet the requ	irements of s	pecial form
	(2)	Maximum c	quantity of mat	erial per package		
		110 curie	es (output)			
		Output cu Standard of Appara	uries are deter N432-1980. "Ra	mined in accordance with diological Safety for th	American Nat ne Design and	cional Construction

U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A **CONDITIONS** (continued) 16-83 age 2 - Certificate No. 9035 - Revision No. 11 - Docket No. 71-9035 The source shall be secured in the shielded position of the packaging by the 6. shipping plug, source assembly, and locking device. The shipping plug, source assembly used must be fabricated of materials capable of resisting a 1475 °F fire environment for one half hour and maintaining their positioning function. The ball stop of the source assembly must engage the locking device. The flexible cable of the source assembly and shipping plug must be of sufficient length and diameter to provide positive positioning of the source in the shielded position. The nameplates shall be fabricated of materials capable of resisting the fire test 7. of 10 CFR Part 71 and maintaining their legibility. In addition to the requirements of Subpart G of 10 CFR Part 71: 8. REG (a) The package must meet the Acceptance Maintenance Program of Section 8 of the application; and Each package shall be operated and prepared for shippent in accordance with (b) Section 7 of the application. The package authorized by this certificate is hereby approved for use under the 9. general license govisions of NO CFR §71.12. April 302 10. Expiration date 1994 Amersham Corporation applic February Supplements dated: RECOLATORY COMMISSION appell, Section Leader Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS Date: April 28, 1995 232

IO CFR 71	518		CERTIFICA FOR RADIOACT	TE OF COMPLIANCE	ES	AR REGULATORY COMMI
1 CERTIFIC	ATE NUME	ER	D. PEVISION NUMBER	C. PACKAGE IDENTIFICATION N	UMBER d.P	AGE NUMBER . TOTAL NUMBER
of Fed	ertificate is leral Regul	ations, Part 71, "Packagi	ng and Transportation of Ra	USA/9036/B scribed in Item 5 below, meets the ap adioactive MaterieL" any requirement of the regulations untry through or into which the page	opiicable safety sta of the U.S. Depart	tment of Transportation or othe
3. THIS CERT a. ISSUED	FICATE IS TO (Norme +	ssued on the basis of Address) ction & Equip	A SAFETY ANALYSIS REPORT	of the package design of appli and identification of Report of Source Production application dated	CATION CATION	ent Company
St. Ro	se, LA	70087-9691	CLEAR	RIE Gmented.		
4. CONDITIO This certi	ns ficate is co	nditional upon fulfilling	the requirements of 10 CFF	Part 71, as applicable, and the co	tions specified	below.
5		6			0	
		5	Cr		p Dy	
(a)	Pack	aging 4	S.	Ba	Same.	
	(1)	Model No .:	C-1 2)	TO CE	0	
	(2)	Description		And)	0	
		radiographic a rectangula fittingsiand 1/8" carbon shield equip may house on gallon, 20- of the sourc to 22 lbs.	searce changer r becamproxima source locking steel other she ped with two cl "pigtail type or 22-gage stee e changer is 51 Up to 8005 tof	elly staigh x 18"	er configu wide 7. tected and ptacke con of J" tub re. The o fled with ight of th t may be i	ration is that of 5" deep. All lenclosed with a sists of a uranin bes, each of which overpack is a 12- foam. The weight be overpack is 19 ncluded within th
	(3)	Drawings				
		The package Equipment Co and 61090, R	mpany Inc. Draw	in accordance with ing Nos. 11489-1, Re	Source Pro ev (4); 11	duction & 489-2, Rev. (3);
(b)	Cont	ents				
	(1)	Type and for	m of material			
		Iridium-192 radioactive		es that meet the rea	quirements	of special form
	(2)	Maximum quan	tity of materia	l per package		
		Two sealed s	ources with a c	ombined activity no	t to excee	ed 240 curies.

U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A CONDITIONS (continued) (6-83) Page 2 - Certificate No. 9036 - Revision No. 8 - Docket No. 71-9036 Tungsten shield pads, with dimensions up to approximately 2-inches diameter and δ. 1/2-inch thick, may be welded to the inside surface of the source changer housing. The nameplate shall be fabricated of materials capable of resisting the fire test 7. of 10 CFR Part 71 and maintaining its legibility. In addition to the requirements of Subpart G of 10 CFR Part 71: 8. The package shall be prepared for shipment and operated in accordance with a. the Operating Procedures of Section 7.0 of the application dated November 13, 1989, as supplemented June 19, September 24, and October 17, 1990. The package must meet the Acceptance Gats and Maintenance Program of Section 8.0 of the approaction dated November 13, 1989, as supplemented June 19, and September 24, 1990. b. The package authorized by this certificate is hereby approved for use under the general license previsions of 10 CFR §71.12. 9. 10. Expiration date October 2000. Source Production Lquipment Com ted Nøvember 3, 1989, and icati DD July 13, 1990. November 29, and 990 June 19 Supplements dated: December 6, 1993; and July EGULATORY COMMISSION chappell, Section Leader R Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards SEP 1 5 1995 Date: 234

IRC FORM 618 8-661 0 CFR 71			E OF COMPLIANCE	UCLEAR REGULA	TORY COMMISSIO
9037	1	D. REVISION NUMBER	C PACKAGE IDENTIFICATION NUMBER	C PAGE NUMBER	. TOTAL NUMBER PAGE
of Federal Regulat b. This certificate do applicable regulat	tions, Part 71, "Packagin es not relieve the consig ory agencies, including	ig and Transportation of Rad por from compliance with ar the government of any cour	ny requirement of the regulations of the U. try through or into which the package will	S. Department of Tran	
a IBSUED TO (Nerre and eneral Atomic 2.0. Box 85608 San Diego, CA	(Addreas) S	6. TITLE A	neral Atomic Company ap ted December 26, 1974, NUMBER 71-9037	plication	ted.
This certificate is con	ditional upon fulfilling t	he requirements of 10 CFR F	Part 71, as applicable, and the conditions	specified below	
(1) (2)	fabricated are approxim vessel is a inner vessel wall and a threaded pit The inner w by eight, 3 between the vermiculite weight inclu Drawing The packagin	to DOT Specifica mately 22.5 inch 5-inch Schedule are approximat 5-inch inside di be cap and the b essel is centere 78-inch diameter inner vessel an tamped to a min uding contents i	container. The outer tion 6J requirements. es in diameter by 55 in 40 carbon steel pipe. ely 50 inches in height ameter. The top of the ottom is a welded 1/4-i d and supported within braced, support spacer d the outer packaging i imum density of 4.5 lbs s approximately 330 pou d in accordance with Ge	The outer di ches high. Dimensions with a 1/4- inner vesse nch thick fl the outer pa rods. The s fjlled wit /ft ³ . Maxim nds.	mensions The inner of the inch thick 1 is a at disc. ckaging void h um gross
			235		

Page 2 - Certificate No. 9037 - Revision No. 9 - Docket No. 71-9037

- (b) Contents
 - (1) Type and form of material

Special function TRIGA fuel elements containing uranium-zirconium-hydride or erbium-uranium-zirconium-hydride whose fuel portion has nominal compositions (except erbium content) as described in Table A.1-1 of the June 9, 1992, submittal, and clad with stainless steel, aluminum or incoloy. Uranium enriched to a maximum 93.5 w/o in the U-235 isotope. The H to Zr atomic ratio within the fuel meat must not exceed 1.65.

(2) Maximum quantity of material per package

U-235 content not to exceed 1.39 kg, contained in a maximum of 7 1.5-inch diameter fuel elements, or a maximum of 25 0.5-inch diameter fuel elements, whose fuel portion has nominal compositions (except erbium content) as described in Table A.1-2 (Rev. 1) of the July 14, 1992, submittal. For enrichments of 20 w/o or greater U-235, uranium content not to exceed an A₂ quantity.

- (c) Fissile Class
- 6. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 8 of the application.
 - (b) The packaging must meet the Acceptance Tests and Maintenance Program of Chapter 9 of the application.
- The package authorized by this certificate is bereby approved for use under the general license provisions of 10 CFR §71.12.
- 8. Expiration date: May 31, 1995.

General Atomic Company application dated December 26, 1974.

Supplements dated: February 7, 1975; January 16 and March 20, 1990; and June 9, July 14 (Enclosure dated July 10, 1992), August 25 and October 19, 1992.

REFERENCES

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

OCT 2 9 1992 Date:

RC FORB 618		CERTIFIC FOR RADIOAC	ATE OF COM	PACKAGE	\$		TORY COMMISSI
& CERTIFICATE NUME	IER .	D. REVISION NUMBER		NTIFICATION NU		d PAGE NUMBER	. TOTAL NUMBER PAG
9039)	8	USA,	9039/B(U	2	11	22
of Federal Regu	s issued to certify that the lations, Part 71, "Packagi does not relieve the consi latory agencies, including	ng and Transportation of	Hadioactive Material	ve regulations of	the U.S. De	epartment of Trans	
THIS CERTIFICATE IS a. ISSUED TO (Alame	ISSUED ON THE BASIS OF and Addresse/	A SAFETY ANALYSIS REPO	ORT OF THE PACKAGE DI	SIGN OR APPLIC	ATION	N	
40 North	Corporation Avenue on, MA 01803		echnical Oper ated April 11 R REG CKET NUMBER		Inc. ap	plication	
CONDITIONS This certificate is c	onditional upon fulfilling	the requirements of 10 C	FR Part 71, as applicat	ele, and the con	ditions spec	ified below.	
(a) Paci (1) (2) (3)	Description A protective an MS-27683-2 by a bolt; 1 insulation; dimensions of 24-inch high Drawings The radiograph the overpack Operations, 1	ohic devices, are construct Inc. Drawing w	eel drums 14- il-1-2781 or abberized hat are appraxim ght including as secondary ed in accord os	gauge ch Mil-2819 r filler mately 15. content: packaging ince with	amp clc high t materi .5-inch s is 10	sure ring emperature al. Overa diameter 5 pounds.	fastened 111 by use in
	Model	No.	Drawing M				
	Overp4 533 616 644 713	ack	A715, F D53301, F D61699, F D64400, F C71301, F D53301, F	Rev. B Rev. O Rev. I Rev. O			

Page 2 - Certificate No. 9039 - Revision No. 8 - Docket No. 71-9039

5. (b) Contents

(1) Type and form of material

Iridium 192 as sealed sources that meet the requirements of special form radioactive material.

- (2) Maximum quantity of material per package
 - (i) 120 curies contained in the Model No. 533, Model No. 644 or Model No 713 radiographic device.
 - (ii) 240 curies contained in the Model No. 616 radiographic device.

- Source assemblies for use in this packaging are limited to those assemblies as identified in Technical Operations, Inc. Drawing No. C42400, Rev. F, Sheet 2, and Sheet 3 of 3, and Drawing Nos. 42401, Rev. 0, 42409, Rev. B.
- 7. Separate molded fillers shall be used for each model type radiographic device to ensure a spug fit within the overpack.
- 8. Nameplates shall be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining their legibility.
- 9. In addition to the requirements of Subpart & of 10 CFR Part 71:
 - (a) The package shall be prepared for shipment and operated in accordance with Section 7 of the application.
 - (b) Each package must be tested and maintained in accordance with the acceptance tests and mainte in e program in section 8 of the application.
- 10. The packaging authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 11. Expiration date: June 30, 1995.

REFERENCE

Technical Operations, Inc. application dated April 11, 1980.

Supplement dated: May 31, 1990, October 18, 1990; and February 21, 1991.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date: FEB 2 8 1991

RC FORM 61 1960 OFR 71			C	RADIOACTIV	E OF COMPLIANCE MATERIALS PACKAGE			TORY COMMISSIO
. CERTIFICAT	E NUMBE	9R	b. REVISI	ON NUMBER	C. PACKAGE IDENTIFICATION N	UMBER	d PAGE NUMBER	. TOTAL NUMBER PAG
	9049		7		USA/9049/B()	11	2
of Feder	al Regul	ations, Part 71,	Packaging and Tra	compliance with an	bed in Item 5 below, meets the ap bactive Material." I requirement of the regulations of ry through or into which the pac	of the U.S. D	epartment of Trans	
Advar 121	nced North	nd Address)	Systems, In	c Adva date	nced Medical Syste d September 28, 19 REG / 71-9049	ems, In 190		tion
CONDITION				C. DOCKET	NUMBER		- Mard halow	
(a)	(1) (2)	cylinder bolted t plug fi drain h point 50 (((((((((((((((((((ion cased lead protective o a steel ted with a we is close of the case beight ask beight ask beight avity heigh avity heigh avity diame ead shield rotective ackaging we	a facket en pallet, In Silicone m d by eithe physicalid , in er, in ht, in eter, in ing, in jacket heig jacket widt		ring to by a lead colted colted for for	nansport. ad-filled f closure. 1 usible plug	It is Tanged The cavity
	(3)	Drawings						
			aging is co Company Di		in accordance with :	the f	ollowing Ge	eneral
		212E246, 106D3870 706E790,	, Rev. 11		106D3855, Rev. 4 129D4690, Rev. 0			

Pictor and a second

Page 2 - Certificate No. 9049 - Revision No. 7 - Docket No. 71-9049

- 5. (b) Contents
 - (1) Type and form of material

Byproduct material meeting the requirements of special form radioactive material.

(2) Maximum quantity of material per package

Radioactive decay heat not to exceed 780 watts.

- Shoring must be provided to minimize movement of contents during accident conditions of transport.
- 7. Package contents must be delivered to a carrier dry.
- 8. Prior to each shipment the silicone rubber lid gasket must be inspected. This gasket must be replaced if inspection shows any defects or every 12 months, whichever occurs first. Cavity drain line must be sealed with appropriate sealant applied to threads of pipe plug, or must be permanently closed and sealed.
- 9. In addition to the requirements of Subpart 6 of 10 CFR Part 71, the package must be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7.0, and must be maintained in accordance with the Maintenance Program of Section 8.2 of the application.
- 10. Fabrication of additional packagings is not authorized.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 12. Expiration date: December 31, 1995.

REFERENCES

Advanced Medical Systems, Inc. application dated: September 28, 1990.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

e

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date: NOV 2 1 1990

240

OFR 71		FOR RADI	FICATE OF COM	S PACKAGES		
A CERTIFICATE HUM		D. REVISION NUM		ENTIFICATION NUMBER	d PAGE NUMBER	e. TOTAL NUMBER PA
PREAMBLE a. This certificate of Federal Reg	is issued to certify the ulations, Part 71, "Peo	t the packaging and con kaging and Transportati	tents described in item 5 bek ion of Redioactive Material." toe with any requirement of I any country through or int	w, meets the applicable s	Department of Trans	
Amershan 40 North	Corporation		June 16, 1980 RRREG	rations, Inc.		dated
CONDITIONS This cettificate is	conditional upon fulfi	lling the requirements o	f 10 CFR Part 71, as applica	S 23	pecified below.	
(a) Pac (1) (2) (3)	A radiogra The overpa wire clamp to maintan high. The steel shel filler mat the packag Drawings The packag	phic exposure ck is an 18-g closure ring n a snug fit. radiographic d, depleted u erial, source e is approxim	ucted in accord	teel drum with filled with mo sions are 19.5 consists of g, Zircalloy " and lock assem	a bolted an Ided rubberi " diameter x an 11-gauge S" tube, pol bly. Gross following Te	d seal zed hair 15" carbon yurethane weight of chnical
	operations	, 110. 014.	g Nos.: 68390;		,	.,

Page 2 - Certificate No. 9053 - Revision No. 6 - Docket No. 71-9053

- 5. (b) Contents
 - (1) Type and form of material

Iridium 192 as sealed sources that meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package

120 curies

- 6. The source shall be secured in the shielded position of the packaging by the source assembly. The source assembly must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintaining their positioning function. The source assembly must engage the locking device. The source assembly must be of sufficient length and diameter to provide positive positioning of the source within the depleted uranium shield assembly.
- Source assemblies for use in this packaging are limited to those assemblies as identified in Technical Operations, Inc. Drawing Nos. 68309, Rev. E, and 68310, Rev. L.
- 8. Nameplate shall be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining their legislity.
- 9. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) Each package must meet the Acceptance Tests and Maintenance Program of Section 8 of the application, as supplemented.
 - (b) Each package shall be operated and prepared for shipment in accordance with the Operating Procedures of Section 7 of the application, as supplemented.
- 10. The packaging authorized by this certificate is hereby approved for use under the general provisions of 10 CFR §71.12
- 11. Expiration date: Nivember 30, 1995.

REFERENCES

Technical Operations, Inc. application dated June 16, 1980.

Amersham Corporation supplements May 31, October 18, and November 16, 1990.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Dated: NOV 3 0 1990

NRC FORM 618 (8-86) 10 CFR 71			TE OF COMPLIANCE	NUCLEAR REGULA	
A CERTIFICATE NU	9056	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9056/B(U)	d. PAGE NUMBER	e. TOTAL NUMBER PAG
of Federal Re	e is issued to certify that th gulations, Part 71, "Packag	e packaging and contents de ling and Transportation of R	scribed in Item 5 below, meats the applicable	S. Department of Tran	
Source Pro	w end Addams) oduction and nt Company, Inc Street	ь. тіты	Source Production and E application dated March supplication dated March	quipment Com	pany Inc., s
4. CONDITIONS This certificate is	conditional upon fulfilling	the requirements of 10 CFI	R Part 71, as applicable, and the conditions	specified below.	
⁵ (a) Pacl	kaging	8	0	3	
(1)	Model Notes S	PEC 2-J	And .	La	
(2)	Description	(BEZ	A CHE	C	
	consist of an and a Zincall Zircallov "S"	outer steel sh oy "5" tabes T Tabe by, a sour	elded Gamma Bay Projecto ell, intermat Bracing, d nercontents are securely celean e locking device box approximately 13-3/ aximum areas weight of 5	and shipping	in the plug. The
(3)	Drawings	Accounting of	in accordance with Sour	<pre>ce Production</pre>	n and
	Equipment Com and 788-2, Re The packaging	pany, Inc. Draw v. (0).	shown in Source Product v. (0), provided fabrica	2); 788-1, Re	ev. (4); oment
	prior to June				
	Classificatio	n 100-H, or suc with Source Pr	open head 20 or 22 gauge ceeding issues, Item 260 oduction and Equipment C	steel drum	constructed
(b) Con	tents				
(1)	Type and form	of material			
	Iridium 192 a radioactive m		s which meet the require	ments of spe	cial form
(2)	Maximum quant	ity of material	per package		
	225 curies				

U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 6184 CONDITIONS (continued) 16-831 ge 2 - Certificate No. 9056 - Revision No. 10 - Docket No. 71-9056 The source must be secured in the shielded position of the packaging by the 6. shipping plug, source assembly, and locking device. The shipping plug and source assembly used must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintaining their positioning function. The source assembly ball stop must engage the locking device. The flexible cable of the source assembly and shipping plug must be of sufficient length and diameter to provide positive positioning of the source in the shielded position. The nameplates must be fabricated of materials capable of resisting the fire test 7. of 10 CFR Part 71 and maintaining their legibility. For transportation of more than factor per package in private carriage the shipment must be in accordance with 49 CFR <math>H3(94)(b). 8. For transportation of mare than 45 curies per package a common carrier, the 9. package must be within a protective overpack as described and constructed in accordance with 5(23). 10. In addition to the requirements of Subpart G of La CER Part 1: The package shall be prepared for shippen and operated in accordance with the Operating Procedures of Section 7.0 of the application, as supplemented August 20 1989, and January 5, 1992; and (a) upplemented Tanuar , 1992. The package must meet the Acceptance (b) Section 60 of the apple of the approved for use under the 11. The packaging authorized both general license provisions disto Mecember 31, 1999 12. Expiration date: REFERENCES Inc. and it tion dated March 13, 1989. Source Production and Equipment Contrary Supplements dated: July 6, August 21 and August 28, 1989; July 27, 1990; July 10 and November 4, 1991; January 5, 1992; and June 21, 1994. FOR THE U.S. NUCLEAR REGULATORY COMMISSION Cass R. Chappell Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS ate: 12/22/94

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BAC FORM (* 8-66) 0 CFR 71	18		CERTIFICAT	E OF COMPLIANCE	S. NUCLEAR REGULA	
. CENTIFICA	TE NUMB	ER ,	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	ER d. PAGE NUMBER	. TOTAL NUMBER PAG
of Fede	rtificate k mai Regu	lations, Part 71, "Packa	ging and Transportation of Had	ribed in Item 5 below, meets the applica	e U.S. Department of Tran	
THIS CERTI	FICATE IS	ISSUED ON THE BASIS (Address)	DF & SAFETY ANALYSIS REPORT	OF THE PACKAGE DESIGN OR APPLICATS IND IDENTIFICATION OF REPORT OR APP	ON LICATION:	
ieneral 2.0. Bo Gan Die	x 856			f Energy & Environment ed August 3, 1973, as REC NUMBER 71-9057		plication
COMDITION This certif	us Icante is c	onditional upon fulfillin	g the requirements of 10 CFR	Part 71, as applicable, and the condition	ons specified below.	
		2				
(a)	Pack	aging 6	Stor .	85	den i i	
	(1)	Model No. :	FPD-100	TO AR	0	
	(2)	Description		Curl Mes	0	
		defects, with head sheet a corrugation shall be acc drop-forged	th minimum thickn and 18-gauge remo s in the cover ne complished by at lugs, one of whi	gallon steel drum, fr ess 18-gauge body shee vable head sheet with ar the periphery. The least a 12-gauge bolt- ch is threaded to rece Gross weight not to e	et, 18-gauge b one or more e outer drum c locking ring eive at least	ottom losure with 5/8-inch
(b)	Cont	ents	" ? · · ·	40		
	(1)	Type and for	m of material	* *		
		Solid uranit in the U-23		als. Uranium may be e	enriched to an	y degree

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NRC FORM 618A (8-63)	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
r⇒ge 2 - Certif	ficate No. 9057 - Revision No. 6 - Docket No.	p. 71-9057
5.	(b) Contents (continued)	
	(2) Maximum quanity of material per p	backage
*	Total contents not to exceed 200 pound type A quantities of radioactive mater	
	(c) Fissile Class	III
	Maximum number of DaRgeRoE Goog	nt 50
6.	Special nuclear material shall be contained jars, metal bans or jars or heavy plastic to the steel dram. Metal secondary containers avoid runtore of the package in the event to thermal tests 10 CFR §71.73 (c)(3).	ags securely tied closed within
*	Fissile Class Area ments are restricted licensee's Sorrents takey Fuel Manufactur facilities.	Facility of other on-site
	(a) The package shall be propered top ship	oment and operated in estimate the application dated
9.	Expiration day September 30, 1995.	NO.
	* MEEREAGES *	
Gulf	Energy & Environmental Systems application	dated August 3, 1973.
Gener	ral Atomics supplement dated August 16, 1990).
9. Gulf Gener	FOR THE U.S. N	UCLEAR REGULATORY COMMISSION
	Charles / Charles E. Mach	
*	Transportation Division of Sa	
SEP 19	and Transport	
uate:		

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HARC FORM 618 (8-66) 10 GFR 71		TE OF COMPLIANCE	CLEAR REGULA	TORY COMMISS
1. & CERTIFICATE NUMBER 9067	6. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9067/B()F	d PAGE NUMBER	. TOTAL NUMBER PAG
of Federal Regulations, Part 71, b. This certificate does not relieve	Packaging and Transportation of Ra he consignor from compliance with a	cribed in Item 5 below, meets the applicable sa dioactive Naterial." In requirement of the regulations of the U.S. Intry through or into which the package will b	Department of Trans	
3. THIS CENTIFICATE IS ISSUED ON THE a ISSUED TO (Nume and Address) .S. Department of Ener H-33.3 ashington, DC 20585	gy U.S	of the package design of application and identification of Report of Application . Department of Energy applied November 7, 1991, as s	plication	
4. CONDITIONS This cettificate is conditional upon 1	ulfilling the requirements of 10 CFR	Part 71, as applicable, and the conditions spi	ecified below.	
a recessed, provided by a provided by a packaging dia Exterior Cavity b Cavity o Lead shi	I, lead shielded ship lug-type lid and a g a drain line penetra a inner can assembly	pping package. The package asketed, bolted closure; tion. Containment for the or by material in specta shielding are as follows 26.4 19.0 10.5 4.5 6.0 2,800 (Incl 110-16	Tifting and e contents 11 form. Th ::	tie-down is
(3) Drawing				
Drawing No. 8	CL3-01, Sheets 1 & 2			
The inner car Institute Dra	assembly is constru wing No. BCL3~38, Re	icted in accordance with E ev. B.	sattelle Mem	orial

THE NEW YEAR

IRC FORM RTBA

CONDITIONS (continued)

Page 2 - Certificate No. 9067 - Revision No. 4 - Docket No. 71-9067

5. (t) Contents

Type, form, and maximum quantity of material per package.

Byproduct material, source material, and special nuclear material not to exceed 300 watts decay heat. The material is in solid metal or oxide form packaged within an inner can assembly specified in Item 5(a)(3) above, or the material meets the requirements of special form radioactive material. Limitations on fissile loading for the Fissile Class are as follows:

I and HI

One (1)

Fissile Class I

Fissile Class III

EAR REGIONA, *(grams U-235 equavalent mass)

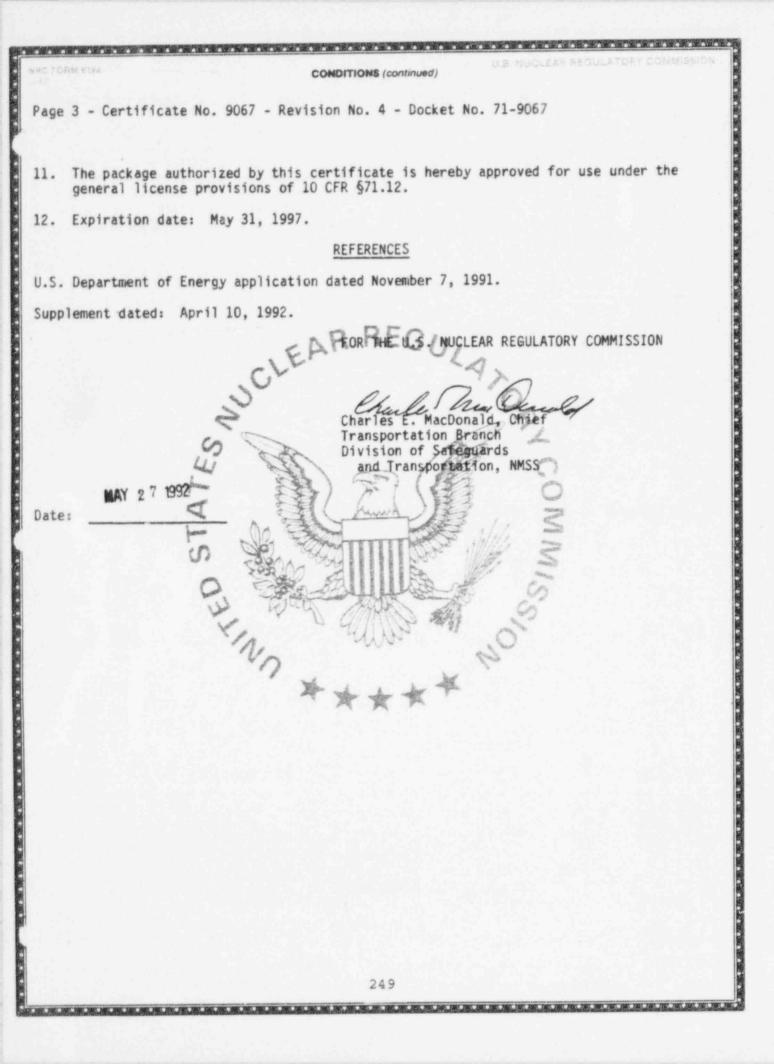
(c) Fissile Clas,

Maximum number of packages per shipment for Fissile Glass IVI

The U-235 equivalent mass must be determined by the following method: 6.

> U-235 equivalent mass equals U-235 mass plus 1.75 times U-233 mass plus 1.60 times Pa mass 20

- Plutonium in excess of 20 corres per package must be in the form of metal, metal 7. alloy, or reactor fuel elements.
- At the time of delivery of the loaded package to a carrier for transport, the package contents must be (1) dry (contents of inner can assembly must not 8. decompose up to a temperature of 750°F) and the fissile material unmoderated (H to X atomic ratio less than 2) and (2) so limited that the dose rate will not exceed 10 millirem per hour at three (B) Test from the external surface of the package.
- The maximum gross weight of the cavity contents must not exceed 40 pounds (inner 9. can assembly, radioactive material, etc.).
- In addition to the requirements of Subpart G of 10 CFR Part 71: 10.
 - (a) Each package shall be maintained in accordance with Section 8.0 of the application, as supplemented.
 - (b) Each package shall be operated and prepared for shipment in accordance with Section 7.0 of the application, as supplemented.



NRC FORM 618 (8-65) 10 CFR 71		DIOACTIVE	OF COMPLIAN	CE			ATORY COMMISSIO
1. CERTIFICATE NUMBER 9068	b. REVISION N	NJMBER	C PACKAGE IDENTIFICATI			d. PAGE NUMBER	e. TOTAL NUMBER PAGE
of Federal Regulations	d to certify that the packaging and , Part 71, "Packaging and Transpo ot relieve the consignor from comp sgencies, including the governmer	oftation of Radioac	tive Material. ouirement of the regulat	ions of the	e U.S. De	epartment of Tran	
a. ISSUED TO (Name and Add S. Department of H-33.3 ashington, DC 205	f Energy	U.S. D	Department of November 7, 1 MBER 71-9068	Energ	y app	lication	d.
 CONDITIONS This certificate is conditio 	nal upon fulfilling the requirement	ts of 10 CFR Part	71, as applicable, and th	e conditio	ons spec	ified below.	
 (2) Descrip A steel with a tie-dow content form. Exterio Cavity Lead sh Loaded (3) Drawing 	encased, lead shie recessed, plug-type n devices; and a dr s is provided by an The packaging has d r height, in. r diameter, in. height, in. ielding, in. weight, lb.	in line p inner car immersions,	pasketed, bolt benetration. h assembly or , weight, and 18.2 15.5 5.25 4.5 1,360 (inc	ed cl Eonta by ma shiel	osure inmen teria ding -1b.	skid)	and ial s:
Drawing The inn	kaging is construct No. BCL2-01, Sheet er can assembly is ite Drawing No. BCL2	construct	, Rev. D. ed in accordar B.				

Page 2 - Certificate No. 9068 - Revision No. 4 - Docket No. 71-9068

5. (b) Contents

Type, form, and maximum quantity of material per package.

EARR

Byproduct material, source material, and special nuclear material not to exceed 200 watts decay heat. The material is in solid metal or oxide form packaged within the inner can assembly specified in Item 5(a)(3)above, or the material meets the requirements of special form radioactive material. Limitations on fissile loading for the Fissile Class are as follows:

50*

2.000*

and II

One (1)

Fissile Class I

Fissile Class III

*(grams U-235 equivalent mass)

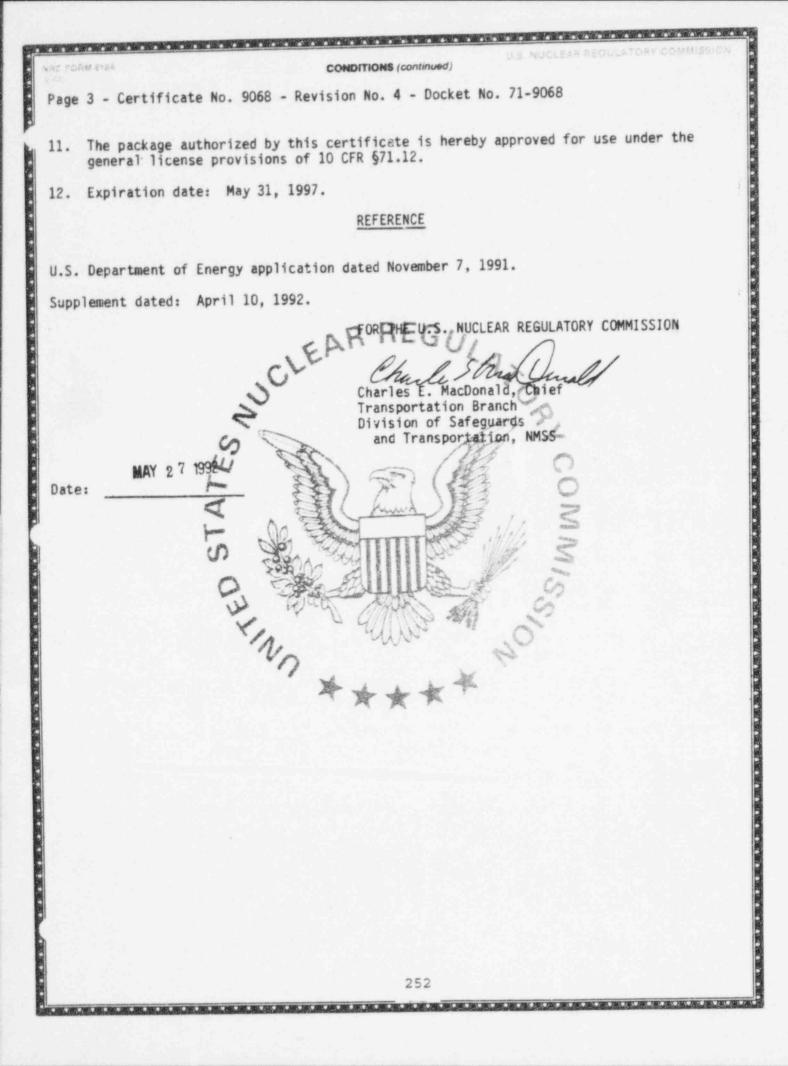
(c) Fissile Class

Maximum number of packages per shipment for Fissile Class III

- 6. Plutonium in excess of 20 curtes per package must be in the form of metal, metal alloy or reactor fuel elements.
- 7. The U-235 equivalent mass must be determined by the following method:

U-235 equivalent mass equals U-235 mass plus 1.75 times U-233 mass plus 1.60 times Pu mass.

- 8. At the time of delivery of the loaded package to a carrier for transport, the package contents must be (1) dry (contents of inner can assembly must not decompose up to a temperature of 750°F) and the fissile material unmoderated (H to X atomic ratio less than 2) and (2) so limited that the dose rate will not exceed 10 millirem per hour at one meter from the external surface of the package.
- The maximum gross weight of the cavity contents must not exceed 20 pounds (inner can assembly, radioactive material, etc.)
- 10. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (i) Each package shall be maintained in accordance with Section 8.0 of the application, as supplemented.
 - (ii) The package shall be prepared for shipment and operated in accordance with Section 7.0 of the application, as supplemented.



of Federal Regula b. This certificate do applicable regula THIS CERTIFICATE IS II a ISSUED TO (Nerry an stinghouse E1 b. Box 355 tsburgh; PA CONDITIONS This certificate is con Packaging (1) Mode	issued to certify that the p tions, Part 71, "Packaging bes not relieve the consig tory agencies, including to ssued on THE BASIS OF A e Address)	and Transportation from compliance he government of SAFETY ANALYSIS ation	ents describ on of Radioa ce with any i any country REPORT OF TITLE AND Westi appli es su DOCKET NI	USA/3 ed F. Item 5 b act ve Materia requirement of through or in the PACKAGE indentificant indentificant inghouse cation igp lemen 71	D69/B(welow, meets it." of the regular into which the edesign on edited the ted. -9069	APPLICATION RT OR APPLICA ic Corpo October 3	1 afety standards set for Department of Trans be transported. THOM: pration 30, 1981,	
a. This certificate is of Federal Regula b. This certificate do applicable regula THIS CERTIFICATE IS I a. ISSUED TO (Nerry an stinghouse E1 b. Box 355 tsburgh; PA CONDITIONS This certificate is cor Packaging (1) Model	Itions, Part 71, "Packaging bes not relieve the consig- tory agencies, including 1 ssued on THE BASIS OF A <i>c Address</i> lectric Corpor 15230	and Transportation from compliance he government of SAFETY ANALYSIS ation	REPORT OF TITLE AND Westi appli ars su DOCKET NI	act ve Materia requirement of through or in the package indentification cation continent op lemen 71	EDESIGN OR EDESIGN OR ION OF REPO E Electr dated (ited. -9069	APPLICATION RT OR APPLICA ic Corpo October 3	Department of Trans be transported.	
a ISSUED TO (Nerve an stinghouse E1). Box 355 stsburgh, PA conditions This certificate is con Packaging (1) Mode	e Address) lectric Corpor 15230 nditional upon fulfilling th	ation	Westi appli as su DOCKET NI	nghouse cation gplemen umber 71	Electr dated (ted. -9069	ic Corpo October 3	oration 80, 1981,	
Packaging (1) Mode	ES	e requirements of	10 CFR Par	171, as appli	cable, and th	e conditions a	pecified below.	
(1) Mode	No.: M0-1					0		
(1) Mode	No.: M0-1	B						
	No.: MO-1	1 6800			-B-	Z d	1	
(2) Desca		2.23	15	m/	H.		0	
(c) beset	ription		l hu	un S	国家		0	
is f polyu by 12 asser adju: local	auge inner she illed with a s urethane foam. 2 ratchet bind nblies are hel stable clampin ted between th down and press ds.	hock-and-th The upper ers and 12 d in place g assembly e fuel asso ure relief	nermal- and 1 high s within (shock emblies device	insulat ower se trength the ov mounte the over mounte the the the the the	ing mat ctions 5/8 erpack ed). Ne package oss weil	cerial of of the c latch pir by a str eutron at e is equi	resisting of verpack are s. The fuel ongback and osorber plate ipped with li	rigid secured es are ifting,
(3) Draw	ings)	专力	*	₹£			
Corp is c	packaging is c pration Drawin onstructed in C5650D55, Rev.	g No. 1581 accordance	F50, Sł	neets 1	and 2,	Rev. 1.	Fuel rod co	ontainer

CONDITIONS (continued) Page 2 - Certificate No. 9069 - Revision No. 9 - Docket No. 71-9069 Contents 5. (b) (1) Type and form of material Unirradiated UO_-PuO_ PWR fuel assembly with the following maximum (i) active dimensions and maximum compositions: Zr Cladding Material 7.784 x 7.784 Envelope, in Enrichment Pu02 in Pu02, plus U02 w/o Pu02 fissile in Pu02, w/o *(a) Pu02 fissile in U02 w/o E *(b) 0.71 AF 16.6 Fissfle, kg Fuel length, to 144 400 Decay heat load, watts/pkg *For three plutonium isotopic cases: Case 1, the $Pu0_2$ enrichment (a) is 6.0 w/o; fissile $Pu0_2$ (b) is 71 w/o. Case 2, the Pu0, eartichment (a) is 4.4 w/o; fissile Pu0, (b) is 81 w/o. Gase 3. the Puo, emitchment (a) is 3.03 w/o; fissile Puo, (b) is 85 w/o. (ii) Mixed Pu0, in materal 00, as pressed sintered pellets fully clad in Teak-tight Zircalloy of min mum 0.024" thickness as fuel rods of the following specifications: Type 10 0.365 Pellet diameter (nom), in 0.422 Rod diameter (nom), in Fuel length (nom), in 120 to 144 Pu0, in Pu0, plus U0, w/o 6.0 Pu02 Fissile in Pu02, w/B U02 fissile in U02, w/O 85 0.71 Uranium dioxide as stainless steel or aluminum clad unirradiated (iii)rods of the following specifications: SST Clad AL Clad 0.446 0.406 Pellet diameter (max), in 0.475 0.476 Rod diameter (nom), in Eugl length (max), in 61.0 70.0 2.5 4.02 U enrichment (max), w/o 254

Page 3 - Certificate No. 9069 - Revision No. 9 - Docket No. 71-9069

5. (b) (2) Maximum quantity of material per package

(i) For the contents described in 5(b)(1)(i)

Two fuel assemblies.

(ii) For the contents described in 5(b)(1)(ii)

Not more than 94 kilograms Pu contained within the fuel rod container described in 5(a)(3).

(iii) For the contents described in 5(b)(1)(iii)

Two inner containers as described in 5(a)(3) containing not more more than a total of 70 kilograms U-235.

II and III

1.6

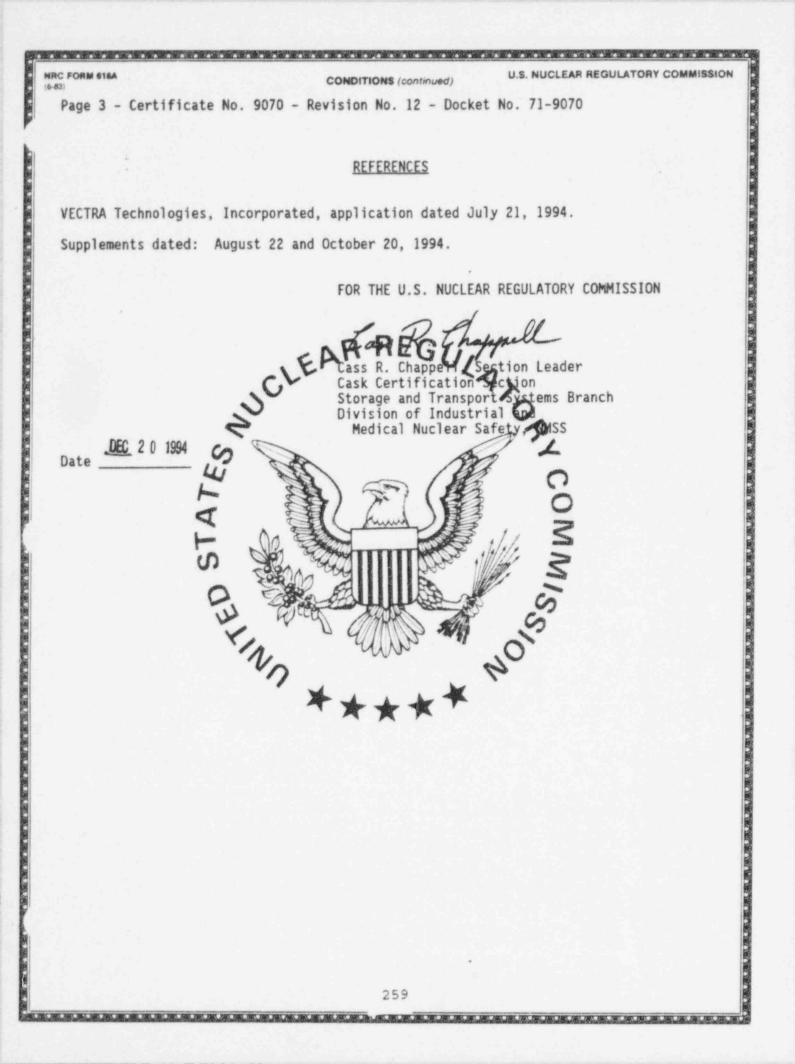
(c) Fissile Class

- Minimum transport index to be shown on label for Class II
- (2) Maximum number of packages per shipment for Class III
- 6. Two (2) neutron absorber plates consisting of 0.19" thick, full length, stainless steel containing 1.3 percent minimum boron or 0.19" thick OFHC copper must be installed between the active area of the fuel assemblies.
- 7. Fuel rods must be closely packed in the fuel rod container on no more than an equivalent metal-to-metal square lattice. Partially loaded fuel rod containers must be fitted with a minimum of three, equally spaced blocks, of which the noncombustible portion of the blocks and the method by which they are secured must assure that the rods are maintained on no more than an equivalent metal-to-metal square lattice within the fuel rod container.
- Each fuel assembly must be unsheated or must be enclosed in an unsealed, 8. polyethylene sheath which will not extend beyond the ends of the fuel assembly. The ends of the sheath must not be folded or taped in any manner that would prevent the flow of liquids into or out of the sheathed fuel assembly. Alternatively, the fuel assembly may be enclosed in an elongated plastic bag or sheath along its full length. At the bottom end of the fuel assembly, the bag will be cut off or folded back to assure that the entire cross section of the lower end of the assembly is unobstructed. When the folding is used, the portion of the sheath that is folded back will be cinched with tape near its end to hold it in place, and the length will be such that when the assembly is loaded in the packaging, the folded sheath will be clamped in place in at least two grid locations. The top end of the bag may be gathered together and taped closed. However, the top end then will be slit on all four sides. The slits will run perpendicular to the axis of the assembly and will extend the inner distance between the top nozzle pads and spring clamps (approximately 60 percent of the length of each side). The slits will be made in a plane near that formed by the top of the pads and clamps.

CONDITIONS (continued) Page 4 - Certificate No. 9069 - Revision No. 9 - Docket No. 71-9069 In addition to the requirements of Subpart G of 10 CFR Part 71: 9. (a) The package must be prepared for shipment and operated in accordance with Chapter 6.0 of the application. (b) Each packaging must meet the acceptance tests and maintenance program of Chapter 7.0 of the application. The package authorized by this certificate is hereby approved for use under the 10. general license provisions of 10 CFR §71.12. 11. Expiration date: January 31, 1997. Westinghouse Electric Corporation application dated October 30, 1981. Supplement dated January 24, 1992. Department of Energy supplements dated: April 2 and June 14, 1984. 111 FOR THE U.S. NUCLEAR REGULATORY COMMISSION Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS JAN 2 9 1992 Date: Nn * 256

of Federal Regulations, Part 71, "Pa b. This certificate does not relieve the applicable regulatory agencies, incl THIS CERTIFICATE IS ISSUED ON THE BAS a. ISSUED TO (Name and Address) VECTRA Technologies, 1010 South 336th Str Suite 220 Federal Way, WA 9800 CONDITIONS This certificate is conditional upon fulfi (a) Packaging (1) Model No (2) Descript	ckaging and Transportation of R consignor from compliance with luding the government of any co b.S OF A SAFETY ANALYSIS REPOR b. TITLE	c. PACKAGE IDENTIFICATION NUMBER USA/9070/B(U) scribed in Item 5 below, meets the applicable a adioactive Material." any requirement of the regulations of the U.S untry through or into which the package will r OF THE PACKAGE DESIGN OR APPLICATION AND IDENTIFICATION OF REPORT OF APPLICATION	1 afety standards set fort Department of Trans; be transported	
 a. This certificate is issued to certify the of Federal Regulations, Part 71, "Pa b. This certificate does not relieve the applicable regulatory agencies, including the second state of the second stat	ckaging and Transportation of R consignor from compliance with luding the government of any co b.S OF A SAFETY ANALYSIS REPOR b. TITLE	adioactive Material." any requirement of the regulations of the U.S untry through or into which the package will r OF THE PACKAGE DESIGN OR APPLICATION	. Department of Trans; be transported	
A ISSUED TO (Name and Address) VECTRA Technologies, 1010 South 336th Str Suite 220 Federal Way, WA 9800 CONDITIONS This certificate is conditional upon fulfit (a) Packaging (1) Model No (2) Descript	b. TITLE	T OF THE PACKAGE DESIGN OR APPLICATION AND IDENTIFICATION OF REPORT OR APPLICATION	TION:	
(a) Packaging (1) Moder of (2) Descript	eet Ju	CTRA Technologies, Inc. a ly 21, 1994, as supplement REGulation		lated
(a) Packaging (1) Model to (2) Descript	CL T a WCA	ET NUMBER TEOP		
(1) Model Ho (2) Descript	illing the requirements of 10 CFF	Part 71, as applicable, and the coordinants	pecified below.	
circular high by shell i inner sh body) se neoprene are prov minimum gauge lo and lock	rbon speel overgac ent dessel is a 55 cylinder 48 inche 24-inches ameter filled with 3-pou ell is molded fibe trins of the over gasket at the ste ided for lifting. 14-gauge his and a cking ring withour		Averpack is ter with a 3 olyurethane opper and low toggle clamp to sections. Im 18-gauge s drum is by w 5/8-inch diam	a right 4-1/2-inch steel foam. The ver (lid and s, and a Four lugs teel with a vay of a 12- meter bolt
(3) Drawing				
		ed in accordance with Nuc -60-200D, Rev. C, cr X-60		

U.S. NUCLEAR REGULATORY COMMISSION NHC FORM 618A CONDITIONS (continued) (6-83) Page 2 - Certificate No. 9070 - Revision No. 12 - Docket No. 71-9070 (b) Contents Type and form of material (1) Radioactive material in the form of dewatered, solid or solidified (1)materials meeting the requirements of low specific activity material, contained in steel drums. Radioactive material meeting the requirements of special form (11) radioactive material, contained in steel drums. (iii) Radioactive material in the form of solid metal pieces or activated solid metal components, portained in steel drums. Maximum quantity of Gaterial per package (2)Greater than whe A quantities of radioactive material. Fissile material contents not to exceed the generally licensed miss limits as specified in 10 CFR §§75.18 and 71.22. Plutonium in excess of the curies per package must be in the form of metal, metal alloy or reactor fuel elements, or must meet the requirements of special ferror adioactive material. Internal decay heat not to expeed 3 watts. The maximum weight of contents, ingluding are not to exceed 550 pounds. 6. Kund The steel drum must ber in accurdance with turix, 1.3.2 of the supplement dated 7. October 20, 1994. The drum must be second positropard 8. over edsitioned by that petrusions will not puncture the Contents must be securely 9. drum under normal or accidents conditions. The lifting lugs must be rendered inoperable for tip-down during transport. 10. In addition to the requirements of Subpart G. 10 CFR Part 71: 11. The package must meet the Acceptance Tests and Maintenance Program of (a) Chapter 8.0 of the application; and The ackage shall be prepared for shipment and operated in accordance with (b) the Operating Procedures in Chapter 7.0 of the application. The packaging authorized by this certificate is hereby approved for use under 12. the general license provisions of 10 CFR §71.12. 13. Expiration date: December 31, 1999.



1. CERTIFICA 9071			IVE MATERIALS PACKAGES	Line and the second li	20241
	TE NUMBER	5. REVISION NUMBER	USA/9071/B()	d. PAGE NUMBER	TOTAL NUMBER PAG
of Fede	rai Regulations, Part 71, "Packa artificate does not relieve the con	ing and Transportation of Ra signor from compliance with	scribed in Item 5 below, meets the applicable adioactive Material." any requirement of the regulations of the U, untry through or into which the package wi	S. Department of Transpo	
EFCO, I 0. Box	ncorporated	ANI AP	OF THE PACKAGE DESIGN OF APPLICATION AND IDENTIFICATION OF REPORT OF APPLIC EFCO application receive th report, "Safety Analy -101," as supplemented. ET NUMBER 71-9071	d June 14, 197	6, k
4 CONDITION This certifi	IS cate is conditional upon fulfillin	the requirements of 10 CFF	Part 71, as applicable, and the coorditions	specified below.	
6. (1) (2)	The overall dime long. The cask shells. The inn steel shell is 1 lead shield fill 0.140-inch thick thick stainless 167 inches long. inches of poured Closure is provi closure seal. T drain lines whic is equipped with overall dimensio diameter by 236 redundant pairs	lead shielded c nsions of the ca consists of two er shell is 5/8- 1/2-inch thick s the space betwo stainless steel steel spacer wire The base is a lead. The flan ded by twenty, 1 here are two pen h are plugged an removable, cann hs of the cask w inches long. Th for lifting. Th	ask for non-fissile radi sk are 40 inches in diam concentric stainless ste inch thick by 28-inch ID by 39-1/4-inch OD and a een. The outer shell is thermal shield separate e. The cavity is 28 inc welded stainless steel c ged lid is of stainless -1/2-inch diameter bolts etrations into the conta d gasketed with a neopre ed balsa impact limiters ith impact limiters in p e cask has four lifting ree of the trunnions are age gross weight is appr	eter by 193 in et cylindrical ; the outer st 3-1/2-inch pou surrounded by d by a 0.125-i hes in diamete onstruction wi steel and lead and a GASK-0- inment vessel ne seal. The at each end. lace are 84 in trunnions, two used for tie-	ches ainless red a nch r by th 3 SEAL for cask The ches in down of

Page 2 - Certificate No. 9071 - Revision No. 5 - Docket No. 71-9071

5. (a) Packaging (Continued)

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NRC FORM ETBA

(3) Drawings

The packaging is fabricated in accordance with ANEFCO, Incorporated Drawing Nos. SC-101, Rev. A; SC-102; SC-103, Rev. A; SC-104, Rev. B; SC-107, Rev. A; SC-108; SC-110, Rev. A; and SC-111.

(b) Contents

(1) Type and form of material

Greater than Type A quantity of Dyproduct material in the form of dry, solid, metallic waste accerial and activated reactor components.

(2) Maximum quantity of material per package

Weight of contents not to exceed 10,000 pounds. Internal decay heat of contents not to exceed 300 watts.

- 6. The package must be shipped ary. In preparation for shipment, the cask cavity must be drained of all excess water. A vacuum pump must be used to reduce the cavity pressure below the varies pressure corresponding to the measured temperature of the drained water. The cavity pressure must be held below the vapor pressure determined for at least 90 minutes. Ory Toaded package need not be vacuum dried provided the "empty" cask cavity and drain times are verified not to contain liquid prior to each logang.
- Except for close fitting consents; appropriate shoring must be used in the cask cavity to limit movement of the contents caring accident conditions of transport.
- 8. In addition to the requirements of Subpart 6 of 10 CFR Part 71:
 - a. The package must be operated and maintained in accordance with procedures in supplement dated December 12, 1991.
 - b. Prior to each shipment the gase o-seal closure seal must be inspected. The gask-o-seal closure seal and the cavity drain O-ring seals must be replaced with new seals within the 12-month period prior to shipment, or earlier if inspection shows any defect.
 - c. The package must be leak tested prior to each shipment in accordance with operating procedures in supplement dated December 12, 1991.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 10. Expiration date: December 31, 1996.

Page 3 - Certificate No. 9071 - Revision No. 5 - Docket No. 71-9071

REFERENCES

ANEFCO, Incorporated Safety Analysis Report Cask AP-101, received June 14, 1976.

FA

NO

Supplements dated: July 21, August 6, and October 21, 1976; April 2, and September 12, 1986; and September 26, and December 12, 1991.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

MacDonald, Chief

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

DEC 1 7 1991

Date:

8C FORM 618 65) CFR 71				TE OF COMPLIANCE	UCLEAR REGULA	
CERTIFICATE	NUMBER		D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	e. TOTAL NUMBER PA
of Federal	Regulation:	s, Part 71, "Packaging of relieve the consign	and Transportation of Ra	criped in Item 5 below, meets the applicable s dioactive MateriaL" any requirement of the regulations of the U.S intry through or into which the package will	Department of Trans	
THIS CERTIFICA & ISSUED TO //	ATE IS ISSUE	D ON THE BASIS OF A	SAFETY ANALYSIS REPORT	OF THE PACKAGE DESIGN OR APPLICATION AND IDENTIFICATION OF REPORT OR APPLICATION	TION:	
P.O. Bo: 1560 Be:	x 2530 ar Cree	ology Group, ek Road 37831-2530	dat	ed January 26, 1994. REG (71-9073	nc., applica	tion
CONDITIONS This certificate	e is conditio	onal upon fulfilling th	e requirements of 10 CFR	Part 71, as applicable, and the conditions s	pecified below.	
	0	lang.		0		
(a)	Packa		2 August	And a	le.	
	(1)	Model No.:	10-142A	So / She 1		
	(2)	Descriptio		telded cask for solid ra	0	
		shells sur thick inne has a 76-1 steel plat stepped we two, 3-inc lid of sim plate. Th eight, 1-i diameter b lid test p bottom of filled wit of the cas with 12-ga The primar 29-inch di	rounding a 3-1 r shell bas a /4-inch OD; th es. The base Ided lid, secu h thick steel oflar construct e secondary lin nch diameter b y 72 inches hi ort. Toroidal the cask. The h rigid polyur k body and int uge, 304 stain y lid is close ameter seconda	ts of two concentric car /2-inch thick lead shiel 66-inch ID, and the 1-in e base consists of two, is welded to the steel c red by eight ratchet bin plates containing openin ion with an additional 1 d is secured to the prim olts. The containment c gh. The package design impact limiters are loc impact limiters are loc ethane foam. Interior a erior surfaces of the up less steel cladding and d by means of eight ratc ry lid is closed by eigh	d. The 1/2- ch thick out 3-inch thick ylindrical s ders, is com gs for a sec -inch thick ary lid thro avity is 66 is provided ated at the gauge stainl nd exterior per lid are seal welded. het binders. t, 1-inch di	inch er shell welded hells. A prised of ondary upper ugh inches in with a top and ess steel surfaces covered The ameter
		stud bolts the lid pl	. Both lids a ates. Lifting	re sealed using silicone is facilitated with thr	gaskets bon ee lugs weld	
		centrally All expose barrier.	located lift 1 d side walls a Four skewed lu	ary lid has a redundant	ess steel th shell, are u	ed to the 1, and a ermal sed for

Page 2 - Certificate No. 9073 - Revision No. 18 - Docket No. 71-9073

5. (a) (3) Drawings

The packaging is fabricated in accordance with Scientific Ecology Group, Inc., Drawing No. STD-02-107, Sheets 1 and 2, Rev. 0.

- (b) Contents
 - (1) Type and form of material
 - Dewatered ion exchange resins or solid waste meeting the requirements for low specific activity material in secondary containers; or
 - (ii) Activated solid components meeting the requirements for low specific activity material in secondary containers.
 - (2) Maximum quantity of material per package

Greater than Type A quantities of radioactive materials which may contain fissile contents not to exceed the generally licensed mass limits as specified in 10 CFR §§§71.18, 71.20, and 71.22. Internal decay heat not to exceed 400 watts and the maximum weight of contents, including secondary containers, not to exceed 10,000 pounds.

- 6. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft³ at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

(b) For any package containing materials with radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

Page 3 - Certificate No. 9073 - Revision No. 18 - Docket No. 71-9073

- Except for close fitting contents, dunnage must be provided in the shipping cask cavity sufficient to prevent significant movement of the contents or secondary containers relative to the outer packaging under normal conditions.
- 8. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) Prior to each shipment, the packaging lid seals must be inspected. The seals must be replaced with new seals if inspection shows any defects or every 12 months, whichever occurs first. The cavity test port must be sealed with appropriate sealant applied to the pipe plug threads.
 - (b) The package shall be prepared for shipment and uperated in accordance with the Operating Procedures in chapter 7 of the application.
 - (b) The package must meet the Acceptance Tests and Maintenance Program in chapter 8 of the application.
- 9. The package authorized by this certificate must be transported on a motor vehicle, railroad car, aircraft, inland watercraft, or hold or deck of a seagoing vessel assigned for the sole use of the licensee.
- Packagings fabricated after March 28, 1980 must be constructed of A-516 Grade 70 carbon steel.
- 11. The packaging authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 12. Expiration date: February 28, 1999.

REFERENCES

Scientific Ecology Group, Inc.,

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Caso F. Choppell

application dated January 26, 1994.

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

FEB_ 2 8 1994

Date:

K" FORM 618 66 CFN 71	FOR RADIOA	CATE OF COMPLIANCE		
& CERTIFICATE NUMBER	5. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAG
9079	15	USA/9079/A	1	3
of Federal Regulations. Part	71, "Packaging and Transportation o	a described in Item 5 below, meets the applicable s of Radioactive Material." with any requirement of the regulations of the U.S v country through or into which the package will	Department of Trans	
THIS CERTIFICATE IS ISSUED ON T a ISSUED TO (Name and Address) acific Nuclear Sys ne Harbison Way, S columbia, SC 29212	tems, Inc.	Nuclear Packaging Inc. a dated March 30, 1988, as	pplication	ed .
CONDITIONS	CL Y CX	OCKET NUMBER 71-9079	acified below	
This certificate is conditional up	oon fulfilling the requirements of 10	CFR Part 71, ss applicable, and the conditions s		
is a ric the cas side wal shell, a 2-inch t intergen steel f the top stepped are sea positive contains plates a is seal	tion tcased, lead shielded but circular cylinder cavity is 73-3/8 in l consists of a 3/8 and a 7/8-inch thick thick steel plates we ally welded to the ange is welded to the ange is welded to the the fid is comprise and welded together ed by a Neoprene gas a closure of the lid s a centrally located and one, 1-inch thick	d cask for low specific act r 81-1/2 inches high by 81- aches high by 75-1/2 inches -inch thick inner steel she outer steel shell. Each b elded together to form a 4- inner and outer steel shell he inner and outer steel shell he inner and outer steel shell he inner and outer steel shell hsed of two, 2-inch thick st to mate with the steel fla sket located between the li is accomplished by eight r d shield plug comprised of k steel plate stepped and w ket, and eight, 3/4-inch st	3/4 inches i in diameter 11, a 1-3/4- ase is comprised inch thick b s of the sid ells of the eel plates, nge. The ca d and steel achet binder two, 2-inch elded. The	in diameter. The cask inch lead ised of two base which i de wall. A side wall a which are isk closures flange, rs. The lid thick steel shield plug
are four	<pre>r cask lifting lugs,</pre>	four tie-down lugs welded three lid lifting lugs, an ght is approximately 48,000	d one shield	

NRC FORM 618A 16-85)

CONDITIONS (continued)

Page 2 - Certificate No. 9079 - Revision No. 15 - Docket No. 71-9079

- (a) Continued
 - (3) Drawings

The Model No. NUPAC 14D-2.0 packaging is fabricated in accordance with Nuclear Packaging, Incorporated Drawing No. X-20-215D, Revision C.

(b) Contents

7.

(1) Type and form of material

Process solids, either dewatered, solid or solidified, meeting the requirements for low specific activity material, in secondary containers.

(2) Maximum quantity of material per package

Greater than Type & quantity of radioactive material which may contain fissile material provided the fissile material does not exceed the limits in 10 CFR \$71.53. The weight of the contents and secondary containers shall not exceed 14,000 pounds and the internal decay heat load shall not exceed 7 watts.

- For any package containing water and/or organic substances which could 6. (a) radiolytically generate combustible gases, determination must be made by test and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - The hydrogen generated must be limited to a molar quantity that would be (1) no more than 5% by velume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft at 14.7 psia and 70°); or
 - The secondary container and cask cavity must be inerted with a diluent to (2) assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

- For any package shipped within 10 days of preparation, or within 10 days (b) after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
- Except for close fitting contents shoring must be placed between secondary containers and the cask cavity to prevent movement during normal conditions of transport.

The lid and shield plug lifting lugs must not be used for lifting the cask, and shall be covered in transit.

U.S. NUCLEAR REGULATORY COMMISSION HRC FORM #18A CONDITIONS (continued) (6-83) Page 3 - Certificate No. 9079 - Revision No. 15 - Docket No. 71-9079 In addition to the requirements of Subpart G of 10 CFR Part 71: (a) Prior to each shipment, the packaging lid seals, if opened (or if security seal is broken), must be inspected. The seals must be replaced with new seals if inspection shows any defects or every twelve (12) months, whichever occurs first. Cavity drain line and optional vent/test connection must be sealed with appropriate sealant applied to the pipe plug threads. (b) Each cask must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application. In addition, the cask must be leak tested at least once every twelve (12) months in accordance with Appendix 8.4 of the application. (c) The package shall be prepared for shipment and operated in accordance with the operating procedures of Section 7.0 of the application. The cask body and each cask lid must be marked in accordance with 10 CFR §71.85(c). 10. The package authorized by this certificate must be transported on a motor vehicle. 11. railroad car, aircraft, inland watercraft, or hold or deck of a seagoing vessel assigned for the sofe use of the licensee. The package authorized by this certificate is hereby approved for use under the 12. general license provisions of 10 CFR §71.12. Expiration date: June 30, 1998. 13. REFERENCES Nuclear Packaging, Incorporated application dated March 30, 1988 Supplement dated: April 26, 1989 and February 23, 1993. FOR THE U.S. NUCLEAR REGULATORY COMMISSION Charles E. MacDonald, Chief Transportation Branch Division of Industrial and Medical Nuclear Safety, NMSS APR 2 7 1993 Date: 268

10 CFR 71			ATE OF COMPLIANC	and a second sec		
CERTIFICATE	NUMBER	6. REVISION NUMBER	C. PACKAGE IDENTIFICATION)	d PAGE NUMBER	e. TOTAL NUMBER PAG
of Federal I	Regulations, Part 71, "Packagin	ig and Transportation of F anor from compliance with	escribed in item 5 below, meets th Radioactive Material." h any requirement of the regulation ountry through or into which the	ons of the U.S. D	epartment of Trans	
Chem- 220 S	TE IS ISSUED ON THE BASIS OF A hanne and Address Nuclear Systems, toneridge Drive bia, SC 29210	b. TITL	trof the package design of A e and identification of Report Chem-Nuclear Syste dated November 24,	ems, Inc.	applicatio	
CONDITIONS		. Charles	KET NUMBER 71-908	7		
This certificate	is conditional upon fulfilling t	he requirements of 10 CF	R Part 71, as applicable, and the	conditions spec	fied below.	
(a)	 (2) Description A steel encadouble-walle lead-filled gasket. Out diameter wire and 5-3/4" in The lid has with a plug. is 26-1/2" in pounds. (3) Drawings The packagin 	nd, lead-filler Tid is attache er steel sheet res. The lead in the lid. The a steel U-bar The cask is in diameter and a steel U-bar of is construct ng is construct	Ided shipping cask t circular cylinder ad with twelve, 1 ts are separated for shielding is 5" in to bolted-on steel for lifting. The 39" in diameter and 54" long. The part ted in accordance to 5-0005, Sheets 1, 5	r. A ste 1/4" bolt rom the c 1 ugs are cavity d 1 68-1/2 ackage we with Chem	el, plug-ty s; and a si ask walls w es, 6" in f for liftir rain line f "long. Th ight is abo -Nuclear Sy	ype, ilicone with small the base ng only. is closed ne cavity but 26,000
(b)	Contents					
	Type, form and m	naximum quanti	ty of material per	package		
	(i) Greater than Decay heat r	n Type A quant not to exceed (ity of by product 1 500 watts; or	material	as solid me	etal.
	(ii) Decay heat r	not to exceed !	5 watts, and:			
	Process soli sealed conta material; or	ainer meeting :	watered, solid, or the requirements f	solidifi or low sp	ed in a sec ecific act	condary ivity

Page 2 - Certificate No. 9081 - Revision No. 10 - Docket No. 71-9081

6.

Solid reactor components in secondary containers, as required, that meet the requirements for low specific activity material.

(a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:

- (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at SIP (i.e., no more than 0.063 g-moles/ft³ at 14.7 psia and 70°F); or
- (ii) The secondary container and cask cavity must be inerted with a diffuent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

- (b) For any package containing materials with radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
- Shoring must be provided to minimize movement of contents during accident conditions of transport.
- Maximum gross weight of the contents, secondary container, and shoring is limited to 5,000 pounds.
- 9. The lid closure to the cask shall be secured by twelve, SA-354, Type BD, 1-1/4"-7 UNC x 2-1/4" long bolts torqued to 320 f -1bs ± 10% (lubricated) or 420 ft-1bs ± 10% (dry).
- The cask shall be delivered to a carrier dry and the cavity drain line shall be sealed with appropriate sealant applied to threads of pipe plug.

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- Prior to each shipment, the leak test described in Section 8.2 of the application must be performed. No package is to be delivered to a carrier for transport with a detectable leak using the method of Section 8.2.
- Radiation measurements shall be made to determine that the dose rate does not exceed 30 mrem/hr at one meter from the surface of a dry loaded cask.
- 13. Prior to each shipment, the lift lugs must be removed from the packaging.
- 14. The contents described in 5(b)(ii) shall be transported on a motor vehicle, railroad car, aircraft, inlend water craft, or hold or deck of a seagoing vessel assigned for serie use of the licensee.
- 15. In addition to the requirements of subpart G of 10 CFR Part 71:
 - (a) The package shall be prepared for shipment and operated accordance with the Operating Procedures in Chapter 7 of the application.
 - (b) The package shall be maintained in accordance with the Maintenance Program in Chapter & of the application
- 16. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CPR \$71.12.
- 17. Expiration date: December 31, 1997.

REFERENCE

Chem-Nuclear Systems, Inc. application dated November 24, 1987.

Supplement dated: Nevember 24, 1992:400

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date:

DEC 1 4 1992

8-85) 0 CFR 71	M 618		CERTIFIC FOR RADIOA	U.S. NUCLEAR REGULATORY COMMISSIO CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIALS PACKAGES					
L. CERTI	FICATE NUMBE		D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUME	R d. PAGE NUMBER	e. TOTAL NUMBER I'AC			
		9086	15	USA/9086/A		12			
of I	is certificate is Fedural Regula	itions, Part 71, "Paci	kaging and Transportation o	described in item 5 below, meets the applical I Radioactive Material." with any requirement of the regulations of the country through or into which the package	U.S. Department of Tran				
* ISSU Scien P.O. 1560	tific Ed Box 2530 Bear Cro	w Address) cology Group D eek Road	p, Inc.	ORT OF THE PACKAGE DESIGN OR APPLICATIO TLE AND IDENTIFICATION OF REPORT OR APPL Safety Analysis Report Radwaste Shipping Cask Revision 4.	for the HN-1	90-1			
		N 37831-25	30	OCKET NUMBER 71-9086					
4. CONDI This ci	ertificate is co	nditional upon fulfill	ling the requirements of 10	CFR Part 71, as applicable, and the conditio	ns specified below.				
5.		5	the second	0	S				
a)	Packagi	ng 💭	187	82-1	See.				
1		lamo	HN-190-1	50 / BB	0				
	(1) M	odel No.:	130-1	个【【管理	0				
	(2) D	escription	AN ELL	Lund Jag	Reading and State				
	T d d s T o i 4 T b b 4 o	he cask is iameter. I hell, a I-3 he base is uter steel nner and ou -inch thick he cask clo etween the y thirty, 1 -inch stepp r Buna-N O-	a right circulat he cask cavity he cask side wa /4-inch lead shu a 4-inch thick shells of the s ter steel shell steel plate wh sure is sealed lid and steel f -inch studs and ed steel shield	ded cask for low specific r cylinder 82.5 inches hi is 74.5 inches high by 75 is consists of a 3/8-inch eff, and a 778-inch thick steel plate which is welch ide wall. A steel flange s of the side wall at the ich is stepped to mate with by a Viton or Buna-N 0-ri lange. Positive lid clos nuts. The lid contains plug. The shield plug is d sixteen, 1/2-inch studs	igh by 81.5 in 5,63 inches in 5,63 inches in 5 outer steel led to the innue is welded to 6 top. The lin ith the steel ing gasket loc sure is accomp a centrally lin is sealed by a	ches in steel shell. er and the d is a flange. ated lished ocated Viton			
	T	here are th	ree cask liftin	four-tie down lugs welde g lugs, three lid lifting he package gross weight	g lugs, and on	e			
	(3) D	rawings							
	D	levelopment		d in accordance with Hitt wing Nos. STD-02-028, Rev Pavision 5					

NRC FORM 618A

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9086 - Revision No. 15 - Docket No. 71-9086

5. ((b)	Cont	teni	ts

6.

7.

8.

(1) Type and form of material

Process solids either dewatered, solid or solidified meeting the requirments for low specific activity material, in secondary containers.

(2) Maximum quantity of material per package

Greater than Type A quantity of radioactive material with the weight of the contents, secondary containers and shoring not exceeding 14,500 pounds except the weight of the contents in HN-100 Series 1, Unit 5 must not exceed 6,900 pounds. Internal decay heat must not exceed 7 thermal watts.

- (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative pakcage such that the following criteria are met over a period of time that is twice the expected shipment time:
 - The inverse general d must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft³ at 14.7 psia and 70° F); or
 - (2) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have bydrogen greater than 5%.

For any package delivered to a carrier for transort, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

(b) For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

Except for close fitting contents, shoring must be placed between secondary containers and the cask cavity to minimize movement during normal conditions of transport.

The lid and shield plug liftng lugs must not be used for lifting the cask, and shall be covered in transit.

NRC FORM STEA Page 3 - Certificate No. 9086 - Revision No. 15 - Docket No. 71-9086

In addition to the requirements of Subpart G of 10 CFR Part 71:

- (a) Prior to each shipment, the packaging lid seals, if opened (or if security seal is broken,), must be inspected. The seals must be replaced with new seals if inspection shows any defects or every twelve (12) months, whichever occurs first.
- (b) Each packaging must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application.
- (c) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Sectin 7.0 of the application.
- The package authorized by this certificate must be transported on a motor vehicle, railroad car, aircraft, inland watercraft, or hold on deck of a seagoing vessel assigned for the sole use of the figensee.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 12. Expiration date: duly 31, 1998.

REFERENCES

cientific Ecology Group, Inc. application dated May 18, 1993.

Supplement dated June 23, 1993.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

C haddle

Cass R. Chappell, Section Leader Cask Certification Section Transportation Branch Division of Industrial and Medical Nuclear Safety, NMSS

JUL 1 3 1993

Date:

RC FORM 818 45) OFR 71			U.S. NUCLEAR REGULATORY COMMISSIO CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIALS PACKAGES					
& CERTIFICATE NU	MBER	9089	6. REVISION NUMBE	iR .	C. PACKAGE IDENTIFICATION N USA/9089/A	UMBER d	PAGE NUMBER	. TOTAL NUMBER PAG
of Federal R	egulation	is, Part 71, "Packaging	and Transportation	e with any n	ed in Item 5 below, meets the ap ctive Material." equirement of the regulations through or into which the par	of the U.S. Dep	artment of Trans	
Scientific P.O. Box 1 1560 Bear	c Eco 2530 Cree	logy Group,	b	We	HE PACKAGE DESIGN OF APPLI IDENTIFICATION OF REPORT OF stinghouse Hittma plication dated 0 supplemented. 71-9089	n Nuclea		
CONDITIONS This cettificate	s conditi	onal upon fulfilling th	e requirements of 1	0 CFR Part	71, as applicable, and the co	aditions specifi	ed below.	
			<u></u>			0.		
(a)	Pack	aging 6	-		0	· P,		
	(1)	Model No. :	HN-1945	-	S AB	interes.		
	(2)	Description		17	7(借)	ŏ		
		diameter. diameter. The 3-inch is a 3-inch cylinder. The lid and with Buna 4 vent/test i lugs welded three cask	The cavity The side w steel base steel pla A central plug are 0-ring ga n the secon to the ou lifting lug	is 75 alls co is in te, sto y local attache skets. ndary ter sho gs, th	84-1/4 inches hi 1/2 inches high insist of two ply tegrally welded t apped to mate with ted shield plug i ed with stud-bolt A plugged drain hid connection is all are used for ree lid lifting l coss weight is ap	by 75-5/ s of 1-1 o the cy h the up s simila s and nu line an provide tie down ugs, and	8 inches /2-inch s linder. per flang rly const ts and se d/or opti d. Four . There one shie	in teel. The lid e of the ructed. aled onal skewed are ld plug
	(3)	Drawings						
		The packagi Nuclear, In	ng is fabr c. Drawing	icated Nos.:	in accordance wi STD-02-078, Rev	th Westi . 1 and	nghouse H STD-02-07	ittman 9, Rev. O.

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5. (b) Contents

6.

(1) Type and form of material.

Process solids, either dewatered, solid or solidified, meeting the requirements for low specific activity material.

(2) Maximum quantity of material per package.

Greater than Type A quantity of radioactive material which may contain fissile material provided the fissile material does not exceed the limits in 10 CFR §71.53. The weight of the contents, secondary containers, and shoring must not exceed 17,000 pounds and the internal decay heat load must not exceed 2 thermal watts.

- (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft² at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

- (b) For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
- Except for close fitting contents, shoring must be placed between the secondary containers and cask cavity to minimize movement during normal conditions of transport.
- The lid and shield plug lifting lugs must not be used for lifting the cask, and shall be covered in transit.
- 9. Packagings without a drain line must be provided with the optional vent/test connection in the cask secondary lid.
- The drain line and optional vent/test connection must be appropriately plugged and sealed prior to transport.

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Page 3 - Certificate No. 9089 - Revision No. 11 - Docket No. 71-9089

- 11. Prior to each shipment, the packaging lid seals, if opened (or if the security seal is broken), must be inspected. The seals must be replaced with new seals if inspection shows any defects or every twelve months, whichever occurs first.
- 12. The packaging must be leak tested at least once every twelve months in accordance with Leak Test Procedure STD-P-02-002, Rev. 3, dated August 18, 1989. Each cask which has been damaged or repaired in the area of a seal must also be tested prior to subsequent use; normal gasket maintenance does not require a subsequent test.
- Packagings fabricated after November 30, 1983, must be constructed of A-516, Grade 70 carbon steel.
- 14. The package authorized by this certificate must be transported on a motor vehicle, railroad car, aircraft, inland watercraft, or hold or deck of a seagoing vessel assigned for the sole use of the license.
- 15. The packaging shall be prepared for shipment and operated in accordance with the Operating Procedures of Section 7.0 of the application.
- 16. Each package must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application.
- Packaging fabricated in accordance with Hittman Nuclear & Development Corporation Drawing Nos. C001-5-9128, Rev. 5 and C001-5-9129, Rev. 3 are not authorized after April 1989.
- 18. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 19. Expiration date: February 28, 1999.

REFERENCES

Westinghouse Hittman Nuclear, Incorporated application dated October 28, 1988.

Supplements dated: January 26, 1989, and December 22, 1993.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Ears R. Chappell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

FEB 2 8 1994

Date:

RC FORM 618 1460 10 CFR 71			CERTIFICA	U.S. I	NUCLEAR REGULA	TORY COMMISSI
CERTIFICATE N	UMBER	b	REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	S. TOTAL NUMBER PAR
PREAMBLE	ate is issued to	certify that the paci rt 71, "Packaging at	aging and contents d nd Transportation of f	escribed in item 5 below, meets the applicable Radioactive Material."	safety standards set fo	rth in Title 10, Code
h This partition	ste does not re	lieve the consignor	from compliance with	h any requirement of the regulations of the U. ountry through or into which the package wi	S. Department of Tran II be transported.	sportation or other
. THIS CERTIFICAT		THE BASIS OF A SA	FETY ANALYSIS REPOR	RT OF THE PACKAGE DESIGN OR APPLICATION	ATION:	
hem-Nucle 40 Stoner columbia,	idge Dri		EAF	Chem-Nuclear Systems, Ir May 1, 1985, as supplema RECOURT NUMBER 71-9094	nc. applicati ented.	on dated
4. CONDITIONS This certificate	is conditional	upon fulfilling the r	equirements of 10 CF	R Part 71, as applicable, and the cooditions	specified below.	
5.		and and		0		
(a)	Packagi	111	680	And "	here.	
	(1) Mod	el No.: Cl	NS 14-195-H		0	
	(2) Des	cription	(到)	众人的	Ö	
	The wit inc rub A s clo lif rin	cask is a h a 77-inc h thick, a er steel s ber sealed econdary 1 sure. The ting trumn g. Packag	right circu h diameter b hell 1/8-inc lid is prov id with a Ne cask is wel ions, three e gross weig	Ided cask for low specifi far cylinder 83-1/8-inch y 80-1/8-inch cavity: Le d in an outer steel shell h thick. Positive closur ided by twelve, 1-1/4-inc oprene seal uses eighteer ded to a 96-inch square t lid lift rings and one se ht is 56,500 pounds.	diameter by ad shielding 3/4-inch th a of the sil h diameter c h, 3/4"-10UNC based plate,	89-7/8-1ncn is 2-3/16- ick and an icone cap screws. bolts for has two
	(3) Dra			女女年		
	Dra	wing No. 1 erts are f	-189-101, Sh	ed in accordance with Ch eet 1 of 1, Rev. A-G. Th accordance with Chem-Nuc Rev. 2.	ne optional s	shield

Page 2 - Certificate No. 9094 - Revision No. 11 - Docket No. 71-9094

(b) Contents

6.

7.

- (1) Type and form of material
 - Process solids, either dewatered, solid or solidified in secondary containers, meeting the requirements for low specific activity material; or
 - (ii) Solid reactor components in secondary containers, as required that meet the requirements for low specific activity material.
- (2) Maximum quantity of material per package

Greater than Type A quantity of radioactive material with the weight of the contents, secondary containers, shield inserts and shoring not exceeding 17,700 pounds.

- (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The bydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.068 g-moles/ft³ at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

- (b) For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
- Shoring must be placed between secondary containers (or activated components), and the cask cavity to prevent movement during normal conditions of transport.
- The lid lifting lugs must not be used for lifting the cask and shall be covered in transit.

CONDITIONS (continued) Page 3 - Certificate No. 9094 - Revision No. 11 - Docket No. 71-9094 In addition to the requirements of Subpart G of 10 CFR Part 71: 9. Prior to each shipment the lid gaskets if opened (or if security seal is a. broken), must be inspected. These gaskets shall be replaced if inspection shows any defects or every twelve (12) months, whichever occurs first. The package shall be prepared for shipment and operated in accordance with b. Section 7.0, Operating Procedures, in the application dated May 1, 1985, and supplements dated August 26, 1985 and August 23, 1990. The package must be maintained in accordance with Section 8.0, Test and C. Maintenance, in the application dated May 1, 1985. 10. Fabrication of additional packagings is not authorized. 11. The package authorized by this certificate must be transported on a motor vehicle, railroad car, aircraft, inland water craft, or hold or deck of a seagoing vessel assigned for sole use of the licensee. 12. The package authonized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12. 13. Expiration date: October 31, 1995. REFERENCE Chem-Nuclear Systems, Inc. application dated May 1, 1985. Supplements dated: August 25, 1985, August 23, 1990 and December 4, 1992. YIND X FOR THE U.S. NUCLEAR REGULATORY COMMISSION Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS JAN 1 3 1993 Date:

CFR 71		CERTIFI	CATE OF	COMPLIANCE TERIALS PACKAGES			ORY COMMISSI
. CERTIFICATE NUMBER		D. REVISION NUMBER	R C.P/	CKAGE IDENTIFICATION NUM	ABER d. PA	GE NUMBER	. TOTAL NUMBER PA
9096		11		USA/9096/A		1 1	3
of Federal Regulations.	Part 71, "Packagin relieve the consid	g and Transportation nor from compliance	of Radioactive with any requir	Item 5 below, meets the appl Material." rement of the regulations of ugh or into which the packu	the U.S. Departr	nent of Trans;	
	ear System ridge Driv	s, Inc.	RRR	Chem-Nuclear Stated August 20	ystems, I	nc. app]	ication
		CL4 of the	OCKET NUMBE	as applicable, and the cost	tions specified	below.	
(a)	(3) Draw Tadi Post Shie and Iany Post by tu with for plat one poun (3) Draw	Aptions apt	fabrica	ted in accordance	ght rcu ght and linch t steel she linch lid kness of sealed 1 ws. A se inch dia 5-inch sq ree lid 1 ross weig	lar cyli a cavity hick lea lls 3/4- and bas l/2-inc id is pr condary meter bo uare bas ift ring ht is 57	nder inch se are h. ovided lid olts se s and 7,450
		ems, Inc. Dr		s. 1-298-101, R			

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NRC FORM 618A (6-83)

6.

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9096 - Revision No. 11 - Docket No. 71-9096

- 5. (b) Contents
 - (1) Type and form of material
 - (i) Process solids, either dewatered, solid or solidified in secondary containers, meeting the requirements for low specific activity material; or
 - (ii) Solid reactor components in secondary containers, as required that meet the requirements for low specific activity material.
 - (2) Maximum quantity of mReEagper package

Greater than Type A quantity of radioactive material with the weight of the contents, secondary containers, auxiliary shield and shoring not exceeding 27,250 pounds.

(a) For any mackage containing water and/or organic ubstances which could padio Trically generate combustible gases, determination must be made by tests and measurements or topapalysis of a representative peckage such that the forthowing criteria are met over a period of same that is twice preservected shipment time:

(i) The hydrogen demerated most be timited to a mean quantity that would be approve than the bolume /(or emivalent limits for other) inframed that should be secondary container gas void the secondary container than 0.53 g-moles/ft³
(ii) We secondary container and case ravity must be inerted with a dilatent to assure that payoen that be limited to 5% by volume in those portions of the package which Could have hydrogen greater than 5%.

greater than 5%.

For any package derivered to a carrier for transport, the secondary container must be prepared for supment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

- (b) For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
- 7. Shoring must be placed between secondary containers (or activated components) auxiliary shield, and the cask cavity to prevent movement during normal conditions of transport.
- The auxiliary shield shown in Drawing No. C-114-E-0004, Rev. No. B, may 8. be used for shipment of solidified wastes and solid reactor components.
- 9. The lid lifting lugs must not be used for lifting the cask and shall be covered in transit.

NRC FORM (6-83)	618A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
	Page	3 - Certificate No. 9096 - Revision No. 11 - Docket No. 71-9096
		Prior to each shipment the lid gaskets if opened (or if security seal is broken), must be inspected. The gaskets shall be replaced if inspection shows any defects or every twelve (12) months, whichever occurs first.
	11.	In addition to the requirements of Subpart G of 10 CFR Part 71:
		(a) The package shall be prepared for shipment and operated in accordance with Section 7.0, Operating Procedures, in the application dated August 26, 1985.
		(b) The package must be maintained in accordance with Section 8.0, Tests and Maintenance, in the application dated August 26, 1985.
	12.	Fabrication of additionapor Rkaging G log authorized.
	13.	The package authorized by this certificate must be transported on a motor vehicle. Thiroad car, aircraft, inland water craft, or hold or deck of a seasong vessel assigned for sole use of the licensee.
	14.	The package authorized by this certificate is hereby approved for use under the general discusse provisions of 18 1975 \$71.12.
	15.	Expiration date: Sentemen 30, 2000.
	Chem-	Nuclear Systems for appropriate August 26, 1985
	Chem- 1995	
		The U.S. NUCLER REGULATORY COMMISSION
		A gan the Chappell
		Cass R. Chappell, Section Leader Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety
	Date	and Safeguards
		283

1876 FORM 618 18-551 10 OPR 71		CERTIFICAT	TE OF COMPLIANCE	B. NUCLEAR REGULA	
1. & CERTIFICATE	N, MBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMB USA/9098/B()	ER d. PAGE NUMBER	. TOTAL NUMBER PAR
of Federal	Regulations, Part 71, "Packagi	ng and Transportation of Ra anor from compliance with a	cribed in Item 5 below, meets the applica dioactive Material." Iny requirement of the regulations of the Intry through or into which the package	e U.S. Department of Tran	
	TE IS ISSUED ON THE BASIS OF	A SAFETY ANALYSIS REPORT	OF THE PACKAGE DESIGN OF APPLICATI AND IDENTIFICATION OF REPORT OF APP	ON LICATION:	
epartment ransporta Safety [t of Energy ation & Packaging Division, EH-33.2 1, DC 20585		Cintichem Inc. applica August 20, 1987, as su CINUMBER 71-9098	tion dated	
CONDITIONS This certificate	e is conditional upon fulfilling	the requirements of 10 CFR	Part 71, as applicable, and the condition	ons specified below.	
(a)	cask and in constructed reinforced an 18-gauge encapsulate 3/8"-16 UNO 2 73" OD x	ed, wooden oute mer steel conta of disks and r with steel rods steel drum. The in steel with -2A x 3/4" long 5.56" long 416 The gross weig jackets	CI-20WC-2A r protective jackets w inment vessel. The pr ings of plywood, which . The protective jack he shielded casks have a gasketed and bolted bolts. The inner con stainless steel, gaske ht of the packages is <u>CI-20WC-2</u> 24-1/4x22x28-3/4	contective jacked are glued too kets are contai e depleted uran d flange closur ntainment vesse eted and thread about 400 pour <u>CI-20WC-2</u> 24-1/4x18x26	ets are ned within num shields re with six, al is a led nds.
	U(D) thick	ness, in	2	1.8	
	Cavity dim	s, in	3.1x6H	3.1x6	1

Page 2 - Certificate No. 9098 - Revision No. 7 - Docket No. 71-9098

(3) Drawings

The packagings are constructed in accordance with Cintichem Inc. Drawing Nos.:

Model No. CI-20WC-2 101259, Rev. C and 100964, Rev. G

Model No. CI-20WC-2A 101354, Rev. F and 101326, Rev. D REGULATO

Inner Containment Vessel 101401, Rev. C

- (b) Contents
 - Type and form of material (1)
 - (i) Mo-99/Ic-99 in normal form as solids or liquids.
 - (ii) I-131 in normal form as liquids.
 - Maximum quantity of material per package (2)
 - (i) For contents described in 5(b)(1)(i): 1,000 curies
 - (ii) For contents described in 5(b)(1)(ii): 200 curies N. E.S.
- Contents must be contained within the inner containment vessel specified in 6. 5(a)(3). UL 105*
- In addition to the requirements of Subpart G of 10 CFR Part 71: 7.

A STATE AND AND AND AND AND AND AND

- The package must be prepared for shipment and operated in accordance with the a. operating procedures (PO-05 and PO-06) of the application.
- The package must be maintained in accordance with the maintenance procedures b. (PO-O6) of the application.
- The inner containment vessel neoprene O-ring seal must be replaced prior to С. each shipment.
- Prior to each shipment, the loaded inner containment vessel must show no d. leakage when tested to a sensitivity of at least 1x10⁻⁵ std-cm³/sec.
- The inner containment vessel must be leak tested within 12 months prior to e. use in accordance with the leak test procedures (PO-07) of submittal dated February 3, 1993. The inner containment vessel must show no leakage greater than 1x10⁻⁷ std-cm³/sec.

Page 3 - Certificate No. 9098 - Revision No. 7 - Docket No. 71-9098

NONT

- Structural parts of the packaging which could be used as tie-down devices must be securely covered or locked during transport in such a manner as to prevent their use for that purpose.
- The packages authorized by this certificate are hereby approved for use under the general license provisions of 10 CFR §71.12.
- 10. Expiration date: February 28, 1998.

REFERENCES

Cintichem Inc. application dated August 20, 1987.

Department of Energy supplements dated: July 15, September 18, and December 21, 1992; and February 3, 1993.

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FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald. Chief

Transportation Branch Division of Industrial and Medical Nuclear Safety, NMSS

FEB 2 6 1993

Date:

				ATE OF COMPLIANCE TIVE MATERIALS PACKAGES		
& CERTIFICATE	NUMBER		5. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAG
9099		and party in the state of the s	5	USA/9099/B(U)F	1 1	2
of Federal	Regulation	s, Part 71, "Packaging	g and Transportation of F			
 b. This certifi applicable 	cate does r regulatory	ot relieve the consig agencies, including	nor from compliance with the government of any co	h any requirement of the regulations of the U. ountry through or into which the package wi	5. Department of Frans Il be transported.	portation of other
THIS CERTIFICA a. ISSUED TO //			SAFETY ANALYSIS REPOR	RT OF THE PACKAGE DESIGN OR APPLICATION E AND IDENTIFICATION OF REPORT OR APPLICA	ATION:	
EH-33	.2	ment of Ene DC 20545		EG&G, ATR Fuel Element S Safety Analysis, EGG-ATR August 19, 1987, as supp	0-7737 (Rev.	
CONDITIONS			Citeria	KET NUMBER 71-909		
This certificate	e is conditi	onal upon fulfilling th	evrequirements of 10 CF	R Part 71, as applicable, and the conditions	specified below.	
		63		5		
(a)	Packa	ging	See .	s) (III "	Ő	
	(1)	Model No .:	ATR	And SE	0	
	(2)	inches x 6 16-gauge s polyethyle covered wi provide se provided b access. The inner 31-3/4 inc steel angl honeycomb Positive c are secure	container is a -15/16 inches. teel. The top ne foam and with sponge rubb paration for f y a continuous container is e hes x 11-3/16 e members and impact limiter losure of the d in place usi	right parallelepiped, 60 constructed of 3/4-inch and bottom are lined with th a 6.020-inch cadmium over and with a 0.020-inch our fuel assemblies. Po- chinge, and two wire sea inches, constructed of 1 covered with 18-gauge sta 's are fixed to the ends overpack is provided by ng 1/16-inch diameter co 853 pounds.	plywood, cov th high densi plate. Wood thick cadmiu sitive closur led hinge pin ck, 73-15/16 -inch plywood eel. Aluminu of the overpa four hinge pi	rered with ty spacers m plate re is s provide inches x l, framed by m, ck. ns which

Page 2 - Certificate No. 9099 - Revision No. 5 - Docket No. 71-9099

- 5. (b) Contents
 - (1) Type and form of material

Unirradiated ATR fuel elements. Each element contains 19 formed fuel plates, clad in Aluminum 6061. Each element contains a maximum of 1,100 grams of U-235 in uranium that is enriched to a maximum of 93 wt% in the U-235 isotope.

II

4.1

(2) Maximum quantity of material per package

Up to four (4) unirradiated ATR fuel elements. Total U-235 content not to exceed 4,400 grams per package

(c) Fissile Class

Minimum Transport Index

- 6. The contents must be maintained within its compartment and the active fuel length must be completely within the region of the cadmium covered spacers. Wood spacers may be used to accomplish this.
- Each package must meet the Acceptance Tests and Maintenance Program of Section 8.0 of supple ent dated August 27, 1993.
- The package shall be prepared for shipment and operated in accordance with the Operating Procedures in Section 7.0 of supplement dated August 27, 1993.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 10. Expiration date: January 31, 1999.

REFERENCES

EG&G, ATR Fuel Element Shipping Container Safety Analysis, EGG-ATRO-7737 (Rev. 1), August 19, 1987

Supplements dated: June 11, 1993, and August 27, 1993

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

. Chappell ass k

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

JAN 2 5 1994

Date:

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IRC FORM 618 (8-85) 10 CFR 71				TE OF COMPLIAN	CE	ULEAN REGULA	TORY COMMISSIO
L& CERTIFICATE	NUMBER	9102	6 REVISION NUMBER	C. PACKAGE IDENTIFICATI	ON NUMBER	d PAGE NUMBER	e. TOTAL NUMBER PAG
PREAMBLE		Chromotoid Construction address for the	1	USA/9102/B(1	1 1	6
of Federa	I Regulati	ons, Part 71, "Packagin	g and Transportation of Ra				
 b. This certi applicable 	ficate doe e regulato	s not relieve the consig ry agencies, including	nor from compliance with the government of any co	any requirement of the regulation untry through or into which the	package will b	e transported.	portation or other
A ISSUED TO			SAFETY ANALYSIS REPORT b. TITLE	OF THE PACKAGE DESIGN OR A AND IDENTIFICATION OF REPOR	PPLICATION T OR APPLICATE	DN.	
22301	L Mt.	oducts, Inc. Ephraim Road MD 20842	N	leutron Products, lated August 31, 1	Inc., ap 977, as	plication supplemente	d.
			c. DOCKI	et NUMBER 71-9102			
CONDITIONS This cettifica	te is cond	itional upon fulfilling th	ne requirements of 10 CFR	Part 71, as applicable, and the	conditions spe	cified below.	
5.		1			62		
(a)	Pack	aging					
	(1)	Model No.:	NPI-20WC-6				
	(2)	Description					
		tube. Posi end covers diameter, 1 height made reinforced the overpac with attach	tive closure of at each end of 2 gauge steel b of 3/4-inch th by 16 steel tie k lid is accomp ed chains and h	by an 8-1/4-inch the shielded cas the cavity. The ody with a wooder ick plywood sheet rods and 32 lug lished by 3 equal eld together with	k is acc overpack shell 3 s glued screws. ly space a 3/8-1	omplished b is a 48-in 8-1/4 inche together an Positive c d bracket a nch by 4-in	y bolted ch s in d lsoure of ≲semblies
	(3)	Drawings	naximum package	gross weight is	6,000 pc	unds.	
		The Model No Neutron Proc constructed	lucts, Inc. Dra in accordance	ackaging is const wing No. 240010, with Neutron Prod , and 240160 Shee	Rev. C. ucts Inc	The overpaid Drawing No	ck is
				289			

Page 2 - Certificate No. 9102 - Revision No. 7 - Docket No. 71-9102

- 5. (b) Contents
 - (1) Type and form of material

Cobalt 60, as sealed sources which meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package

The maximum activity must not exceed 9,500 curies. The maximum internal decay heat must not exceed 150 thermal watts.

- 6. The contents must be secured in the drum assembly (Item 11) so as to restrict movement in any direction to less than 0.25 inch by lead, steel or tungsten full diameter plugs and spacers.
- The gross weight of the packaging must not exceed 6,000 pounds and the inner shielded cask shall be snug-fitting within the wooden overpack.
- 8. In addition to the requirements of Subpart 6 of 10 CFR Part 71:
 - (a) The package wust be prepared for shipment and operated in accordance with the Operating Procedures in the supplement dated September 21, 1993.
 - (b) The package must meet the Acceptance Tests and Maintenance Program in the supplement dated September 23, 1993.
- The packaging authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 571.12.
- 10. Expiration date: October 31, 1998.

REFERENCES

Neutron Products, Incorporated application dated August 31, 1977.

Supplements dated: February 6, 1978; July 31, 1985; August 2 and September 7, 1988, and September 21, 1993

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

. Chaplack

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

NOV 0 9 1993

Dated:

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8-85 0 CFR 71	618			ATE OF CON	IPLIANCE		TORY COMMISSI
I. & CERTI	FICATE N	MBER	b. REVISION NUMBER	C. PACKAGE I	DENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAG
	9107		5		USA/9107/B(U) 1 1	
of f	s certifica ederal A	egulations, Part 71, "Pac ate does not relieve the c	t the packaging and contents of kaging and Transportation of consignor from compliance will using the government of any of	Radioactive Material th any requirement of	the regulations of the U.S.	Department of Tran	
		E IS ISSUED ON THE BASI	S OF A SAFETY ANALYSIS REPO	INT OF THE PACKAGE	DESIGN OR APPLICATION	ION	
40 N	orth	Corporation Avenue n, MA 01803	E A		nical Operation December 30, 71-9107		
4. CONDIT This ce	nons	is conditional upon fulfil	ling the requirements of 10 C	FR Part 71, as applic	able, and the conditions sp	ecified below.	
5			Carl Carl		0		
(a)	Pack	Model No	771	001	R. L		
	(2)	Description		Princh St	個心	era until	
		storage cont The capacity accept certa deemed to me Changer meas radioactive The "S" tube The depleted space betwee	. 771 shipping c ainer and Type B of the containe in Tech/Ops wire et the requirement ures 23 inches b source assembly is surrounded b uranium shield n the depleted u a rigid polyuret	Shipping Co r is 110 cur mounted rad nts of speci ong, 24 inch is housed th y depleted u assembly is ranium shiel	intainer for rac ies of cobalt t liographic source al form. The M ies wide and 20 i a Zircalloy or iranium metal as encased in a st d assembly and	liographic 50. The con ces which ha lodel No. 7 inches high Titanium s shielding ceel housing the inner of	sources. ntainer will ave been 71 Source h. The "S" tube. material. g. The void container is
5.	(3)	Drawings					
			g is constructed 77190, Sheets 1			chnical Open	rations, Inc
(b)	Cont	ents					
	(1)	Type and for	m of material				
		Cobalt 60 as radioactive	sealed sources material.	that meet th	e requirements	of special	form
	(2)	Maximum quan	tity of material	per package			
		110 curies					

NRC FORM 618A (8-83)

CONDITIONS (continued)

Page 2 - Certificate No. 9107 - Revision No. 5 - Docket No. 71-9107

- Source assemblies for use in this packaging are limited to those assemblies as 6. identified in Section 1-3 of Technical Operations, Inc. application dated December 30, 1982.
- Nameplates shall be fabricated of materials capable of resisting the fire test of 7. 10 CFR Part 71 and maintaining their legibility.
- In addition to the requirements of Subpart G of 10 CFR Part 71: 8.
 - (1) The package must be prepared for shipment and operated in accordance with the Operating Procedures in the supplements dated February 16, April 13, and April 28, 1993; and,
 - (2) Each package must be maintained and acceptance tested in accordance tested in with Chapter 8 of the supplements dated February 16, April 13, and April 28, 1993
- The packaging authorized by this certificate is hereby approved for use under the 9. general license provisions of 10 CFR §71.12.
- 10. Expiration date: May 31, 1998.

REFERENCES

Technical Operations, Inc., application dated December 30, 1982.

Supplements dated February 16, April 13, and April 28, 1993.

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JU.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Industrial and Medical Nuclear Safety, NMSS

MAY 2 0 1993

Date:

6RC FORM 8-85) 0 CFR 71	618		CERTIFICA FOR RADIOACTI	TE OF COMPLIANCE	NUCLEAR REGULA	
L& CERTIFIC	CATE NUN	ABER 9108	6. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	e TOTAL NUMBER PAG
PREAMDL	F			And a second s		J
a. This of Fe	deral Reg	ulations, Part 71, "Packag	ging and Transportation of Ra			
b. This appli	certificati cable reg	e does not relieve the con ulatory agencies, includii	signor from compliance with a sg the government of any cou	iny requirement of the regulations of the U. intry through or into which the package wi	li be transported.	
		IS ISSUED ON THE BASIS C	F A SAFETY ANALYSIS REPORT	OF THE PACKAGE DESIGN CR APPLICATION AND IDENTIFICATION OF A FORT OR APPLICA	ATION	
140	Stone	ear Systems, 1 ridge Drive SC 29210	nc.	Chem-Nuclear Systems, dated May 31, 1983, as REGU/71-9108		
4. CONDITIO	ONS Ifficate is	conditional upon fulfilling	the requirements of 10 CFR	Part 71, as applicable, and the conditions	specified below.	
⁵ (a)	Pack	aging	2	5		
	(1)	Model No.	NS 6-75	122 "	line,	
	(2)	Description	(段)	网(熊	0	
		inches in dia inches in dia the outer 3/4 base plate co lead and a 1/ and a 1/2-inc A secondary of constructed of plate, 1-3/4 Neoprene gase bolts, respect through the of Three lugs on for lifting.	meter by 86-5/8 meter by 74-1/2 -inch and inner nsists of a 64-3 4-inch outer pla h thick steel in over, plugging t f a 1/4-inch out inches of lead a eted and secured tively. The cav over and drained the cask sides.	tive material. The out: inches long and the cav inches long. The 3-1/4 1/2-inch steel shells in /4-inch square 1-inch of te. The cover consists mer plate with 2-7/8 inch he 20-inch central open er plate, 1-1/2 inches of nd a 1/4-inch inner plat by sixteem, 3/4-inch an ity is vented through a through a 1/2-inch plug cover ribs and secondar e cask shell are used for pounds.	ity dimension inch annulus filled with uter plate, 3 of a 1-inch ches of lead ing in the co of lead, a 1 te. The cove nd eight, 5/8 1/8-inch plu gged tube at ry cover are	ns are 53 s between h lead. The 3 inches of steel outer shielding. over, is /2-inch ers are 8-inch ugged tube the bottom. provided
	(3)	Drawing				
		The packaging No. 1036-D-01	is fabricated a , Sheets 1 and 2	ccording to Chem-Nuclea , Revision M.	r Systems, In	nc., Drawing
(b)	Cont	ents				
	(1)	Type and form	of material			
		Dewatered or activity mate	solidified waste rial in secondar	meeting the requirement y containers.	ts of low spe	ecific
				293		

NRC FORM \$15A

CONDITIONS (continued)

Page 2 - Certificate No. 9108 - Revision No. 9 - Docket No. 71-9108

(2) Maximum quantity of material per package

(6-83)

Greater than Type A quantity of radioactive material with the weight of the contents, secondary containers and shoring not exceeding 10,300 pounds. The decay heat load shall not exceed 20 watts.

6.(a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:

- (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft² at 14.7 psia and 70°F); or
- (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package with could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

- (b) For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
- Except for close fitting contents, shoring must be placed between the secondary containers and the cask cavity to prevent movement during normal conditions of transport.
- The cover lifting lugs must not be used for lifting of the cask and must be plugged or covered in transit.
- 9. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) Prior to each shipment, the packaging lid seals, if opened (or if security seal is broken), must be inspected. The seals must be replaced with new seals if inspection shows any defects or every twelve months, whichever occurs first. A determination must be made that closure seal replacement is current with the seal replacement schedule. Cavity drain line and vent connections must be sealed with appropriate sealant applied to the pipe threads.

NRC FORM 618A (6-85) CONDITIONS (continued)

Page 3 - Certificate No. 9108 - Revision No. 9 - Docket No. 71-9108

- (b) The packaging must be maintained in accordance with the Maintenance Program of Section 5.0 of the application, as supplemented. In addition, the cask must be leak tested at least once every twelve months in accordance with Subsection 5.2.5 of the application.
- (c) The package shall be prepared for shipment and operated in accordance with the operating procedures of Section 4.0 of the application, as supplemented.
- 10. Fabrication of additional packaging after October 31, 1983 is not authorized.
- The package authorized by this certificate must be transported on a motor vehicle, railroad car, aircraft, inland water craft, or hold or deck of a seagoing ressel assigned for sole use of the licensee.
- 12. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 13. Expiration date: September 30, 1998.

REFERENCES

Chem-Nuclear Systems, Incorporated, application dated May 31, 1983.

Supplements dated: September 9, 1983; January 27, 1984; August 25, 1988; and August 27, 1993.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

ISEP 1 7 1993

Date:

NRC FORM 61 (8-85) 10 CFR 71	8	CERTIFICAT FOR RADIOACTI	TE OF COMPLIANCE	NUCLEAR REGULA	
& CERTIFICA	TE NUMBER	6 REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	6. TOTAL NUMBER PA
911	11	13	USA/9111/A		3
of Feder	nal Regulations, Part 71, "Packa	iging and Transportation of Har	cribed in Item 5 below, meets the applicable disactive Material." Iny requirement of the regulations of the U ntry through or into which the package w	S. Department of Trans	
chem-Nuc 140 Stor	Clear Systems, In neridge Drive a, SC 29210	c. C	t NUMBER 71-9711	c., applicati	ion dated
CONDITION	5 cate is conditional upon fulfilia	ng the requirements of 10 CFR	Part 71, as applicable, and the conditions	specified below.	
5.		2	0		
		an Comment		2	
(a) Pa	ckaging 🦃	1000	Dark .	In.	
(1)) Model Nos .: C	NS 6-80-2 and CNS	6-80-2A		
(1)	, Houer Hosan o		377 1 33	0	
(2)) Description	注射()	and MES-	9	
	requirements f the cask are 7 two concentric lead shield. thick outer sh welded steel p stepped welded centered 29-in additional 1-i diameter by 58 eight, 1-1/4-i are sealed usi seal. Both li configuration port is locate steel. Three both the cask	or low specific a 0-1/2-inch diamet carbon steel cyl The 3/8-inch thic ell has a 70-1/2- lates of 60-inch Tid comprised of ch diameter secon nch thick upper p -inches bigh. Cl nch bolts or stud ng silicone gaske ds on Model No. C as shown on Drawi d at the cask bot lift lugs, locate and the primary 1	cask for solid radioact ctivity material. The er by 78-5/8-inch heigh indrical shells surroun k inner shell has a 59- inch OD; the base consi diameter and 70-1/2-inc two, 4-inch thick stee dary lid of similar con late. The containment osure of the primary li s and nuts. Both lids ts. The secondary lid NS 6-80-2A are sealed u ng No. C-110-D-0020, Re tom. The cask is lined d on the secondary lid id. Four lugs, welded gross weight is approx	overall dimen t. The cask ding a 4-1/4- inch ID, and sts of two, 4 h diameter, a l plates cont struction wit cavity is 59- d is accompli on Model No. has a redunda sing a double v. A. A plug with 12 gaug are used for to the outer	sions of consists of inch thick the 1-inch l-inch thick and a caining a th an inch ished by CNS 6-80-2 ant Neoprene co-ring gged drain ge stainless lifting shell are
(3) Drawing				
	The packaging Incorporated D	is fabricated in rawing No. C-110-	accordance with Chem-Nu D-0028, Sheets 1 and 2	clear Systems of 2, Revisio	on B or

Incorporated Drawing No. C-110-D-0028, Sheets 1 and 2 of 2, Revision B or optional lid seal configuration given in Drawing No. C-110-D-0020, Revision A, for the Model No. CNS 6-80-2A.

'age 2 - Certificate No. 9111 - Revision No. 13 - Docket No. 71-9111

- 5. (b) Contents
 - (1) Type and form of material
 - (i) Greater than Type A quantity of byproduct material contained in solids and solidified waste, meeting the requirements for low specific activity material, in secondary containers.
 - (ii) Greater than Type A quantity of byproduct material contained in activated solid components meeting the requirements for low specific activity material.
 - (2) Maximum quantity of material per package

Greater than Type A quantity of radioactive material with the weight of the contents, secondary containers and shoring not exceeding 7,500 pounds. The decay heat load must not exceed 60 watts. The contents may include fissile materials provided the mass limits of 10 CFR §71.53 are not exceeded.

- (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time.
 - (1) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft² at 14.7 psia and 70° F); or
 - (2) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For the package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which the determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

- (b) For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
- Except for close fitting contents, shoring must be placed between secondary containers and the cask cavity to prevent movement during normal conditions of transport.
- The cavity drain line must be sealed with appropriate sealant applied to the pipe plug threads prior to transport.

Page 3 - Certificate No. 9111 - Revision No. 13 - Docket No. 71-9111

- 9. Packages must be leak tested initially and at least once every 12 months, as specified in Subsection 8.1.3 of the Safety Analysis Report as revised December 19, 1988. The cavity or volume between the double O-ring seals (Model No. CNS 6-80-2A) shall be pressurized to 14.0 psig. Seal acceptance must be based on no observable leakage over a ten minute period using a pressure gauge with a maximum graduation of two pounds and the pressure supply line disconnected from the cask and test fixture.
- 10. The package authorized by this certificate must be transported on a motor vehicle, railroad car, aircraft, inland water craft, or hold on deck of a seagoing vessel assigned for sole use of the licensee.
- 11. Each package must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the Safety Analysis Report of June 29, 1983, as revised September 19, 1983 and December 19, 1988.
- 12. The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Section 7.0 of the current Safety Analysis Report of June 29, 1983, as revised September 19, 1983 and December 19, 1988.
- The nackage authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 14. Expiration date: January 31, 1999.

REFERENCES

Chem-Nuclear Systems, Incorporated application dated June 29, 1983.

Supplements dated: September 19, 1983, December 19, 1988 and December 28, 1993.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Caso R. Chappell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

JAN 1 1 1994

Date:

8-666) D CAF9R 71				TE OF COMPLIANCE	CLEAR REGULA	TORY COMMISSIC
CENTIFICATE NI	MBER	and the second se	REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	To TOTAL NUMBER PAG
PREAMBLE a. This certifica of Federal Re	te is issued	to certify that the packs Part 71, "Packaging an	aging and contents de d Transportation of R	scribed in Item 5 below, meets the applicable sa adioactive Material."	fety standards set fo	th in Title 10, Code
 b. This certification applicable relationships 	ite does no igulatory a	t relieve the consignor gencies, including the procession of the process of the p	from compliance with government of any co	any requirement of the regulations of the U.S. untry through or into which the package will i	Department of Tran be transported.	sportation or other
. THIS CERTIFICAT a ISSUED TO /No			ETY ANALYSIS REPOR	T OF THE PACKAGE DESIGN OR APPLICATION AND IDENTIFICATION OF REPORT OR APPLICAT	ION:	
40 No	rth Av	orporation venue MA 01803	EAP	Amersham Corporation app dated March 9, 1989, as REGUL 9126		d
CONDITIONS This cettificate	s condition	hal upon fulfilling there	quirements of 10 CFI	R Part 71, as applicable, and the cognitions sp	ecified below.	
(a)	Packa	iging to C		OR		
	(1)	Model Nos .:	20, 20A, 5	0 and 50A	-	
	(2)	Description		m-shilelded aniographic	O device Th	6
		shipping co wide, and a housed in a surreunded depleted un The word sp the outer c	otathersis inches his incallor	noroximately 21 inches 10 	tube is material. steel hous d assembly	es is The ing. and
	(3)	Drawings The packagi	ng is constr	unded the accordance with	Gamma Indus	tries
(b)	Conte		821-1001-12	8, Rev. 2, Sheets 1 and 2		
(/	(1)		rm of materi	al		
			s sealed sou ctive materi	rces that meet the require	ements for	special
	(2)	Maximum qua	ntity of mat	erial per package		
		Mode1	No.	Quantity		
			d 20A d 50A	20 curies 50 curies		

Page 2 - Certificate No. 9126 - Revision No. 7 - Docket No. 71-9126

- 6. The source shall be secured in the shielded position of the packaging by the safety plug assembly, source assembly, and lockbox assembly. The components used to secure the source must be fabricated of materials capable of resisting a 1475 °F fire environment for one-half hour and maintaining their positioning function. The ball stop of the source assembly must engage the locking device. The flexible cable of the source assembly and safety plug assembly must be of sufficient length and diameter to provide positive positioning of the source in the shielded position.
- 7. The can and side plates must be a minimum of 1/4-inch thick carbon steel. The can and side plates shall be joined by full penetration welds. All other welds shall be fillet welds having sufficient throat thickness to develop strength equal to or greater than the metals being joined.
- 8. The nameplates shall be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining their legibility.
- 9. In addition to the requirements of Subpart 6 of 10 CFR Part 71, the package must be operated and maintained in accordance with the operating procedures and maintenance program in Chapters 7 and 8 of supplement dated September 27, 1994.
- 10. Fabrication of new packages is not authorized.
- 11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 12. Expiration date: October 31, 1999.

REFERENCES

Amersham Corporation application dated March 9, 1989.

Supplement dated: August 21, 1989; and September 27, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

. Choppell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

MON 0 8 1994

Date:

BC FORM 618 5-85 0 CFR 71			E OF COMPLIANCE	NUCLEAR REGULA	TORY COMMISSIO
CERTENCAT	E NUMBER	6 REVISION NUMBER	USA/9127/B(U)	P d PAGE NUMBER	e. TOTAL NUMBER PAGE
of Federa	I Regulations, Part 71, "Packa ficats does not relieve the cor	ging and Transportation of Rac signor from compliance with a	ribed in Item 5 below, meets the applicat lioactive Material." ny requirement of the regulations of the ntry through or into which the package	U.S. Department of Tran	
	CATE IS ISSUED ON THE BASIS (OF A SAFETY ANALYSIS REPORT	OF THE PACKAGE DESIGN OR APPLICATIO		
mersham 0 North	Corporation	Am Ma	REG 67-9127	lication date	d
4. CONDITIONS	te is conditionel upon fulfillin	CL-9 C DOCKE	Part 71, as applicable, and the cognition	ns specified below.	
this centrice			0)	
(a) Pac	kaging 6	0		D.	
(1)	Model Nos . 440	0, 100A 200 and	200A 222	2	
(2)	Description	- (#2	D (B	C	
	container is ap high. The radi or titanium "S" shielding mater steel housing assembly and the	tess of the tipe	Tradiographic device. thes long 23 inches w sently is roused in a is surrounded by deple transfer shield assem traems be depleted up is filled with a poly 500 pounds.	Ziccalloy	ches etal as
(3)	Drawings	2	10		
	The packaging i Nos. 821-1001-1	s constructed in 28, Rev. 2; Sneet	accordance with Gamma	Industries Dr	awing
(b) Cont	ents				
(1)	Type and form o	f material			
	Cobalt 60 as se radioactive mat		meet the requirements	of special f	חדיו ס

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NRC	FOR	ы	61	8A	
(6-83)					

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9127 - Revision No. 7 - Docket No. 71-9127

(2) Maximum quantity of material per package

Model No.

Quantity

100 and 100A 200 and 200A

100 curies 200 curies

- 6. The source shall be secured in the shielded position of the packaging by the safety plug assembly, source assembly and lockbox assembly. The components used to secure the source must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintaining their positioning function. The ball stop of the source assembly must engage the locking device. The flexible cable of the source asempting and safety plug assembly must be of sufficient length and diameter to provide passifie positioning of the source in the shielded position.
- 7. The can and side plates must be a minimum of 1/4-inch thick carbon steel. The can and side plates chall be joined by full penetration welds. All other welds shall be fillet were having sufficient throat thickness to develop strength equal to or greates than the metals being joined.
- 8. The nameplates shall be fabilitated of material's fabile of resisting the fire test of 10 CFR mart 71 and manual taining their leaded ity.
- In addition to the requirements of Stippers 6 of 00 CFR Part 7 the package must be operated and maintained in accordance of the procedures in Section 7 and Section and the spin dat dat 9.

10. Fabrication of new package

- approved for use under the 11. The package authorized by this certi general license provisions of 19 CE NO
- 12.. Expiration date: October 31, 1999

Gamma Industries application dated March 9, 1989.

Supplement dated: August 21, 1989; September 27, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cars R. Chappell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

NOV 0 1 1994

Date:

CERTIFICATE NUMB 9128 PREAMBLE	lea .	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	S. TOTAL NUMBER PAR
		6	USA/9128/B(U)	1	3
of Federal Regu b. This certificate (applicable regul	lations, Part 71, "Packag does not relieve the cons latory agencies, includin sissued on THE BASIS O	ing and transportation of A ignor from compliance with g the government of any co	scribed in item 5 below, meets the applicable sa adioactive Material." any requirement of the regulations of the U.S. buntry through or into which the package will T OF THE PACKAGE DESIGN OR APPLICATION E AND IDENTIFICATION OF REPORT OR APPLICATION	Department of Trans be transported.	
	Corporation Avenue	EAF	Amersham Corporation a March 9, 1989, as supp REG (71-9128	pplication (lemented	dated
CONDITIONS This certificate is c	conditional upon fulfilling	the requirements of 10 CF	R Part 71, as applicable, and the conditions s	pecified below	
(a) Paci (1)	container is 26 inches hi source assen septum at th beyond the o depleted und shield assen the depleted with a poly pounds. (3) Drawing The pac Drawing 821-100	s approximately igh in its skid ably is housed in the center of the optimum shield in ium metal as s ably is encased i uranium shield methane foam.	tructed in accordance with 033, 180-01, 191, 821-100 -129, 811-1001-212, 811-1	inches long he radioact "S" tube. I the source surrounded l epleted uran void space l ontainer is ontainer is Gamma Indu 5-008D, 821	g and ive assembly by nium between filled 500 stries -1001-117,

Page 2 - Certificate No. 9128 - Revision No. 6 - Docket No. 71-9128

- 5. (b) Contents
 - (1) Type and form of material

Cobalt 60 as sealed sources that meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package

200 curies

- 6. The source shall be secured in the shielded position of the packaging by the safety cap, source assembly and lockbox assembly. The components used to secure the source must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintaining their positioning function. The ball stop of the source assembly must engage the locking device. The flexible cable of the source assembly must be of sufficient length and diameter to provide positive positioning of the source at the septum in the shielded position.
- 7. The can and side places must be a minimum of 1/4-inch thick carbon steel. The can and side plates shall be joined by full penetration welds. All other welds shall be fillet welds having sufficient threat thickness to develop strength equal to or greater than the metals being joined.
- 8. The nameplates shall be tabricated of materials capable of resisting the fire test of 10 CFR Part 31 and maintaining their legibility.
- 9. Use of packaging fabricated after lanuary 31, 1991 is not authorized.
- 10. In addition to the requirements of Subpart & of 10 CER Part 71:
 - a. The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Section 7.0 of the March 9, 1989 application as supplemented.
 - b. The package must be maintained in accordance with the Acceptance Tests and Maintenance Program of Section 8.0 of the March 9, 1989, application as supplemented.
- 11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 12. Expiration date: February 28, 1996

Page 3 - Certificate No. 9128 - Revision No. 6 - Docket No. 71-9128

REFERENCES

Amersham Corporation application dated March 9, 1989.

Supplements dated: August 21, and September 23, 1989; February 8, and December 6, 1990; and January 29, 1991.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

EAR

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

NC

Date:

FEB 1 2 199

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NO

RC FORM 818 (65) (CFR 71	CERTIFICATE	OF COMPLIANCE MATERIALS PACKAGES		TORY COMMISSIO
& CERTIFICATE NUMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER		e. TOTAL NUMBER PAGE
9132	12	USA/9132/B(I	<u>1)1 1</u>	1
PREAMBLE a. This certificate is issued to certify that the p of Federal Regulations, Part 71, "Packagin	g and Transportation of Hadic	ACTIVE MUTHICEL		
 This certificate does not relieve the consig applicable regulatory agencies, including 	nor from compliance with any the government of any count	requirement of the regulations of the occurry through or into which the package will	be transported.	
THIS CERTIFICATE IS ISSUED ON THE BASIS OF A & ISSUED TO (Aliame and Address)	SAFETY ANALYSIS REPORT OF	THE PACKAGE DESIGN OF APPLICATION D IDENTIFICATION OF REPORT OF APPLICA	TION	
U.S. Department of EH-32		Nuclear Packaging April 22, 1985, a		
Washington, DC 205	85 C. DOCKET	REG 71-9132		
CONDITIONS This certificate is conditional upon fulfilling t	he requirements of 10 CFR Pr	art 71, as applicable, and the conditions i	specified below.	
a) Packaging	1	2		
(1) Mødel	No.: I-3	180		
(2) Descri	ption	D (M -		
and lo Pimite 52 inc	e (cask). The c wer steel encase rs. The overall hes in diameter.	lead shielded irradiate ask is a right circular d rigid polyurethane fo dimensions are 213.2 i The cask without the in length and 26.44 inc	cylinder wi baw (20 lb/ft inches in ler impact limit	ith upper) impact igth and ters
steel Betwee provid	shell overlayed n these two mate ing an air gap f	s comprised of a one-in with a 10 gauge stainle rials is a 0.08-inch di or additional thermal p	ess steel cov ameter wire protection.	ver. wrap,
stain] 8.625 annula	ess steel Schedu inches with a no r space between	inment vessel) is a sta le 40 pipe having an ou minal wall thickness of the inner and outer she s of approximately 8 in	tside diamet 0.322 inch. 11s is fille	er of The
steel positi inches	closure plates w oning and sealin in length by 7.	er shells are welded at ith conical surfaces to g. The containment vess 981 inches in diameter.	assist in al measures	147
11.83- The to thick plug i 2-1/4- plug i	inch thick stain p end of the con stainless steel s retained by a inch ASTM A320, s secured in pla	is sealed at the botto less steel plug with 2 tainment vessel is seal plug with 2 Viton O-rin closure plate secured b Grade L7 socket head ca ce utilizing 16, 1/2"-1 x flange screws.	Viton O-ring led with a 11 og seals. Th by 8, 1/2"-13 op screws. T	seals. 1.625-inch be bottom BUNC x The top

Page 2 - Certificate No. 9132 - Revision No. 12 - Docket No. 71-9132

5. (a) Packaging (continued)

NRC FORM FISA

No drain or vents penetrate directly into the containment vessel. A drain/vent line opens directly into the area between the 2 O-ring seals at each end of the cask (end plugs). During shipment, the lines are sealed with Viton O-ring sealed threaded fasteners.

The cask is provided with 6 trunions, 4 spaced 90 degrees apart at the top end and two spaced at 180 degrees apart at the bottom end of the cask. The cask is tied down at the forward and aft ends by means of a cradle and yoke assembly. The gross weight of the cask and contents is 38,200 pounds. CAR REGU

(3) Drawing

The packaging is constructed in accordance with Energy Research and Development Administration (ERDA) Drawing No. H=4-66230, Sheets 1,3,5, and 6, Revision No. 0, and Sheets 2 and 4, Revision No. 1. For payloads in spent fuel containers the applicable drawings are DOE Drawing Nos. H-3-47474 Sheets 1 and 2, Revision No. @ and H-4-66535, Revision No. 0, and Los Alamos Drawing No. 54Y-110854, Sheets 1 and 2, Revision No. B.

(b) Contents

Type, form, and maximum quantity of moterial per package

Irradiated, (a) mixed oxide (MOX) Thei pins and assemblies, (b) reactor fuel comprised of N-235 and or Pe-239 oxides, carbides, nitrides or metallic alloys the (c) structural components. The minimum cooling time of each assembly and rod must be 96 days and the cask may contain 1,400 thermal watts. Prior to irradiation the fuel and structural components must have the following specifications:

Туре	Fuel Description*	Array Bescription	Maximum Fissile Package Loading	Pin Dimensions
217 Pin DFA Assembly	31% Pu0, -69% U0 ₂ (natural U)	Hexagonal Array w/pins at 0.26" center-to-center	11.2 kg	0.23"Dia 36" Active Fuel Length
217-Pin MOX Fuel Pins	50% max PuO + 235 UO ₂ - remainder natural UO ₂	Circular array groups of pins in seven compart- ments in 5" Schedule 5 Pipe	27.5 kg	0.23"-0.29" Dia. 35" Active Fuel Length
109-Pin MOX Fuel Pins	35% Pu0, -65% U0 ₂ (86% U-235)	Circular Array Individual Pins contained in 0.44" Dia. Tubes	26.2 kg	0.23"-0.29" Dia. 36" Active Fuel Length
	217 Pin DFA Assembly 217-Pin MOX Fuel Pins 109-Pin MOX	TypeDescription*217 Pin DFA Assembly31% Pu02 -69% U02 (natural U)217 -Pin MOX Fuel Pins50% max Pu04 - remainder natural U02109 -Pin MOX 109 -Pin MOX35% Pu02 -65%	TypeDescription*Description217 Pin DFA Assembly31% Pu0, -69% U0, (natural U) 2 (natural U)Hexagonal Array w/pins at 0.26" center-to-center217-Pin MOX Fuel Pins50% max Pu0 + 235 U0, - remainder natural U0, 2Circular array groups of pins in seven compart- ments in 5" Schedule 5 Pipe109-Pin MOX Fuel Pins35% Pu0, -65% U0, (86% U-235)Circular Array Individual Pins contained in 0.44"	TypeFuelArrayFissile Package Loading217 Pin DFA Assembly31% Pu0, -69% U0_2 (natural U)Hexagonal Array w/pins at 0.26" center-to-center11.2 kg217 Pin MOX Fuel Pins50% max Pu0 + 235 U0_2 - remainder natural U0_2Circular array groups of pins in seven compart- ments in 5" Schedule 5 Pipe27.5 kg109 Pin MOX Fuel Pins35% Pu0_2 -65% U0_2 (86% U-235)Circular Array Lircular Array

NRC FORM E18A

CONDITIONS (continued)

Page 3 - Certificate No. 9132 - Revision No. 12 - Docket No. 71-9132

5. (b) Contents (continued)

	Туре	Fuel Description*	Array Description	Maximu Fissile Package Loading	e Pin
(4)	55-Pin MOX Fuel Pins	35% PuO ₂ ~65% UO ₂ (86% U-235)	Circular Array Individual Pins contained in 0.625" Dia. Tubes	13.2 kg	0.23"-0.29" Dia. 36" Active Fuel Length
(5)	37-Pin MOX Fuel Pins	352 Pu02 -652 Pu02 (862 Pu-235)	Rearcolar Array Individual/Pins contained in 0.75" Dia. Tubes	8.9 kg	g 0.23"-0.29" Dia. 36" Active Fuel Length
(6)	42-Pin MOX	5% Pu02 -65% 802 (86% U-235)	Circular Array Individual Pins contained in 0.625" Dia. Tubes	10.1 kg	0.23"-0.29" Dia. 36" Active Fuel Length
(7)	40-Pin MOX Fuel Pins	35% Put, 65%) UO2 (86% 8-235)	Circular Array Individual Pins contained in 0.625" Dia. Tobes	9.6 kg	9 0.23"-0.29" Dia. 36" Active Fuel Length
(8)	19-Pin MOX Fuel Pins	352 960, -652 U0 2 (852 U-235)	Cincular Array Individual Pins contained in 0.88" Dia. Tubes	4.6 kg	9 0.23"-0.29" Dia. 36" Active Fuel Length
(9)	PU Compounds Fuel Pins (spent fuel containers)	502 PUX max-UX X=0, 0, or 0 (94% 0-235)	Unrestricted array Individual Pios contained in SS 5-inch Schedule 40 pipe	8.0 kg	g Container Cavity 5.047" Dia. by 38.9" length
(10)	LAMPRE Fuel Pins (spent fuel container)	97.5% Pu max-X alloy X≖Fe, Co or Cs	Circular Array Individual Pins contained in 0.625" or 0.75" Dia. steel tubes	8.0 k	g 0.425" Dia. 38" Active Fuel length
(11)	Structural Components (incl. Control assemblies)	Dosimetry Foils		1.0 k	g

			ONS (continued)		
Page	4 - Certificat	e No. 9132 - Revis	ion No. 12 - Docket No	. 71-9132	
		85-94%(Pu-U)C -6 1 15% (Pu-U ₂)C ₃ . Max 23% Pb, Uraniu is not enriched	im contained in	3.0 kg	0.37" outer D 36" Active Fu Length
(13)	pins. Sodium	max. Remainder U (U enriched	 in. diam. tubes wit 5-in. Schedule 40 p 	hin	0.30" Outer D 36" Active Fuel Length
	*All plutonium type (9) has n	in the fuel Types	(1) thru (8) contains Type (10) contains a	at least t least 69	10% Pu-240; fu 90-240.
5.	(c) Fissile	Class	and '	In I	II
	Maxinum	number of packages	per shipment	\bigcirc (ne
6.	Content 5 (4)(No. H-4-66230,	1) shown in AEC Dra Sheet 5, Rev. 0.	wing No. 14-4-21500, R	ev.9; and	ERDA Drawing
	Ident 69 descr H-4-66230, She Contents 5.(b) container Iden	ibed by ERDA Drawi ets 5 and 6, Rev. ((6). (71. (8). (12)	ERDA Drawing Nos. H-	et 1, Rev.	0; and hin inner
	Revision No. O No. B must be	and Los Alamos Dra contained within th ets 5 and 6, Revist	in DOE Drawing No. H- wing No. 544-110854, ie (dent 69 Liner show ion No. O and DOE Draw	Sheets 1 a n in ERDA	and 2, Revision Drawing No.
7.	sodium wetted	fuel rods (externa)	water coolant in cask 1) is authorized for u ents of Section 7.4 of	p to 200 g	of sodium

WRC FORM 618A CONDITIONS (continued) Page 5 - Certificate No. 9132 - Revision No. 12 - Docket No. 71-9132 In addition to the requirements of Subpart G of 10 CFR Part 71: 8. (a) Each package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application, as supplemented. The leak test to satisfy ANSI N 14.5 and Regulatory Guide 7.4 in Section 8.1.3 of the application must be a test having sufficient sensitivity to detect a leak rate (air at standard temperature and pressure leaking to 10^{-2} atm) of 10^{-1} atm cc/sec. The results of these tests must be documented and retained for the life of the cask. (b) Each package shad be operated and prepared for shipment in accordance with the Operating Procedures of Chapter 7 of the application, as supplemented. Any repair to the trunnions because of out-of-roundness or weld failure must 9. be authorized by NRC prior to returning the package to service. 10. The containment closure Dolts (as specified by Note 9, Drawing No. H-4-66230, Sheet 1, Revision No. D. must be targued to 70 ± 10 ft-1b. 11. The cask authorized by this certificate is hereby approved for use under the general license previsions of 10 CFR \$71,12. 12. Expiration Date: March 31, 1996 EFERENCES Nuclear Packaging, Inc. application dated April 22, 1985

Supplements dated: October 8 and 31, 1985; February 3, 1986; March 21, 1986 May 24, 1988; September 17, 1990; and March 22, 1991.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

APR S 1001

Date:

IS-050 10 OFR 71		CERTIFICAT	E OF COMPLIANCE	NUCLEAR REGULA	
1 CERTIFICATE NUM	BER	A REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	8. TOTAL NUMBER PAGE
	9137	3	USA/9137/B(U)		<u> </u>
of Federal Reg	ulations, Part 71, "Packag	ing and Transportation of Has	ribed in Item 5 below, meets the applicab lioactive Material." ny requirement of the regulations of the I ntry through or into which the package v	U.S. Department of Trans	
. THIS CERTIFICATE I a. ISSUED TO (Norm	S ISSUED ON THE BASIS O	F & SAFETY ANALYSIS REPORT	OF THE PACKAGE DESIGN OR APPLICATION INDIDENTIFICATION OF REPORT OR APPLI	N CATION	
Amersham Co 40 North A Burlington			hnical Operations, Inc. ed November 9, 1979. REC TNUMBER 71-9137	. application	
4. CONDITIONS This certificate is	conditional upon fulfilling	the requirements of 10 CFR	Part 71, as applicable, and the condition	as specified below.	
5. (a) Pac	kaoing S		0	2	
(a) rac (1)	hadaid	820	- All	1997 - 19	
(2)	Description		And Series	ö	
	consist of a material, ur and bottom s the "J" tube has an outso inches. The pounds.	n outer stainles anyon shield, ei upport plates s by means of a de diameter of 1	elded source changer. s steel shell, polyure ght Titanium "J" tubes The contents are secur source cable locking d 9-1/2 inches and outsi eight of the package in	thane potting , source stop, ely positioned evice. The pa de length of 2	, and top d within ackage 21-1/2
(3)	The packagin	g is constructed	An accordance with Te	chnical Operat	tions,
	Inc. Drawing	No. 82090, Shee	ts I through 4.		

С.

NAC FORM FIEA	CONDITIONS (continued)
Page 2 - Cert	tificate No. 9137 - Revision No. 3 - Docket No. 71-9137
. (b) Cor	itents
(1)	Type and form of material
	Iridium 192 sources which meet the requirements of special form radioactive material.
(2)	Maximum quantity of material per package
	1,000 curies with no more than 240 curies in a single source.
(a) The wit	tion to the requirements of Subpart G of 10 CFR Part 71: e package shall be prepared for shipment and operated in accordance th the Operating Procedures of Section 7.0 of the application, as oplemented; and
(b) The 8.0	e package must meet the Acceptance Test and Maintenance Program of Section of the application, as supplemented.
7. The pac general	kage authorized by this certificate is hereby approved for use under the license provisions of 10 CFR \$71.12.
Technical Op	erations, Inc. apprication cated November 9, 1979. poration supplements dated August 22, 1989, May 4, and October 19, 1990.
	FOR THE U.S. NUCLEAR REGULATORY COMMISSION Charles MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS
NO ¹ Date:	V 0 9 1990

NRC FORM 8 (8-95) 10 CFR 71			E OF COMPLIANCE	ICLEAR REGULAT	
1. a. CERTIFIC		D. REVISION NUMBER	USA/9139/A	d PAGE NUMBER	e. TOTAL NUMBER PAG
of Fed	eral Regulations, Part 71, "Packa ertificate does not relieve the cor	ging and Transportation of Rad signor from compliance with an	rribed in Item 5 below, meets the applicable sa lioactive Material." ny requirement of the regulations of the U.S. ntry through or into which the package will i	Department of Trans	
a ISSUED ennessee 01 Mark lattanoc	TO (Name and Address) E Valley Authority Ket Street Oga, TN 37402	6 TITLE A Geni Mari	of THE PACKAGE DESIGN OF APPLICATION NO IDENTIFICATION OF REPORT OF APPLICAT eral Electric Company app ch 24, 1980, as supplement NUMBER 71-9139	plication da nted.	ted
This certif	icate is conditional upon fulfillin	the requirements of 10 CFR F	Part 71, as applicable, and the cooditions sp	ecified below.	
(1) (2)	cask is a right cavity 74-inch II supported by out thick, respective outer and inner respectively. The inner carbon stee carbon steel use eight (26,000 lb Buna N O-ring. bolt-down flange The cask lid sea	circular cylinder by 74-inch heig er and inner carbo aly. The bottom carbon steel plate te 1.5-inch thick ef plates 1-inch is SA516, Grade proof load each) The cask is equip (1-inch bolts) and and lifting lugs about 8 x 10 inch	k for low specific active with 79-inch 00 by 80-fr nt. The 1.5-inch thick on steel shells 0.75-inch 1.56-inch thick lead shift es 1.0-inch and 0.375-inch lead lid shield is support and 0.5-inch thick, respect 70. The lid is attached ratchet type load binder ord with a 3/4-inch drain at two 2-1/2-inch diameters are protected by a wood es thick). Gross weight	the height, head shield and 0.375- eld is support thick, orted by out ectively. T d to the cas rs and seale h line, sixt er lifting 1 den sacrific	and a is inch rted by er and he k with d with a een-hold ugs. ial
(3)		constructed in a	coordance with DY Engine	aring Compan	v Inc
			ccordance with PX Engined gh 3, Revision No. O.	er ing compan	y, 1110.,

C

Page 2 - Certificate No. 9139 - Revision No. 7 - Docket No. 71-9139

- 5. (b) Contents
 - (1) Type and form of material

Dewatered or solidified waste material in sealed secondary containers or solid irradiated hardware, meeting the requirements for low specific activity material.

(2) Maximum quantity of material per package

Greater than Type A quantity of radioactive material with the weight of the contents, secondary containers and shoring not exceeding 20,150 pounds.

- 6. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflamable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft³ at 14.7 bits and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that axygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

- (b) For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
- Shoring must be placed between secondary containers (or activated components) and the cask cavity to prevent movement during normal conditions of transport.

 The lid lifting lugs must not be used for lifting the cask and must be covered in transit.

Page 3 - Certificate No. 9139 - Revision No. 7 - Docket No. 71-9139

9. In addition to the requirements of Subpart G of 10 CFR Part 71:

- (a) Each package shall be operated and prepared for shipment in accordance with the Operating Procedures in Tennessee Valley Authority supplement dated November 19, 1991; and
- (b) The packaging acceptance tests and maintenance program must be in accordance with Section 7.0 of the General Electric application, dated March 24, 1980, as supplemented, except:
 - (i) The lid O-ring seal must be replaced if inspection prior to each shipment shows any defects or every twelve (12) months, whichever occurs first.
 - (ii) During inactive periods, the maintenance and testing frequency may be disregarded provided that the packaging is brought into full compliance prior to the next use of the package.
- The package authorized by this certificate must be transported on a motor vehicle, railroad car, aircraft, inland water craft, or hold or deck of a seagoing vessel assigned to sole use of the ticensee.
- 11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 12. Expiration Date December 31, 1996.

REFERENCES

General Electric Application dated March 24, 1980.

General Electric supplements dated: May 29, and July 11, 1980.

Tennessee Valley Authority supplements dated: May 16, 1990; and November 19, 1991.

FOR THE U.S. MUCLEAR REGULATORY COMMISSION

Marles) nex

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date: DEC 6 1991

C FORE 618 69 3FR 71		CERTIFICATI	E OF COMPLIANCE MATERIALS PACKAGES		8. TOTAL NUMBER PAGES
CERTIFICATE NUMBER	9141	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBE USA/9141/E		2
of Federal Regulation	ions, Part 71, "Packagi	ng and Transportation of Hadi	bed in Item 5 below, meets the applica pactive Material." y requirement of the regulations of the my through or into which the package	U.S. Department of Tran	
THIS CERTIFICATE IS IS a. ISSUED TO (Name and	SUED ON THE BASIS OF	A SAFETY ANALYSIS REPORT O	F THE PACKAGE DESIGN OR APPLICATION OF REPORT OR APPLICATION OF REPORT OR APPL	DN LICATION:	
Amersham Co 40 North Av Burlington	venue	EAR	Technical Operations dated February 1, 19 REC NUMBER 71-9141		ation
CONDITIONS This certificate is con	ditional upon fulfilling	the requirements of 10 CFR P	art 71, as applicable, and the condition	ons specified below.	
			9		
(a)	Packaging	Stor	130	der.	
	 Model No Descript 			2	
	device. high and housed surround depleted steel M assembly	The shipping co i 5.3 inches wide inside a tungsten ied by depleted u i uranium shield using. The void and stainless solyurethane foam.	d, uranium shielded m ntainer is 13.0 inche The radioactive so source tube. The so ranium metal for shie assembly is encased to space between the un teel housing is fille The gross weight of	es long, 7.7 in ource assembly ource tube is inding. The in a stainless anium shield ed with a cast	is
	(3) Drawing	5			
	Technica	al Operations, In	cted in accordance w c. Drawing Nos. 90090 90091, Sheets 1 of 1), Sheets 1,2,	ing 3,

Page 2 - Certificate No. 9141 - Revision No. 3 - Docket No. 71-9141

5.(b) Contents

(1) Type and form of material

Iridium 192 as sealed sources which meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package

120 curies

- 6. The source shall be secured in the shielded position of the packaging by the source assembly. The source assembly must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintaining their positioning function. The source assembly must engage the locking device. The source assembly must be of sufficient length and diameter to provide positive positioning of the source within the depleted uranium shield assembly.
- The name place shall be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining their legibility.
- 8. In addition to the requirements of Subpart 6 of 10 CFR Part 71:
 - a. The package shall be prepared for shipment and operated in accordance with the operating Procedures of Section 7.0 of the application, as supplemented; and
 - b. The package must meet the Acceptance tests and Maintenance Program of Section 8.0 of the application, as supplemented.
- The package authorized by this certificate as hereby approved for use under the general license provisions of 10 CFR §71.12.
- 10. Expiration date: November 30, 1995

REFERENCES

Technical Operations, Inc. application dated February 1, 1980.

Amersham Corporation supplements dated April 30 and October 19, 1990.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Pharle 10

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation. NMSS

Date: NOV 1 4 1998

BIC FORME #18 5-360) CFR 71	CERTIFIC/	ATE OF COMPLIANCE TIVE MATERIALS PACKAGES		TORY COMMISSIO
& CERTIFICATE NUMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	. TOTAL NUMBER PAG
9143	3	USA/9143/B(II)	1_1	2
of Federal Regulations, Part 71, "Package	ng and Transportation of a gnor from compliance with the government of any c	h any requirement of the regulations of the U.S. ountry through or into which the package will	Department of Trans be transported.	portation or other
40 North Avenue Burlington, MA 01803	EAF	dated August 1, 1980, REF 71-9143		
This certificate is conditional upon fulfilling	the requirements of 10 Cf	FR Part 71, as applicable, and the conditions sp	ecified below.	
(a) Packaging	8	24		
(1) Model Nor	920	Ref 2		
(2) Description		uranium shielded radiogra		
wide. The source tube for shieldin stainless si assembly and	radioactive so the source ng. The deple teel bousing d stainless ste	The void space between the ross weight of the contained	side a tungs eted uranium is encased e uranium sh a castable	sten n metal i in a nield rigid
(3) Drawings	Vn .	www.so		
Operations,	Inc. Drawing	ted in accordance with the Nos. 92090, Sheets 1, 2, an 4, Rev. 0; and 90091, Shee	nd 3 of 3, F	lev. 0;

Page 2 - Certificate No. 9143 - Revision No. 3 - Docket No. 71-9143

- 5. (b) Contents
 - (1) Type and form of material

Iridium 192 as sealed sources which meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package

240 curies

- 6. The source shall be secured in the shielded position of the packaging by the source assembly. The source assembly must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintaining their positioning function. The source assembly must engage the locking device. The source assembly must be of sufficient length and diameter to provide positive positioning of the source within the depleted uranium shield assembly.
- 7. The name plate shall be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining their legibility.
- 8. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - a. The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Section 7.0 of the application, as supplemented; and
 - b. The package must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application, as supplemented.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 10. Expiration Date: January 31, 1996.

REFERENCES

Technical Operations, Inc. application dated August 1, 1980.

Amersham Corporation supplement dated November 12, 1990.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date: DEC 1 9 1990

ERC FORM 618 5-661 10 CFR 71			ATE OF COMPLIANCE	S. NUCLEAR REGU	LATORY COMMISSIC
9145	1	5. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUME	ER d. PAGE NUMB	ER I. TOTAL NUMBER PAG
of Federal Regula b. This certificate do	tions, Part 71, "Packagin es not relieve the consig	g and Transportation of nor from compliance wi	described in Item 5 below, meets the applic Radioactive Material." th any requirement of the regulations of th country through or into which the packag	e U.S. Department of Tr	
NUPAC Service NUPAC Service No. 1 Harbiso Columbia, SC	s, Inc. n Way	ь. тл 	UPAC Services Division, ated February 21, 1991,	Inc. applica	
CONDITIONS		0 10	CKET NUMBER 71-9145		
(u) Packa (1) (2)	Model Nos.: Description A steel encas The casks are by 52.5-inch thickness ran steel shells. steel plates cask lid is s binders. A s secured to th is provided w equally space 13,200 to 28,	ed lead shiel right circul inside high c ging from 1.2 The bottom ranging in the ecured to the econdary cask e primary lid ith a Neopren d lifting/tie	, NUPAC 50-2.5L, NUPAC ded cask for low specif ar cylinder with a 48.5 avity. The walls of th 5 to 3.75 inches encase and top covers of the c ickness from 1.00 to 3. cylindrical cask body lid is centered in the with eight, 3/4-inch s e gasket seal. The cas down devices. Cask gr	ic activity m -inch inside e casks conta d in 3/8-inch ask are made 00 inches. T by eight, 1-i primary lid tuds and nuts k is provided	aterial. diameter in a lead thick up of two, he primary nch rachet and is . Each lid with four
(3)			ies packagings are fabr c. Drawing No. X-20-201		

Page 2 - Certificate No. 9145 - Revision No. 10 - Docket No. 71-9145

(b) Contents

7.

(1) Type and form of material

- Dewatered, solid or solidified waste, meeting the requirements for low specific activity material, in secondary containers; or
- (ii) Activated solid components meeting the requirements for low specific activity material.
- (2) Maximum quantity of material per-package

Greater than Type & quantity of radioactive material.

- (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary cogtainer gas roid if present at STP (i.e., no more than 0.063 g-moles/ft at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have a hydrogen concentration greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

(b) For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

Shoring must be placed between secondary containers (or activated components) and the cask cavity to prevent movement during normal conditions of transport.

CONDITIONS (continued) Page 3 - Certificate No. 9145 - Revision No. 10 - Docket No. 71-9145 In addition to the requirements of Subpart G of 10 CFR Part 71: 8. (a) Prior to each shipment, the packaging lid seals must be inspected. The seals must be replaced with new seals if inspection shows any defects or every 12 months, whichever occurs first. (b) Each package must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application. (c) The package shall be prepared for shipment and operated in accordance with the operating procedures in Section 7.0 of the application. The package authorized by this certificate must be transported on a vehicle, 9. railroad car, aircraft, in land water craft, or hold or deck of a seagoing vessel assigned for sole use of the licensee. Lid lifting devices must be covered prior to transport to prevent their use as 10. tie-down devices. The cask body and each cask Fid must be marked in accordance with 10 CFR §71.85(c). 11. The package authorized for use by this certificate is hereby approved for use under 12. the general license provisions of 10 CFR §71.12. 13. Expiration date: March 31, 1996. REFERENCES NUPAC Services Division, Inc. application dated February 21, 1991 EOR THE U.S. MUCLEAR REGULATORY COMMISSION Charles E. MacDonald, Chief

Transportation Branch Division of Safeguards and Transportation, NMSS

Date: MAR 2 6 1992

1485)) CIFR 71			CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIALS PACKAGES				
& CERTIFIC	9147	ER ,	b. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	e. TOTAL NUMBER PAGES	
of Fed	eral Reguli	ations, Part 71, "Packa	ging and Transportation of Rad	cribed in Item 5 below, meets the applicable dioactive MateriaL" ny requirement of the regulations of the U. ntry through or into which the package wi	S. Department of Trans		
AR 4(nersha Nort	nssued on the Basis of Address M Corporation h Avenue ton, MA 0180	n Tec Oct	of the package design of application and identification of REPORT of APPlic chnical Operations, Inc. ober 30, 1980, as suppl RE $71-9147$, application	n dated	
CONDITIO	NS ficate is co	nditional upon fulfillin	g the requirements of 10 CFR	Part 71, as applicable, and the conditions	specified below.		
(a)	Pack (1) (2)	Description A stainless shipping co wide. The source tube for shield stainless s assembly an polyurethan Drawings The package Inc., Drawi January 22, A; Drawing	s steel encased, intainer is 9.0 i radioactive sources. The source to ing. The deplete steel housing. I nd stainless stee ie foam. The gro is constructed ing No. 85090, Sh 1987), sheets 2	uranium shielded source nches long, 10.8 inches ce assemblies are house ubes are surrounded by d uranium shield assemb he void space between t 1 housing is filled wit ss weight of the contain in accordance with Tech eet 1 Rev. 0 (contained through 5, Rev. 0; Draw C; Drawing Nos. 85000-5 91, Rev. A.	high and 9.0 d inside tita depleted uran is encased be uranium sh h a castable ner is 105.0 nical Operati in supplemen wing No. 9009	o inches nium ium metal in a ield rigid pounds. ons, t dated 1, Rev.	
(b)	Conte	ents					
	(1)	Type and fo	orm of material				
			as sealed source active material.	es which meet the requi	rements of sp	ecial	
	(2)	Maximum qua	ntity of materia	l per package			
		240 Curies.					

U.S. NUCLEAR REGULATORY COMMISSION HRC FORM 6184 CONDITIONS (continued) (6-83) Page 2 - Certificate No. 9147 - Revision No. 5 - Docket No. 71-9147 The sources must be secured in the shielded position of the packaging by the 6. source assemblies. The source assemblies must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintaining their positioning function. The source assemblies must engage the locking device. The source assemblies must be of sufficient length and diameter to provide positive positioning of the sources within the depleted uranium shield assembly. Shielded shipping plugs shall be installed on source tubes during transport. The name plate must be fabricated of materials capable of resisting the fire 7. test of 10 CFR Part 71 and main Rain PgErgir legibility. In addition to the requirements of Subpart G of 10 CFR Part 71: 8. Each package Just meet the Acceptance Tests and Maintenance Program of Section 8 in the application, as supplemented. (a) Each package shall be operated and prepared for shipment in accordance with the operation precedures of Section in the application, (b) as supplemented. is bereby approved for use under 9. The packaging authorized by this certificate the general license provisions Expiration date: No 10. Technical Operations, the application 198 Amersham Corporation suppresents dated: January 22, 198 March 30, and November 3, 1988; March 10, 1989; October 19 and November 16, 1990; and August 15, 1995. FOR THE U.S. NUCLEAR REGULATORY COMMISSION Loss K. Choppell Cass R. Chappell, Section Leader Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety And Safeguards SEP 1 3 1995 Date:

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NRC FORM 61 (8-86) 10 CFF 71	1.		E OF COMPLIANCE	ICLEAR REGULA	IONT COMMISSI		
1. A CERTIFICAT		D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9148/B(U)	d. PAGE NUMBER	. TOTAL NUMBER PA		
of Feder	al Regulations, Part 71, "Package tificate does not relieve the cons	ing and Transportation of Rac ignor from compliance with a	ribed in Item 5 below, "see its the applicable se lioactive Material." ny requirement of the regulations of the U.S. stry through or into which the package will i	Department of Trans			
	CATE IS ISSUED ON THE BASIS OF	A SAFETY ANALYSIS REPORT O	OF THE PACKAGE DESIGN OR APPLICATION NO IDENTIFICATION OF REPORT OR APPLICAT	ION:			
40 North	Corporation Avenue on, MA 01803	Те Ма	chnical Operations, Inc. rch 24, 1981, as supplem RE 71-9148	application ented.	n dated		
4. CONDITIONS This certific	ste is conditional upon fulfilling	the requirements of 10 CFR I	Part 71, as applicable, and the conditions sp	ecified below.			
5.	and a second		0				
	kaging	C. C.C.	the 2				
(1)	Model No.: 770						
(2)	A steel encased uranium shielded source charger for radiographic						
	inches wide, and Zircalloy or tit uranium metal sh steel containers	20 inches high. anium "S" tube. ield. The deple . The void spac ntainer is fille	urce changer measures 23 The radioactive source The "S" tube is surroum ted uranium shield assem e between the depleted u d with a rigid polywreth ounds.	assembly is ded by deplo bly is encas ranium shie	s housed in eted sed in two ld assembly		
(3)	Drawing	2	0				
	The packaging is Drawing No. 7709		accordance with Technica ough Rev. 3.	1 Operation:	s, Inc.		
(b) Cont	tents						
(1)	Type and form of	material					
	Cobalt 60 as sea radioactive mate		meet requirements of sp	ecial form			
(2)	Maximum quantity	of material per	package				
	550 curies						
			325				

1671		CONDITIONS (continued)
	Page	2 - Certificate No. 9148 - Revision No. 4 - Docket No. 71-9148
	6.	The source must be secured in the shielded position of the packaging by the shipping plug, source assembly, and locking device. The shipping plug, source assembly used must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintaining their positioning function. The ball stop of the source assembly must engage the locking device. The flexible cable of the source assembly and shipping plug must be of sufficient length and diameter to provide positive positioning of the source in the shielded position.
	7.	Name plates must be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining their legibility.
	8.	The lifting eye bolts (2) must be removed prior to shipment and the holes covered to prevent their use as a tie-down device during transport.
	9.	In addition to the requirements of Subpart G of 10 CFR Part 71:
		(a) The package shall be prepared for shipment and operated in accordance with the operating procedures in the application; and
		(b) The package shall be maintained in accordance with the maintenance program in in the application.
	10.	The packaging authorized by is certificate is hereby approved for use under the general license provision of 10 CFR 571.12.
	11.	Expiration date: March 31, 1997.
	Techr	nical Operations, Inc. application dated March 24, 1981.
	Supp	lements dated: January IE, and May 10, 1982; February 25, and April 16, 1992.
		FOR THE U.S. NUCLEAR REGULATORY COMMISSION
		* * Marles She Quald
		Charles E. MacDonald, Chief Transportation Branch Division of Safeguards
		JUN 2 3 1992 and Transportation, NMSS
	Date	

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GER 71	CERTIFICAT	E OF COMPLIANCE		S. TOTAL NUMBER PAGE
CERTIFICATE NUMBER 9150	b. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9150/B(U)	1	3
	g and Transportation of Had nor from compliance with an the government of any coun	ny requirement of the regulations of the U.S. stry through or into which the package will	Department of Trans	
THIS CERTIFICATE IS ISSUED ON THE BASIS OF A a ISSUED TO (Aucros and Address) U.S. Department of Energy H-32 Vashington, DC 20585	PAT- Safe	-2 (Plutonium Air-Transp ety Analysis Report, SAN y 1981, as supplemented. NUMBER 71-9150	ortable Mode D81-0001, pr	
CONDITIONS This certificate is conditional upon fulfilling t	ne requirements of 10 CFR I	Part 71, as applicable, and the conditions a	pecified below.	
overpack (AQ- within a caps The AQ-2 over inches) high attached to t walled stain bottom and bo protective ca spreader whic protective ca The TB-2 cont sections, bol diameter sphe on the mattir The C-1 capsu inch) diamete lid which is Brass or alum various radio liners.	21. The content are (C-1) with pack is a right and 381 nm (15 he cylinder out ess steel struct lied at the top se houses the Th h is further su se. ainment vessel ted together wi re. A copper g g hemispherical le is a stainle r and a nominal sealed with tef ninum canisters n active contents	carcolar cylinder, appr inches) in diameter with er walls. The outer she ture with rounded end ca . An inner grain orient B-2; it is surrounded by rrounded by a grain orie consists of (2) iron-bas th (20) bolts, forming a asket held between knife surfaces of the TB-2 pr ss steel cylinder with a 70 mm (2.76 inch) lengt	ters are con oximately 35 protruding 11 is a dout ps, riveted ed maple wood a titanium nted redwood e superalloy n 88 mm (3. -edge sealin ovides a sea nominal 44 h; it has a apsule to ho e quartz or	tained 6 mm (14 handles ble on the d load d 46 inch) ng beads 1. mm (1.80 screw top

age 2	4	ficate No. 9150 - Revision No. 4 - Docket No. 71-9150
	(7)	
	(7)	
	(3)	Drawing and Specifications
		The packaging is constructed in accordance with specifications and drawings, as listed by document number, issue, and title in the List of Data LD-T67000-000, page 1, issue D and page 2, issue D (Chapter 9 of Safety Analysis Report, SAND81-0001, printed July 1981).
(b) Cont	ents
	(1)	Type and form of material
		Plutonium, uranium, or mixtures of plutonium-uranium in various isotopic compositions in solid form as EGU
		(i) oxide powder, sintered oxide pellets, and metal;
		(ii) pluten rum sulfate tetrahydrate, $Pu(SO_4)_2$ 4H20 and plutonium nitrate dihydrate, $Pu(NO_3)_4$ 2H20.
	(2)	Maximum quantity of material per package
		(i) For the contents described in 5(b)(1)(i):
		Not to exceed 15 grams fissile material, 120 grams mass, 2 watts decay heat, or 0.5 gram water. (ii) For the contents described in 5(b)(1)(ii):
		Not to exceed 3 grams or 0.5 grams water in addition to the water of hydration.
9	grams of packaging	grams of polyrinylchloride (PVC), 18 grams of quartz (SiO_) or glass, 50 brass, and 16 grams of aluminum may be used within the C=1 capsule for of contents. Up to 0.3 gram of polytetra-fluoroethylene (PTFE) tape may to seal the C-1 capsule.
7. 1	The C-1 (does not	capsule need not be leak tested when the activity of plutonium contents exceed 20 ci per package.
8. /	A maximum TB-2 to a	n of 2.0 grams of aluminum foil may be used to shim the C-1 within the avoid relative movement between the two.
1	specifie	first use, each package must meet the criteria for the acceptance tests d in section 8.1 of Chapter 8 of the Safety Analysis Report (SAND81-0001, July 1981).
	tests sp	each shipment, the package must meet the criteria for inspections and ecified in section 8.2 of Chapter 8 of the Safety Analysis Report 0001, printed July 1981).

	CONDITIONS (continued)
Page	3 - Certificate No. 9150 - Revision No. 4 - Docket No. 71-9150
11.	Periodic testing and maintenance of the package must be in accordance with section 8.3 of Chapter 8 of the Safety Analysis Report (SAND81-0001, printed July 1981).
12.	Operating procedures must be in accordance with Chapter 7 of the Safety Analysis Report (SAND81-0001, printed July 1981).
13.	Through special arrangement with the carrier, the shipper shall ensure observance of the following operational controls for each shipment of plutonium by air:
	(a) The package(s) must be stowed aboard aircraft on the main deck in the aft-most location that is possible for cargo of its size and weight. No other type of cargo may be stowed aft of the package(s).
	(b) As an alternative to (a), packages must be stowed in the aft-most lower cargo compartment. No other type of cargo may be stowed aft of the packages(s).
	(c) Package(s) must be secured and restrained to prevent shifting under normal transport.
	(d) Cargo which bears the "EXPLOSIVE A" label may not be transported aboard an aircraft carrying a PAI-2 package(s)."
4.	The package authorized for use by this certificate is hereby approved for use under the general lidense provisions of 10 CFR \$71.12.
15.	The package authorized by this certificate is hereby approved for transportation of plutonium by air
16.	Expiration date: Wuly 31, 1996.
	REFERENCES
	2 (Plutonium Air-Transportable Model 2) Safety Analysis Report, SANDIA Report No. 31-0001, July 1981.
	application dated April 19, 1983. Supplements dated August 3, 1983, July 15, 1986, July 16, 1991.
	FOR THE U.S. NUCLEAR REGULATORY COMMISSION
	01 10 0 01
	Charles I Mac Amader Charles E. MacDonald, Chief
	Transportation Branch
	Division of Safeguards and Transportation, NMSS
Data	AUG 7 199F
Date	
	329

& CERTIFICATE NUME			TE OF COMPLIANCE		ATORY COMMISSIO
9151	ER .	b. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBE	R d PAGE NUMBER	R . TOTAL NUMBER PAGE
PREAMBLE a. This certificate of Federal Regu	lations, Part 71, "Packagin does not relieve the consid	packaging and contents design and Transportation of Rac	cribed in Item 5 below, meets the applicat dioactive Material." ny requirement of the regulations of the	U.S. Department of Tra	
applicable regu THIS CENTIFICATE IS a ISSUED TO INAMINE CCIENTIFIC EC 560 Bear Cru ak Ridge, TI CONDITIONS This certificate is c 5. (a) Packagi (1) Mo (2) De St Th di di a con th st	atory agencies, including issued on THE BASIS OF and Address/ cology Group, eek Road 1 37831 onditional upon futfilling (del Nos.: HN- scription eel encased, li e casks are ri- ameter. The ci ameter. The ci a	A SAFETY ANALYSIS REPORT A SAFETY ANALYSIS REPORT b. TITLE Inc. 100 Series 3 and ead shielded cas ght circular cyl ask cavities are ask side walls of d shell, and a , 2-inch thick s is integrally w A steel flange f at the top. The estepped and we is sealed by a sitive closure of	of THE PACKAGE DESIGN OF APPLICATION Scientific Ecology dated September 21, TNUMBER 71-9151 Part 71, as applicable, and the condition inders 81-1/2 inches fi 73-3/8 inches high by onsist of a 3/8-inch to 1/8-inch thick outer st iteel plates welded tog elded to the inner applicable to the inner s welded to the inner applicable to the inner the Iid is comprised of elded together to mate Neoprene gasket locate of the Iid is accomplis	Mill be transported. NATION Group, Inc. a 1992. As specified below. Control to the specified below. Tivity matering by 81-3/4 75-1/2 inche hick inner st cel shell. The steel and outer steel two, 2-inch the with the steel shed by eight, shield plug	ial. ial. inches in inches in incel shell, ine base is n a 4-inch shells of eel shells chick steel el flange. e lid and 1-3/4-inch

Page 2 - Certificate No. 9151 - Revision No. 15 - Docket No. 71-9151

(3) Drawings

The Model No. HN-100 Series 3 packaging is fabricated in accordance with Hittman Nuclear & Development Corp. Drawing Nos.: C001-5-9138, Rev. 13; C001-5-9139, Rev. 8; C001-5-9140, Rev. 9; C001-5-9141, Rev. 3; C001-5-9142, Rev. 1; COO1-5-9143, Rev. 8; and COO1-5-9144, Rev. 3. Optional stainless steel shielding insert in accordance with Drawing Nos.: STD-02-035, Rev. A; STD-02-036, Rev. A; and STD-02-037, Rev. 2.

The Model No. LN 14-170 Series I packaging is fabricated in accordance The Mode, with LN Technologies 8916 M 2003, NEC 8916 M 2002, Rev. 0; 8916 M 2006, Rev. 0. REGULAN Rev. 0; and 8916 M 2006, Rev. 0. REGULAN with LN Technologies Corporation Drawing Nos.: 8916 M 2001, Rev. 1; 8916 M 2002, Rev. 0; 8916 M 2003, Rev. 0; 8916 M 2004, Rev. 0; 8916 M 2005,

(b) Contents

6.

(.) Type and form of material

Process solids, either dewatered, solid or solidified, meeting the requirements for low specific activity material, in secondary containers.

(2) Maximum quantity of material per package

Greater than Type A quantity of radioactive material which may contain fissile material provided the fissile material does not exceed the limits in 10 CFR §71.53. The weight of the contents, optional shield insert, and secondary containers shall not exceed 17,800 pounds. When the shield insert is not installed in the cask, the internal decay heat load shall not exceed 7 watts. When the shield insert is installed in the cask, the internal decay heat load shall not exceed 28 watts.

- (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time: 💥
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft³ at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

Page 3 - Certificate No. 9151 - Revision No. 15 - Docket No. 71-9151

(b) For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

In addition to the requirements of Subpart G of 10 CFR Part 71:

- (a) Prior to each shipment, the packaging lid seals, if opened (or if security seal is broken), must be inspected. The seals must be replaced with new seals if inspection shows any defects or every 12 months, whichever occurs first.
- (b) Each package must meet the Acceptance Tests and Maintenance Program of:

Model No. HN-100 Series 3

Section 7.0 of the application. Gamma scan for the shielding acceptance may be based on lead equivalence for lead and steel with all readings within 2.3 inches \pm 10% on a 4-inch grid.

Model No. LN 19 10 Series 1

LN Technologies Corporation Procedures MM-011, Rev. 1, WM-012, Rev. H; WM-012, Rev. F.

(c) The package shall be prepared for shipment and operated in accordance, with the operating Procedures of:

Model No. HN-190 Series 3

Section 6.0 of the application.

Model No. 14 14-170 Series 1

LN Technologies Corporation Procedure WM-014, Rev. L.

8. Torque requirements for closure fasteners:

(a) Primary lid ratchet binders must be torqued to 175-200 ft-lbs.

(b) Secondary lid bolts must be torqued to 120 ± 10 ft-lbs.

 Seals which show any visual defects (cracking, gouging, tearing, etc.) must be repaired in accordance with:

Model Nos. HN-100 Series 3

Note No. 3 on Hittman Drawing No. COO1-5-9138, Rev. 13; or, replaced with a new seal.

Model No. LN 14-170 Series I

LN Technologies Corporation Procedure WM-012, Rev. H, Section 7.1 (joint angle must be approximately 45°); or, replaced with a new seal.

Page 4 - Certificate No. 9151 - Revision No. 15 - Docket No. 71-9151

- 10. The package authorized by this certificate must be transported on a motor vehicle, railroad car, aircraft, inland watercraft, or hold or deck of a seagoing vessel assigned for the sole use of the licensee.
- 11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 12. Expiration date: October 31, 1997.

REFERENCES

Scientific Ecology Group, Inc. application dated September 21, 1992.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date:

OCT 9

B-050 0 CFR 71			CERTIFICA	TE OF COMPLIANC	e Ges	UCLEAR REGULAT	e. TOTAL NUMBER PAG
1.4. CERTIFICATE NUM	BER		D. REVISION NUMBER	USA/9152/B		d. PAGE NUMBER	E TOTAL NUMBER PAG
of Federal Reg	ulations, Par	171, "Packaging	ckaging and contents de and Transportation of P	scribed in Item 5 below, meets the	applicables	. Department of Trans	
. ISSUED TO (Aama ransportati Safety Div Jashington,	ent of on and ision, DC 205	Energy Packaging EH-33.2 85	EAF	T OF THE PACKAGE DESIGN OR AF F AND IDENTIFICATION OF REPORT U.S. Department o dated February 26	f Energ , 1988,	y applicatio as suppleme	n nted.
This certificate is	conditional	pon fulfilling the	requirements of 10 CF	R Part 71, as applicable, and the	conditions s	pecified below.	
	(2) D d d s s s s c s s c s s c s s c s s c s s s c s s s s c s s s s s c s	odel No.: escriptio shipping buble-wal 9-1/8" in avity 26- urrounds- lug type, eal provi proximat quipped w asket, a imiters fi teel. Th atchet bi n diamete pproximat	n cask for rad led steel cir diameter and the central c lead filled ded by a flat h a sealed 3/ ely 6" of lea ith a cavity steel lifting illed with 16 e impact limi nders. The c	Lioactive waste. T cular cylinder sep 68-1/2" high with ter and 45-1/6" hi avity. Closure is cover secured by t silicone rubber g 8" test port betwe d are in the base drain line sealed hook for the cove 5.5 lb/ft ³ rigid po ters are attached overall dimensions high. The packag	arated a cent gh, app accomp welve (asket a en the and cov with a r, and lyureth to the with im	by 16-gauge ral steel li moximately 5 lished by a 12), 1-1/4" ind a silicon gaskets. ver. The cas 3/8" cap scr top and bott ane foam cla cask by six mpact limiter	wires, ned " of lead steel, bolts and he rubber k is rew and com impact d in (6), 1"
	1)rawing The packag Inc., Draw	ning is constr ving No. E-1-4	ructed in accordanc 36-111, Sheets 1 a	e with nd 2, F	Chem-Nuclear Rev. D.	Systems,

age 2 - Certificate No. 9152 - Revision No. 11 - Docket No. 71-9152

(b) Contents

- (1) Type and form of material
 - Greater than Type A quantity of nonfissile radioactive material as solidified or dewatered process solids (resins) within a sealed secondary container; or

- Greater than Type A quantity of irradiated solid reactor components within a sealed secondary container.
- (iii) Greater than Type A quantity of irradiated fuel (dewatered) within secondary containers described in Chem-Nuclear Systems, Inc. application dated July 16, 1985.
- (2) Maximum quantity of material per package

For the contents described in 5(b)(1)(i), (++), and (iii):

Not to exceed a decay heat generation of 800 watts and 3,000 pounds including weight of the contents and secondary container; and

For the contents described in 5(b)(1)(1):

Residual water in the secondary container not to exceed the activity stated in Table 4.5.2-1 of the application.

For the contents described in 5(b)(1)(iii):

The maximum U-235 enrichment of the unanium oxide fuel material must not exceed 3 w/o. The average burnup of the fuel material must not exceed 3,165 MWD/MTU and must be cooled for at least 6.0 years. Fissile contents not to exceed 400 grams U-235 prior to irradiation.

(3) Fissile Class

6.

7.

III

One

Maximum number of packages per shipment for the contents described in 5(b)(1)(iii)

As needed, appropriate shoring must be used in the cask cavity to limit movement of the secondary container during accident condition of transport.

- The cask cover must be secured by 12, SA-354, Type BD, 1-1/4"-7UNC x 2-1/4" long bolts torgued to 270 ft-lbs ± 10% (lubricated) or 360 ft-lbs ± 10% (dry).
- Prior to each shipment, the leak test described in Appendix 8B of the application must be performed. No package is to be delivered to a carrier for transport with a detectable leak using the method of Appendix 8B.

Page 3 - Certificate No. 9152 - Revision No. 11 - Docket No. 71-9152

- (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited a to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft³ at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container most be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

- (b) For any package containing materials with radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days after venting of drums or other secondary containers, the determination in (a) above meed not be made, and the time restriction in (a) above does not apply.
- 10. In addition to the requirements of Subpart 6 of 10 CFR Part 71:
 - (i) Each package must meet the acceptance tests and be maintained in accordance with the Maintenance Program of Section 8 of the application.

The leak tests described in Appendixes 8-A and 8-B of the application may be performed in accordance with EG&G Idaho, Inc. letter dated December 20, 1982 which was submitted with the Department of Energy consolidated application dated February 26, 1988. Maintenance and repair records shall be furnished to the packaging owner.

(ii) The O-ring must be replaced quarterly with new seals. The flat lid gasket must be replaced annually. The test port and drain line seals must be replaced before each loaded shipment.

Page 4 - Certificate No. 9152 - Revision No. 11 - Docket No. 71-9152

.1. The package authorized by this certificate in hereby approved for use under the general license provisions of 10 CFR §71.12.

12. Expiration date: May 31, 1999.

REFERENCES

Department of Energy consolidated application dated: February 26, 1983. Department of Energy supplements dated: May 12, 1989; and April 11. 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cass R. Chappell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

MAY 1 3 1994 Date:

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RC FORM 9-861 0 CFR 71	618				TE OF COMP	LIANCE	ICLEAR REGULA	TORY COMMISSI
& CERTIFI	CATE N 9156	UMBER	b. REVISIO	IN NUMBER		A/9156/B(U)	d PAGE NUMBER	e. TOTAL NUMBER PAG
of Fe	certifica deral R certific	equiations, Part 71, "P ate does not relieve the	ackaging and Trans	portation of Rac	fioactive Material."	v, meets the applicable sa e regulations of the U.S. which the package will t	Department of Trans	
		E IS ISSUED ON THE BA	SIS OF A SAFETY AN	ALYSIS REPORT (OF THE PACKAGE DE	SIGN OR APPLICATION	ON	
2515 1	111W	l Nuclear Con iams Street ro, CA 94577	npany		REG.	uclear Compan er 23, 1981, -9156	y applicati as suppleme	on nted.
This cet	ONS tificate	is conditional upon ful	filling the requirem	ents of 10 CFR I	Part 71, as applicabl	e, and the conditions sp	ecified below.	
).			Caroline .			0		
	Pack (1)	Aging Model No.:	IR-50		~ /	P ^r 2	- 	
	(2)	Description	here a	劉) 7	x) (4		6	
		changer, sto radiographia measures 8.1 radioactive The "S" tube material. steel housin assembly and foam. The a 10 gallon	orage conta sources i source ass is surrou the deplete ng. The vo the inner to pound so (min 20 ga	iner, and n special long, 4.5 embly is nded by d d uranium id space containe urce chan uge) stee	t Type B shi form. The inches wid housed in Z lepleted ura shield ass between the er is filled ager is cent el drum with	designed for pping contain Model No. IR e, and 8.5 in incalloy or t mium metal as embly is enca depleted ura with a rigid ered by plywo a 12-gauge s overpack is	er for 50 source ches high. itanium "S" shielding sed in a st nium shield polyuretha od supports teel closur	changer The tube. ainless ne within
	(3)	Drawings						
		Company Draw	wing Nos.: t 31, 1992;	2A, Rev. 50-4, Re	1, dated No	with Industr vember 4, 199 November 4,	2; 2B, Rev.	1,

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CONDITIONS (continued)

Page 2 - Certificate No. 9156 - Revision No. 4 - Docket No. 71-9156

(b) Contents

(1) Type and form of material

Iridium 192 as sealed sources that meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package

120 curies

6. The sources must be secured in the shielded position of the packaging of the shipping plug, source assembly, and locking device. The shipping plug, source assembly used must be fabricated of material's capable of resisting a 1475°F fire environment for one barf hour and maintaining their positioning function. The ball stop of the source assembly must engage the locking device. The flexible cable of the source assembly and shipping plug must be of sufficient length and diameter to provide positive positioning of the source in the shielded position.

- 7. The name plate on overpact host be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining its legibility. The two vent holes in the side of the overpack must be covered with tape or rubber (plastic) plugs to prevent entry of rain water.
- 8. In addition to the requirements of Subnart 5 of 10 CFR Part 71, each package must meet the acceptance tests and maintenance program, and shall be operated and prepared for shipment in accordance with the operating procedures in the application document entitled "Operating Procedures, Acceptance Test, and Maintenance Program," Revision 1, dated November 4, 1992.
- The packaging authorized by this certificate is mereby approved for use under the general license provisions of 10 CFR §71.12.

REFERENCES

10. Expiration date: January 31, 1998.

Industrial Nuclear Company application dated December 23, 1981.

Supplements dated: May 28, 1982; October 13, 1983; and March 20, June 25, September 4, and November 4, 1992.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

JAN 7 1993

Date:

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NRC FORM 618 (8-95) 10 CFR 71				TE OF COMPLIANCE		
1. A CERTIFICATE 9157	NUMBER		6	C. PACKAGE IDENTIFICATION NUMBER USA/9157/B(U)	d PAGE NUMBER	e. TOTAL NUMBER PAG
of Federal	Regulati	ons, Part 71, "Packagin s not relieve the consid	g and Transponation of fla nor from con wishice with a	ribed in Item 5 below, meets the applicable so loactive Material." ry requirement of the regulations of the U.S. ntry through or into which the package will	Department of Trans	
n ISSUED TO Indu 2515 San	Warme and Stria Will Leand	Address/ 1 Nuclear Com iams Street ro, CA 94577	ipany	OF THE PACKAGE DESIGN OF APPLICATION AND IDENTIFICATION OF REPORT OF APPLICAT Industrial Nuclear Co dated December 23, 19 T NUMBER 71-915	ompany Appli 181, as supp 17	cation lemented.
This certifica	te is cond	itional upor fulfilling th	e requirements of 10 CFR	Part 71, as applicable, and the conditions sp	ecified below.	
5. (a)	Pack (1) (2)	device, stor sources in s 8.875 inches source assen tube is surr depleted ura housing. Th the inner co weight of th Drawings The packagin	age container, pecial form. Fong, 4.5 included by is housed ounded by deple anium shield as the void space be intainer is fill the exposure dev and is constructed 1A, Rev. 2, dat	ure device is designed for and Type B shipping cont the Model No. IR-100 expo nes wide, and 8.5 inches in Zircalloy or titanium ated uranium metal as shi sembly is encased in a st etween the depleted urani led with a rigid polyuret ice is 53 pounds.	ainer for ri sure device high. The "S" tube. elding mate ainless ste um shield a hane foam.	adiographic measures radioactive The "S" rial. The el ssembly and The gross

CONDITIONS (continued) Page 2 - Certificate No. 9157 - Revision No. 6 - Docket No. 71-9157

- (b) Contents
 - (1) Type and form of material

Iridium 192 as sealed sources that meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package

120 curies

- 6. The source must be secured in the shielded position of the packaging by the shipping plug, source assembly, and locking device. The shipping plug, source assembly used must be fabricated of materials capable of resisting a 1475°F fire environment for one-balf hour and maintaining their positioning function. The ball stop of the source assembly must engage the locking device. The flexible cable of the source assembly and shipping plug must be of sufficient length and diameter to provide positive positioning of the source in the shielded position.
- The name place on the exposure device must be fabricated of materials capable of resisting the fire best of 10 CFR Part 71 and maintaining its legibility.
- 8. In addition to the requirements of Subpart C of 10 CFR Part 71, each package must meet the acceptance tests and maintenance program, and shall be operated and prepared for shipment in accordance with the operating procedures in the application document entreled "Operating Procedures, Acceptance Test, and Maintenance Program," Revision 1, dated November 4, 1992, as supplemented December 15, 1992.
- The packaging authorized by twis certificate is hereby approved for use under the general license provisions of IC CFR §71.12.
- 10. Expiration date: Danuary 31, 1998.

REFERENCES

Industrial Nuclear Company application dated December 23, 1981.

Supplements dated: May 28, 1982; October 13, 1983 (two letters); November 26, 1990; February 22, and April 26, 1991; and March 20, June 25, September 4, November 4, and December 15, 1992.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date: JAN 7 1993

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OFR 71		CERTIFI	CATE OF CON	MPLIANCE	.S. NUCLEAR REGU	
CERTIFICATE NUMBE	A	D. REVISION NUMBE	der fahren verster som en se an en se	IDENTIFICATION NUM	BER d. PAGE NUME	BER 0. TOTAL NUMBER PA
9159		6	USA	/9159/A	1	4
of Federal Regula	tions, Part 71, "Pack	the packaging and conter aging and Transportation onsignor from compliance ding the government of a	with any requirement of	the regulations of the	e U.S. Department of T	
HIS CERTIFICATE IS a ISSUED TO (Name and cific Nucle ookside Off e Harbison lumbia, SC	ar Systems, i.e Park Way, Suite	Inc.	TITLE AND IDENTIFICAT	ication dat	ed February 2	9, 1988,
CONDITIONS	nditional upon fulfili	ing the requirements of 10	CFR Part 71, as appli	cable, and the condit	ions specified below.	
	8	Auger		0	>	
					3	
) Packagin	9 0	and a		the of	day	
St ca ca 2. ou pl se op Ne st li ca pr	sks are rig vity. The 63 inches e ter steel s ates rangin cured to the tional seco imary lid w oprene gask ainless ste ne with pip sks are pro imary lid i d is provid	lead shielded ht circular cy walls of the concased in 0.38 hell. The top g in thickness e cylindrical ndary lid is co ith eight, 3/4 et seal. The el liner (seal e plug, and an vided with fou s provided wit ed with one li 200 pounds.	finders with asks contain fuch thick cover and ca from 2.0 to cask body by entered in th -inch studs a casks may be welded along optional 3/4 r equally spa h three lift	a 75.5-inch a lead thic nper steel sk bottom a 3.0 inches. eight, 1-1/ he primary 1 and nuts. E provided wi all edges) 1-inch drain aced lifting ing lugs and	ID by 73.38- kness ranging shell and 0.8 re made up of The primary 4-inch rachet id and is sec ach lid is pr th an optional line and pip /tie-down dev the optional	Inch IH from 1.25 to 8-inch thick two steel cask lid is binders. An ured to the ovided with a l 12-gauge lid vent e plug. The ices. The secondary
Mode1		OD, inches	Lead Tk, inches	Top Tk, <u>inches</u>	Bottom Tk, inches	Gross Wt, pounds
Number						

NIRC FORM 618A (6-83)

CONDITIONS (continued)

Page 2 - Certificate No. 9159 - Revision No. 6 - Docket No. 71-9159

5. (a) (3) Drawings

Model Nos. NUPAC 14/190L. NUPAC 14/190M. and NUPAC 14/190H

The packages are fabricated in accordance with Nuclear Packaging, Inc. Drawing No. X-20-307-SNP. Sheets 1, 2 and 3, Revision No. A.

Model Nos. LN 14-170L, LN 14-170M, and LN 14-170H

The packages are fabricated in accordance with LN Technologies Corporation Drawing No. 5025-M-2005: Sheets 1 and 2, Revision No. 0. EAR REGULAS

(b) Contents

6.

- Type and form of material (1)
 - (i) Dewatered, solid, or solidified waste meeting the requirements for low specific activity material, in secondary containers; or
 - (ii) Activated solid components meeting the requirements for low specific activity material, in secondary containers.
- Maximum quantity of material per package (2)

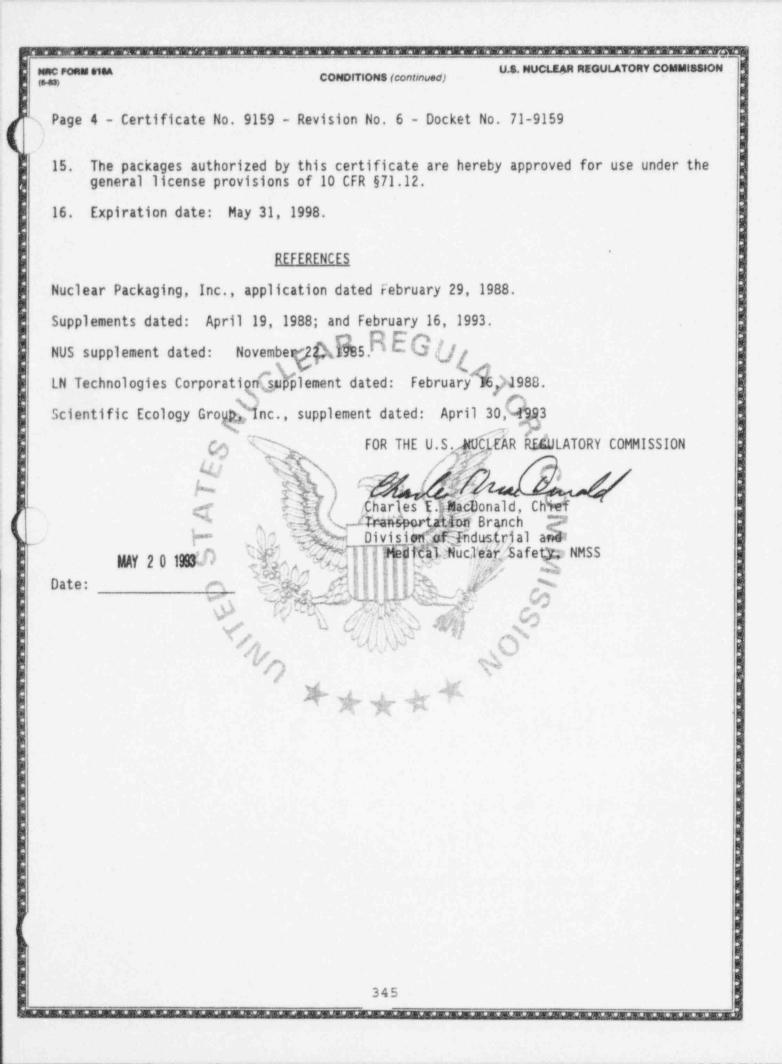
Greater than Type A quantity of radioactive material which may contain fissile material provided the fissile material does not exceed the limits in 10 CFR §71.53. The decay heat load is limited to 7 watts for the Model Nos. NUPAC 14/1901, NUPAC 14/1904, LN 14-1701, and LN 14-170M; and 25 watts for the Model Wos. NUPAC 14/1908 and LN 14-170H casks.

- (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft³ at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

For any package shipped within 10 days of preparation, or within 10 days (b) after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

IRC FORM 6-63)	CONDITIONS (continued)
Page	3 - Certificate No. 9159 - Revision No. 6 - Docket No. 71-9159
7.	Maximum gross weight of the contents, secondary containers, and shoring is limited to 20,000 pounds.
8.	Except for close fitting contents, shoring must be placed between secondary containers and the cask cavity to minimize movement during normal conditions of transport.
9.	The lid and the shield plug lifting lugs must not be used for lifting the cask, and must be covered in transit.
10.	The cask must be provided with either (or both) a drain line or a lid vent line as shown in the drawing in order to provide a method to leak test the package.
11.	In addition to the requirements of Subpart G of 10 OFR Part 71:
	(a) Prior to each shipment, the packaging Neoprene lid seals if opened (or if security seal is broken), must be inspected. The seals must be replaced with new seals if inspection shows any defects or every bwelve (12) months, which ever occurs first. Cavity drain and vent lines must be sealed with appropriate sealant applied to the pipe prug threads.
	(b) Each packaging must meet the Acceptance Tests and Maintenance Program of:
	Model Nos. NUPAC 14/1901, NUPAC 14/190M and NUPAC 14/190H
	Section 8.0 of the application.
	Model Nos. LN 14-1701, LN 14-170M and LN 14-170H
	LN Technologies Corporation Procedures WM-036, Rev. A; WM-026, Rev. B; and WM-013, Rev. F.
	(c) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of:
	Model Nos. NUPAC 14/190L, NUPAC 14/190M and NUPAC 14/190H
	Section 7.0 of the application.
	Model Nos. LN 14-170L. LN 14-170M and LN 14-170H
	LN Technologies Corporation Procedures WM-025, Rev. C.
12.	The ratchet binders on the cask lid must be torqued to 100±10 ft-1b.
13.	The cask body and each cask lid must be marked in accordance with 10 CFR §71.85(c).
14.	The packages authorized by this certificate must be transported on a motor vehicle, railroad car, aircraft, inland watercraft, or hold or deck of a seagoing vessel assigned for the sole use of the licensee.
	344



a. CE	TI	E NUMBER	BEVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9165/B(U)	d. PAGE NUMBER	e. TOTAL NUMBER PAGE
PRE/	AMBLE This cert of Feder	ificate is issuad to certify that the ai Regulations, Part 71, "Packag	ing and Transponation of had	ribed in Item 5 below, meets the applicable sa	Department of Trans	
ers No	ham (rth A	CATE IS ISSUED ON THE BASIS OF O (Nerve and Address) Corporation Avenue 1, MA 01803	Tec	of THE PACKAGE DESIGN OF APPLICATION NOD IDENTIFICATION OF REPORT OF APPLICAT hnical Operations, Inc. 21, 1982, as supplement	application	dated
A. CO	NOITION	s cate is conditional upon fulfilling	the requirements of 10 CFF	Part 71, as applicable, and the conditions s	pecified below.	
)	(1) (2)	of an outer carbo shield, eight Tit and a gasketed li head bolts. The means of a source of approximately	on steel shell, r canium "J" tubes, id which is secur contents are sec e cable locking d 11.25 inches and he lid eyebolt. 5 pounds.	source changer. Primar igid polyurethane pottin source stop, top and bo ed with eight, 3/8"-16 U ured and positioned with levice. The package has i outside height of appro The maximum total weight	g material, ttom support NC x $5/8$ " lo in the "J" an outside o ximately 14	t plates ong hex tubes by diameter .75 inches
		The packaging is	constructed in a D: Sheet No. 1,	Accordance with Technical Rev. 1; Sheet No. 2, Rev	Operations . 0; Sheet I	Inc. No. 3,
2)	Cont	ents				
1		Type and form of	material			
		Level to a literation of		ne requirements of specia	l form radi	pactive
	(2)	Maximum quantity	of material per	package		
		1,000 curies wit				

Page 2 - Certificate No. 9165 - Revision No. 2 - Docket No. 71-9165

- The cover bolts shall be provided with tamperproof seal in accordance with 10 CFR §71.43(b).
- 7. The two (2), 1/4-inch diameter vent holes in the side of the packaging shall be provided with tight fitting rubber or plastic plugs to preclude the entry of rain water into the packaging.
- 8. The name plate shall be fabricated of material capable of resisting the fire test of 10 CFR Part 71 and maintaining its legibility.
- 9. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) Each packaging must meet the Acceptance Tests and Maintenance Program in Section 8 of the application dated August 16, 1993.
 - (b) The package shall be prepared for shipment and operated in accordance with the Operating Procedures in Section 7 of the application dated August 16, 1993.
- 10. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 11. Expiration date: December 32, 1998.

REFERENCES

chnical Operations, Inc. application dated May 21, 1982.

Supplements dated: May 12 and Movember 10, 1983.

Amersham Corporation supplements dated: November 8, 1988; and August 16, 1993.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

* * * tass K.

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

DEC 1 5 1993

IRC FORM 618 8-651 0 OFR 71			CERTIFICAT	TE OF COMPLIANCE		. TOTAL NUMBER PAG
9166	NUMBER		5. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUM USA/9166/B(U)	BER d. PAGE NUMBER	2
of Federal	Regulation	ns, Part 71, "Packaging	and Transportation of Max	cribed in item 5 below, meets the applie dioactive Material." Iny requirement of the regulations of t ntry through or into which the packa	he U.S. Department of Tran	
Amersham (40 North / 3urlingtor	Corpor Avenue	ation	Te	of THE PACKAGE DESIGN OF APPLICATION OF REPORT OF APPLICATION OF APPLIC	Inc. applicatio	on dated
4. CONDITIONS This certificate	e is condit	tional upon fulfilling th	e requirements of 10 CFR	Part 71, as applicable, and the condi-	tions specified below.	
(a) Packs (1) (2)	The M stora spec: 9.56 the s source is en rigid latcl durin	ription Model No. 864 age container ial form. The inches high side of the p ce assemblies bunded by ura hing assembling hing assembling brawing The packagi	c, and Type B s ne Model No. 86 The package backage (8.31 i s are housed in anium metal shi tarbon steel ho ne foam. A dec ies and a shipp The gross wei ng is construct g No. 86490, Sh	ainer is designed for hipping container for 4 source changer is 6 incorporates two hand nches at its widest p brass source tubes. elding (43 lbs). The using with void space k plate above the shi ing cover protecting ght of the container ed in accordance with eets No. 1, through 6	Tachographic 10 inches in d 11es which protected 10 inches in d 11es which protected 10 inches in d 10 inches inches in 10 inches inches inches in 10 inches inches inches in 10 inches inches inches in 10 inches inches inches inches in 10 inches inches inches inches in 10 inches inches inches in 10 inches inches inches inches in 10 inches inches inches in 10 inches inches inches in 10 inches inches inches in 10 inches inches in 10 inches inches in 10 inches inches in 10 inches in	sources in iameter and rude from radioactive bes are d assembly castable hree source ssemblies
(b)	Cont	ents				
	(1)	Type and fo	rm of material			
		Iridium 192 radioactive		ces that meet the red	quirements of s	pecial form
	(2)	Maximum qua	ntity of materi	al per package		
		360 curies				
				34.9		
				348		

j.	2 - Certificate No. 9166 - Revision No. 3 - Docket No. 71-9166
	The source attached to the source assembly must be secured in the shielded position of the packaging by the source latching assembly with the latch bars in the engaged position. The safety pins shall be operational and the shipping cover shall be in place and secured.
	The two (2), 1/4-inch diameter vent holes in the sides of the package shall be covered with tape or rubber (plastic) plugs to preclude the entry of rain water into the packaging.
	The name plate shall be fabricated of material capable of resisting the fire test of 10 CFR Part 71 and maintaining its legibility.
э.	In addition to the requirements of Subpart G of 10 CFR Part 71:
	(a) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Section 7.0 of the application; and
	(b) The package must meet the Acceptance Test and Maintenance Program of Section 8.0 of the application.
10.	The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
11.	Expiration date: January 31, 1998.
	REFERENCES
Techn	ical Operations, Inc. application dated May 21, 1982.
Suppl	ement dated: November 28, 3982.
	FOR THE U.S. NUCLEAR REGULATORY COMMISSION
	FOR THE U.S. NUCLEAR REGULATORY COMMISSION
	Transportation Branch Division of Safeguards and Transportation, NMSS
Date:	

H100) 0 CEFPI 71	FO		E OF COMPLIANCE	NUCLEAR REGULAT	
& CERTIFICATE NUMBER 916	b.REV	ISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9167/B(U)	0. PAGE NUMBER	. TOTAL NUMBER PAGE
PREAMBLE a. This certificate is issued to a of Federal Regulations, Par b. This certificate does not rei applicable regulatory agen	entify the, the peckagin t 71, "Packa sing and T ieve the consignor from cles, including the gov	n compliance with any emment of any count	bed in Item 5 below, meets the applicable bactive Material." I requirement of the regulations of the U ry through or into which the package w	I.S. Department of Trans nill be transported.	
A ISSUED TO (Nume and Address) Amersham Corporati 40 North Avenue Burlington, MA 018	on 03	Am Au E AR c DOCKET	ersham Corporation app gust 25, 1982, as supp NUMBER 71-9167	lication date lemented.	d
 CONDITIONS This certificate is conditional in 	upon fulfilling the requ	irements of 10 CFR P	art 71, as applicable, and the condition	s specifient below.	an e paparat de la mainime de participa de
(a) Packaging	20		03		
	et Nos.: 32	068, 3227B,	and 3218		
sou ste The pro 320 (2- Mod dia be enc by loc	rces in spec el and the d containers vides radiat 6B and 3227B inch dramete el No. 3218 meter and 1 used only fo ased WEP plu a knurled st ked in place	ial form. I imensions an are filled w ion and ther containers r and 3-inch container ha 3-inch diame r a referenc g will be in ainless stee over the sc	gned as Type B shippin he containers are cons e 16.8 inches in diame ith water extended pol mal protection to the each have one receptace diameter receptacles, s two (2) receptacles ter receptacles). The e or calibration source serted into the recept 1 screw cap. A stain rew cap with a key ope ner is 165 pounds.	tructed of st ter by 20.4 i yester (WEP) contents. The le for the so respectively for the source smaller rece e. A stainle acle and held ess steel lat	ainless nches high. Which Model No. urce). The es (2-inch ptacle will ss steel in place ch bar is

Page 2 - Certificate No. 9167 - Revision No. 4 - Docket No. 71-9167

5. (a) (3) Drawings

The packagings are constructed in accordance with Amersham Corporation Drawing Nos.:

Model Ny. 320	6B M	odel No.	3227B	Model No.	. 3218	
0A22413, Rev. 1A22299, Rev. 3A22297, Rev. 3A22420, Rev. 2A22442, Rev. 2A22442, Rev. 2A22385, Rev. 2A22419, Rev.	D 0/ G 1/ C 3/ B 3/ A 2/ B 2/	A22299,	Rev. C Rev. A Rev. A Rev. A	3A22439, 3A22443,	Rev. G Rev. A Rev. A Rev. C	
Cir				3A22321,	Rev. C	

and the "NOTES ON DRAWINGS" given on pp 1-34 and 1-35 of the application (01/17/83).

- (b) Contents
 - (1) Type and form of material

Am-241/Be neutron sources that meet the requirements of special form radioactive material.

- (2) Maximum quantity of material per package
 - 25 curtes

6. Venting of the source receptacie(s) in event of decomposition of the WEP shielding plug due to the accident conditions of transport, shall be provided for by drilling a 1/4-incb bole in the top surface of the screw cap(s). The hole shall be filled with plastic, rubber, or low temperature melt alloy to preclude entry of rain water during normal conditions of transport.

7. Name plates on the container must be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining their legibility.

8. In addition to the requirements of Subpart G of 10 CFR Part 71:

- (a) Each package shall be prepared for shipment and operated in accordance with the Operating Procedures in Section 7 of the application, as supplemented; and
- (b) Each package shall be acceptance tested and maintained in accordance with the Acceptance Tests and Maintenance Program of Section 8 of the application, as supplemented.

IRC FORM (18A	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
	. 9167 - Revision No. 4 - Docket No	. 71-9167
 The packaging auth general license pr 	orized by this certificate is hereb ovisions of 10 CFR §71.12.	y approved for use under the
10. Expiration date:	December 31, 1998.	
	REFERENCES	
Amersham Corporation ap	plication dated August 25, 1982.	
Amersham Corporation su September 19, 1991; and	pplements dated: January 17, 1983; February 17 and October 29, 1993.	March 1, 1988; August 1 and
	FOR THE U.S. NUCLEAR RE	72,
ů.	Cass R. Chapy	all
A d	Cass R. Chappell, Secti Cask Certification Sect	ion
[DEC 2 2 1993"	Storage and Transport S Division of Industrial Medical Nuclear Safet	and
ate:		
	S TOT THE S	S
	No	50°
	并并安长年	
	352	

	FOR		E OF COMPLIANCE E MATERIALS PACKAGES	• • • • • • •	TORY COMMISSI
GERTIFICATE NUMBER	b. REVIS	SION NUMBER	C PACKAGE IDENTIFICATION NUMB		e. TOTAL NUMBER PA
PREAMBLE a. This certificate is issued of Federal Regulations.	Part 71, "Packaging and Tra	and contents descri ansportation of Redia	ibed in Item 5 below, meets the application	able safety standards set for e U.S. Department of Trans	
THIS CERTIF TE IS ISSUED a ISSUED TO fame and Addre Chem-Nuclear S 220 Stoneridge Columbia, SC 2	≫ ystems, Inc. Drive	Cher	THE PACKAGE DESIGN OR APPLICAT ID IDENTIFICATION OF REPORT OR APP n-Nuclear Systems, In ed February 26, 1990, REG71-9168 NUMBER	nc. application	
CONDITIONS This certificate is condition	al upon fulfilling the requin	ements of 10 CFR P	art 71, as applicable, and the conditi	ons specified below.	
The high cyli cont stee the diam stee 20 e secc spac inch stai	rigtion packaging is a cask for radio nder with a 62- ain a lead thir l shell and 1- package are pro- eter wire wrap l jacket. The l plates. The qually spaced 2 ndary lid is se ed 2-inch diame	carbon stee bactive wast inch ID by tkness of 3. L/2-inch thi by ided with on 12-inch bottom welc primary lic 2-inch diame ealed with a eter boits screw and a d the space	el encased, lead shie te materials. The ca 75-inrb high cavity. 35 inches encased in ick outer steel shell a thermal barrier co centers and covered dment is made of two, d is sealed with a do eter bolts. The 29-i a double silicone 0-r The optional drain silicone 0-ring. Th between the double of ting.	ask is a right The walls of 0.75-inch thi I. The exposed misting of a with a 3/16-in 3-1/4-inch th buble silicone inch diameter c ring and twelve line is sealed he lid sealing	circular the cask ck inner sides of 5/32-inch ch thick ick carbon O-ring and entered equally with a 3/4 surfaces ar
poly othe limi with The	urethane foam r about the cas ters are 102 in the impact lin package is prov	impact limit sk with eigh nches in dia niters attac vided with f	k are provided with s ters. The impact lin nt 1-inch diameter ra ameter and the overal ched is 132 inches. four tie-down and two d with three lifting	niters are secu atchet binders. 11 height of th 5 removable lif	red to each The impac e package ting

E

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9168 - Revision No. 8 - Docket No. 71-9168

- (a) Packaging (Continued)
 - (3) Drawings

The packaging is constructed in accordance with Chem-Nuclear Systems, Inc. Drawing No. C-110-E-0007, Sheets 1, 2, and 3, Revision No. H.

- (b) Contents
 - (1) Type and form of material
 - (i) Byproduct material in the form of dewatered resins, solids, or solidified waste contained resing secondary containers; or
 - (ii) Radioactive material in the form of activated reactor components.
 - (2) Maximum quantit of material per package

Type B quantity of radioactive material, not to exceed 2,000 times a Type A quantity, 100 thermal watts, and 14,680 pounds including weight of the contents, secondary containers, and shoring the contents may include fissile materials provided the mass limits at 10 CFR § 1,53 are not exceeded

- 6. Except for close fitting contents, wondershoring that be placed between the secondary contenters, on accorded components, since the cask canity to prevent movement during accident conditions of the between the second second
- 7. The cask primary hid must be secure of the and the secondary lid by twelve, 2"-BUNC-2A x 4" ong hex of Secure of the second to 500 ft-lbs ± 50 ft-lbs (lubricated).
- 8. Prior to each shipment (except for the contents meeting the requirements for low specific activity material which is transported by exclusive use vehicle), the packaging must br leak tested in accordance with Section 8.2.2.2 of the application.
- 9. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - Each package must meet the acceptance tests and be maintained in accordance with the Acceptance Tests and Maintenance Program of Section 8.0 of the application, as supplemented February 22, 1994,
 - (ii) The seals must be replaced with new seals if inspection shows any defects or every 12 months, whichever occurs first. The tests ports and optional drain line must be appropriately plugged and sealed prior to transport, and
 - (iii) The package must be prepared for shipment and operated in accordance with the operating procedures of Section 7.0 of the application.

U.S. NUCLEAR REGULATORY COMMISSION NRC FORM E18A CONDITIONS (continued) 16.831 Page 3 - Certificate No. 9168 - Revision No. 8 - Docket No. 71-9168 10. (a) For any package containing water or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time: The hydrogen generated must be limited to a molar guantity that would (i) be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft³ at 14.7 psia and 70°F); or (ii) The secondary container and resk cavity must be inerted with a diluent to assure that experimentation inited to 5% by volume in those portions of the backage which could have hydrogen greater than 5%. For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the sake manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment t For any backage containing materials with radioactivity concentration not exceeding that for tow specific activity material, and sipped within 10 days of preparation, on within 10 whys a ters venting of grums or other secondary containers, the datermination (a), above new not be made, and the time restriction in covariant activity apply (b) v concentration not 11. The package authorized by this cert general license provisions at 1975 approved for use under the here e 30, 2000 12. Expiration date: REFERENCES Chem-Nuclear Systems, Inc., application dated February 26. 1990. Supplement dated: February 22, 1994. FOR THE U.S. NUCLEAR REGULATORY COMMISSION ass R. Chappell Cass R. Chappell, Section Leader Cask Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safequards Date: June 23, 1995

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RC FORM 618 9-651 0 CFR 71	CI		COMPLIANCE ERIALS PACKAGES	NUCLEAR REGULA	TORY COMMISS
& CERTIFICATE NUMBER		ON NUMBER C. PAC	KAGE IDENTIFICATION NUMBER	d PAGE NUMBER	e. TOTAL NUMBER PA
9176	10		USA/9176/A		
of Federal Regulations, Par	t 71, "Packaging and Tran	sportation of Madioactive N	em 5 below, meets the applicable taterial." ment of the regulations of the U gh or into which the package w	S. Department of Tran	
Pacific Nuclear Sy Brookside Office P One Harbison Way,	stems, Inc. ark Suite 209	NUPAC	ckage Design OF APPLICATION FICATION OF REPORT OF APPLIC application dated plemented.		, 1988,
columbia, SC 2921		C DOCKET NUMBER	71-9176 s applicable, and the conditions	specified below.	
This certificate is conditional 5.	upon running merequirer		0	and the second se	
	10			100 m	
(a) Packaging	12 0	5. · · · · ·	the second	See.	
 Model M (2) Descrip 	and LN 14	210L, NUPAC 14/ -195H	210H, CNSI 14-215	H-Series A,	LN 14-195L,
Steel e casks a cavity. 1.88 ir outer s plates cylindn seconda lid wit Neoprer stainle line wi casks a primary lid is	encased lead sh ire right circu The walls of iches encased i iteel shell. T with thickness ical cask body ary lid is cent th eight, 3/4-i the gasket seal. ess steel liner ith pipe plug, are provided with lid is provide	lar cylinders the casks cont n 0.38-inch the he top cover ar of 2.0 inches by eight, 1-1) ered in the princh studs and r The casks may (seal weight and an optional th four equally ed with three one lifting lug	or low specific ac with a 77.25-inch ain a lead thickn ock inner steel sh ad cask bottom are The primary cas 74-inch rachet bin imary lid and is s buts. Each lid is 74-inch drain lid 10ng all edges), 13/4-inch drain lid 9 spaced lifting/t 11fting lugs and t 9. The casks gros	10 by 80.25- ess ranging ell and 0.88 made up of k lid is sec ders. An op ecured to th provided wi an optional ine with pip ie-down devi he optional	from 1.25 to from 1.25 to inch thick two steel ured to the tional e primary th a 12 gauge lid vent e plug. The ces. The secondary
Mode1		D, Lead thes inche		Bottom Tk, inches	Gross WC, pounds
Number			4.0	4.0	

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NRC FORM STRA

CONDITIONS (continued)

Page 2 - Certificate No. 9176 - Revision No. 10 - Docket No. 71-9176

5. (a) (3) Drawing

Model Nos. NUPAC 14/210L and NUPAC 14/210H

The packages are fabricated in accordance with Nuclear Packaging, Inc., Drawing No. X-20-306-SNP, Sheets 1, 2 and 3, Rev. A.

The packages may include an optional removable shield insert fabricated in accordance with Pacific Nuclear Drawing Nos. PS-121892-1 and PS-121892 submitted on December 21, 1992.

Model No. CNSI 14-215H Series AR FC

The package is fabricated in accordance with Chem-Nuclear Systems, Inc., Drawing Nos. 24500-08, Sheets 1 and 2, Rev. D., and 24500-5, Rev. 2.

The package may include an optional removable shield insert fabricated in accordance with Chem-Nuclear Systems, Inc., Drawing No. C-119-B-0017, Rev. 2.

Model Nos. IN 14-1951 and LN 14-195H

The packages are fabricated in accordance with LN Technologies Corporation Drawing No. 5025-M-2005, Sheets 1 and 2, Rev. 0.

(b) Contents

6.

(1) Type and form of material

- Dewatered, solid, or solidified waste, meeting the requirements for low specific activity material, in secondary containers; or
- (ii) Activated solid components meeting the requirements for low specific activity material, in secondary containers
- (2) Maximum quantity of material per package

Greater than Type A quantity of radioactive material which may contain fissile material provided the fissile material does not exceed the limits in 10 CFR §71.53. The decay heat load is limited to 9 watts.

- (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft³ at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

U.S. NUCLEAR REGULATORY COMMISSION NAC FORM STRA CONDITIONS (continued) (6-83) Page 3 - Certificate No. 9176 - Revision No. 10 - Docket No. 71-9176 (a)(continued) For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time. For any package shipped within 10 days of preparation, or within 10 days (b) after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply. Maximum gross weight of the contents, secondary containers, shoring, and optional 7. shield insert is limited to 20,000 pounds. Except for close fitting contents, shoring must be placed between secondary 8. containers and the cask cavity to minimize movement during normal conditions of transport. The lid and the shield plug lifting lugs must not be used for lifting the cask, and 9. must be covered in transit, The cask must be provided with either (or both) a drain line or a lid vent line as 10. shown in the drawing in order to provide a method to leak test the package. In addition to the requirements of Subpart G of 10 CFR Part 71: 11. Prior to each shipment, the packaging Neoprene Tid seals if opened (or if (a) security seal is broken; must be anspected. The seals must be replaced with new seals if inspection shows any defects or every twelve (12) months, which ever occur first. Cavity drain and vent fines must be sealed with appropriate sealant applied to the pipe plug threads. Each packaging must meet the Acceptance Tests and Maintenance Program of: (b) Model Nos. NUPAC 14/210L and NUPAC 14/210H Section 8.0 of the application. Model No. CNSI 14-215H Series A Chem-Nuclear Systems, Inc., Document No. CNSI 9176-S1, Rev. 1, Section 4.0. Model Nos. LN 14-195L and LN 14-195H LN Technologies Corporation Procedures WM-036, Rev. A; WM-026, Rev. B; and WM-013, Rev. F. The package shall be prepared for shipment and operated in accordance with (c) the Operating Procedures of: Model Nos. NUPAC 14/210L and NUPAC 14/210H Section 7.0 of the application.

U.S. NUCLEAR REGULATORY COMMISSION HRC FORM #18A COMDITIONS (continued) (6-85) Page 4 - Certificate No. 9176 - Revision No. 10 - Docket No. 71-9176 11. (c)(Continued) Model No. CNSI 14-215H Series A Chem-Nuclear Systems, Inc., Document No. CNSI 9176-S1, Rev. 1, Section 3.0. Model Nos. LN 14-195L and LN 14-195H LN Technologies Corporation Procedures WM-025, Rev. C. The ratchet binders on the cask lid must be torgued to 100±10 ft-1b. 12. The cask body and each cask lid must be marked in accordance with 10 CFR §71.85(c). 13. The packages authorized by this certificate must be trapsported on a motor vehicle, 14. railroad car, aircraft, inland watercraft, or hold or depk of a seagoing vessel assigned for the sole use of the licensee. 15. The packages authonized by this certificate are hereby approved for use under the general license provisions of 10 CFR §71.12. Expiration date: May 31, 1998. 16. REFERENCES Nuclear Packaging, Inc., application dated February 29, 1988 Supplements dated: April 19, 1988; and March 1. 1993. Pacific Nuclear supplements dated: October 23 and December 2 and 21, 1992. Chem-Nuclear Systems, Inc., supplements dated: February 19 and April 21, 1988; and January 18, and April 29, 1993. NUS supplement dated: November 22, 1985. LN Technologies Corporation supplement dated: February 16, 1988. Scientific Ecology Group, Inc., stallement dated: April 30, 1993. FOR THE U.S. NUCLEAR REGULATORY COMMISSION Charles E. MacDonald, Chief Transportation Branch Division of Industrial and Medical Nuclear Safety, NMSS MAY 2 0 1993 ate:

C FORM 618 (65) CFR 71		CERTIFICA FOR RADIOACT	TE OF COMPLIANCE	UCLEAR REGULAT	
& CERTIFICATE NU	MBER	6 REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	8. TOTAL NUMBER PAG
9177		6	USA/9177/A		
of Federal Re	gulations, Part 71	"Packaging and Transportation of A	scribed in Item 5 below, meets the applicable s adioactive Material." any requirement of the regulations of the U.S buntry through or into which the package will	Department of Trans	
THIS CERTIFICATE		BASIS OF A SAFETY ANALYSIS REPOR	T OF THE PACKAGE DESIGN OR APPLICATION E AND IDENTIFICATION OF REPORT OR APPLICA	TION	
Brookside One Harbis	office Pa office Pa on Way, S SC 29212	uite 209 CAP	NUPAC application dated as supplemented.	February 29	, 1988,
CONDITIONS This certificate is	s conditional upor	fulfilling the requirements of 10 CF	R Part 71, as applicable, and the conditions s	pecified below.	
		leads -	0.		
(a) Danku		CA ST	22		
(a) Packa	iging	19 . Car	1250 4	rates.	
(1)	Model No.	s.: NUPAC 10/140 and	LN 10-135A	et a	
			TY (dis)	a di seconda	
(2)	Descript	ion	Knuch) 123	hant	
	casks aw cavity. encased shell. in thick cylindri secondar lid with Neoprene stainles line wit casks ar primary	e right circular cyl The walks i, the ca in 0.50 Inch thick in The top cover and ca ness from 2.0 to 3.0 cal cask body by eig y lid is centered in eight, 3/4-inch stur gasket seal. The ca s steel liner (seal) h pipe plug, and en e provided with four lid is provided with	casks for low specific ac inders with a 66.0-inch I sks contain a lead thickn mmer steel shell and 1.13 sk bottom are made up of inches. The primary cas ht, 1-1/4-inch rachet bin the primary lid and is s ds and nuts. Each Hid is asks may be provided with welded along all edges), optional 3/4-inch drain 1 equally spaced lifting/t three lifting lugs and t ting lug. Each cask has	D by 73.0-in ess of 2.75 inch thick two steel pl k lid is sec ders. An op ecured to the provided wi an optional ine and pipe ie-down devi he optional	ch IH inches outer steel ates ranging ured to the tional e primary th a 12-gauge lid vent plug. The ces. The secondary

ALEVELS.

NRC FORM 618A (6-83)

U.S. NUCLEAR REGULATORY COMMISSION

CONDITIONS (continued)

Page 2 - Certificate No. 9177 - Revision No. 6 - Docket No. 71-9177

5. (a)(3) Drawings

Model No. NUPAC 10/140

The package is fabricated in accordance with Nuclear Packaging, Inc., Drawing No. X-20-308-SNP, Sheets 1, 2, and 3, Rev. A.

Model No. LN 10-135A

The package is fabricated in accordance with LN Technologies Corporation Drawing No. 5025-M-2005: Sheets 1 and 2, Rev. 0. EAR REGULAS

(b) Contents

- (1) Type and form of material
 - (i) Dewatered, solid, or solidified waste, meeting the requirements for low specific activity material, in secondary containers; or
 - (ii) Activated solid components meeting the requirements for low specific activity material, in secondary containers.
- (2) Maximum quantity of material per package

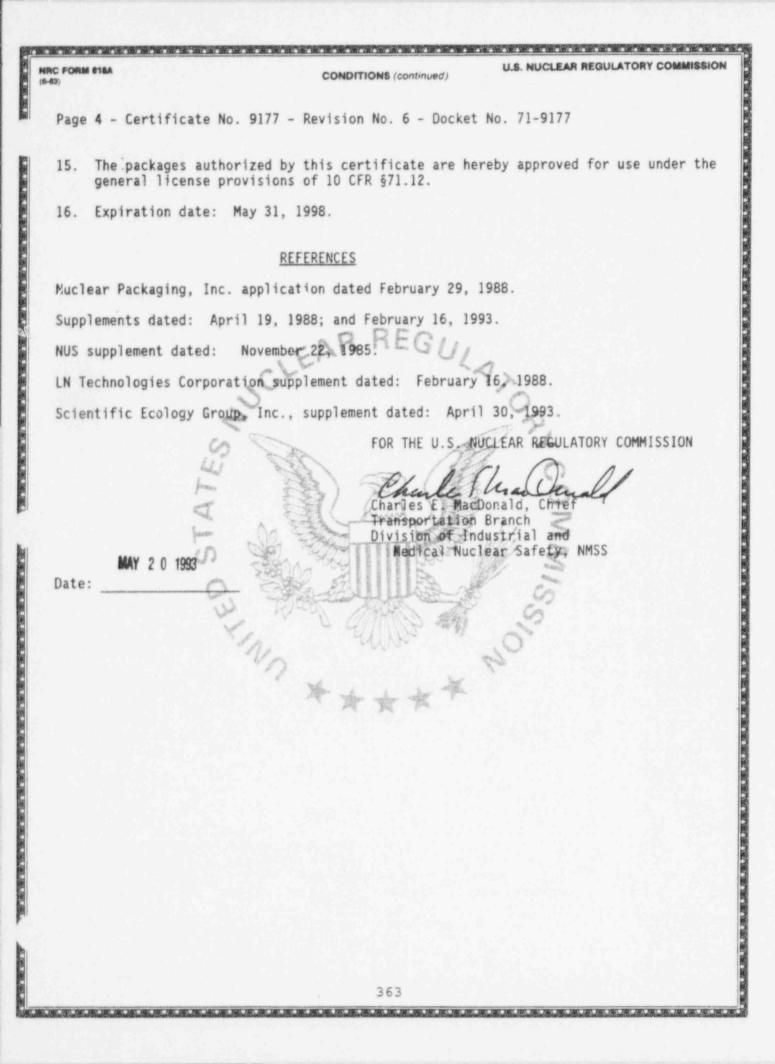
Greater than Type A quantity of radioactive material which may contain in fissile material provided the fissile material does not exceed the limits in 10 CFR §71.53. The decay heat load is Timited to 24 walts.

- For any package containing water and/or organic substances which could 6. (a) radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft³ at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

For any package shipped within 10 days of preparation, or within 10 days (b) after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

RC FORM	618A	CONDITIONS (continued)
Page	3 -	Certificate No. 9177 - Revision No. 6 - Docket No. 71-9177
		mum gross weight of the contents, secondary containers, and shoring is limited 5,000 pounds.
8.	cont	pt for close fitting contents, shoring must be placed between secondary ainers and the cask cavity to minimize movement during normal conditions of sport.
		lid and the shield plug lifting lugs must not be used for lifting the cask, and be covered in transit.
10.	The show	cask must be provided with either (or both) a drain line or a lid vent line as m in the drawing in order to provide a method to leak test the package.
11.	In a	ddition to the requirements of Subpart G of 10 CFR Part 71:
	(a)	Prior to each shipment, the packaging Neoprene lid seals if opened (or if security seal is broken), must be inspected. The seals must be replaced with new seals if inspection shows any defects or every twelve (12) months, which ever occurs first. Cavity drain and vent lines must be sealed with appropriate sealast applied to the pipe plug threads.
	(b)	Each packaging must meet the Acceptance Tests and Maintenance Program of:
		Model No. NUPAC 10/240
		Section 8.0 of the application.
		Model No. 1N 10-1358
		LN Technologies Corporation Procedures WM-036, Rev. A; WM-026, Rev. B; and WM-013, Rev. F.
	(c)	The package shall be prepared for shipment and operated in accordance with the Operating Procedures of:
		Model No. NUPAC 10/140
		Section 7.0 of the application.
		Model No. LN 10-135A
		LN Technologies Corporation Procedures WM-025, Rev. C.
12.	The	ratchet binders on the cask lid must be torqued to 100±10 ft-1b.
13.	The	cask body and each cask lid must be marked in accordance with 10 CFR §71.85(c).
14.	rail	packages authorized by this certificate must be transported on a motor vehicle, road car, aircraft, inland watercraft, or hold or deck of a seagoing vessel igned for the sole use of the licensee.
		362



CFR 71		and the second	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAG
A CERTIFICATE NU	MBER	5 REVISION NUMBER		1	
9178	en alle and with the second	6	USA/9178/A		A
of Federal Re	igulations, Part 71, "Packag	ing and Transportation of Rac	bribed in Item 5 below, meets the applicable sa bloactive Material." Iny requirement of the regulations of the U.S. Intry through or into which the package will i	Department of Trans	
Brookside One Harbis	w wnd Addmess) Iclear Systems, Office Park on Way, Suite 2	Inc.	NUPAC application dated as supplemented.		, 1988,
Columbia,		- (° 1	T NUMBER 71-9178		
CONDITIONS This certificate i	s conditional upon fulfilling	the requirements of 10 CFR	Part 71, as applicable, and the conditions sp	becified below.	
	C	2	0		
(a) Packa	ging 6	4	022		
	herbed	41 has 901 T 200	17.100 /202	15	
(1)	Model Nois : NU	PAC 7/100 and LN		7	
(2)	Description	111		0	
	cavity. The w encased in 0.3 shell. The to in thickness f cylindrical ca secondary lid lid with eight Neoprene gaske stainless stee line with pipe casks are prov primary lid is	alls of the cask 8-inch thick inn p cover and cask rom 2.0 to 3.5 i sk body by eight is centered in t , 374-inch studs t seal. The cas 1 liner (seal we plug, and an op ided with four e provided with t	ders with a 75.5-inch ID s contain a lead thickne er steel shell and 0.88- bottom are made up of t nches. The primary cask , 1-1/4-inch rachet bind he primary lid and is se and nuts. Each lid is ks may be provided with lded along all edges), a tional 3/4-inch drain li qually spaced lifting/ti hree lifting lugs and th ng lug. Each cask has a	ss of 3.00 inch thick wo steel pl lid is sec ers. An op cured to the provided with an optional n optional ne and pipe e-down device e optional	inches outer steel ates ranging ured to the tional e primary th a 12-gauge lid vent plug. The ces. The secondary

HRC FORM CISA (6-83)

6.

CONDITIONS (continued)

Page 2 - Certificate No. 9178 - Revision No. 6 - Docket No. 71-9178

5. (b) Drawings

Model No. NUPAC 7/100

The package is fabricated in accordance with Nuclear Packaging, Inc., Drawing No. X-20-309-SNP, Sheets 1, 2, and 3, Revision No. A.

Model No. LN 7-100

The package is fabricated in accordance with LN Technologies Corporation AR REGULAS Drawing No. 5025-M-2005, Sheets 1 and 2, Revision No. 0.

Contents (c)

- (1) Type and form of material
 - Dewatered, solid, or solidified wastes, meeting the requirements (i)For low specific activity material, in secondary containers; or
 - Activated solid components meeting the requirements for low (ii)specific activity material, in secondary containers.
- (2) Maximum quantity of materia) per package

Greater than Type A quantity of radioactive material which may contain fissile material provided the fissile material does not exceed the limits of 10 CFR §71.53. The decay heat load is limited to 17 watts.

- For any package containing water and/or organic substances which could (a) radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft³ at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen is limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

U.S. NUCLEAR REGULATORY COMMISSION

NRC FORM 618A

CONDITIONS (continued)

Page 3 - Certificate No. 9178 - Revision No. 6 - Docket No. 71-9178

- (b) For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
- Maximum gross weight of the contents, secondary containers, and shoring is limited to 13,000 pounds.
- Except for close fitting contents, shoring must be placed between secondary containers and the cask cavity to minimize movement during normal conditions of transport.
- The lid and the shield plug tifting lugs must not be used for lifting the cask, and must be covered in transit.
- 10. The cask must be provided with either (or both) a drain time or a lid vent line as shown in the drawing in order to provide a method to leak test the package.
- 11. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) Prior to each shipment, the packaging Neoprene lid seals if opened (or if security seal is broken), must be inspected. The seals must be replaced with new seals if inspection shows any defects or every twelve (12) months, which ever occurs first. Cavity drain and vent lines must be sealed with appropriate sealant applied to the pipe plug threads.
 - (b) Each packaging must meet the Acceptance Tests and Maintenance Program of:

Model No. NUPAC 7/100

Section 8.0 of the application.

Model No. LN 7-100

LN Technologies Corporation Procedures WM-036, Rev. A; WM-026, Rev. B; and WM-013, Rev. F.

(c) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of:

Model No. NUPAC 7/100

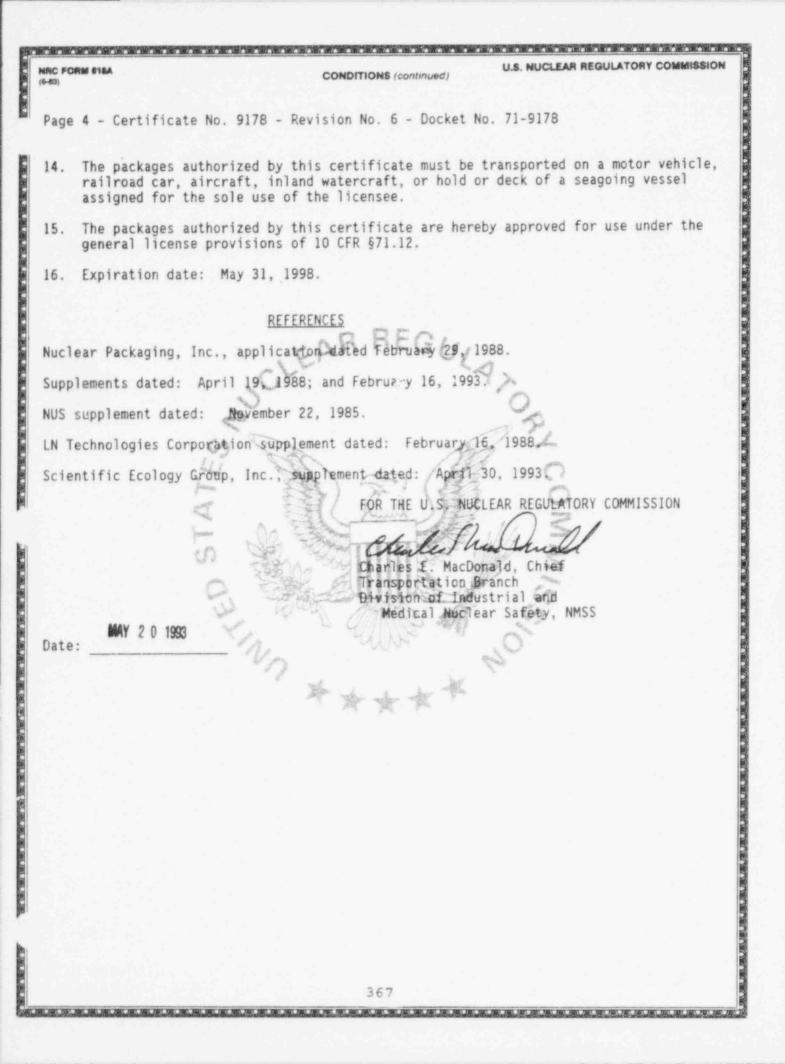
Section 7.0 of the application.

Model No. LN 7-100

LN Technologies Corporation Procedures WM-025, Rev. C.

12. The ratchet binders on the cask lid must be torqued to 100±10 ft-lbs.

.3. The cask body and each cask lid must be marked in accordance with 10 CFR §71.85(c).



AGI OFR 71	618		CERTIFICA FOR RADIOAC	ATE OF CON	IPLIANCE LS PACKAGES	NUCLEAR REGUL	
A. CERTIFIC	ATE NUMBER	named Judge Calif. In conception, in a second second	D. REVISION NUMBER		DENTIFICATION NUMBE	R d. PAGE NUMBE	R . TOTAL NUMBER P
9	179		6	US	A/9179/A		1
of Fed	ertificate is iss deral Regulatio	ns, Part 71, "Packaj	e packaging and contents of ging and Transportation of signor from compliance wit ng the government of any of	hadioactive Material	the regulations of the	U.S. Department of Tra	
THIS CERT	TIFICATE IS ISSI	JED ON THE BASIS C	F A SAFETY ANALYSIS REPO	RT OF THE PACKAGE	DESIGN OF APPLICATION OF REPORT OR APPL	N ICATION:	
Brooks One Ha	ide Offi	lay, Suite		as supple		ed February 2	9, 1988,
CONDITIC This cert	ONS Ificate is condi	tional upon futfillin	, the requirements of 10 C	FR Part 71, as applic	able, and the conditio	ns specified below.	
		100	2		0		
(a) P	Packaging	63	Str.		the "	Se	
	 Mod (2) Det 	del Nas.: N scription	UPAC 6/100L, NU	IPAC 6/100H,	LN 5-80L, a	nd LN 6-80H	
	ca ca 3. pli se op pr Ne sti ca li	sks and rig vity. The 56 inches e ter steel s ates rangin cured to th tional seco imary lid w oprene gask ainless ste ne with pip sks are pro imary lid i d is provid	lead shielded ht circular cyl walls of the ca ncased in 0 50- hell. The top g in thickness e cylindrical c mdary lid is ce ith eight, 3/4- et seal. The c el liner (seal e plug, and an vided with four s provided with 900 pounds.	inders with isks contain inch thick cover and c from 2.0 to task body by intered in t inch studs tasks may be welded alon optional 3/ requally sp three lift	a 61.0-inch a lead thic inner steel ask bottom a 3.0 inches. eight, 1-1/ he primary 1 and nuts. E provided wi g all edges) 4-inch drain aced lifting ing lugs and	ID by 62.0-i kness ranging shell and 1.1 re made up of The primary 4-inch rachet id and is sec ach lid is pr th an optional line and pip /tie-down dev the optional	nch IH from 2.43 t 3-inch thick two steel cask lid is binders. A ured to the ovided with 1 12-gauge lid vent e plug. The ices. The secondary
	Model Number		OD, inches	Lead Tk, 	Top Tk, <u>inches</u>	Bottom Tk, <u>inches</u>	Gross Wt, pounds
		LN 6-80L LN 6-80H	69.11 71.37	2.43 3.56	4.56.0	4.5	42,900 53,900

368

-0

NRC FORM 618A (6-83)

CONDITIONS (continued)

Page 2 - Certificate No. 9179 - Revision No. 6 - Docket No. 71-9179

5. (a) (3) Drawings

Model Nos. NUPAC 6/100L and NUPAC 6/100H

The packages are fabricated in accordance with Nuclear Packaging, Inc., Drawing No. X-20-310-SNP, Sheets 1 and 2, Revision No. A.

Model Nos. LN 6-80L and LN 6-80H

The packages are fabricated in accordance with LN Technologies Corporation Drawing No. 5025-M-2005, Sheets 1 and 2, Revision No. 0. EAR REGULAS

(b) Contents

- (1)Type and form of materia
 - (i) Dewatered, solid, or solidified wastes, meeting the requirements for low specific activity material, in secondary containers; or
 - (ii) Activated solid components meeting the requirements for low specific activity material, in secondary containers.
- Maximum quantity of material per package (2)

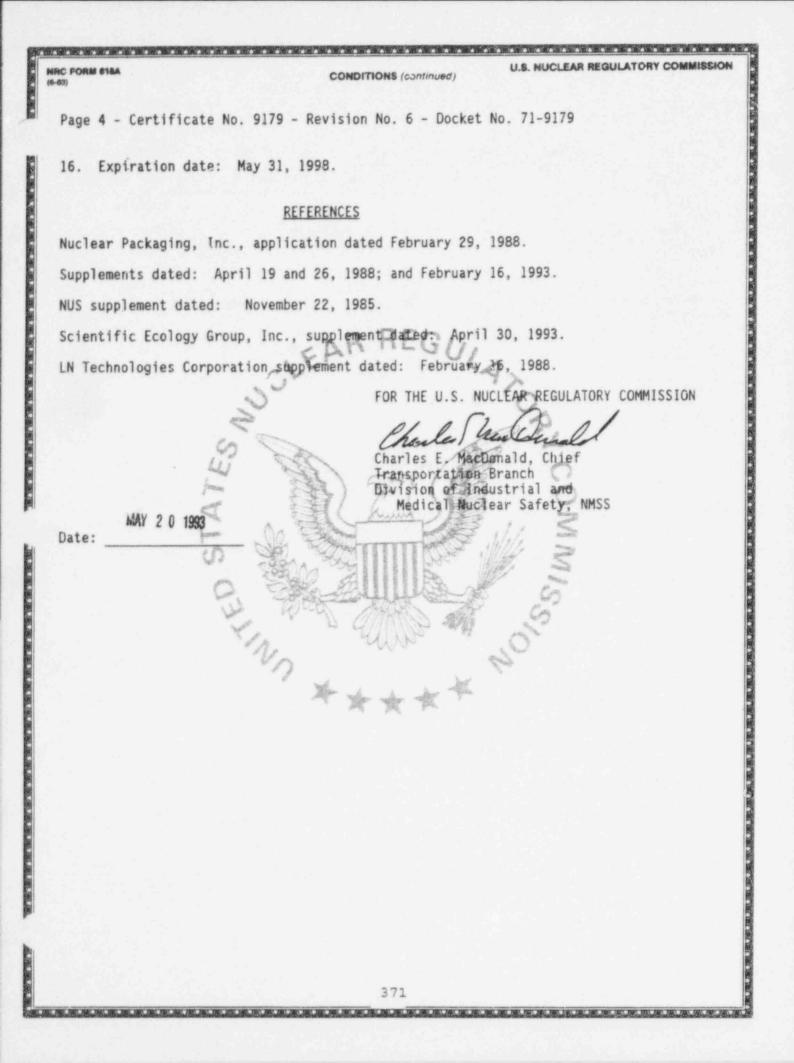
Greater than Type A quantity of radioactive material which may contain fissile material provided the fissile material does not exceed the limits of 10 CFR \$71.53. The decay heat load is limited to 9 watts for the Model Nos. NUPAC 5/1001 and UN 5-801 casks and 61 watts for the Model Nos. NUPAC 6/100H and LN 6-80H casks.

- 6. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft³ at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen is limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

(b) For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

6-63)	618A CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
Page	3 - Certificate No. 9179 - Revision No. 6 - Docket No. 71-9179
7.	Maximum gross weight of the contents, secondary containers, and shoring is limited to 15,000 pounds.
8.	Except for close fitting contents, shoring must be placed between secondary containers and the cask cavity to minimize movement during normal conditions of transport.
9.	The lid and the shield plug lifting lugs must not be used for lifting the cask, and must be covered in transit.
10.	The cask must be provided with either (or both) a drain line or a lid vent line as shown in the drawing in order to provide a method to leak test the package.
11.	In addition to the requimements of Subpart G of 10 EFR Part 71:
	(a) Prior to each shipment, the packaging Neoprene lid seals if opened (or if security seal is broken), must be inspected. The seals must be replaced with new seals if inspection shows any defects or every twelve (12) months, which ever occurs first. Cavity drain and vent lines must be sealed with appropriate sealant applied to the pipe plug threads.
	(b) Each packaging must meet the Acceptance Tests and Maintenance Program of:
	Model Nos. NUPAC 6/100L and NUPAC 6/100H
	Section 8.0 of the application.
	Model Nos IN 6-80 and 6-80H
	LN Technologies Corporation Procedures WM-036, Rev. A; WM-026, Rev. B; and WM-013, Rev. F.
	(c) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of:
	Model Nos. NUPAC 6/100 and NUPAC 6/100H
	Section 7.0 of the application.
	Model Nos. LN G-80L and LN 6-80H
	LN Technologies Corporation Procedures WM-025, Rev. C.
12.	The ratchet binders on the cask lid must be torqued to 100 \pm 10 ft-lbs.
13.	The cask body and each cask lid must be marked in accordance with 10 CFR §71.85(c)
14.	The packages authorized by this certificate must be transported on a motor vehicle, railroad car, aircraft, inland watercraft, or hold or deck of a seagoing vessel assigned for the sole use of the licensee.
15.	The packages authorized by this certificate are hereby approved for use under the general license provisions of 10 CFR §71.12.



of Federal Regulations, Part 71, "Packaging and Transportat b. This certificate does not relieve the consignor from complia applicable regulatory agencies, including the government of a THIS CERTIFICATE IS ISBUED ON THE BASIS OF A SAFETY AMALYSE a ISBUED TO (Nerre and Address) uclear Packaging, Inc. 010 South 336th Street ederal Way, WA 98003 * CONDITIONS This certificate is conditional upon fulfilling the requirements of 5. (a) Packaging (1) Model No.: PAS-2 and PA (2) Description A post accident liquid outer overpack, inner of containment vessel (Moo The outer overpack is 3 of low castoon steel and between the shells is 1 three pounds per cubic of Transportation Speci rethane foam cat to fit vessel. The optional s carbon or stainless steel Viton 0-ring and eight, is equipped with a test filled steel weldment (shielded wall penetrat: 0-rings). The 3-3/4" I valved sample vial surv The vial, which serves	USA/9181/B(U) 1 2 Contents described in Item 5 below, meets the applicable safety standards set forth in Title 10, Cod ortation of Radioactive Material." Ipliance with any requirement of the regulations of the U.S. Department of Transportation or other and of any country through or into which the package will be transported. LYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION: Nuclear Packaging, Inc. application dated dated March 31, 1983, as supplemented.
of Federal Regulations, Part 71. "Packaging and Transportat b. This certificate does not relieve the consignor from complian applicable regulatory agencies, including the government of a. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSE a. ISSUED TO (Name and Address) Access of the second the second	Inpliance with any requirement of the regulations of the U.S. Department of Transportation or othe ant of any country through or into which the package will be transported.
 a issued to (Neume and Address) iciear Packaging, Inc. ideral Way, WA 98003 CONDITIONS This certificate is conditional upon fulfilling the requirements of 5. (a) Packaging Model No.: PAS-2 and PA Description A post accident liquid outer overpack, inner of containment vessel (Mod The outer overpack is 3 of low carbon steel and between the shells is f three pounds per cubic of Transportation Spect rethane foam cat to fit vessel. The optional scarbon or stainless steel Viton 0-ring and eight, is equipped with a test filled steel weldment (shielded wall penetration 0-rings). The 3-3/4" Valved sample vial surr The vial, which serves 	Nuclear Packaging, Inc. application dated dated March 31, 1983, as supplemented.
This certificate is conditional upon fulfilling the requirements of 5. (a) Packaging (1) Model No.: PAS-2 and PA (2) Description A post accident liquid outer overpack, inner of containment vessel (Mod The outer overpack is 3 of low carbon steel and between the shells is f three pounds per cubic of Transportation Spect rethane foam cut to fit vessel. The optional scarbon or stainless ste Viton 0-ring and eight, is equipped with a test filled steel weldment (shielded wall penetrat 0-rings). The 3-3/4" I valved sample vial surr The vial, which serves	the open that 21 as applicable and the conditions specified below
 Model No.: PAS-2 and PA Description A post accident liquid outer overpack, inner of containment vessel (Mod The outer overpack is 3 of low carbon steel and between the shells is f three pounds per cubic of Transportation Spect rethane foam cut to fit vessel. The optional carbon or stainless ste Viton 0-ring and eight, is equipped with a test filled steel weldment of shielded wall penetration 0-rings). The 3-3/4" in valved sample vial survice 	ats of 10 CFR Part 71, as appricable, and the constituties specified before
	PAS-2A id sampling container, the packaging consists of an r overpack, containment vessel or optional secondary Model No. PAS-2A), sample shield, and a sample vial. s 32" 00 x 48" high constructed with an outer shell and an inner shell of fiberglass. The annulus s filled with foam having a density of approximately ic foot. The inner overpack consists of a Department ecification 17H steel drum lined with rigid poly- fit the outside dimensions of the primary containment l secondary containment vessel is fabricated from steel (17.7" 00 x 24-3/4" high) provided with a ht, 5/16" cap screws. The primary containment vessel est port. The sample shield consists of a lead t (16.5" 0D x 22.75" high) provided with four ations and a shielded lid (all gasketed with Viton " ID x 8-1/4" high sample shield cavity contains a urrounded by absorbent vermiculite and lead shot. es as the secondary containment vessel, may contain of liquid (reactor coolant water sample). The gross e is approximately 2,400 pounds.

U.S. NUCLEAR REGULATORY COMMISSION

"ge 2 - Certificate No. 9181 - Revision No. 5 - Docket No. 71-9181

5. (b) Contents

NRC FORM 6184

(8-83)

(1) Type and form of material

Radioactive material in the form of liquid coolant sample obtained from a reactor coolant system.

(2) Maximum quantity of material per package

50 milliliters with a thermal mapload not to exceed 3.0 watts.

- 6. In addition to the requirements of Subpart 6 of 10 LFX Part 71, each package prior to first use must meet the acceptance tests and criteric specified in Section 8.1, must be maintained in accordance with Section 8.2, and prepared for shipment in accordance with Section 7.0 of the application. The sample chield and sample vial must be annually love tested to the requirements of LT-12 (Appendix 8.3.2).
- 7. The statement of the explanation NUPAC's test, Assembly Helium Shiffer Test for the NUPAC PAS-2 Packaging (5.5, of 16, Rev. 2, March 9, there must be replaced by the following acceptance criteria. For each assembly the make an acceptably low leakage rate, the detection encompany the capable of detecting a leak of 10⁻⁴ scc/sec or smaller. Anothered feakage rate of acceptance criteria prior to first use the of acceptable.

Prior to first use of each parton in losk and spectful as Notes 8 and 14 on Drawing No. X 20 22050 Bev, Compas of performed as required.

9. The package authonized by this certificate is Horeby sproved for use under the general license provisions provisions of the second s

10. Expiration date: August 31, 1995

Nuclear Packaging, Inc. application dated March 31, 1983.

Supplements dated: September 9, 1983; February 17, March 9, and December 19, 1984; April 9, 1985; June 2, 1986; February 11, 1987; February 27, and October 27, 1989; and May 31, 1990.

REFERENCES

FOR THE U.S. NUCLEAR REGURLATORY COMMISSION

Charles E. MacDonald, Chief Transportation Certification Branch Division of Fuel Cycle and Material Safety, NMSS

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AUG 1 4 1990

RC FORM 618 H85)) CFR 71			CERTIFICA FOR RADIOACT	TE OF COMPLIANC	E	ICLEAR REGULA	TORY COMMISSI
& CERTIFICATE NU	MBER	Longer	5. REVISION NUMBER	C PACKAGE IDENTIFICATIO	NUMBER	C PAGE NUMBER	. TOTAL NUMBER PAG
9183		T	11	USA/9183/B()F	1	4
of Federal R	egulations	Part 71, "Packaging	and Transportation of R	scribed in Item 5 below, meets the adioactive Material." any requirement of the regulatio untry through or into which the	ns of the U.S.	Department of Trans	
Nucles 655 Ei Suite	ar Ass nginee	urance Corp ring Drive	b. TITLE	Nuclear Assurance dated May 26, 1989 REG 61/918	Corpora), as su	tion applic	ation
CONDITIONS	is conditio	nal upon fulfilingsth	requirements of 10 CFI	Pari 71, as applicable, and the		ecified below.	
				and a subject of the local data and the subject of	0		
·		1					
(a)	Packa	ging	A	and a	1 1	R.	
(-/	(1)	Model No .:	NATE-	D CB	C	2	
	(2)	Descriptio		Anna)	9	0	
		circular C limiters. inches in 49,000 pou in diamete thickness steel shew at the bot	the overall a the overall a diameter the odd overall a the overall of the outer of a are welded tom. The annu	buen and tower sta increasing are 214 increasing are 214 increa	inches the case the c	med balsa in in length an is approxim ng and 13.5 5/16 inch, e two stain ss steel sh outer shel	mpact nd 50 mately inches and the less ield disc ls is
		lid is sec 1-1/4-inch polytetraf either sid Other cask shield dis rupture di flange. F	ured to the ca diameter bolt luoroethylene e of the upper features incl c, vent valve, sc - pressure	is a frustum of a avity flange by six s. The seal is pr O-rings. Four tru or lower impact ude two drain valu head closure gas relief valve syste the cask may be en container.	c, ASTM- rovided innions, imiter, ves loca ket leak em locat	A320, Grade by two two located are provide ted in the l check valve ed in the ca	L43, d on ed. bottom e, and avity
	(3)	Drawings					
				oping cask is const Inc., Drawing No. I			
				1.1.2.1			
				374			

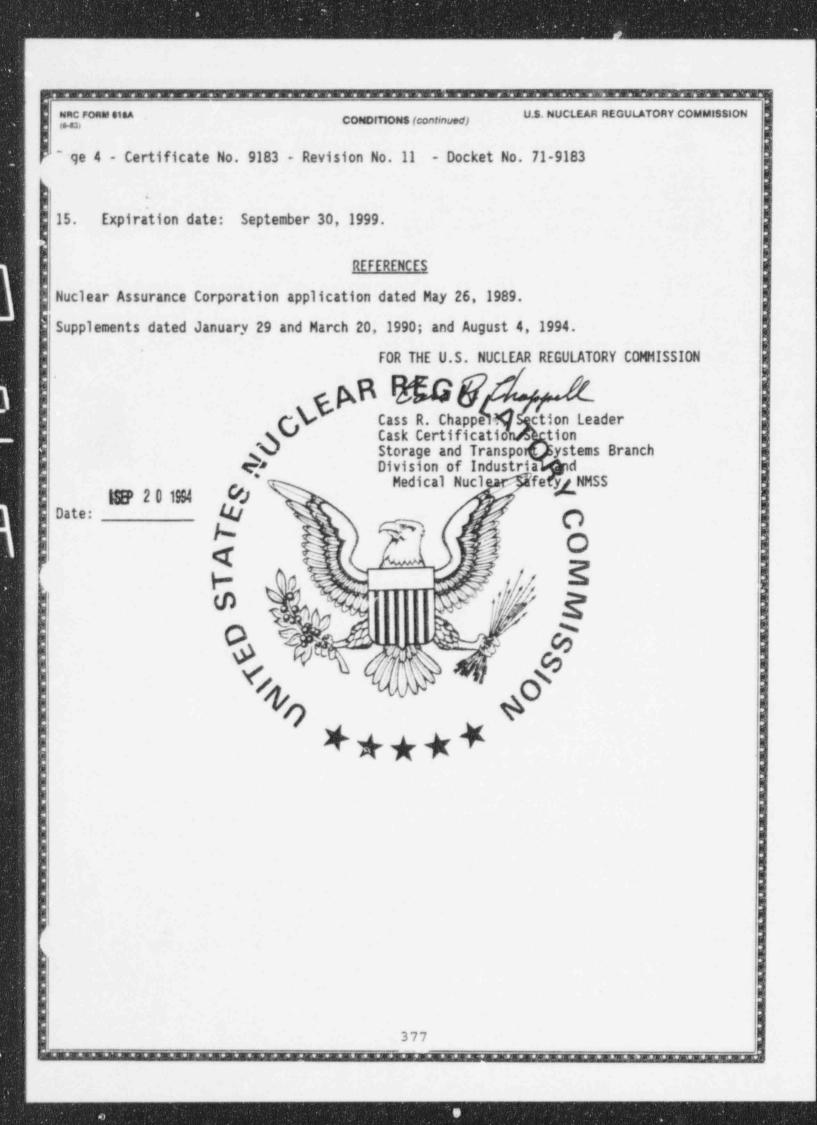
U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 518A CONDITIONS (continued) 16-831 ge 2 - Certificate No. 9183 - Revision No. 11 - Docket No. 71-9183 5. (b) Contents Type and form of material (1)Clad, irradiated, metallic natural uranium fuel rods. (1) (ii) Solid, non-fissile, irradiated hardware. Maximum quantity of material per package (2) The cavity content must not exceed a thermal decay heat load of 750 watts and a weight of 3 700 105 G including weight of component spacers (or fuel basket) used in the cask cavity to limit movement of contents during shipment. Fuel rods are additionally limited as follows intact rods or 6 encapsulated (defective) rods. Each (i)) intact rods or 6 encapsulated (defective) rods. Each defective rod will be encapsulated in either a 2.75-inch I.D. Jailed fuel rod can, as shown enclose lear Assurance Corporation Orawing to 340-108-D2, Rev 9 for a 4.00-inch I.D. failed fuel rod can, as shown on Nuclear fusion corporation Drawing No. 340-108-01, Nev. 9. Defective rods encapsulated in the 2.75-inch I.D. failed fuel cod can be for the shipped in a six rod capacity there is shown on the feat for the shipped in a six rod Drawing No. 490-001, Berry at and defective rods encapsulated in the 4.00-form I.D. failed fuel for fuel for cans the shipped in a three field range for fuel for fuel for cans the shipped in a on in the 4.00-fock he shown on Nuclear Assurance d. 1211-219, Rev. 600 MWD/MTU average burch-up (ii)(iii) Minimum 365-day cooling time after irrediation. Fissi'e Class I (c) ときためときときとなどなどの 6. The cask cavity must be dry (no free water) when delivered to a carrier for transport. 7. As needed, appropriate component spacers (fuel basket and axial spacers for shipment of fuel rods) must be used in the cask cavity to limit movement of contents during accident conditions of transport. 8. The cask may be shipped in a closed shipping container provided that the closed container, the cask tie-down and support system, and the transport vehicle (trailer) meet the applicable requirements of the Department of Transportation. Tie-down devices which are a structural part of the package must comply with 10 CFR §71.45.

 NMC FORM STA (SEE) INDICIDENT (continued) U.S. NUCLEAR REGULATORY COMMISSION (SEE) Indicate No. 9183 - Revision No. 11 - Docket No. 71-9183 When the cask is shipped in a closed shipping container, the center of gravity of the combined cask, closed shipping container, and trailer must not exceed 75 inches. Men the cask is shipped in a closed shipping container, the internal heat load must not exceed 750 watts. In lieu of the requirements of 10 CFR §71.87(e), the licensee must perform periodic maintenance and testing of 0-rings, drain and vent ball valves, relief valves, and rupture discs of the cask as indicated in the table group below. During inactive periods, the maintenance and testing frequency may be disregarded provided that the package is buy the table of the package. Cask Component Ball Valve Ball Valve Cavity Relief Tave Cavity Rupture Disc Neutron Shield Tave Impact limiters There must be no visual (presure reary in factions of pressure drop for the 	NAC SECR			
 When the cask is shipped in a closed shipping container, the center of gravity of the combined cask, closed shipping container, and trailer must not exceed 75 inches. When the cask is shipped in a closed shipping container, the internal heat load must not exceed 750 watts. In lieu of the requirements of 10 CFR §71.87(e), the licensee must perform periodic maintenance and testing of 0-rings, drain and vent ball valves, relief valves, and rupture discs of the cask as indicated in the table given below. During inactive periods, the maintenance and testing frequency may be disregarded provided that the package is bruther that the p		DRM 618A	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
 the combined cask, closed shipping container, and trailer must not exceed 75 inches. 10. When the cask is shipped in a closed shipping container, the internal heat load must not exceed 750 watts. 11. In lieu of the requirements of 10 CFR §71.87(e), the licensee must perform periodic maintenance and testing of 0-rings, drain and vent ball valves, relief valves, and rupture discs of the cask as indicated in the table given below. During inactive periods, the maintenance and testing frequency may be disregarded provided that the package is brutht interference prior to the next use of the package. Cask Component Ball Valve Ball Valve O-rings O-rings O-rings Inner Containment Vessel Cavity Relief Tayve Cavity Relief Tayve Cavity Rupture Disc Impact limiters Annually Annually Annually Pack Shipment Annually Annually Replace Provided Tay Period Provided that the package of the package of the package. 	- ge	3 - Certificate No. 9183	- Revision No. 11 - Docket	No. 71-9183
<pre>must not exceed 750 watts.</pre> 11. In lieu of the requirements of 10 CFR §71.87(e), the licensee must perform periodic maintenance and testing of 0-rings, drain and vent ball valves, relief valves, and rupture discs of the cask as indicated in the table given below. During inactive periods, the maintenance and testing frequency may be disregarded provided that the package is brutht ind to compliance prior to the next use of the package. Cask Component Ball Valve O-rings O-rings O-rings Inner Containment Vessel Cavity Relief Tave Impact limiters Impact limiters Impact limiters Inter Containment Vessel Impact limiters Impact	9.	the combined cask, close	in a closed shipping contai d shipping container, and tr	ner, the center of gravity of ailer must not exceed 75
periodic maintenance and testing of O-rings, drain and vent ball valves, relief valves, and rupture discs of the cask as indicated in the table given below. During inactive periods, the maintenance and testing frequency may be disregarded provided that the package is bruther interaction to the next use of the package. <u>Cask Component</u> Ball Valve Ball Valve Ball Valve O-rings O-rings Inner Containment Vessel Cavity Relief Tave Rupture Disc Impact limiters Annually Neutron Shield Tave Rupture Disc	10.			ner, the internal heat load
Ball Valve Ball Valve O-rings O-rings Inner Containment Vessel Cavity Relief Talve Cavity Rupture Disc Neutron Shield Taot Impact limiters Annually	11.	periodic maintenance and valves, and rupture disc	testing of O-rings, drain a s of the cask as indicated i the maintenance and testing e is build into Table compl	nd vent ball valves, relief n the table given below. frequency may be disregarded jance prior to the next use
Ball Valve Ball Valve O-rings O-rings Inner Containment Vessel Cavity Relief Talve Cavity Rupture Disc Neutron Shield Taot Impact limiters Annually		Cask Component	Period	Test/Action
O-rings O-rings Inner Containment Vessel Cavity Relief Talve Cavity Rupture Disc Neutron Shield Tant Impact limiters Annually An		Ball Valve	Each Shipment	Hydroptest to 30 psig
Cavity Relief Laive Cavity Rupture Disc Neutron Shield Tant Rupture Disc Impact limiters Annually Annnually Annually Annually Annually Annually Annually Ann		0-rings		Test to 00 psig
Cavity Rupture Disc Neutron Shield Tant Rupture Disc Impact limiters Annually Annnually Annually Annua		Inner Containment Vessel	Innual Kund	Test to 100 psig
Neutron Shield Tant Rupture Disc Impact limiters Annually Annnually Annually Annually Annually Annuall		Cavity Relief	A STATISTICS	Test at Set point
Rupture Disc Impact limiters Annually Annually Annually Annually Annually		Cavity Rupture Disc	Anneally	Replace
			Aconuerty	Reperce
The second secon		Impact limiters 1	Annually	West to 5 psig
inere must be no visual (pressure and the second of pressure aron for the		*There must be no visual	(preting and interaction	s of pressure drop for the

There must be no visual (pressures range regications of pressure drop for the component under test during a 10-minute test period. Otherwise, corrective action must be taken and the test repeated until such time as the component meets the specified tests. (Test to pressures equal to or greater that those indicated.)

- 12. The package shall be prepared for shipment and operated in accordance with the operating procedures in Chapter 7 of the application, as supplemented.
- 13. Each package must be maintained in accordance with the maintenance program in Chapter 8 of the application.

*. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.



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		and the second se	C. PACKAGE IDENTIFICATION NUMBER	A PAGE NUMBER	. TOTAL NUMBER PAG
& CERTIFICATE NUMBER		D. REVISION NUMBER		1	2
9184		3	USA/9184/B(U)		
of Federal Régulat	ions, Part 71, "Packaging	and Transportation of Hat	cribed in Item 5 below, meets the applicable si dioactive Material." ny requirement of the regulations of the U.S. ntry through or into which the package will	Department of Trans	
VECTRA Techt	nologies, Inc. n Way, Suite 2	Nucl	of THE PACKAGE DESIGN OF APPLICATION AND IDENTIFICATION OF REPORT OF APPLICAT lear Packaging, Inc. cons ed March 31, 1989, as sup RE (1-9184 T NUMBER	olidated ap	plication
 CONDITIONS This certificate is con 	ditional upon fulfilling th	e requirements of 10 CFR	Part 71, as applicable, and the conditions sp	pecified below.	
(a) Packas (1) (2)	Model No.: P Description The packaging OH) enclosed (32.5" OD x 3 a undefined s and four offg sample cask. to absorb the the secondary steel encased thermal prote The primary c steel varying Viton O-ring testing. The The secondary steel and 5.1 steel and 5.1 steel and 5.1 steel and 5.1 steel and 5.1 and 4.8 thic 1.0"-8 UNC x with a sealed The overpack the top and b eight, 3/4"-1 water from er	inside a secon 9.0° OH). The ample cask. Av as vials are mi- Loose vermicur water sample containment vio- overpack (43.0 ction. ontainment ves- in thickness seals and a second assembly is secontainment v- " thick lead s " thick lead s k lead shieldi 3.0 long bolts test port bet- provides about ottom. The two 0 UNC x 1.5" 1 tering the ove	primany containment vess dary containment vessel 15 milliliter water samp ditionally, four iodine aintained inside the foan lite surrounds the perime should leakage occur. Co essel and radiation shiel 0" OD x 66.0" OH) which p sel, which is constructed from 3/4" to 1.25", is pr aled test port between th cured with eight, 3/8"-16 essel and radiation shiel hielding in the radial di hielding on the bottom, a ng on the top. The lid . The lid is sealed with ween the seals for leak to 7.25" thick foam on the o halves of the overpack ong bolts. A Neoprene ga rpack. ncluding a maximum sample	Ind radiatio The is conta- collection i shoring ab- ter of the mpletely su d is a foam- provides imp- d of 304 sta- rovided with- te seals for- 5 UNC x 8" 1 d provides irection, 2. and 3.5" thi- is secured w- n two Viton- testing. sides and a- are held to- asket preven	n shield ined within cartridges ove the sample cask rrounding filled act and inless double leak ong screws. 0.75" thick or thick ck steel ith eight, 0-rings bout 13" on gether by ts rain

RC FORM 618A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIC
Page 2 - Ce	rtificate No. 9184 - Revision No. 3 - Docket No. 71-9184
5.(a)(3)	Drawings
	The package is constructed in accordance with Nuclear Packaging, Inc. Drawing No. X-20-218D, Sheets 1 and 2, Rev. C.
(b) Conte	nts
(1)	Type and form of material
	 Radioactive material in form of liquid or gaseous samples in sample casks, cartridges and vials.
	 (ii) Byproduct and activation naterials as solids and process solids or resins, either departered, solid, or solidified in secondary containers. Maximum quantity of material per package
(2)	Maximum quantity of material per package
	50 Ci of mixed fission and activation products 15 illiliters of liquid, one sample case or secondary container and four cartridges and four vials.
prior Secti propa	dition to the requirements of Subpart 8 of the CFR Parcel, each package to first use must be the acceptance to the and criteria specified in on 8.1, must be maintained in accordance of the Section 22, and must be ared for snipment in accordance with Charles 7.0 of the poplication, and the ement dated July 8, 1990
	backage authorized by this certain cace is hereby approved for use under the all licensporovisions of being all
	ation dater July B2, 1999.
Nuclear Pac	ckaging, Inc. consolidated application dated March 31, 1989.
Supplement	dated: April 7, 1989. * * * *
VECTRA Tech	nologies, Inc. supplement dated: July 8, 1994.
	FOR THE U.S. NUCLEAR REGULATORY COMMISSION
	Cars R. Chappell
	Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS
Date:	
	379

OFR 71				ATE OF COMPLIANCE		
a. CERTI	9185	UMBER	6 REVISION NUMBER	USA/9185/B(U)	A PAGE NUMBER	C. TOTAL NUMBER PAG
PREAM	EL F					th in Title 10. Code
to	Federal R	legulations, Part 71, "Packaç	ing and Transportation of			
b. Th ap	is certific plicable n	ate does not relieve the Jone regulatory agencies, includir	signor from compliance wit og the government of any o	th any requirement of the regulations of the U.S country through or into which the package will	 Department of Trans be transported. 	sportation or other
		TE IS ISSUED ON THE BASIS O ame and Address)	F A SAFETY ANALYSIS REPO	RT OF THE PACKAGE DESIGN OR APPLICATION	TION:	
Indu	stria	1 Nuclear Compa	ny	Industrial Nuclear		ication
		iams Street ro, CA 94577		dated October 13, 19	983.	
San	Leand	FO, CA 945/7	EAF	REGU 71-9	185	
CONDI This c	TIONS ertificate	is conditional upon fulfilling	the requirements of 10 C	FR Part 71, as applicable, and the conditions s	pecified below.	
(a)	Pack	aging	8	0		
	(1)	Model No.: OP	-100	And the	f.	
	(2)	Description		50 (18 1	0	
		Protective ove	rpack for Model	No. IR-100 exposure devi	. The ove	rpack
		consists of an	outer containe	er which is a 10-gallon op ly and cover, welded seams	en head stee	1 drum
		clamp-ring typ	e head closure.	The 53 pound exposure d	evice is cen	tered
		by plywood sup device and ove	ports within th rpack is 78 pou	e drum. The gross weight mds.	of the expo	sure
	121	L'he	REAL	AN SE S		
	(3)	Drawings	1			
		The overpack i	s constructed i	in accordance with Industr , dated November 4, 1992;	ial Nuclear	Company
			August 31, 1992			,
			R	黄東下		

Page 2 - Certificate No. 9185 - Revision No. 3 - Docket No. 71-9185

- (b) Contents
 - (1) Type and form of material

Iridium 192 as sealed sources that meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package

120 curies

- The sources must be contained within the Model No. IR-100 packaging in accordance with Certificate of Compliance No. 19157.
- 7. The name plate on the overpack must be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining its legibility. The two vent holes in the side of the overpack must be covered with tape or rubber (plastic) progs to prevent entry of rain water.
- 8. In addition to the requirements of Subpart G of 20 CFR Part 71, each package must meet the acceptance tests and maintenance program, and shall be operated and prepared for shipment in accordance with the operating procedures in the application document entitled "Operating Procedures, Acceptance Test, and Maintenance Program," Revision 1, dated Movember 4, 1992, as supplemented December 15, 1992.
- 9. The packaging authorized by this certificate is hereby approved for use under the general license provisions of 10 LER \$71.12.
- 10. Expiration date: January BI, 1998,

REFERENCES

Industrial Nuclear Company application dated December 23, 1981.*

Supplements dated: May 28, 1982*, October 13, 1983 (two letters)*; April 26, 1991; and March 20, June 25, September 4, November 4, and December 15, 1992.

*See Docket No. 71-9157.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

Date:

JAN 7 1993

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RC FORM 611 (66)) CFR 71			E OF COMPLIANCE	CLEAR REGULAT				
. CERTIFICAT	E NUMBER	5. REVISION NUMBER	L PACKAGE IDENTIFICATION NUMBER USA/9186/B(U)F	d PAGE NUMBER	e. TOTAL NUMBER PAG			
of Feder	al Regulations, Part 71, "Pack	iging and Transportation of Rad	bribed in Item 5 below, meets the applicable sa lioactive Material." ny requirement of the regulations of the U.S. ntry through or into which the package will t	Department of Trans				
S. Depa vision	cate is issued on the basis of Name and Addages of Naval Reactor: n, DC 20585	Safety in the Ju Analysi in the	DF THE PACKAGE DESIGN OF APPLICATION WD IDENTIFICATION OF REPORT OF APPLICATI Analysis for Shipping S8 S-6213 Container, Rev. 7 Ine 16, 1975, as suppleme s for Shipment of S6W Sh Model 2 S-6213 PUSC, as TNUMBER 71-9186	, dated nted; and Sa ipboard Powe	afety er Units			
CONDITIONS This certific	ate is conditional upon fulfillin	ig the requirements of 10 CFR I	Part 71, as applicable, and the conditions sp	ecified below.				
	\$	2	0					
) Pac	kaging 60	Sec.	and the state					
(1)	presim	2 / 182	er Unit Shipping Containe	3				
	Model 2, S-6213 Power Unit Shipping Container							
(2)	Description							
	A power unit shipping container (PUSC) for shipment of a power unit complete with control rods and control rod drive mechanisms installed.							
	approximately hemispherical central flange is of the same material is HY located thick central mating strength studs into the barre longest contro support adapte	S-6213 PUSC consists of a carbon steel cylindrical shell y 9-1/4 feet in outside diameter by 39-1/2 feet long, including all steel end impact limiters, with 10-3/4-foot outside diameter ages joining the barrel and cover halves. The Model 2 S-6213 PUS ume design as the Model 1, except that the primary container HY-80 steel. A power unit is supported in the PUSC by a central ck circular steel plate (PU head) which is clamped between the ing flanges of the PUSC and fastened by 94, 2-inch diameter high ids. The upper and lower extremities of the power unit cantileve crel and cover halves without additional support except for the crol rod drive mechanisms (S8G Power Unit Type B only). A lower over is installed in the barrel end of the container during shipm prototype power unit and the S6W shipboard power unit.						
	secured to a s	pecially built fla hs approximately 4	zontal position on a supp atbed rail car. The PUSC 490,000 pounds for shipme	, including	frame and			
	pounds for shi	the PUSC, includir pment of the S6W p e S6W shipboard po	ng frame and contents is prototype power unit and ower unit.	approximate 429,900 pou	ly 438,900 nds for			
			382					

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(a) Continued

(3) Drawings

The Model 1 and Model 2 S-6213 PUSC are constructed in accordance with the Drawings included in the applications (see references, below).

(b) Contents

- (1) Type and form of material
 - Unirradiated Naval Reactors Type A or B S8G power unit as described in Chapter 5 of the application and containing uranium enriched in the U-235 isotope.
 - (ii) Unirradiated S6W advanced fleet reactor prototype power unit or unirradiated S6W advanced fleet reactor shipboard power unit as described in Chapter 6 of "S6W Prototype Power Unit in S-6213 Power Unit Shipping Container Safety Analysis Report" WAPD-REO(c)1219, Revision 1, and containing uranium enriched in the U-235 isotope.
 - (iii) Unirradiated S6W high performance fleet cone shipboard power unit, as described in addendum to Chapter 6 of "S6W Shipboard Power Unit in S-6213 Power Unit Shipping Container Safety Analysis Report For Packaging," WAPD-REO(c) 1457 and WAPD REO(c)-1566, and containing uranium enriched in the U-235 Tsotope.
- (2) Maximum quantity of material per package

For the Model 1 S-6213 PUSC:

One Type A S86 Power Unit, or One Type B S8G Power Unit, or One S6W Advanced Elect Reactor Prototype Power Unit, or One S6W Advanced Fleet Reactor Shipboard Power Unit, or One S6W High Performance Fleet Core Shipboard Power Unit.

For the Model 2 S-6213 PUSC:

One S6W Advanced Fleet Reactor Shipboard Power Unit, or One S6W High Performance Fleet Core Shipboard Power Unit.

(c) Fissile Class

III

Maximum number of packages per shipment One (1)

The Model 1 S-6213 PUSC shall be designated as B()F. Use of Model 1 S-6213 PUSC fabricated after August 31, 1986 is not authorized.

All control rods shall be restrained in the power unit fuel cells by the control rod holddown latches.

Page 3 - Certificate No. 9186 - Revision No. 9 - Docket No. 71-9186

For the Model 1 S-6213 PUSC, in addition to the requirements of Subpart G of 10 CFR Part 71, a determination shall be made, for each shipment, of the "g" forces that the package or packaging has been subjected to during transport.

- (a) A nondestructive examination of the entire length of both inner and outer surfaces of the four tie-down support bracket-to-container wall butt welds shall be conducted:
- if the packaging (with or without contents) has been subjected to "g" forces in excess of 2 g's in any direction through the center of gravity of the package since the last inspection, and
- (2) following the fourth shipment, * and
- (3) after every second shipment following the fourth shipment.

*This requirement shall not be construed to require an inspection if the previous shipment had been inspected in accordance with (8(a)(1)) above

- (b) The nondestructive examination in accordance with a written procedure may be by either:
 - (1) The liquid menetrant method in accordance with:
 - (i) Article 6, Section & ASME Code, or
 - (ii) MIL-STD-271E, "Mondestructive Testing Requirements for Metals," Section 5, October 31, 1973, pr
 - (iii) NAVSHIPS 250-1500-1; "Welding Standard," Section 12.5
 - (2) or the magnetic particle method in accordance with:
 - (i) Article 7, Section V, ASME Code (Yoke Technique; Dry Particle Method; direct or rectified current), or
 - (ii) MIL-STD-271E, Section 4; specifically 4.3.1 (General) and 5.6.1 (coatings), 4.3.3 (Dry Powder), 4.3.3.3.6 (Continuous), and 4.3.3.3 (Procedure) as excepted by using direct or rectified current, 4.3.3.3.3 (Yoke Technique), 4.3.2.5 (sensitivity and cleaning), and 4.3.1.3 (smoothness), or
 - (iii) NAVSHIPS 250-1500-1, Section 12.4, 12.4.1 (General), 12.4.3 (Dry powder), 12.4.3.3.2.1 (Yoke Technique)using direct or rectified current.
- (c) If any indications, as defined in accordance with either:
 - (i) Paragraph UA-93(a), Appendix VIII, Division 1, Section VIII, ASME Code (with 7(b)(2)(i), above), or
 - (ii) Paragraphs UA-72 and UA-73, Appendix VI, Division 1, Section VIII, ASME Code (with 7(b)(2)(i), above), or

C FORM HANZ CONDITIONS (continued) Page 4 - Certificate No. 9186 - Revision No. 9 - Docket No. 71-9186 (iii) Class 1 acceptance criteria of NAVSEA 0900-LP-003-8000, "Surface Inspection Acceptance Standards for Metal," with Change 2, July 1, 1974 (with 7(b)(1)(ii) or 7(b)(2)(ii), above), or NAVSHIPS 250-1500-1, Section 10.3.2 (with 7(b)(1)(iii) or (iv) 7(b)(2)(iii), above), as noted, are detected, the packaging shall be repaired and reinspected prior to use and shall be inspected prior to each shipment thereafter. Any defects shall be reported in accordance with 10 CFR §71.95. Expiration date: July 31, 1997 EARFERENCES SULATO For the Model 1 S-6213 PUSC: U.S. Naval Reactors application dated July 24, 1975. Supplements dated: June 3, 1977; July 24, 1978; Naval Reactors letter G#C89-2838, dated May 22, 1989; Naval Reactors letter G#C90-03664, dated September 5, 1990; Naval Reactors letter G#92-03563, dated June 17, 1992; and Naval Reactors letter G#C92-03714, dated Uctober 2, 1992. r the Model 2 S-6213 PUSC: No.S. Naval Reactors apprication 6#C91-11165, dated December 19, 1991. Supplements dated: Naval Reactors letter G#92-03563, dated June 17, 1992; and Naval Reactors letter G#C92-09714, dated October 2, 1992. XIND. FOR THE U.S. NUCLEAR REGULATORY COMMISSION Charles E. MacDonald, Chief Transportation Branch Division of Industrial and Medical Nuclear Safety, NMSS APR 1 1993 Date: 385

REC FORM 618			CERTIFICAT	U.S. NU U.S. NU VE OF COMPLIANCE VE MATERIALS PACKAGES		ORY COMMISSIC
& CERTIFICATE N	UMBER		D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	e. TOTAL NUMBER PAG
. a. Gentingenten		9187	2	USA/9187/B(U)	1 1	2
				cribed in Item 5 below, meets the applicable sa dioactive Material."		
b. This certific applicable r	ate does egulatory	not relieve the consig agencies, including	nor from compliance with a the government of any com	ny requirement of the regulations of the U.S. ntry through or into which the package will t	be transported.	
A THIS CERTIFICA & ISSUED TO (A	TE IS ISSU	ED ON THE BASIS OF	A SAFETY ANALYSIS REPORT	OF THE PACKAGE DESIGN OR APPLICATION	ION:	
Amerst 40 Non Burlin	rth Av		a	ech/Ops application dates s supplemented.	d December 2	7, 1983,
			E P. DOCKS	T NUMBER		
4. CONDITIONS This certificate	is condit	tional upon fulfilling	the requirements of 10 CFR	Part 71, as applicable, and the conditions sp	pecified below.	
^{5.} (a)	Packa	aging		20		
	(1)	Model No. :	865	132 -1		
	(2)	Description	+ F 1	hielded radiographic exp		
		handle and components uranium shi in the sour assembly. 0.12-inch t locking ass	two 1.38" x 5.5 consist of an o eld, and a sour ce tube by a so Tamper indicati hick steel oute embly for addit	ice is provided with 0.88 "long triangular shaped uter steel shell, interna- ce tube. The contents an urce holder assembly and og seals are provided on r cover is bolted over the domal protection during approximately 59 pounds.	legs. Prim al bracing, re securely actuator an the packagi he source ac	ary depleted positioned d locking ng and a tuator and
	(3)	Drawings	X to	L to the "		
		The packagi Drawing Nos 86500-10, F	.: 86590, Shee	ed in accordance with the ets 1 through 5, Rev. 1; 8	e following 86591, Rev.	Tech/Ops 1; and

C FORM \$16A	CONDITIONS (continued)
Page	2 - Certificate No. 9187 - Revision No. 2 - Docket No. 71-9187
(b)	Contents
1996	(1) Type and form of material
	Iridium-192 as sealed source must meet the requirements of special form radioactive material.
	(2) Maximum quantity of material per package
	240 curies.
6.	In addition to the requirements of Subpart G of 10 CFR Part 71:
	(a) Each packaging must meet the Acceptance Tests and Maintenance Program in Section 8, of the October 29, 1993, supplement.
	(b) The package shall be prepared for shipment and operated in accordance with the Operating Procedures in Section 7, of the October 29, 1993, supplement.
7.	The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
8.	Expiration date: December 31, 1998.
	REFERENCES
Tech/	Ops application dated December 27, 1983.
Suppl	ements dated: March 15, 1984, November 8, 1988, and August 16, and
	per 29, 1993
	FOR THE U.S. NUCLEAR REGULATORY COMMISSION Lass R. Chappell
	Cass R. Chappell, Section Leader
	Cask Certification Section Storage and Transport Systems Branch
	Division of Industrial and
	IDEC 1 5 1993 Medical Nuclear Safety, NMSS
Date:	

(CFR 71	RM 618			TE OF COMPLIAN	CE	EAR REGULAT	ORY COMMISS
e. CER	TIFICATE N 9196	UNRER	6	USA/9196/		d. PAGE NUMBER	. TOTAL NUMBER PA
0	WBLE his certific f Federal F	legulations, Part 71, "Packagin	packaging and contents deing and Transportation of Ri	scribed in Kern 5 below, meets t adicactive Material."	he applicable safety		
b.T	his certific pplicable r	ate does not relieve the consi- egulatory agencies, including	gnor from compliance with the government of any co	any requitement of the regulat untry th: sugh or into which th	ions of the U.S. De e package will be t	partment of Trans mansported.	portation or other
		TE IS ISSUED ON THE BASIS OF arme and Address/	A SAFETY ANALYSIS REPORT	OF THE PACKAGE DESIGN OR A	PPLICATION		
010	South	ckaging, Inc. 336th Street y, WA 98003	EAR	Nuclear Packaging dated November 22 REG (21-9)	2, 1989, as	ated appli supplemen	ication ited.
CONE	OITIONS	is conditional upon fulfilling,	the requirements of 10 CFF	Part 71, as applicable, and th	e conditions specif	fied below.	
		1	<u>367</u>		0		
a)	Packa	ging 65	27		22		
	(1)	Model No .: UX-	30	~ 10	g estan.		
	(2)	Description		21(醫	ó		
		overpack is a r shells with the (8 - 9.5 PCF). of the overpack secured with te	ight circular c volume between A stepped and to be removed n indexed, cross	uranium hexafluor ylinder construct the shells fillo gasketed horizon from the base. s-locking "ball The maximum gro	ed of two ad with E-i ad joint p The package ock" pins.	stainless nch thick ermits the "halves" The over	steel foam top half are pack is
	(3)	Drawing	2	1	5		
		The Model No. U Packaging, Inco	X-30 packaging rporated Drawin	is fabricated in g No. X-20-235D,	accordance Sheets 1 t	with Nucl hrough 3,	ear Rev. I.
b)	Conte	ents					
	(1)	Type and form o	of material				
		UF ₆ enriched in	the U-235 isot	ope.			
	(2)	Maximum quantit	y of material p	er package			
			30A cylinder: U-235 isotope.	4,950 pounds UF_6	enriched t	o not more	than 5
					enriched t		

Page 2 - Certificate No. 9196 - Revision No. 6 - Docket No. 71-9196

(c) Fissile Class II Minimum transport index to be shown on 5.0 label for Class II The 30-inch diameter UF6 cylinder must be fabricated, inspected, tested and 6. maintained in accordance with American National Standard N14.1 (1990 edition). Cylinders shipped after December 31, 1992 must be fabricated in accordance with Section VIII, Division I, of the ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Code and be ASME Code stamped. Prior to each shipment, the overpack gaskets must be inspected. These gaskets must 7. be replaced if inspection shows any defects or every 12 months, whichever occurs first. When the optional 4 lig Tifting clips are used instead of the top lugs, the top lid 8. (cover) must be lifted with a spreader bar (saddle). Each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 8 9. of the application The packaging shell be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application. 10. The package authorized by this certificate is hereby approved for use under the 11. general license provisions of 30 CFR \$11.12. Expiration date: January 31, 1995 12. REFERENCES Nuclear Packaging, Incorporated applicati lated November 22, 1989. Supplements dated: December 20, 1989, November 8, 1990, June 10, June 18, September 11, October 9, and November 6, 1992. FOR THE U.S. NUCLEAR REGULATORY COMMISSION Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

NOV 1 3 1992

Date:

the second design of a second device the second s	AND ADDRESS OF THE OWNER AND ADDRESS OF THE OWNER A	C PACKAGE IDENTIFICATION NUMBER	O. PAGE NUMBER	. TOTAL NUMBER PAG
A CERTIFICATE NUMBER	b. REVISION NUMBER	USA/9200/B(M)F	1	5
of Federal Regulations, Part 71, "Packer	ing and Transportation of har	cribed in Item 5 below, meets the applicable sa dioactive Material." Iny requirement of the regulations of the U.S. Intry through or into which the package will I	Department of Transp	
THIS CENTIFICATE IS ISSUED ON THE BASIS C a ISSUED TO (Nume and Address) partment of Energy aho Operations Office O Second Street aho Falls, ID 83401	Nuc	OF THE PACKAGE DESIGN OR APPLICATION AND IDENTIFICATION OF REPORT OR APPLICAT Clear Packaging, Inc. app ril 6, 1991, as supplement REPORT	lication dat	ed
I. CONDITIONS This certificate is conditional upon fulfillin	g the requirements of 10 CFR	Part 71, as applicable, and the conditions sp	ecified below.	
shipped dew outer diame inch diamet inner shell steel outer plate make shield surr wrap on a 3 stainless s provided by bolts. A t provided wi cylindrical shear block attachment 120 inches thick stain Each impact necked down limiter. T	atered. The cash ter by 207.5-inch er by 192.5-inch shell and 7.50-inch shell and 7.50-inch up the cask body. ounds the cask out. 3-inch pitch spat teel equipped with 2 Neoprene 0-rin est port is provi th a vent port. surface include for fitting to lugs (8 at each of in diameter by 75 less steel and fi limiter is secu- to 1 inch. Play he overall dimensi	shielded shipping cask. k is a right circular cyll a length. The cavity dim length. A 1.0-inch thic k lead annulus and 2.0-in inch thick welded stainle . A ten gauge stainless ater shell with standoff acing. The outer lid is th a 300 psig rupture dis- ings secured by 32, 1-1/2-1 ided between the 0-rings. Protrusions from the out 2 lifting and 4 tie-down the shipping skid, and 16 end of the cask). The im 5 inches long fabricated illed with closed-cell po- red to the cask by 8, 1-1 stic pipe plugs are provi- sions of the cask with up h outer diameter by 279.5	ensions are k stainless ch thick sta ss steel bot steel therma provided by 7.50-inch th c. The seal 6 UNC closur The lid is er cask exte trunnions, impact limiter from 1/4-inc lyurethane f /4-7 UNC bol ded in each per and lowe	inch 51.25- steel inless tom 1 a wire ick is e also rnal 1 ter s are h oam. ts impact r

Page 2 - Certificate No. 9200 - Revision No. 8 - Docket No. 71-9200

5. (a) (2) Description (continued)

WRE FORM FIRM

A separate inner vessel (fuel/canister basket) is positioned within the cask cavity. The inner vessel consists of 7, 14.5-inch ID by 0.38-inch wall pipes with a welded bottom plate and top end fixture plate which provides a 151-inch long cavity for the canisters. The pipe assembly is positioned within a 50.25-inch OD by 1.0-inch thick steel shell with a 2.0-inch thick welded bottom plate. The space between the pipes and steel shell contain stainless steel structural members and solid neutron moderator and absorber. The top of each tube is shielded by a 10-inch thick stainless steel plug. The inner lid is 5.0-inch thick stainless steel plug. The inner lid is 5.0-inch thick stainless steel plug. The inner lid is 5.0-inch thick stainless steel plug. The inner lid is 5.0-inch thick stainless and is secured to the inner vessel by 24, 3/4-10 UNC closure bolts. A test port is provided between the 0-rings. The lid is also provided with a vent port.

A fuel, filter, or knockout canister is positioned within the inner vessel with canister impact limiters and a top 10.0-inch thick stainless steel shield plug. Each canister is 14.0-inch OD by 150.0-inch long by 0.25-inch wall and contains Boral sheets or B₄C rods. Canister containment is not required with closure provided by welded or bolted plate with 2 or 4 fittings.

The weight of the cask (100,500 pounds), impact limiters (11,700 pounds each), inner vessel (37,006 pounds), canisters (1,046, to 1,440 pounds each), and canister contents (1,500 to 1,894 pounds each) is approximately 181,500 pounds.

- (3) Drawings
 - (i) The packaging is constructed in accordance with Nuclear Packaging Inc. Drawing No. X-101-100, Sheets 1 through 7, Rev. T.
 - (ii) The canisters are constructed in accordance with Babcock and Wilcox Company Drawing Nos.: 1161299D, Rev. I; 1161300D, Rev. B1; and 1161301D, Rev. 1.

(b) Contents

- (1) Type and form of material
 - (i) Byproduct and special nuclear material in the form of irradiated fuel particles, partial fuel rods, partial assemblies, and core debris. The maximum pre-irradiation U-235 enrichment must not exceed 2.98 weight percent. The average burnup of the fuel material must not exceed 3,165 MWD/MTU and be cooled for at least 6.0 years.

NRC FORM FISA

CONDITIONS (continued)

Page 3 - Certificate No. 9200 - Revision No. 8 - Docket No. 71-9200

5. (b) (1) (Continued)

(ii) Irradiated core structural components, contaminated defueling equipment, and filter-aid materials.

Except for close fitting contents, dunnage must be provided in the shipping cask cavity sufficient to prevent significant movement of the contents and secondary containers relative to the outer packaging under accident conditions.

- (iii) Byproduct and special nuclear material in the form of internal contamination inside the inner vessel. Internal contamination shall not exceed the limits for low specific activity material as defined in 10 CFB \$71.4.
- (2) Maximum quantity of material per package

Seven fuel, knockout, or filter canisters or any combination thereof within the inner vessel. The radioactive decay heat load must not exceed 100 watts in each canister. The gross weight of each canister must not exceed 2,940 pounds.

III

One

(c) Fissile Class

6.

Maximum number of packages per shipment (vehicle)

The cask cavity and inner vessel must be dry when delivered to a carrier for transport, except for free water which may be present following drip drying of the canisters for a minimum of 2 minutes after removal from the storage pool. The canisters must be loaded and dewatered in accordance with Section 7.1.1 of the application which includes approximately 2 atm of argon, nitrogen, or helium cover gas. The cask cavity and inner vessel must be filled with argon, nitrogen, or helium at 1.0 atm pressure.

- 7. In addition to the requirements of Subpart G of ID CFR Part 71:
 - (a) Prior to each shipment, the inner and outer lid seals must be inspected. The seals must be replaced with new seals if inspection shows any defects or every 12 months, whichever occurs first; and
 - (b) Each package must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application.
 - (c) The package must be prepared for shipment and operated in accordance with Section 7.0 of the application.

8. For any canister containing water and/or organic substances which could radiolytically generate combustible gases, a determination must be made by tests and measurements or by analysis of a representative canister that the following criteria are met over a period of time that is twice the expected shipment time:

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(Continued) 8.

The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the canister gas void if present at STP (i.e., no more than 0.063 g-moles/ft' at 14.7 psia and 70°F); or that oxygen is limited to 5% by volume in those portions of the canister which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the canister must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the canister is closed and must be completed within twice the expected shipment time. AR REG

9. Bolt torque:

The outer cask lid must be secured by 32, ASTM A320, Grade L43 (Cadmium plated), 1-1/2-6 UNC-2A x 5.5 Tong bolts torqued to 780-945 ft-1bs (lubricated).

The inner vessel lie must be secured by 24, ASTM A320, Grade L43 (Cadmium plated), 3/4-10 UNC-2A x 2,25 lang bolts torqued to 130-158 ft-Tbs (labricated).

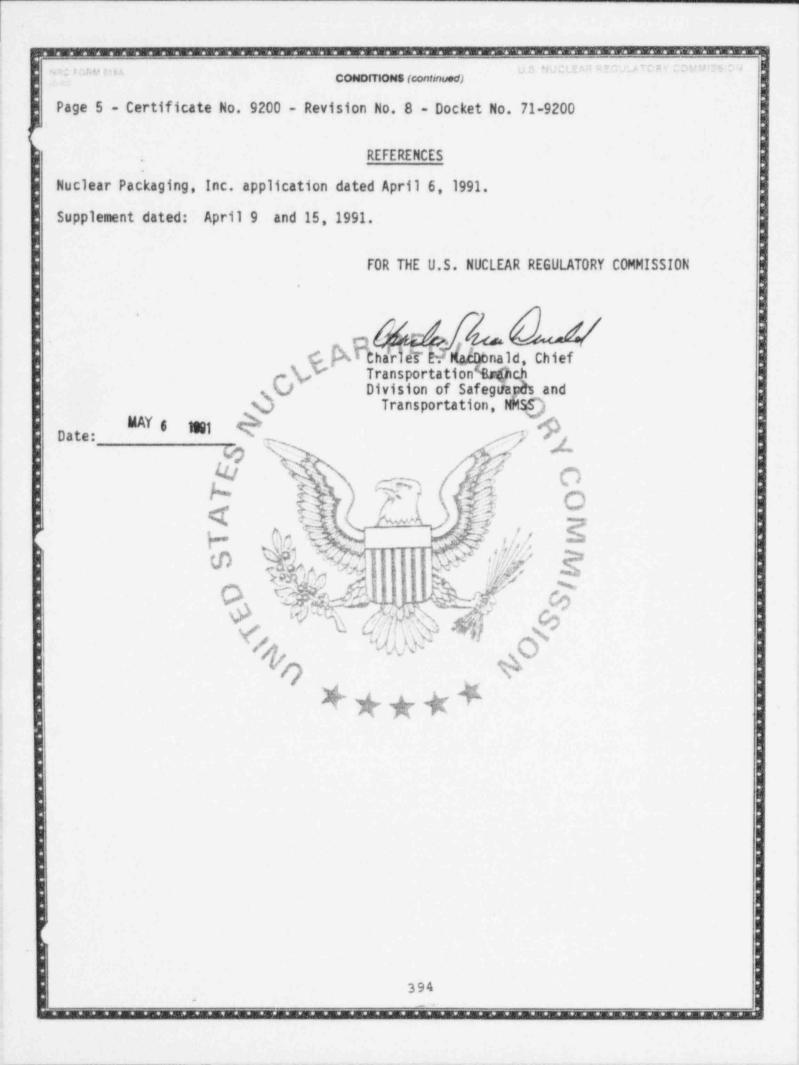
The upper and lower overpack limiters must each be secured by 8, ASTM A320, Grade L43 (Cadminim plated), 1-1/4-7 UNC-2A x 41.75 long bolts torqued to 225-270 ft-lbs (lubricated).

Except for the contents specified in 5.(b) (P)(P)(P), prior to each shipment, the licensee must confirm that the cask and inner vessel are properly sealed by tests as specified in Appendix 3.4 or Section 8.2.2 of the application. The test is 10. satisfied if no reakage is detected using a test with a minimum sensitivity of 1x10⁻³ atm-cm⁻/s.

11. The neoprene O-ring seals used in the containment vessel closure must be fabricated from neoprene material specified as Cascade Gaskets compound number CG 100-111-60.

- 12. The licensee may use a tarpauline to cover the cask during time of transport.
- 13. The package authorized by the certificate is hereby approved for use under the general provisions of 10 CFR §71.12.

14. Expiration date: May 31, 1996.

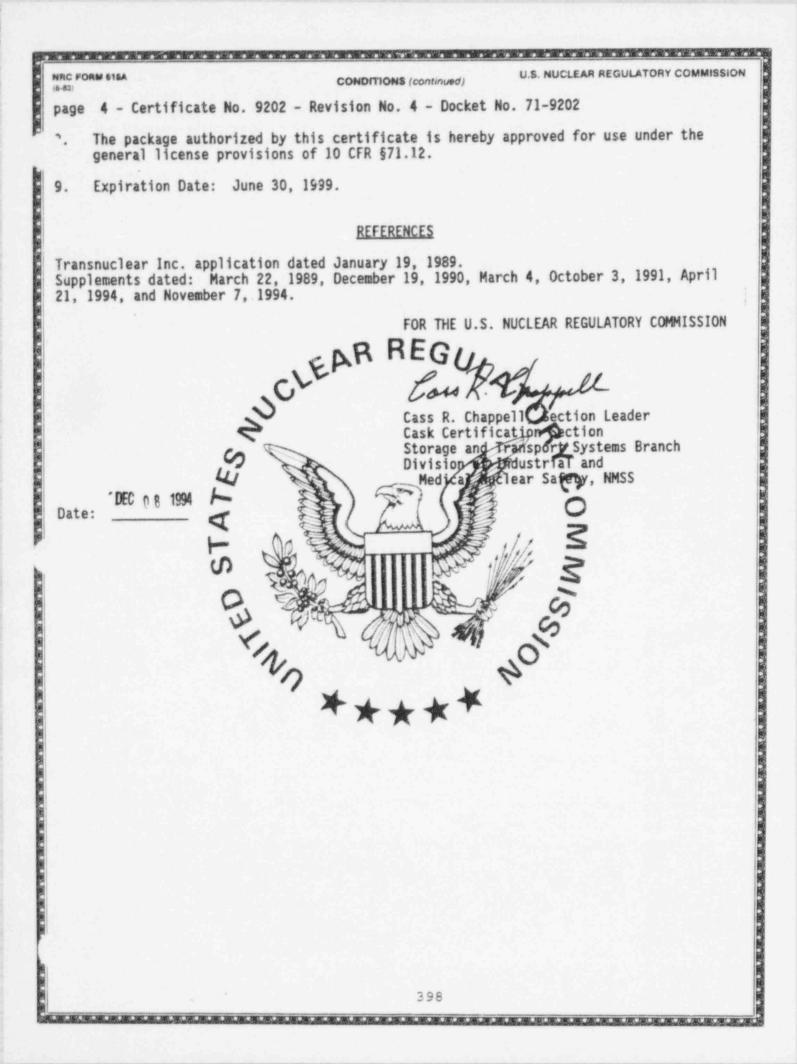


IB-C FORM \$18 8-661 0 CFR 71		E OF COMPLIANCE	ULEAN REGULA	TORY COMMISSI
1. & CERTIFICATE NUMBER	b. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAG
9202	4	USA/9202/B(U)F	1	4
of Federal Regulations, Part 71, "Pack	aging and Transportation of Rad	ribed in Item 5 below, meets the applicable sa lioactive Material." hy requirement of the regulations of the U.S. stry through or into which the package will t	Department of Trans	
 THIS CERTIFICATE IS ISSUED ON THE BASIS a. ISSUED TO (Nerve and Address) Department of Energy Idaho Operations Office 550 Second Street Idaho Falls, ID 83401 		Transnuclear, Inc. application dated January 19, 1989, a REG 71-422	ation	ited.
 CONDITIONS This certificats is conditional upon fulfilli 	notherequipements of 10 CFR I	Part 71, as applicable, and the conditions sp	ecified below.	
(2) Description The TN-BER is to 44 BWR spe approximately pounds. The 244.5 inckes by 83.25 inck is 171 inches approximately The containme 350; Grade LF plate and lic The 74.75-inc diameter stee with a viton The containme two gas sampl The spent fue	nt Suel assemblie 2152000 pounds overal of dimension long by 131 meter long and 64 meter long and 64 meter long and 64 meter long and 64 meter lass cubic feet. are made from 9. h diameter lid is l (ASME SA 540 Gri 0-ring mounted in int vessel is prov- ing ports and a re l assemblies are l	s of a 9.62-ince thick for bolted to the cask with bolted to the cask with bolted to the cask with ade B24, Class 1) bolts. a groove machined in the ided with access and vent esearch instrumentation p	The package of capacity pact limited by is 190.5 in payload comme of the com- orged steel of lid. The SA-350, Gr forty-eight The cask is ort in the signed 44 com	is of 41,250 ers, are inches long avity which avity is (ASME SA- bottom ade LF3). , 1-5/8-inc s sealed of the lid. the lid, and cask body.
fuel basket. end-to-end. fuel and the	Each compartment During transport, remaining with st om an aluminum al	can accommodate two BRP one-half the compartment ainless steel inserts. Pe loy are positioned betwee	fuel assemb s are loade ripheral in	olies stacke ed with spen iserts
		395		

U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A CONDITIONS (continued) 16.83 page 2 - Certificate No. 9202 - Revision No. 4 - Docket No. 71-9202 (a) Packaging (continued) 5. (2) Description (continued) The cask is provided with steel encased balsa-red wood impact limiters. The limiters have an outer diameter of 131 inches, an inner diameter of 91 inches, and a thickness of 20 to 26 inches. Each impact limiter is attached to the cask by four equally spaced 2.25-inch diameter bolts. The impact limiters are also connected to each other with fourteen 1.50-inch diameter tie rods. The cask has four lifting lugs welded to the lid, and four lifting/ tiedown trunnions bolted to the cask body. The packaging is constructed in accordance with the following (3) Drawings (i) Transnoclear, Inc. Drawings: 302-150-1, Rev. 2 Longitudinal Section 3024-150-2, Rev. 4 2024-150-3, Rev. 2 9024-150-4, Rev. 2 9024-150-5, Rev. 2 9024-150-5, Rev. 2 9024-150-6, Rev. 4 Transverse Section Spell and Bottom Ad Frunnion Front Impact Limiter Rear, Impact imiter 024-150-7, R Packaging Papetrations 3024-150-11,5 3024-150-112, 3024-150-13, Ma Bolt Parts Lists 3024-150-160 Rev. 3024-150-160 Rev. minion Shoulder Bolt Simpact Longter Spacers Tierods Tierod Brackets Front Impact Limiter & 3084-150-26, Rev Tierod Bracket Assembly Reas Impact Limiter & 3024-189-27. Rev. Fierod Bracket Assembly 3024-150-31, Attachment Bolt Re Disc Spring 3024-150-32. (ii) The fuel assembly basket is constructed in accordance with the following Transnuclear, Inc. Drawings: Basket General Arrangement 3024-150-8, Rev. 1 Basket Cross Section 3024-150-9, Rev. 0 Basket Plane View 3024-150-10, Rev. 1 Type A and B Spacers 3024-150-15, Rev. 0 3024-150-17, Rev. 2 Basket Peripheral Inserts 3042-150-18, Rev. 2 Fuel Replacement Inserts 396

NRC FORM	618A		cc	NDITIONS (continued)	U.S. NUCLEA	R REGULATORY	COMMISSION
page	3 -	Certificate I	No. 9202 - Rev	ision No. 4 - D	ocket No. 71-920	2	
5.	(b)	Contents					
	1.8	(1) Type and	d form of mate	rial			
					el assemblies as ollowing specifi		in the
Assem Typ		Array	Pellet dia. (in.)	Clad <u>Thickness</u>	Rod OD (in.)	Pitch (in)	Mass (U) K
	B C D D E F D(EG) EP	11×11 7×7 8×8 9×9 9×9	0.275/0.373 0.275/0.373 0.620 0.500 0.471 0.471 0.471 0.471		0.344/0.449 0.344/0.449 0.700 0.570 0.562 0.562 0.562 0.562	0.577 0.577 0.921 0.807 0.707 0.707 0.707 0.707	132 121 133 113 141 137 136 118
	(c)	(2) Maximum (i) Ton (i) Max	quantitizer a rty-four decayse ximum decayse ximum 103 wards ove the cassen ove the cassen ove the cassen	aterial per pactors semblies. per pactors per pactors fres to te pos	entry is fourcee	1 kilowatts. uel baskets	
				kages per shipm	•	One	
6.				April and			
7.	In ac		1		f 10 CFR Part 71		
	a.	The packaging the Operating	g must be prepa g Procedures of	f Chapter 7 of	nt and operated the application.	in accordanc	e with
	b.		g must meet the the application		sts and Maintena	nce Program	of
	c.	The packaging of the applic		ed in accordance	e with Section 7	.1.2.19 and	Chapter

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CERTIFICATE NUMBER 203 2 2 2 2 2 2 2 3 3 3 3 3 4	ENC FORM 618 9-80 0 CFR 71			CERTIFICA FOR RADIOACT	TE OF COMPLIANCE		TORY COMMISSIO
9203 2 USA/9203/AF 3 PREAMEL a This certification is based to certify that the packaging and contents described in them 5 below, meet the applicable safety standards set orth in Title 10, Code of Foderal Regulations. Per 17, "Peckaging and Transportation of Reductive Materia". b. This certification is added to certify that the packaging and contents described in them 5 below, meet the applicable safety standards set orth in Title 10, Code of of foderal Regulations does not relieve the consignet from compliance with any requirement of the US. Department of Transportation or other explicition generics, including the government of any country through or into which the package will be transported. The certificate is desured on The BAGB of A BARETY ANALYSIS REPORT OF THE PACKAGE DESIGN OF APPLICATION b. Title APPLICATION * BEAUED TO Memore and Advent b. Title APPLICATION OF APPLICATION * BEAUED TO Memore and Advent b. Title APPLICATION OF APPLICATION * BEAUED TO Memore and Advent b. Title APPLICATION OF APPLICATION * BEAUED TO Memore and Advent b. Title APPLICATION OF APPLICATION * BEAUED TO Memore and Advent b. Title APPLICATION OF APPLICATION * BEAUED TO Memore and Advent b. Title APPLICATION OF APPLICATION * BEAUED TO Memore and Advent b. Title APPLICATION OF APPLICATION * BEAUED TO Memore and Advent b. Title APPLICATION OF APPLICATION * BEAUED TO Memore and Advent b. Title APPLICATION OF APPLICATION * BEAUED TO Memore advector b. Title APPLICATION		UMBER		Contraction of the local distance of the loc	C. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	. TOTAL NUMBER PAG
 a Dracewai Regulation, Am 71, "Packaging and Intracontation of Reductive Manham." b The certification of other the containt the company the the mark of the manhamment of the manhamment of Transportation of other explorable regulations at the U.S. Department of Transportation of other explorable regulations and Adams." b The certification of the BASIS of A SAFETY ANALYSIS REPORT of the FACAAGE DESIGN ON APPLICATION Company Company P.O. Box 11646 Lynchburg, VA 24506-1646 Company Description COMPTICIES Company Description The packaging Model No.: DHTF Description The packaging constructed in a conditional upon fulfilling the requirements of 10 CFR Pert 71, as applicable, and the conditions specified below. (a) Packaging Model No.: DHTF Description The packaging constructed thread State of the State of the conditional upon fulfilling the requirements of 10 CFR Pert 71, as applicable, and the conditional plate. The containment vessel is fulfilling with rescue of the containment vessel is packaging in a state of the containment vessel is maintained by a 3/8-inch thick carbit specified and gasketed top flang closure and state vessel is maintained by a 3/8-inch thick carbit specified and its manhamment. Closure of the containment vessel is maintained by a 3/8-inch thick carbit specified better in a state of the containment vessel is maintained by a 3/8-inch thick carbit specified better is a specified better in a state of the containment vessel is maintained by a 3/8-inch thick carbit specified better is a specified better in a state of the containment vessel is maintained by a 3/8-inch thick carbit specified better is a specified better is a specified better is threaded, having a 5/8-inch diameter bolt and lock nut. The gross weight of the packaging and contents is 490 pounds. 	9203			2	USA/9203/AF	1_1	3
B&W Fuel Company P.O. Box 11546 Lynchburg, VA 24506-1646 (a) Packaging (1) Model No.: DHTF (2) Description The packaging consists of a 14-gauge stainless steel containment vessel, S.5 Inches by 9.5 Inches by 17.5 Inches high, with a bolted and gasketed top flang closure and stainless steel welded bottom plate. The containment vessel is centered and supported in a 55-gallon DOT Specification T/C carbon steet draw by 16.5± 2 Hbs/ft' industrial cane fiberbaard. Closure of the containment vessel is maintained by a 3/8-inch thick carbo steel lid and 1/8-inch thick silicone rubber gasket secured with eight, 3/8-16NC by 15/12 long hax bolts and nuts. The outer 16-gauge lid is main with a 12-gauge beilt lacking ring with drop forged lugs, one of which is threaded, having a 5/8-inch diameter bolt and lock nut. The gross weight of the packaging and contents is 490 pounds. (3) Drawing The packaging is constructed in accordance with Babcock & Wilcox Company	of Federal F	legulatio	ns, Part 71, "Packaging	and Transportation of h	any requirement of the regulations of the U.S.	Department of Trans	
P.O. Box 11646 Lynchburg, VA 24506-1646 COCKET MUMBER 71-9203 COMPTINE (a) Packaging (1) Model No.: DHTF (2) Description The packaging corrests of a 14-gauge stainless steel containment vessel, 9.5 Vinches by 9.5 inches by 17.5 Inches high, with a bolted and gasketed top flang closure and stainless steel welded bottom plate. The containment vessel is centainment vessel is maintained by a 3/8-inch thick carb steel lid and 1/8-inch thick silicone rubber gasket secured with eight, 3/8-16NC by 1-1/2, Jong hex bolts and nuts. The outer 16-gauge belt with a 12-gauge belt acking ring with drop forged lugs, one of which is threaded, having a 5/8-inch diameter bolt and lock nut. The gross weight of the packaging and contents is 490 pounds. (3) Drawing The packaging is constructed in accordance with Babcock & Wilcox Company	6. ISSUED TO IN	larne enci A	(ddrass)	SAFETY ANALYSIS REPOR			ted
 (a) Packaging (1) Model No.: DHTF (2) Description The packaging consists of a 14-gauge stainless steel containment vessel, 9.5 inches by 9.5 inches by 17.5 inches high, with a bolted and gasketed top flang closure and stainless steel welded bottom plate. The containment vessel is centered and supported in a 55-gallon DOT Specification 17C carbon steet drum by 16.5± 2 lbs/ft° industrial cane fiberboard. Closure of the containment vessel is maintained by a 3/8-inch thick carbon steel lid and 1/8-inch thick silicone rubber gasket secured with eight, 3/8-16NC by 1-1/2 long hex bolts and nuts. The outer 16-gauge lid is maintained drop forged lugs, one of which is threaded, having a 5/8-inch diameter bolt and lock nut. The gross weight of the packaging and contents is 490 pounds. (3) Drawing The packaging is constructed in accordance with Babcock & Wilcox Company	P.0.	Box	11646	646 EAF	November 19, 1990, a		
 (a) Packaging (1) Model No.: DHTF (2) Description The packaging consists of a 14-gauge stainless steel containment vessel, 9.5 inches by 9.5 inches by 17.5 inches high, with a bolted and gasketed top flang closure and stainless steel welded bottom plate. The containment vessel is centered and supported in a 55-gallon DOT Specification 17C carbon steet drum by 16.5± 2 lbs/ft° industrial cane fiberboard. Closure of the containment vessel is maintained by a 3/8-inch thick carbon steel lid and 1/8-inch thick silicone rubber gasket secured with eight, 3/8-16NC by 1-1/2 long hex bolts and nuts. The outer 16-gauge lid is maintained drop forged lugs, one of which is threaded, having a 5/8-inch diameter bolt and lock nut. The gross weight of the packaging and contents is 490 pounds. (3) Drawing The packaging is constructed in accordance with Babcock & Wilcox Company	CONDITIONS This certificate	is condi	tional upon fulfilling th	e requirements of 10 CF	R Part 71, as applicable, and the conditions sp	ecified below.	
 Model No.: DHTF Description The packaging consists of a 14-gauge stainless steel containment vessel, 9.5 inches by 9.5 inches by 17.5 inches high, with a bolted and gasketed top flang closure and stainless steel welded bottom plate. The containment vessel is centered and supported in a 55-gallon DOT Specification 17C carbon steel dram by 16.5± 2 lbs/ft industrial cane fiberboard. Closure of the containment vessel is maintained by a 3/8-inch thick carbon steel lid and 1/8-inch thick silicone rubber gasket secured with eight, 3/8-16NC by 1-1/2 long hex bolts and nuts. The outer 16-gauge lid is main with a 12-gauge belt lacking ring with drop forged lugs, one of which is threaded, having a 5/8-inch diameter bolt and lock nut. The gross weight of the packaging and contents is 490 pounds. Drawing The packaging is constructed in accordance with Babcock & Wilcox Company 	i.		the state		0		
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 9.5 inches by 9.5 inches by 17.5 inches high, with a bolted and gasketed top flang closure and stainless steel welded bottom plate. The containment vessel is centered and supported in a 55-gallon DOT Specification 17C carbon steel drum by 16.5± 2 lbs/ft industrial cane fiberboard. Closure of the containment vessel is maintained by a 3/8-inch thick carbon steel lid and 1/8-inch thick silicone rubber gasket secured with eight, 3/8-16NC by 1-1/2 long hex bolts and nuts. The outer 16-gauge lid is maintained is threaded, having a 5/8-inch diameter bolt and lock nut. The gross weight of the packaging and contents is 490 pounds. (3) Drawing The packaging is constructed in accordance with Babcock & Wilcox Company 		(2)	Description		Lind VE3		
 steel lid and 1/8-inch thick silicone rubber gasket secured with eight, 3/8-16NC by 1-1/2 long hex bolts and nuts. The outer 16-gauge lid is may with a 12-gauge boit locking ring with drop forged lugs, one of which is threaded, having a 5/8-inch diameter bolt and lock nut. The gross weight of the packaging and contents is 490 pounds. (3) Drawing The packaging is constructed in accordance with Babcock & Wilcox Company 			9.5 inches top flang c containment Specificati	by 9.5 inches lesure and sta vessel is cen	by 17.5 inches high, with inless steel welded botto terred and supported in a	a bolted an m plate. Th 55-gallon D(nd gasketed he)T
(3) Drawing The packaging is constructed in accordance with Babcock & Wilcox Company			steel lid a 3/8-16NC by with a 12-g	nd 1/8-inch th 1-1/2 long he auge boit loci	nick silicone rubber gaske ex bolts and nuts. The ou king ring with drop forged	t secured wi ter 16-gauge lugs, one d	ith eight, e lid is mad
The packaging is constructed in accordance with Babcock & Wilcox Company			The gross w	eight of the p	backaging and contents is	490 pounds.	
		(3)	Drawing				
						bcock & Wil	cox Company

Page 2 - Certificate No. 9203 - Revision No. 2 - Docket No. 71-9203

(b) Contents

our probabilities

(1) Type and form of material

Dry uranium oxide pellets enriched to a maximum 4.1 w/o in the U-235 isotope. The maximum K/U atomic ratio, considering all sources of hydrogenous material within the containment vessel must not exceed 1.3. Pellets must be packaged in accordance with Babcock & Wilcox Company Drawing No. MS-216E, Rev. 1.

(2) Maximum quantity of material per package

The total contents not to exceed 275 pounds, with the U-235 content not to exceed 4.1 kilograms.

II and III

50

(c) Fissile Class

Corrugated Trays

Minimum transport index to be shown on label

Maximum number of packages per shipment for

Bagged Peltets

Minimum transport tudex to be shown on label

Maximum number of packages per shipment for Class III

- 6. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) The package must be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application.
 - (b) Each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application.
- 7. The eight, 3/8-inch containment vessel bolts must be torqued to 35 ft-lbs ±10% and the 5/8-inch closure ring bolt and lock nut must be torqued to 70 ft-lbs ±10%. Immediately following each loading of a package, the closure ring must be inspected to assure it is fully seated (engaged).
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 9. Expiration date: January 31, 1996.

Page 3 - Certificate No. 9203 - Revision No. 2 - Docket No. 71-9203

REFERENCES

401

B&W Fuel Company application dated November 19, 1990.

Date: JAN 2 3 1991

. UN

NO

Supplements dated: December 7 and December 10, 1990, and January 3 and January 11, 1991.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

EAR MacDonald, Chief es Ε.

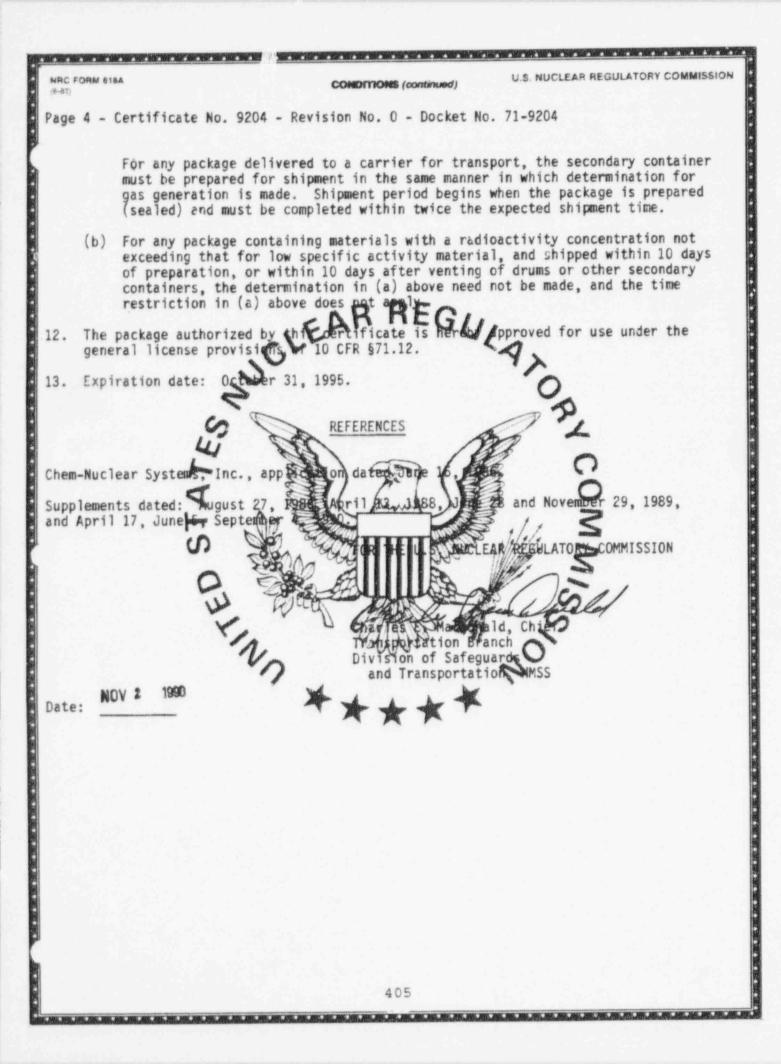
Transportation Branch Division of Safeguards and Transportation, MMSS

NC FORM 618	CERTIFICATE O	OF COMPLIANCE		TORY COMMISSIC
& CERTIFICATE NUMBER	b. REVISION NUMBER	. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	S. TOTAL NUMBER PAG
9204	0	USA/9204/B(U)	1_1	4
of Federal Regulations, Parl 71, "P b. This certificate does not relieve the applicable regulatory agencies, in	hat the packaging and contents described ackaging and Transportation of Radioac s consignor from compliance with any re cluding the government of any country t	quirement of the regulations of the U.S. through or into which the package will t	Department of Trans	
THIS CERTIFICATE IS ISSUED ON THE BA & ISSUED TO (Name and Address) Chem-Nuclear Systems,		HE PACKAGE DESIGN OF APPLICATION DENTIFICATION OF REPORT OF APPLICATION Chem-Nuclear Systems,]		applicati
220 Stoneridge Drive Columbia, SC 29210		lated June 16, 1986, as	supplement	.ed.
4. CONDITIONS This certificate is conditional upon fu	Ifilling the requirements of 10 CFR Part	71, as applicable, and the conditions sp	ecified below.	
5.	and the second s	0		
(a) Packaging	a Sar	And "1		
(1) Model No.	: CNS 10-160B	DAG C	2	
(2) Descripti	on State			
to traws upright foam impa	ical carbon steel and ort radioactive waste osition and is equippe oct limiters on the top is, shielding, and weig	material. The cask is d with steel encased, and bottom. The pack	transporte	d in the rethane
Casl	height	18 11 2	88 inches	
	outer diameter	78	-1/2 inches	
	cavity height	63	77 inches	
	cavity diameter	in consider realising	68 inches	
Uver	all package freight, wi all package diameter,	th impact limiters	130 inches	
	i shielding thickness		-7/8 inches	
	s weight		70 000 11-	
	backaging and contents)		72,000 1bs	
	imum weight of contents noring, and secondary c		18,000 lbs	
shell, a steel out 5-1/2-in optional steel the region be	body consists of a 1-1 1-7/8-inch thick lead ter shell. The inner a ch thick carbon steel b 12-gage stainless stee ermal shield surrounds tween the impact limit to each other around th	gamma shield, and a 2- and outer shells are we obtom plate. The cask al liner. A 12-gage st the cask outer shell i ters. The impact limit	inch thick ded to a cavity has ainless n the ers are	carbon
		402		

p			*****		
	NRC FORM 6 (8-63)	18A	CONDITIONS	(continued) U.S. N	UCLEAR REGULATORY COMMISSION
	Page 2 -	Cert	ficate No. 9204 - Revision No. 0	- Docket No. 71-92	04
			The cask lid is a 5-1/2-inch this 31-inch diameter opening equipper is sealed with a double silicone diameter bolts. The secondary 1 within the primary lid, and is s silicone O-ring and 12 equally s The space between the double O-r port for leak testing the primar	d with a secondary 0-ring and 24 equ id is 46 inches in ealed to the prima paced 1-3/4-inch d ing seals is provi	lid. The primary lid ally spaced 1-3/4-inch diameter, is centered ry lid by a double iameter bolts. ded with a test
			The optional cask drain and vent silicone O-ring seal DR	EGII,	with a plug and a
			The package is equipped with four shell, and two fifting lugs which lid is equipped with three lifting top impacts imiter and rain cover	h are removed fur ng lugs which are	ng transport. The peyered by the
		(3)	Drawing	assemble	The second secon
			The packaging is substructed and following Chem-Nuclear Systems Frawing Number C 110-D 29003-000 C 110-D 29003-000 C 110-D 29003-012 C 110-D 29003-012 C 110-D 29003-012 C 110-D 29003-012 C 110-D 29003-014 C 110-D 29003-014 C 110-D 29003-014 C 110-D 29003-014 C 10-D 29003-021 C 10-D 20003-021 C 10-D 2000-0000-00000000000000000000000000		ings OMM/SS
	(b)	Cont		r p	
		(1)	Type and form of materia	**	
			 Byproduct material in the f process solids, or solidifi containers; or 		
			(ii) Radioactive material in the	form of activated	reactor components.
		(2)	Maximum quantity of material per	package	
1			Type B quantity of radioactive m	aterial not to ex	ceed 2 000 times a

Type A quantity. Decay heat not to exceed 100 watts. Weight of contents, secondary containers, and shoring not to exceed 18,000 pounds. Contents may include fissile materials provided the mass limits of 10 CFR §71.53 are not exceeded.

NRC F (6-63)	ORM 618	5A			CONDITIO	WS (continued)		U.S. NUCLEAR	REGULATORY CO	MMISSION
Page	3 -	Certif	ficate No.	9204 - Rev	ision No.	0 - Docket	t No. 7	1-9204		
~	cont	ainers	s or activ	tting conte ated compor of transpo	ents and	ing must be the cask ca	e place avity t	d between to prevent i	the secondar movement dur	y ing
7.	8UNC 30 f	x 5-3 t-1bs	3/8" long (lubricat	hex cap scr	ews with ptional d	24, and th a flat wash rain and ve	ner, to	rqued to 3	by 12, 1-3/4 00 ft-1bs ± plugged	*-
8.	Lift	lugs	must be r	emoved from	the cask	pdeprior.	to tr	ansport.		
9.	In a	dditio	on to the	requirement	S of Subp	art G of id	UFK P	art 71:		
		Each	packaging		the Accep	tance Tests	and M	ipenance O	Program of	
	(b)	The p Opera	package mu ating Poop	st be prepa	red for s hapter 7	hipment and of the appl	opera licatio	n; and	ordance with	the
	(c)	repla	aced with	d, second new seals rs first	hid, and inspect	the option	ve eef	nt and dre	n seals mus ery 12 month	t be s,
10.	The	packag	ge m það be	leak test	off	ows:		1, 3	N	
	(a)	OT IC	OW SDECITI	C action L'LY	material		anspen	area by ella	INTIAG	
	(b)	with	Section 8	A of the	applicat	ich prior to thin the two replacement	co"firs	t ose of an	ny	
11.	(a)	radio and i follo	olytically measuremen	generate of ts or by an	combustibl alysis of	a represent	determ	package th	st be made by	
		(1)	no more t gases) of	han 5% by the second	olume (or lary conta	equivalent	t limit	s for other present at	ty that would r inflammable STP (i.e.,)	e
		(2)	to assure	that oxyge	en is limi	ask cavity i ted to 5% by ve hydrogen	y volu	me in those		nt
						404				



RC FORM 018 1-967 2 OFR 71		E OF COMPLIANCE	CLEAR REGULATORY CON	AMISSIC
A CERTIFICATE NUMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9206/B(U)F	d PAGE NUMBER . TOTAL NU	MBER PAG
of Federal Regulations, Part 71, "Packag b. This certificate does not relieve the cons applicable regulatory agencies, includin	ing and Transportation of Rad ignor from compliance with ar g the government of any cour	ny requirement of the regulations of the U.S. itry through or into which the package will b	Department of Transportation or	
A THIS CERTIFICATE IS ISSUED ON THE BASIS OF a ISSUED TO (Name and Address) Office of Facility Safety Analysis, EH-32 J.S. Department of Energy Mashington, DC 20585		REG (22206	tion dated	
4. CONDITIONS This certificate is conditional upon fulfilling	the requirements of 10 CFR I	Part 71, as applicable, and the cognitions sp	ecified below.	
20 PWR spent fur is approximately of the package including the fir is transported frame. The containment (ASME SA-350) c inches in diame is bolted to th B24, Class 1) b in a groove mac O-ring is provi access and vent a research inst penetrations ar The spent fuel	age is a selection is assemblies - 	ositioned within a 40 com	imiters atached, ter. The total we be of the contents 500 pounds. The c y designed shippin ged steel roximately 82.25 ches. The lid (ASME SA-540, Grad ring mounted ond metallic ask is provided wi orts and ive of these partment fuel bask	le ith
Each compartmen one-half of the stainless steel	t can accommodate compartments are inserts. Peript	a single PWR assembly. e loaded with spent fuel heral inserts fabricated basket and cask cavity w	During transport, and the remaining from an aluminum a	with

NRC FORM 618A (6-83)

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

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age 2 - Certificate No. 9206 - Revision No. 3 - Docket No. 71-9206

(a) (2) Continued 5.

> The cask is equipped with impact limiters made of balsa and redwood encased in carbon steel shells. The impact limiters have an outer diameter of 131 inches, an inner diameter of 91 inches, and a thickness ranging from 20 to 26 inches. Each impact limiter is attached to the cask by four 2.25-inch diameter bolts. The impact limiters are also connected to each other with fourteen 1.5-inch diameter tie rods.

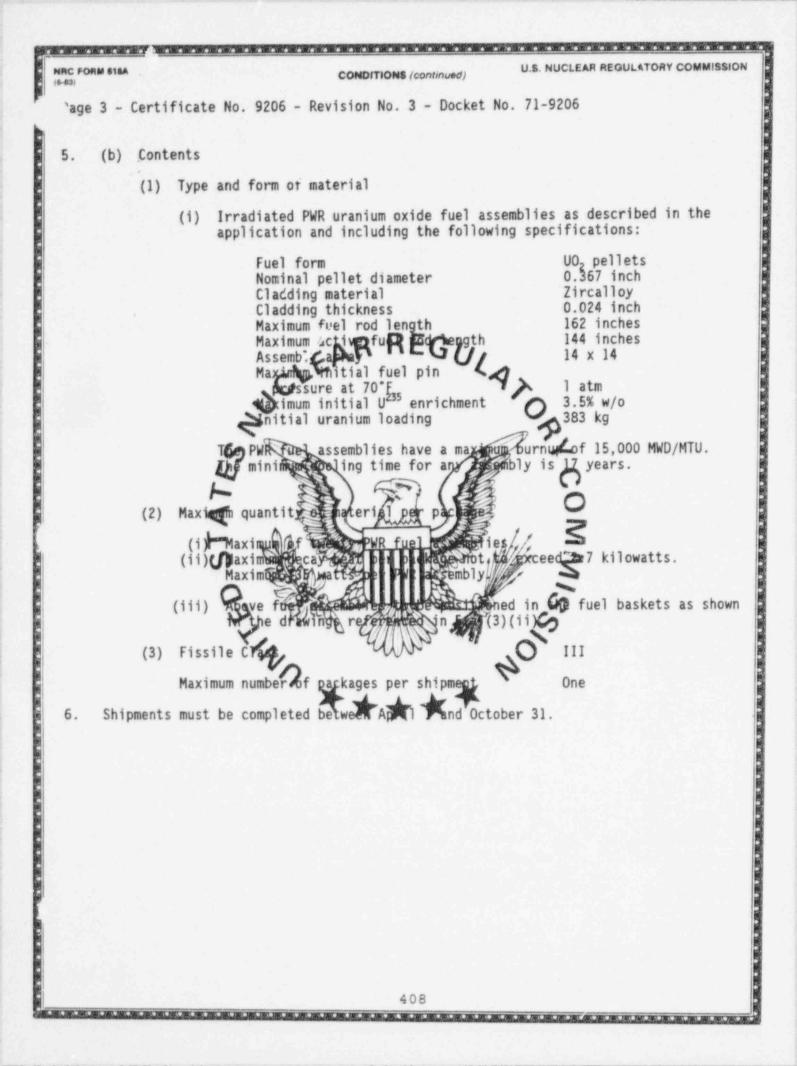
The cask has four lifting lugs welded to the lid, and four lifting/tiedown trunnions bolted to the cask body.

(3) Drawings



(ii) The fuel basket assembly is constructed in accordance with the following Transnuclear Drawings:

3024-150-28,	Rev.	0	Basket-General Arrangement
3024-150-29,	Rev.	0	Basket-Cross Section
3024-150-30,	Rev.	0	Basket-Plan View
3024-150-37,	Rev.	1	Peripheral Insert
3024-150-38,	Rev.	0	Fuel Replacement Insert



(6.85)

Page 4 - Certificate No. 9206 - Revision No. 3 - Docket No. 71-9206

7. Bolt torques:

- (a) The cask lid bolts must be torgued to 1120 ft-lbs.
- (b) The bolts used to secure the vent and drain port covers must be torqued to 50 ft-1bs.
- The bolts used to secure the upper gas sampling port transport plug (c) must be torgued to 30 ft-1bs.
- (d). The bolts used to secure the lower gas sampling port cover and port transport plug must be torqued to 15 ft-lbs.
- Known or suspected failed such a semprice Gods, and fuel with cladding defects 8. greater than hairline cracks are not authorized.
- In addition to the requirements of Subpart G of 10 CP Part 71: 9.
 - Each packaging must be prepared for shipment and operated in accordance with the operating procedures in Chapter 7 of the application. After loading, the cask must be captum dried and backfilled with nitrogen at one atmosphere as described in Chapter of the application. (a)
 - Each packaging must meet the Acceptance forts and Main Gance Program of Chapter 8 of the application from from the second (b)
 - The packaging mus application. hoe with Section .1.2.19 of the (c) bribe

REFERENCES

- The package autorized approved for use under 10. the general license provisions of the \$71
- Expiration Date: 31, 2000. 11.

1989 Transnuclear, Inc. application dated Aptemper A.

Supplements dated: March 7 and October 22, 1990; January 7 and February 11, 1991; November 7, 1994; and March 2 and 15, 1995.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Channel JOSS K

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport System Branch Division of Industrial and Medical Nuclear Safety, NMSS

Date: 04/21/95

RC FORM 618 1461 CFR 71			TE OF COMPLIANCE	NUCLEAR REGULAT	ORY COMMISSIC
& CERTIFICATE 9208	NURIBER	D. REVISION NUMBER	C PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAGE
of Federal b. This certifi applicable	Regulations, Part 71, "Packag cate does not relieve the cons regulatory agencies, includin	ing and Transportation of Ri signor from compliance with ig the government of any co	any requirement of the regulations of the U untry through or into which the package w	S. Department of Transp	
E ISSUED TO /	NTE IS ISSUED ON THE BASIS O Name and Address/	F & SAFETY ANALYSIS REPORT b. TITLE	OF THE PACKAGE DESIGN OR APPLICATION AND IDENTIFICATION OF REFORT OR APPLIC	ATION:	
One Harb	echnologies, Inc ison Way, Suite , SC 29212		NuPac Services, Inc., ap dated April 17, 1991, as P 71-9208 ET NUMBER		
This certificate	e is conditional upon fulfilling	the requirements of 10 CFF	Part 71, as applicable, and the conditions	specified below.	
(a) Pack (1) (2)	Model No.: 10- Description Steel encased, overall dimensi 130-inch height cylindrical she thick inner she 76-inch OD; The and 74-inch dia A stepped welde comprised of tw secondary lid o plate. Within secondary lid. the 29-inch lid sealed with a s inches in diame cask bottom and impact limiters limiters are 10 equipped with p the cask body a gauge 304 stain	ons of the cask. The cask cons lis surrounding li has a 66-incl base consists of meters. The base d lid, secured to a, 3-inch thick f similar constr the primary lid The 16-inch lid is secured by olid silicone f ter by 72 inches the lid is prov are located at -gauge steel sho lastic plugs. In d interior sur-	ask for solid radicactiv and impact limiters are sists of two concentric a 3-1/2-inch thick lead a ID, and the 1-inch thi of two, 3-inch thick wel- se is welded to the stee by 16, 1-1/2-5 UNC-2A st steel plates containing ruction with one additio there is a 16-inch or 2 i is secured by 8, 7/8-i 16, 1-1/4-inch studs and lat gasket. The contain s high. A plugged drain vided with a plugged tes the top and bottom of t eets filled with rigid p As an option, interior a faces of the upper lid m ding and seal welded.	112-inch dian carbon steel shield. The ck outer shell ded steel plat l cylindrical uds and nuts, an opening for nal 1-inch the 9-inch centered nch studs and nuts. The liment cavity is port is locat t port. Toro he cask. The olyurethane an nd exterior st ay be covered	neter by 1/2-inch 1 has a tes of 66- shells. is or a ick upper ed nuts and ids are s 66 ted at the idal impact nd are urfaces of with 12-
	Four skewed lug package gross w	is, welded to the	e outer shell are used f imately 68,000 pounds.	or tie-down.	The
(3)	Drawing				
	The Model No. 1				

Page 2 - Certificate No. 9208 - Revision No. 7 - Docket No. 71-9208

- (b) Contents
 - (1) Type and form of material
 - Dewatered, solid, or solidified waste which may be in secondary containers;
 - (ii) Activated components which may be in secondary containers; or
 - (iii) Dewatered, solid or solidified material, meeting the requirements for low specific activity material, which may be in secondary containers.
 - (iv) Dewatered or solidified ion exchange resin from light water reactors, in secondary containers.
 - (2) Maximum quantity of material per package

Decay heat not to exceed 400 watts. Fissile materials not to exceed the limits of 10 CFR §71.53. Maximum weight of contents, including dunnage and secondary containers, not to exceed 10,000 pounds.

For the contents specified in 5(b)(1)(i) and 5(b)(1)(ii):

Not to exceed a Type A quantity of transuranic materials.

- 6. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gales, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be not more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft³ at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package to be delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

(b) For any package containing materials with radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

Page 3 - Certificate No. 9208 - Revision No. 7 - Docket No. 71-9208

- 7. Except for close fitting contents, dunnage must be provided in the shipping cask cavity sufficient to prevent significant movement of the contents or secondary containers relative to the outer packaging under normal condition.
- 8. Bolt Torque:

The primary cask lid studs and nuts must be torqued to 300 ± 25 ft-lbs (lubricated).

The secondary cask lid studs and nuts must be torqued to 200 \pm 10 ft-lbs (lubricated).

- 9. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) Prior to each shipment, the packaging seals must be inspected. The seals must be replaced with new seals if inspection shows any defects or every 12 months, whichever occurs first. Cavity drain and test ports must be sealed with appropriate sealant applied to the pipe plug threads. The cask must be leak tested in accordance with the supplement dated November 24, 1992.
 - (b) The package must be prepared for shipment and operated in accordance with the operating procedures in Section 7.0 of the application; except that the package shall be leak tested in accordance with supplement dated November 24, 1992.
 - (c) Each package must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application; except that the package shall be leak tested in accordance with the supplement dated November 24, 1992.

10. Use of intumescent coating fire shield is not authorized.

- 11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 12. Expiration date: June 30, 1996.

REFERENCES

412

Nuclear Packaging, Inc., application dated April 17, 1991.

Supplements dated: May 24, 1991; November 24, 1992; May 19, 1993; and January 20, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

tais R. Chappall

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

MAY 2 4 1994

Date:

1(3FR 71	FOR RADIOACTI	TE OF COMPLIANCE	والمتعادية والمتعادية	
& CERTIFICATE NUMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAG
9210	1	USA/9210/B(U)	1 1	3
of Federal Regulations. Part 71, "Package b. This certificate does not relieve the con	ing and Transportation of Ra signor from compliance with a ig the government of any cou	any requirement of the regulations of the U.S. untry through or into which the package will b	Department of Trans le transported.	
Scientific Ecology Grou P.O. Box 2530 1560 Bear Creek Road Oak Ridge, Tennessee 37		Scientific Ecology Group, dated October 26, 1993, a REG/19/10	Inc., appl s supplemen	ication ted.
CONDITIONS This certificate is conditional upon fulfilling	the sequirements of 10 CFR	Part 71, as applicable, and the conditions sp	ecified below.	
surrounding a shell has a 66 the base consi 74-inch diamet a combination cask is provid is of a steppe plates of 76-i integral 6-inc through 16, 1- covers the 29- of stepped con secondary 1id strength bolts cask-primary 1 is also provid Two impact limiter polyurethane. 12-gauge 304-s covered by the steel thermal	is a solution of the cask stand two conce a 1/2 inch thick is of two, 3-in ers. The base i of fillet and fu ed with a primar d construction w nch diameter ho struction consis is secured to th High temperat id and the prima ed with an addit iters are locate s are lo-gauge s The inner surfa tainless steel. impact limiters shield. There i	ask for solid radioactive ask for solid radioactive mentation diameter by nuccearbon steel cylind ead shield. The 1/2-in ead shield. The 1/2-in ead shield to the steel sol weided to the steel sol block weided steel of a sweided to the steel cyl lipemetration groups well y lid and a secondary lid hich is made of two, 3-in 66-inch diameter joined strength bolts. The sec le at the center of the p ting of two, 3-inch thick e primary lid through 16, ure silicone gaskets are ry lid-secondary lid inte ional Neoprene seal. d at the top and bottom of tainless steel shells fil ces of the cask and the 1 The portion of the cask is covered with a 10-gau s a 1/4-inch gap between ined using 1/4-inch space	30-inch h pical shell th thick in 1 has a 76- tes of 66- indrical sh ds. The to . The prim ch thick st together to to the cask ondary lid plates. T 1-1/4 - 7 provided at rfaces. Th f the cask. led with ri id are clad body that i ge 304-stai the shell a	s ner inch OD; and ells by p of the ary lid eel form an body which is also he UNC high the e latter The gid with s not nless

NRC FORM 618A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
Page 2 -	Certificate No. 9210 - Revision No. 1 - Docket No. 71-9210
5.(a)(2)	Description (Continued)
	The package gross weight is limited to 68,000 pounds.
(3)	Drawings
	The packaging is constructed in accordance with Scientific Ecology Group, Inc., Drawing No. STD-02-106, Sheets 1 and 2, Rev. 1.
(b)	Contents
(1)	Type and form of material
	(i) Dewatered, solid, or son di ReEwote in secondary containers;
	(ii) Activated solid components in secondary containers; or
	(iii) Dewatered of solidified ion exchange resins for light water reactors in secondary containers.
(2)	Maximum quantity of material per package
	Greater than Type A contribues of radioactivezmaterials which may contain fissile quantities limiter to the amounts at exempted under 10 CFR §71.53. Not to exceed a Type A quantity of transuration materials except for the contents specified in Stor (1)(111) and materials of low opecific activity. Internal decay here not the exceed 400 water sails of low opecific activity. contents including secondary containers not to exceed 1000 pounds.
6.(a)	For any package control ing water and or organic substances which could radiolytically generate competences of termination must be made by tests and measurements or by enalosis of terresentative package such that the following criteria are met, ever a period of time that is twice the expected shimment time:
	(i) The hydrogen generated must be limited to a molar quantity that would be no more than 534 by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft ² at 14.7 psia and 70°F); or
	(ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.
	For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.
(b)	For any package containing materials with radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) does not apply.

IC FORM 6184 83)	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISS
Page 3	- Certificate No. 9210 - Revision No. 1 - Docket No. 71-9210
7. In	addition to the requirements of Subpart G of 10 CFR Part 71:
(a)	The package must meet the Acceptance Test and Maintenance Program of Section 8.0 of the application, as supplemented.
(b)	The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Section 7.0 of the application, as supplemented.
	containment vessel must be leak tested to 1.3×10^{-6} atm-cm ³ /sec (at the ndard conditions of ANSI N14.5):
	 prior to the first use of each package, after the package's thirPush E Guert, and within twelve months of the last leak left, and whenever gaskets are replaced.
tra 10 ⁻¹ has	or to each shipment, except when only low specific activity material is nsported as exceptive use, the containment system shall be tested to 5.0 x atm-cm/sec (at the standards conditions of ANSI NI4.5) to verify that it been properly assembled
10. The gen	package authorized by the certificate is they approved for use under the eral license provisions of 0/CFR 371.12.
11. Exp	iration date: December 2009.
Scienti	fic Ecology Coup, Inc. application and Octover 26, 193.
Supplem	ents dated: Abril 5 and October 31, 1994.
	FOR THE U.S. NUCLEON REGULATORY COMMISSION
	* * Call Dithel for
	Cass R. Chappell, Section Leader Cask Certification Section
	Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS
Date: _	Dec. 21, 94

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RC FORM	118		CERTIFICA FOR RADIOACT	TE OF COMPLIANCE	JCLEAR REGULATORY COMMISS
& CERTIFIC	ATE NUME	NER .	D. REVISION NUMBER	C.PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER . TOTAL NUMBER PA
9215			4	USA/9215/B(U)	1 3
of Fed	ertificate i Ieral Règu	lations, Part 71, "Packa	iging and Transportation of P	escribed in Item 5 below, meets the applicable st tadioactive Mater 'aL" I any requirement of the regulations of the U.S. puntry through or into which the package will	Department of Transportation or other
THIS CERT	IFICATE IS TO (Name	ISSUED ON THE BASIS	OF A SAFETY ANALYSIS REPOR	IT OF THE PACKAGE DESIGN OF APPLICATION E AND IDENTIFICATION OF REPORT OF APPLICAT	10N:
22301 P.O. I	Mt. E Box 68	ducts, Inc. phraim Road MD 20842		tron Products, Inc. appli tember 14, 1992, as suppl RE 71-9215	
4. CONDITIO This cett	NS ficate is c	onditional upon fulfillin	ng the requirements of 10 CF	R Part 71, as applicable, and the conditions sp	pecified below.
6.		5		0	
(a)	Packa	aging 2	-AC	15-5 -2	
	(1)	Model No.:	NPI-20WC-6 MKII	DO B	2
	(2)	Description	1、输(_	hund) [2]	0
		20WC-6 wood thick steel 3/16-inch t accomplishe	en overpack. Th spherical shell hick steel tube.	ded cask contained within he cask is 24 inches in di and a cavity formed by a Positive closure of the covers at each end of the DOO pounds.	ameter with a 3/8-inch n 8-1/4-inch ID by shielded cask is
	(3)	Drawings	Na	and and the second	
		Neutron Pro	o. NPI-20WC-6 Mk ducts, Inc. Draw Sheet 2 of 2, Re	II packaging is construct ving Nos. 240116, Rev. D, ev	ed in accordance with and 240122, Sheet 1 of
(b)	Conte	ents			
	(1)	Type and fo	orm of material		
		Cobalt-60 a radioactive		which meet the requireme	nts of special form

Page 2 - Certificate No. 9215 - Revision No. 4 - Docket No. 71-9215

(b) Contents (Continued)

6.

8.

- (2) Maximum quantity of material per package
 - For sources contained within drum assembly shown as Item 5 on Neutron Products, Inc. Drawing No. 240122, Sheet 1 of 2:

Maximum activity not to exceed 15,000 curies, maximum decay heat not to exceed 240 watts.

 (ii) For sources contained within drum assembly shown as Item 4 on Neutron Products, Inc. Drawing No. 240122, Sheet 2 of 2:

Maximum activity not to exceed 9,500 curies, maximum decay heat not to exceed 150 watts.

(iii) For sources contained within drum assembly shown as Item 2 on Neutron Products, Inc. Drawing No. 240122, Sheet 2 of 2:

Maximum activity not to exceed 6,300 curies, maximum decay heat not to exceed 100 watts.

In addition to the requirements of Subpart G of 10 CFR Part 71:

- (a) The package must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application.
- (b) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Section 7.0 of the application.

 The contents must be secured in the drum assembly so as to restrict movement in any direction to less than 0.25 inch, by lead, steel, or tungsten full diameter plugs and spacers.

The gross weight of the package must not exceed 6,000 pounds, and the inner shield cask shall be snug-fitting with the wooden overpack.

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Page 3 - Certificate No. 9215 - Revision No. 4 - Docket No. 71-9215

9. The packaging authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.

10. Expiration date: October 31, 1997.

REFERENCES

Neutron Products, Incorporated application dated September 14, 1992. Supplements dated: October 29, 1992, and November 17, 1993.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Lan R. Choppell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

FEB 1 7 1994 Date:

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NRC FORM 618 (6-65) 10 CFR 71			E OF COMPLIANCE		ICLEAR REGULAT	TORY COMMISSIC
1. & CERTIFICATE 9216	NUMBER	D. REVISION NUMBER	USA/9216/B		d. PAGE NUMBER	. TOTAL NUMBER PAG
2. PREAMBLE a. This certif of Federal	Regulations, Part 71, "Packaging	packaging and contents descr ng and Transportation of Radi	ibed in Item 5 below, meets the a oactive Material."	applicable sa		h in Title 10, Code
 b. This certif applicable 	icate does not relieve the consi regulatory agencies, including	nor from compliance with an the government of any coun	y requirement of the regulation try through or into which the p	s of the U.S. ackage will t	Department of Trans be transported.	portation or other
LISSUED TO A Chem-Nuclo 140 Stone	ATE IS ISSUED ON THE BASIS OF Name and Address/ ear Systems, Inc. ridge Drive SC 29210	Chem-Nuc	THE PACKAGE DESIGN OF APP TO IDENTIFICATION OF REPORT OF Clear Systems, Inc ovember 24, 1987, RECOUNTRY 71-9216	c. appl	ication	
4. CONDITIONS This certificat	e is conditional upon fulfilling.	he requirements of 10 CFR P	art 71, as applicable, and the c	onditions sp	ecified below.	
5.	100			0		
(a) Pack	aging 🖉	and the second se	100	7 P,		
(1)	Model No .: CNS	1-13G		C	5	
(2)	Description		* ((信号)	0	5	
	protective jack steel pallet. a silicone rubb	et encloses the The cask is clo er gasket and bo	oping cask. A dou cask during transp sed by a lead-fil lted closure. The cription is as fo	port. led fla e cavit	nged plug f y is equippe	itted with
		er, in ht, in eter, in ing, in jacket height, in jacket width, in	67.19 38.5 54.0 26.5 5.0 81.8 68.0 25,500	3.87		
(3)	Drawings					
	Drawing Nos.:	C-110-B-06402-00	accordance with (1, Rev. A; C-110- C-110-B-06402-004	8-06402	-002, Rev. /	ns, Inc. A;

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5. (b) Contents

(1) Type, form and maximum quantity of material per package

Plutonium in excess of 20 curies per package must be in the form of metal, metal alloy or reactor fuel elements; and

(i) Byproduct material and special nuclear material as solid metal or oxides. Decay heat not to exceed 600 watts. The radioactive material shall be in the form of fuel rods, or plates, fuel assemblies, or meeting the requirements of special form radioactive material.

U.S. NUCLEAR REGULA

500 gm U-235 equivalent mass; or C

(ii) Neutron sources meeting the requirements of special form radioactive material.

500 gm U-235 equivalent mass. Decay heat not to exceed 50 watts; or

(iii) Irradiated Pu02 and U02 fuel rods clad in Zircalley or stainless steel. Decay heat not to exceed 600 watts All feel rods shall be contained within a closed 5-inch Schedule to pipe with a maximum useable length of 39-5/8 inches.

1,200 gm fissile material with no more than 300 gm fissile material per 5-incm Schedule 40 pipe:

- Process solids, either dewatered, solid, or solidified in a secondary sealed container meeting the requirements for low specific activity radioactive material.
- (v) Solid nonfissile irradiated metal hardware, reactor control rods (blades), reactor start-up sources, and segmented boron carbide tubes (tube contents not to exceed a Type A quantity).
- (vi) Radioactive (Hot Cell) waste materials immobilized with cement grout and contained in a 55-gallon for extended 55-gallon drum) DOT Specification 17H or 17C steel drum, lid and closure. The Waste material must be packaged in accordance with the Procedural Outline of the Immobilization of Cell Waste Using Cement Grout, Attachment D of the application. The cement grout must be at least 50 volume percent (estimated) of the drum contents and relatively uniformly distributed throughout the drum. At least 3/4" thick layer of grout must cover all radioactive waste contents. Decay heat not to exceed 100 watts, and fissile material not to exceed 500 grams U-235 equivalent mass.

5. (c) Fissile Class

III

Page 3 - Certificate No. 9216 - Revision No. 3 - Docket No. 71-9216

Maximum number of packages per shipment

(i) Contents 5.(b)(1)(i), 5.(b)(1)(ii),5.(b)(1)(iii), or 5.(b)(1)(vi):

Two (2)

- The U-235 equivalent mass is determined by U-235 mass plus 1.66 times U-233 mass plus 1.66 times Pu mass.
- 7. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time.
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft³ at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

- (b) For any package containing materials with radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
- For packaging of neutron sources, the cavity drain line must be closed with a plug with a melting temperature of 200°F and the cask cavity must be dry before delivery of the package to a carrier.
- 9. For packaging of other than neutron sources, the cask must be delivered to a carrier dry and the cavity drain line must be closed with a plug which will maintain its seal at temperatures up to at least 620°F.
- For the shipment of irradiated metal hardware, the use of the auxiliary shielded inner container and shoring plug shown in Chem-Nuclear Systems, Inc. Drawing Nos. 8651-E-02, Rev. A and 8651-C-01, Rev. B is authorized. The inner container must be provided with vent and drain lines.

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		U.S. NUCLEAR REGILATORY COMMIDSION	STRU.
NHC FOR	M 6184	CONDITIONS (continued)	
Page	4 - Cer	tificate No. 9216 - Revision No. 3 - Docket No. 71-9216	
11.	Shoring conditi	must be provided to minimize movement of contents during accident ons of transport.	
12.	In addi	tion to the requirements of Subpart G of 10 CFR Part 71:	
	(a) T N	he package shall be prepared for shipment and operated accordance with Chem- uclear Systems, Inc. Operating Procedures, Section 7.0.	
	T	rior to each shipment the silicone rubber lid gasket(s) must be inspected. his gasket(s) must be replaced if inspection shows any defects or every welve (12) months, whichever occurs first. Cavity drain line must be sealed ith appropriate sealant applied to threads of pipe plug.	
	1	rior to each shipment the baseplate to cask shell weld must be visually nspected in accordance with Chem-Nuclear Systems, Inc. Operating Procedures, ection 7.0.	
	(d) T M	he packaging must meet Chem-Nuclear Systems, Inc. Acceptance tests and aintenance Program, Section 8.0.	
13.	For pac from th	kaging of neutron sources, 50 times measured neutron dose rate at one meter e surface of a cask must be less than 1,000 mrem/hr.	
14.	railroa	tents described in S(b)(1)(iv) must be transported on a motor vehicle, d car, afroraft, inland water crafts, or hold or deck of a seagoing vessel d for sole use of the licensee.	
15.	The pac general	kage authorized by this certificate is hereby approved for use under the license provision of 10 EFR \$71.12.	
16.	Expirat	ion date: December 31, 1997.	
		REFERENCES	
Chem	-Nuclear	Systems, Inc. application dated November 24, 1987.	
Supp	lement d	lated: November 24, 1992.	
		FOR THE U.S. NUCLEAR REGULATORY COMMISSION	
		Charles Mar Devall	
		Charles E. MacDonald, Chief Transportation Branch	
		Division of Safeguards and Transportation, NMSS	
		DEC 1 6 1992 Transportation, NMSS	
Date			and the second se

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RC FORM 515 36) OFR 71			TE OF COMPLIA	NCE	ICLEAR REGULA	TORY COMMISSI
· CERTIFICATE NUMB	ER	D. REVISION NUMBER	C. PACKAGE IDENTIFIC	9217/AF	d PAGE NUMBER	e. TOTAL NUMBER PA
of Federal Regul	ations, Part 71, "Packag loes not relieve the cons	e packaging and contents des ing and Transportation of Ra lignor from compliance with a g the government of any cou	dioactive Material."	ulations of the U.S.	Department of Trans	
THIS CERTIFICATE IS		F A SAFETY ANALYSIS REPORT	OF THE PACKAGE DESIGN	OR APPLICATION		
Siemens P P.O. Box	ower Corporat	da	REG []-	, 1987, as		
CONDITIONS This certificate is co	nditional upon fulfilling	the requirements of 10 CFR	Part 71, as applicable, an	d the constions sp	ecified below.	
(2)	Model No. A Description A uranium oxi a 16-gauge st bolted and ga inner vessel long, 16 gaug welded to the inch thick st top of the in inner vessel The inner vess nuts at each with drop for container ins	NF-250 de powdet he Het est inner vessel sketed top flang is centered and e steel drug of inner vessel at eel flange and a per vessel with and outer contai sel is closed by end. The outer ged lugs and a 5 ert is positione ght of the packa	11-12 mode supported in a twelve 1/4-ing the tex and t 76-gauge same n the outen co ner is filled six 1/2-inch container is c As-inch diamet d within the i	s 10 by 57 steel welds 22 1/2-if diameter he botton r band posi ntainer. with vermic square shar losed with er bolt and nner vesse	A inches ad bottom pl h ID by 68- spring stee of the vesse ition and su the annulus culite. hk studs wit a 12-gauge l lock nut.	ate. The 3/8-inch 1 rods 1. A 3/8- pport the between the between the locking rin A product
(3)	Drawings					
	(i) The pack Corporat 2, and 3	aging is constru ion Drawing No.	cted in accord EMF-306,175 R	ance with S -9 (Revis	Siemens Powe ion No. 9),	er Sheets 1,

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NRC FORM 618A (6-83)			CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
Page 2 - 0	Certificat	e No. 9217 - Re	vision No. 3 - Docket	No. 71-9217
	(3) Draw	ings (cont'd)		
	(11)	with Advanced	duct container insert Nuclear Fuels Corporat 5, Sheet 2, Rev. 1, an	is constructed in accordance ion Drawing No. ANF-607,244, d Sheet 3, Rev. 2.
	(111)	constructed in Drawing No. AN	accordance with Advan F-306,176, Rev. 1 and 1	uct suitcase, respectively, are ced Nuclear Fuels Corporation Siemens Nuclear Power Sheets 1 and 2, Rev. 4.
(b)	Contents			
	(1) Type	and form of MG	AR REGU	
	(1)	Dry uranum ox U-235 Dotope.	ide powder enriched to	maximum 5.0 w/o in the 1149 H considering all in the inner vessel.
		sources of the	and a maximum mass of rogenous material with	A
	(111)	the U-235 isot	il ets enriched total	haximum of w/o in
	(iv)	(Manium Kide Isotope op A	Part of the start of	window of Sw/o in the U-235
		mum quant the en	winds and a	33
	(i)		ts described in 5(b)(1)	
		The contends n	ot to exceed the follow	wing:
		Maximum Enrichment <u>(wt% U-235)</u>	Hax um Uranium Mass (kg U)	Maximum U-235 Mass <u>(kg U-235)</u>
		3.4 3.8 4.6 5.0	62.4 55.1 41.6 36.9	2.2 2.1 2.0 1.9
		The contents m described in 5	ust be contained in pro (a)(3)(ii).	oduct container
	(ii)	For the conten	ts described in 5(b)(1)(ii):
		content not to	ents not to exceed 120 exceed 6 kg. The con tainer described in 5(tents must be contained

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6-83)	616A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
Page	3 -	Certificate No. 9217 - Revision No. 3 - Docket No. 71-9217
		(iii) For the contents described in 5(b)(1)(iii):
		The total contents not to exceed 120 kg U, with the U-235 content not to exceed 1.2 kg. The contents must be contained in product container described in $5(a)(3)(iii)$.
		<pre>(iv) For the contents described in 5(b)(1)(iv):</pre>
		The total contents not to exceed 120 kg U, with the U-235 content not to exceed 1.2 kg. The contents must be contained in product container described in $5(a)(3)(ii)$.
	(c)	Fissile Class EAR REGUL I and II
		Fissile Class EAR REGUL I and II (1) Minimum Tracsfort Index to be shown on label for Fissile Class II (1) Minimum Tracsfort Index to be shown on label for Fissile Class II (1) Minimum Tracsfort Index to be shown on label for Fissile Class II (1) Minimum Tracsfort Index to be shown (1) Minimum Tracsfort Index to be shown (2) (1) (1) and limited in (3) (2) (1):
		For Contents described in 5(b) (ii) and limited in 5(b) (ii):
		(2) Fissile Classical and the second described in S(b) (1) (iii) and limited in S(b) (1) (iv) and limited in (b) (1) (iv) and limited in (b) (2) (iv)
6.	In a	addition to the requirements of Subpart G of 10 CFR Part 71:
	a.	The package must be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7 of the application.
	b.	The packaging must meet the Acceptance Tests and Maintenance Program in Chapter 8 of the application.
7.		package authorized by this certificate is hereby approved for use under the ral license provisions of 10 CFR §71.12.
Expi	ratio	n date: January 31, 2000.

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NRC FORM 618A

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

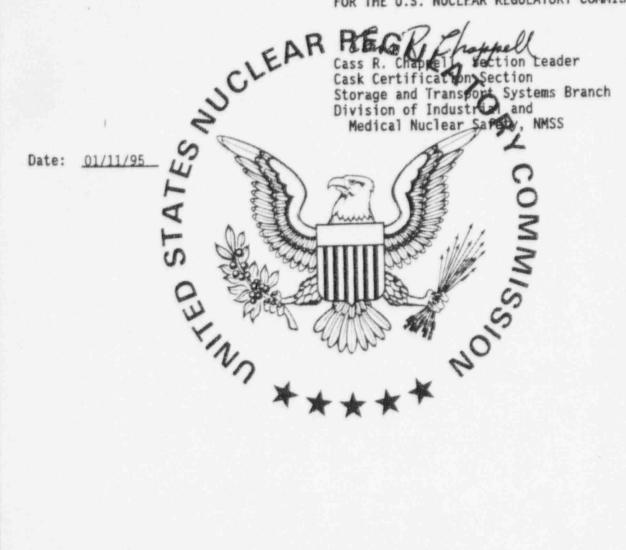
Page 4 - Certificate No. 9217 - Revision No. 3 - Docket No. 71-9217

REFERENCES

Advanced Nuclear Fuels Corporation application dated October 12, 1987. Supplements dated: February 2, March 10, July 20, and December 7, 1989; and March 16, 1990.

Siemens Power Corporation application dated October 20, 1994. Supplements dated: December 19, December 20, and December 30, 1994, and January 5 and January 10, 1995.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION



486) C2F91 71	FOR RADIOACTIV	E OF COMPLIANCE /E MATERIALS PACKAGES	1	. TOTAL NUMBER PAGES
A GERTIEICATE MUMBER	6 REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9218/B(U)F	d. PAGE NUMBER	4
of Federal Regulations, Part 71, "Packa	aging and Transportation of Rad	ribed in Item 5 below, meets the applicable si lioactive Material." hy requirement of the regulations of the U.S htry through or into which the package will	Department of Trans	
THIS CERTIFICATE IS ISSUED ON THE BASIS	OF A SAFETY ANALYSIS REPORT (OF THE PACKAGE DESIGN OR APPLICATION NO IDENTIFICATION OF REPORT OF APPLICAT	rion:	
Department of Energy Transportation & Packag Safety Div., EH-33.3 Washington, DC 20585		ear Packaging Inc. applied March 3, 1989, as supp REG ₇₁₋₉₂₁₈	cation lemented.	
CONDITIONS This certificate is conditional upon fulfilli	ng the requirements of 10 CFR	Part 71, as applicable, and the conditions a	pecified below.	
designed to transuranic stainless s containwent less steel urethane for package is approximate weighs not contents of The OCA has ring. The seal). The	s steel and polyur waste. The pack teel inner contain assembly (OCA) outer containment am and a 1/4 to 3 a right circular by 94 inches diam more than 19,250 7,265 pounds. a domed lid whic OCV containment so OCV is equipped of	ethane form insulated sh aging consists of an unv mment vessel (ICV), posi onsisting of an unvented vessel (OCV), a 10-inch /8-inch thick outer stai cylinder with outside di eter and 122 inches heig pounds when loaded with h is secured to the OCA eal is provided by a but with a seal test port an	of contact- ented, 1/4- tioned with 1/4-inch th thick layer nless steel mensions of ht. The par the maximum body with a yl rubber O d a vent por	handled inch thick in ar outer hick stain- r of poly- shell. The ckage allowable locking -ring (bore rt.
dimensions height. Th ICV contain The ICV is are placed The cavity	of the ICV are ap ne ICV lid is secu- ment seal is prov equipped with a security in the top and bo	cylinder with domed ends proximately 73 inches di red to the ICV body with ided by a butyl rubber O eal test port and vent p ttom domed ends of the I contents is a cylinder s height.	ameter and 9 a locking 1 -ring (bore ort. Alumin CV during sl	98 inches ring. The seal). um spacers nipping.

NRC FORM 618A **CONDITIONS** (continued) U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9218 - Revision No. 6 - Docket No. 71-9218

5.(a) Packaging (continued)

Drawings (3)

> The packaging is constructed in accordance with Nuclear Packaging Inc. Drawing No. 2077-500 SNP, Sheets 1 through 11, Rev. K.

> The contents are positioned within the packaging in accordance with Nuclear Packaging Inc. Drawing Nos. 2077-007 SNP, Rev. C, and 2077-008 SNP, Sheets 1 and 2, Rev. C.

Contents (b)

(6-83)

(1)

Type and form of materia R REGU, Dewatered, sold of solidified transuranic and tritium-contaminated wastes. Wastes must be packaged in 55-gallon downs, standard waste boxes (SWB), or bins. Wastes must be restricted to perhibit explosives, corrosives, nonradioactive phrophorics and pressonized containers. Within Within a drum, oin of SWB, radioactive pyrophories must not exceed 1 percent by weight and free liberids must not exceed topercent by volume. Flammable organics are limited to 500 ppm in the pracspace of any drum, bin or SWB.

Maximum quantity of the terial per packate (2)

> Contents not to exceed 165 pounds so using shoring and secondary containers, interno her pounds per/55-galten drum and 4,000 pounds per SWS

Maximum number of the EN+ SED ge and authorized packaging as follows configurations and

- 4 55-gallon Hours (i)
- (ii)
- (iii)
- (iv)
- 2 SWBs, each SWB containing one bin, 2 SWBs, each SWB containing one bin, 2 SWBs, each SWB, containing 4 55-gallon drums, 1 ten-drum Alerneck (MOOP), containing 10 55-gallon drums, (v)
- 1 TDOP, containing 1 SWB, (vi)
- 1 TDOP, containing 1 bin within an SWB, or (vii)
- (viii) 1 TDOP, containing 4 55-gallon drums within an SWB.

Fissile material not to exceed 325 grams Pu-239 equivalent with no more than 200 grams Pu-239 equivalent per 55-gallon drum or 325 grams Pu-239 equivalent per SWB. Pu-239 equivalent must be determined in accordance with Appendix 1.3.7 of the application.

Decay heat not to exceed the values given in Tables 6.1 through 6.3 "TRUPACT-II Content Codes", (TRUCON), DOE/WIPP 89-004, Rev. 8.

(c) Fissile Class

1

NRC FORM 618A U.S. NUCLEAR REGULATORY COMMISSION CONDITIONS (continued)

Page 3 - Certificate No. 9218 - Revision No. 6 - Docket No. 71-9218

- Physical form, chemical properties, chemical compatibility, configuration of 6. waste containers and contents, isotopic inventory, fissile content, decay heat, weight and center of gravity, radiation dose rate must be determined and limited in accordance with Appendix 1.3.7 of the application, "TRUPACT-II Authorized Methods for Payload Control", (TRAMPAC).
- Each drum, bin or SWB must be assigned to a shipping category in accordance with 7. Table 5, "TRUPACT-II Content Codes", (TRUCON), DOE/WIPP 89-004, Rev. 8, or must be tested for gas generation and meet the acceptance criteria in accordance with Attachment 2.0, to Appendix 1.3.7 of the application.
- Each drum, bin or SWB must be labeled to indicate its shipping category. All 8. A Reckar Euglishe of the same shipping category. Al drums, bins or SWB's within
- Each drum, bin, SWB, on TOOP must be equipped with filtered vents prior to shipment in accordance with Appendix 1.3.7 of the application. Drums which were 9. not equipped with filtered vents during storage must be aspirated before shipment. The misimum aspiration time must be determined from Tables 7.1 through 9.3 in "RUPACT-II Content Codes", (TRUCON), DOBANIPP 89-004, Rev. 8.
- In addition to the requirements of Subpart 6 00 DE CFR Part 71: 10.
 - Each package must be prepared for shipment and operated in accordance with the procedures described in Chapter 7 10 "Operating Procedures", of the (a) application.

和理心思心思心思心思心思心能心思心能心思心思心思心思心思心思心思心思心思心能心能心能心能心能心能心能

- Each rickage and be tested and maintained in accordance with the procedures descended in the sale of "Accentance Tests and Mainten Program of the sale icetion. (b) "Acceptance Tests and Maintenance
- The contents of each package must be in accordince with sppendix 7.4.3., 11. "Payload Control Procedures", of the and ication.
- Prior to each shipment, the lid and vent port search on the inner and outer containment vessels must be leak tested to 1 x 10⁻⁴ std cm³/sec in accordance with Chapter 7.0, "Operatil Procedures", of the application. 12.
- 13. All free standing water must be removed from the inner containment vessel cavity and the outer containment vessel cavity before shipment.
- 14. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 15. Expiration date: June 30, 1999.

(6-83)

NRC FORM 618A (6-83)

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

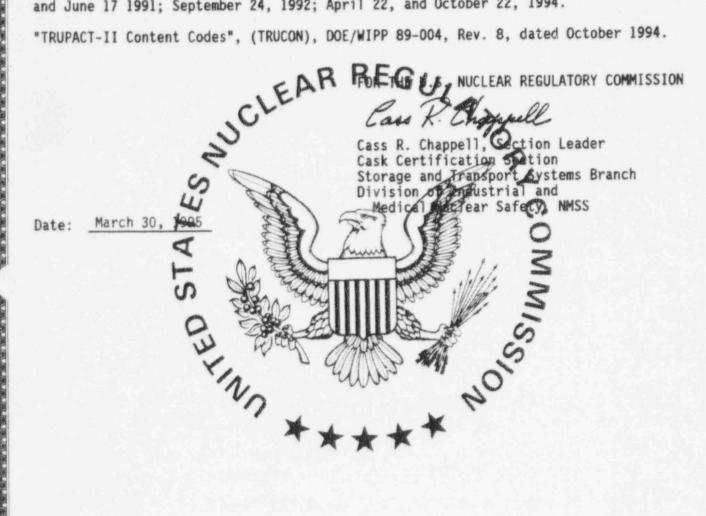
Page 4 - Certificate No. 9218 - Revision No. 6 - Docket No. 71-9218

REFERENCES

Safety Analysis Report for the TRUPACT-II Shipping Package dated March 3, 1989.

Supplements dated: May 26, June 27, June 30, August 3, and August 8, 1989; April 18, July 10, July 25, August 24, and December 20, 1990; April 11, April 29, and June 17 1991; September 24, 1992; April 22, and October 22, 1994.

"TRUPACT-II Content Codes", (TRUCON), DOE/WIPP 89-004, Rev. 8, dated October 1994.



U.S. NUCLEAR REGULATORY COMMISSION S-850 10 CFR 71 CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIALS PACKAGES								
LE CERTIFICATE NUMBER	b	REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMB		e. TOTAL NUMBER PAG			
9221		1	USA/9221/B()F		3			
of Federal Regulations,	Part 71, "Packaging a	from compliance with a	mbed in Item 5 below, meets the application lioactive Material." Iny requirement of the regulations of the ntry through or into which the packag	e U.S. Department of Tran				
THIS CERTIFICATE IS ISSUED a. ISSUED TO (Nome and Addin		FETY ANALYSIS REPORT	OF THE PACKAGE DESIGN OR APPLICAT	ON PLICATION:				
U.S. Departme Division of N Washington, D	laval Reactor		Safety Analysis for Shipping Cask NRBK- Canch 11, 1968 as s	41, 42 and 43				
CONDITIONS This certificate is condition	hal upon fulfilling the	requirements of 10 CFR	Part 71, as applicable, and the conditi	ons specified below.				
5. (a) Pac	kaging 🔶		0					
(1)	Model No .:	NRSK-41		2				
(1)	Hoder No	C.C.	1322					
(2)	Descriptio	in the last	To 188					
	casks for has an out The outer cayity is provided withick stat The cask i elastomete shield whi surface of thermal sh welded to stainless recess is for the bo 48-inch so	the shrament side diameter shell is 1/2- 5 inches in d ith a bottom nless steel a s closed by a r O-ring gask d, 1/4-inch t Ch provides a the cask out ield. A one- the bottom of steel plate w welded to the ttom surface uare, all wel	lead shielded 304L s of irradiated test sp of 27.16 inches and inch thick stainless iameter by 16 inches drain. The cavity sh nd is shielded by 10 lead-filled flanged et and bolted closure mick; stainless steel 1/16-inch air gap be er shell and the insi inch thick stainless Mask. A second one- ith a 1/8-inch deep, first plate to provi of the cask. The cas ded, "I" beam skid. y 9,000 pounds.	ecimens. The is 40 inches h steel. The ca deep and is ell is 1/4-incl inches of lead plug fitted wi . The cask has outer thermal tween the oute de surface of steel plate is inch thick 25.5-inch diam de a thermal si k is bolted to	cask igh. sk h th an s a r the eter hield a			
(3)								
	Memorial I Sheet 2 of	nstitute Draw	ucted in accordance w ing No. 41-0001, Shee d Westinghouse Electr v. A.	t 1, Rev. A and				

Page 2 - Certificate No. 9221 - Revision No. 1 - Docket No. 71-9221

- 5. (b) Contents
 - (1) Type and form of material

Byproduct and special nuclear material in solid form, contained within the MIN-41 product container. The MIN-41 container is constructed in accordance with Westinghouse Electric Corporation, Drawing No. 2D77456.

(2) Maximum quantity of material per package

The fissile contents of the package must be limited to a maximum of 350 equivalent grams of U-235. The number of equivalent grams of U-235 is determined by the equation: 1.0 x grams U-235 + 1.4 x grams U-233 + 1.6 x grams plutanium. The maximum decay heat load per package must not exceed 900 Btu/br for an exclusive use shipment or 250 Btu/hr for a non-exclusive use shipment.

- (c) Fissile Class
- 6. In addition to the requirements of Subpart 6 of 10 CFR Part 71:
 - (a) The MIN-41 container must be tested for leak tightness within one year prior to use to a minimum sensitivity of 10 atm-cm/sec.
 - (b) Prior to each shipment, the MIN-41 container myst be leak tested after assembly to a minimum sensitivity of 10" atm-cm/sec.
- 7. The NRBK-41 shipping container may be covere with a wrapping of polyvinyl chloride (PVC) during shipment provided the shipment is made in a closed vebicle. The applicable requirement: of 10 CFR §71.87 must be satisfied prior to wrapping the shipping container.
- 8. Expiration date: January 31, 1996.

Page 3 - Certificate No. 9221 - Revision No. 1 - Docket No. 71-9221

RC FORM 8184

REFERENCES*

Safety Analysis for Radioactive Material Shipping Cask No. NRBK-41, 42 and 43 dated March 11, 1968.

Supplements: Division of Naval Reactors letters S# 1458 dated June 19, 1968; S# 1570 dated September 19, 1968; S# 1597 dated September 19, 1968; S# 1658 dated October 22, 1968; S# 1681 dated November 7, 1968; S# 1690 dated November 22, 1968; S# 1903 dated March 19, 1969; S# 2000 dated June 2, 1969; S# 2509 dated June 10, 1970, and Bettis Atomic Power Laboratory letter WAPD-CL(IH)-733, dated October 10, 1968, and Division of Naval Reactors letters Z# 85-1605 dated April 1, 1985; S# 86-3305 dated February 3, 1986; and S# 86-3332 dated June 16, 1986, and Bettis Atomic Power Laboratory letter WAPD-D(RAS)-526 dated June 20, 1986; and Division of Naval Reactors letters 5#87-2738 dated September 18, 1987; and Naval Reactors letter S#90-12,039 dated December 24, 1990.

* See Docket No. 71-5814 FOR THE U.S. NOCLEAR REGULATORY COMMISSION harles E. MacDonald, Chief ransportation Branch ision of Safeguards and mansporbation, NMSS FEB 1.2 Date:

<pre>14 CEMPTHCATE MANNEE</pre>	C FORM 618 86) CFR 71			E OF COMPLIANCE		TORY COMMISSIO
Present index is induced to certify that the packaging and contents described in them 5 below, meets the applicable safety standards set forth in Title 10, C • The certificate is induced to certify that the packaging and Transportation of Reduced Transportation of Reduced Transportation of Reduced Transportation of the U.S. Department of Transportation of the use of the regulations of the U.S. Department of Transportation or or explicitly expresses. Including the government of any country through or into which the package will be transported. I THE CENTRICATE IS INDUCE ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OF APPLICATION	CERTIFICATE NUMBE	R	5. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAG
 The certificate is issued to certify that the packaging and contents described in them 5 below, meets the applicable and publications with any requirement of the regulations of the U.S. Department of Transportation of a populations, part 17, "Packaging and Transportation of a population of the use of the use		9222	3	USA/9222/A	1 1	4
 applicable regulatory spencies, including the government of any country through or into which the package will be transported. This optimizate is BBLED on the BABB or a Safety ANALTBB REPORT of the ANDADE DEBIDIN OF APPLICATION a BBLED TO MANE WAY ADAIL b TILE AND IOENTIFICATION OF REPORT OF A PACKAGE DEBIDIN OF APPLICATION b TILE AND IOENTIFICATION OF REPORT OF A PACKAGE DEBIDIN OF APPLICATION b TILE AND IOENTIFICATION OF REPORT OF A PACKAGE DEBIDIN OF APPLICATION b TILE AND IOENTIFICATION OF REPORT OF A PACKAGE DEBIDIN OF APPLICATION b TILE AND IOENTIFICATION OF REPORT OF A PACKAGE DEBIDIN OF APPLICATION b TILE AND IOENTIFICATION OF REPORT OF A PACKAGE DEBIDIN Scientificate as conditional upon fulfilling the regularments of 10 CFR Pert 71, as applicable, and the coorditions specified below (a) Packaging (1) Model No.: 14-235 (2) Description Steel encased lead sbielded cask for Yow specific activity material. The cask is a right circular cylinder with a 77.25 Thich ID by 80.25 in H caskity. The outside diameter of the cask contain a lead thickness of 1.88 inches encased in 0.38 inch thick inner steel shell and 0.88-inch thick outer steel shell. The way is off the cask contain a lead thickness of 1.88 inches encased in 0.38 inch thick inner steel shell and 0.88-inch thick outer steel shell. The top Cover and cask bottom are made up of two steel plates with thickness of 220 inches. The primary lid and is secured to the primary lid with eight, 3/4-inch Stdes and nuts. Each lid is provided with a Neprene gasket seal. The cask is provided with a 12-gauge stainless steel Three faces wielded along all edge), a lid wi line with pipe plug, and a 3/4-inch drain line and pipe plug. The cast is provided with four equally spaced lifting/tie-down devices. The primary lid is provided with the lifting lugs and the secondary lid provided with one lifting lug. The cask gross weight is 58,400 pound: (3) Drawings The package is fabricated in accordance with Scientific Ecology	a. This certificate is of Federal Regula	ations, Part 71, "Packaging	g and Transportation of Rad	loactive Material."		
 a Bound to Name and Address? b Title AND IDENTIFICATION OF RECENT ON APACOLIDAR Scientific Ecology Group, Inc. 1560 Bear Creek Road Dak Ridge, TN 37831-2530 CONDITIONS This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the codditions specified below. (a) Packaging (1) Model No.: 14-215 (2) Description Steel encased lead shielded cask for low specific activity material. The cask is a right circular cylinder with a 77.25 finch ID by 80.25-in THE walls of the cask is 83-5 inches with a 92.25 inch height. The walls of the cask is 83-5 inches with a 92.25 inch height. The walls of the cask contain a lead thickness of 1.88 inches encased in 0.38 inch thick finner steel shell and 0.88-inch thick outer steel shell. The top cover and cask bottom are made up of two steel plates with thickness of 20 inches. The primary cask lid secured to the cylindrical cask body by eight, 1-1/4-inch rachet binders. A secondary lid is centered in the primary lid and is securi to the primary lid with eight, 3/4-inch Studs and nuts. Each lid is provided with a Nepprese gasket seal. The cask is provided with a 12-gauge stainless steel Three fiscal welded along all edges), a lid wi line with pipe plug, and a 3/4-inch drain line and pipe plug. The cas is provided with one lifting lug. The cask gross weight is 58,400 pound is provided with one lifting lug. The cask gross weight is 58,400 pound (3) Drawings The package is fabricated in accordance with Scientific Ecology Group Inc. Drawing No. STD-02-077, Sheets 1 and 2, Rev. 10. 	 b. This certificate d applicable regula 	des not relieve the consignatory agencies, including t	nor from compliance with an the government of any cour	ty requirement of the regulations of the U.S try through or into which the package will	be transported.	sportation or other
 December 14, 1987, as supplemented. December 14,			SAFETY ANALYSIS REPORT C	OF THE PACKAGE DESIGN OR APPLICATION ND IDENTIFICATION OF REPORT OR APPLICA	FION:	
 CONDITIONS This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the codditions specified below. (a) Packaging (1) Model No.: 14-215 (2) Description Steel encased lead shielded cask for few specific activity material. The cask is a right circular cylinder with a 77.25-inch ID by 80.25-in IH cayity. The outside diameter of the cask is 32.5 inches with a 92.25-inch height. The walls of the cask contain a lead thickness of 1.88 inches encased line 0.33 tack thick timer steel shell and 0.88-inch thick outer steel shell. The top cover and cask bottom are made up of two steel plates with thickness of 2.0 inches. The primary cask lid is secured to the cylindrical cask body by eight, 1-1/4-inch rachet binders. A secondary lid is centered in the primary lid and is secure to the primary lid, with eight, 3/4-inch studia and nuts. Each lid is provided with a Newprene gasket seal. The cask is provided with a 12-gauge stainless steel There iseal welded along all edges), a lid willine with pipe plug, and a 3/4-inch drain line and pipe plug. The cast is provided with four equally spaced lifting/tie-down devices. The primary lid is provided with four equally spaced lifting lugs and the secondary lid provided with one lifting lug. The cask gross weight is 58,400 pounds (3) Drawings (3) Drawings No. STD-02-077, Sheets 1 and 2, Rev. 10. The optional shield inserts are fabricated in accordance with Scientific Ecology Group. 	560 Bear Cr	eek Road		REG/14, 1987, as sup		
 (a) Packaging (1) Model No.: 14-215 (2) Description Steel encased lead shielded cask for low specific activity material. The cask is a right circular cylinder with a 77.25-rnch ID by 80.25-in IH cavity. The outside diameter of the cask is 83.5 inches with a 92.25 inch height. The walls of the cask contain a lead thickness of 1.88 inches encased in 0.38-inch thick inner steel shell and 0.88-inch thick outer steel shell. The top cover and cask bottom are made up of two steel plates with thickness of 2.0 inches. The primary cask lid secured to the cylindrical cask body by eight, 1-1/4-inch rachet binders. A secondary lid is centered in the primary lid and is secure to the primary lid with eight, 3/4-inch studs and nuts. Each lid is provided with a Nepprene gasket seal. The cask is provided with a 12-gauge stainless steel Ther iseal welded along all edges), a lid veline with pipe plug, and a 3/4-inch drain line and pipe plug. The cas is provided with four equally spaced lifting/tie-down devices. The primary lid is provided with three lifting lugs and the secondary lid provided with one lifting lug. The cask gross weight is 58,400 pounds (3) Drawings (3) Drawings Nearch in accordance with Scientific Ecology Group Inc. Drawing No. STD-02-077, Sheets 1 and 2, Rev. 10. 	CONDITIONS This certificate is co	nditional upon fulfilling th	e requirements of 10 CFR F	× 2)	pecified below.	
 (1) Model No.: 14-215 (2) Description Steel encased lead shielded cask for lew specific activity material. The cask is a right circular cylinder with a 77.25 inch ID by 80.25 in IH cavity. The outside diameter of the cask is 83.5 inches with a 92.25 inch height. The walls of the cask contain a lead thickness of 1.88 inches encased in 0.38 inch thick inner steel shell and 0.88-inch thick outer steel shell. The top cover and cask bottom are made up of two steel plates with thickness of 2.0 inches. The primary cask lid secured to the cylindrical cask body by eight. 1-1/4-inch rachet binders. A secondary lid is centered in the primary lid and is secure to the primary lid with eight, 3/4-inch studs and nuts. Each lid is provided with a Neopreze gasket seal. The cask is provided with a 12-gauge stainless steel Three iseal welded along all edges), a lid væ line with pipe plug, and a 3/4-inch drain line and pipe plug. The cas is provided with four equally spaced lifting/tie-down devices. The primary lid is provided with three lifting lugs and the secondary lid provided with one lifting lug. The cask gross weight is 58,400 pounds (3) Drawings (3) Drawing No. STD-02-077, Sheets 1 and 2, Rev. 10. The optional shield inserts are fabricated in accordance with Scientific Ecology Group. 		Cos		0		
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The package is fabricated in accordance with Scientific Ecology Group Inc. Drawing No. STD-02-077, Sheets 1 and 2, Rev. 10. The optional shield inserts are fabricated in accordance with Scientific		IH cavity. 92.25-inch 1.88 inches thick outer two steel p secured to binders. A to the prim provided wi 12-gauge st line with p is provided primary lid	The outside dia height. The wa encased in 0.34 steel shell. lates with thick the cylindrical secondary lid ary lid with eight any lid with eight an Neoprene ga ainless steel T ipe plug, and a with four equa- is provided with	ameter of the cask is 83 Ils of the cask contain 3-inch thick inner steel The top cover and cask b kness of 2.0 inches. Th cask body by eight, 1-1 is centered in the prima ght, 3/4-inch studs and asket seal. The cask is iner (seal welded along 3/4-inch drain line and 11y spaced lifting/tie-d th three lifting lugs an	inches wi a lead thick shell and C ottom are ma e primary ca /4-inch rach ry lid and i nuts. Each provided wi all edges), pipe plug. own devices. d the second	ith a kness of 2.88-inch ade up of ask lid is het is secured lid is ith a a lid vent The cask The dary lid is
Inc. Drawing No. STD-02-077, Sheets 1 and 2, Rev. 10. The optional shield inserts are fabricated in accordance with Scienti	(3) Drawings				
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						Scientific
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o. b) Contents

7.

- (1) Type and form of material
 - Dewatered, solids, or solidified waste, meeting the requirements for low specific activity material, in secondary containers; or
 - (ii) Activated solid components meeting the requirements for low specific activity material, in secondary containers.
- (2) Maximum quantity of material per package

Greater than Type A quantity of radioactive material which may contain fissile material provided that the fissile material does not exceed the limits in 10 CFR §71.18 and §71.22. The decay heat load is limited to 9 watts.

- 6. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft² at 14.7 psia and 70°r); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

(b) For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

Maximum gross weight of the contents, secondary containers, shield inserts and shoring is limited to 20,000 pounds.

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- Except for close fitting contents, shoring must be placed between secondary containers and the cask cavity to minimize movement during normal conditions of transport.
- 9. The lid and shield plug lifting lugs must not be used for lifting the cask, and must be covered in transit.
- 10. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) Prior to each shipment, the packaging Neoprene lid seals must be inspected. The seals must be replaced within twelve (12) months prior to shipment. Also, seals must be replaced with new seals if inspection shows any defects. Cavity drain and vent lines must be sealed with appropriate sealant applied to the pipe plug threads.
 - (b) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Section 7.0 of the application and Scientific Ecology Group, Inc. supplement dated May 16, 1990.
 - (c) Each cask must meet the Acceptance Tests and Maintenance Program of Section 8.0 of the application. In addition, the cask must be leak tested within twelve (12) months prior to shipment and each seal must be leak tested after replacement in accordance with Paragraph 8.1.3 of the application.
- 11. The cask body and each lid must be marked in accordance with 10 CFR §71.85(c).
- 12. The packages authorized by this certificate must be transported on a motor vehicle, railroad car, aircraft, inland watercraft, or hold or deck of a seagoing vessel assigned for the sole use of the licensee.
- Optional shield inserts may be used as needed. The optional shield inserts must be fabricated in accordance with Scientific Ecology Group, Inc., Drawing No. STD-02-086, Revision 0.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.

15. Expiration date: March 31, 1999.

Page 4 - Certificate No. 9222 - Revision No. 3 - Docket No. 71-9222

REFERENCES

Hittman Nuclear application dated December 14, 1987.

Hittman Nuclear supplements dated: January 26, March 25, and June 10, 1988.

Scientific Ecology Group, Inc. supplements dated: April 3 and May 16, 1990; January 26, June 10, and October 4, 1993; and February 3, February 25, and March 2, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cars K. Chappell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

MAR 2 3 1994

Date:

96) OFR 71	CERTIFIC	CATE OF COMPLIANCE	NUCLEAR REGULA	
& CERTIFICATE NUMBER	5. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PA
9224	2	USA/9224/A	1	3
of Federal Regulations, Part 71, "Pac	chaging and Transportation	ts described in Item 5 below, meets the applicab of Radioactive Material." with any requirement of the regulations of the ny country through or into which the package	U.S. Department of Trans	
THIS CERTIFICATE IS ISSUED ON THE BAS a. ISSUED TO (Name and Address)	IS OF A SAFETY ANALYSIS RE	PORT OF THE PACKAGE DESIGN OR APPLICATION TITLE AND IDENTIFICATION OF REPORT OR APPLI	N CATION:	
Scientific Ecology Gr P.O. Box 2530	oup, Inc.	Scientific Ecology G application dated Mag		
1560 Bear Creek Road Oak Ridge, TN 37831-	2530 54	DOCKET NUMBER 71-9224		
CONDITIONS This certificate is conditional upon fulfi	illing the requirements of 10	O CFR Part 71, as applicable, and the condition	ns specified below.	
	1900 C. 200	0	0	
(a) Packaging	10 C	0	2	
(1) Model Nos.	: HN-190-2	S AL	0	
(2) Descriptio	m 51/	~ (\] []	0	
The cask i inches in inches in inner stee steel shel welded tog to the inn welded to The lid is and welded are sealed flange, po binders. two, 2-inc	s a right circu diameter. The diameter. The l shell, a 1-37 l. Each base i gether to form a ner and outer st the immer and o s comprised of t d together to ma by a Neoprene ositive closure The lid contain ch thick steel p d. The shield p	ded cask for low specific lar cylinder 81-1/2 inche cask cavity is 73-3/8 incl cask side walls consist of 4-inch lead shell, and a s comprised of two, 2-inch 4-inch thick base which ceel shells of the side wa buter steel shells of the two, 2-inch thick steel pl ate with the steel flange. gasket located between th of the lid is accomplished is a centrally located shi plates and one, 1-inch thi plug is sealed by a Neopre are used to provide positi	s high by 81-3 hes high by 75 f a 3/8-inch t 7/8-inch thick h thick steel is integrally 11. A steel f side wall at t ates which are The cask clo e lid and stee d by eight rac eld plug compr ck steel plate ne gasket, and	/4 -1/2 hick outer plates welded lange is he top. stepped sures l het ised of stepped

	NRC FORM 616A (6-63)	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
	Page 2 - Ce	rtificate No. 9224 - Revision No. 2 - Docket No. 71-9224
Contraction of the local division of the loc	5. (a) (3)	Drawing
		The Model No. HN-190-2 packaging is fabricated in accordance with Hittman Nuclear & Development Corp. Drawing Nos.: STD-02-080, STD-02-081, and STD-02-082, all Rev. O.
	(b)	Contents
	(1)	Type and form of material
		Process solids, either dewatered, solid or solidified, meeting the requirements for low specific activity material, in secondary containers.
	(2)	Maximum quantity of material per package
		Greater than Type A quantity of radioactive material which may contain fissile material provided the fissile material does not exceed the limits in IO CFR §71.53. The weight of the contents and secondary containers shall not exceed 14,200 pounds and the internal decay heat load shall not exceed 7 watts.
	6. (a)	 For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time: (i) The hydrogen generate? must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., po more than 0.063 g-moles/ft³ at 14.7 psia and 70°F); or
		(ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.
		For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.
	(b)	For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
	. Excep conta trans	t for close fitting contents, shoring must be placed between secondary iners and the cask cavity to prevent movement during normal conditions of port.
		439

U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A **CONDITIONS** (continued) Page 3 - Certificate No. 9224 - Revision No. 2 - Docket No. 71-9224 The lid and the shield plug lifting lugs must not be used for lifting the cask, and must be covered in transit. In addition to the requirements of Subpart G of 10 CFR Part 71: Prior to each shipment, the packaging lid seals if opened (or if (a) security seal is broken), must be inspected. The seals must be replaced with new seals if inspection shows any defects or every twelve (12) months, which ever occur first. Cavity drain line and optional vent/test connection must be sealed with appropriate sealant applied to the pipe plug threads. Each packaging must meet the Acceptance Tests and Maintenance Program of (b) Section 8.0 of the application. In addition, the cask must be leak tested at least once every twelve (12) months in accordance with Subsection 8:1.3 of the application.

- The package shall be prepared for shipment and operated in accordance (c) with the Operating Procedures of Section 7.0 of the application.
- The cask body and each cask fid must be marked in accordance with 10 CFR 10. §71.85(c).
- The package authorized by this certificate must be transported on a motor 11. vehicle, railroad car, aircraft, inland watercraft, or hold or deck of a seagoing vessel assigned for the sole use of the licensee.
- The package authorized by this certificate is hereby approved for use under 12. the general license provisions of 10 CFR §71.12.
- Expiration date: June 30, 1998. 13.

-REFERENCES

Scientific Ecology Group. Inc., application dated May 18, 1993.

Supplement dated: June 23, 1993.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

L'halspell

Cass R. Chappell, Section Leader Cask Certification Section Transportation Branch Division of Industrial and Medical Nuclear Safety, NMSS

JUL 0 9. 1993.

Date:

(6-83)

8.

9.

RC FORM 818		CERTIFICAT	E OF COMPLIANCE	UCLEAN REGULA	TORY COMMISSIO
CFR 71		POR RADIOAC IT	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAGE
& CERTIFICATE NUMBER	9225	8	USA/9225/B(U)F	1	6
of Federal Regulation	ns, Part 71, "Packaging an i not relieve the consignor t ry agencies, including the p UED ON THE BASIS OF A SAI	rensponation of Rad from compliance with an government of any cour	ribed in Item 5 below, meets the applicable ioactive Material." hy requirement of the regulations of the U. htry through or into which the package will of THE PACKAGE DESIGN OR APPLICATION NO IDENTIFICATION OF REPORT OR APPLICATION	5. Department of Tran I be transported.	
655 Engin Suite 200 Norcross,	national, Inc. eering Drive GA 30092	Nu da	Iclear Assurance Corporated March 24, 1995, as	tion applica supplemented	ation 1.
This certificate is cond	itional upon fulfilling the n	equirements of 10 CFR	Part 71, as applicable, and the conditions	specified below.	
(a) Pack (1) (2)	Description A steel encase transport one rods, up to 42 overall dimens long by 65 inc in length and	PWR assembly, MTR fuel ass ions of the p hes in diamet 44 inches in s in diameter t.	ed shipping cask. The two BWR assemblies, up emblies, or up to 25 in ackage, with impact lin er. The cask body is a diameter. The cask cav . The volume of the ca	to 15 metal dividual PWF iters, are 2 pproximately ity is 178 i	lic fuel rods. The 22 inches 200 inches
	shell, a 5-3/4 stainless stee and outer shel end forging. inch diameter steel plate an stainless stee forging with t O-ring. A sec test the seal. fill and drain O-rings. The neutron sh shell with 0.5 is 164 inches	inch thick 1 louter shelf ls are welded The cask bott lead disk enc d bottom end l stepped des welve 1-inch ond teflon O- Other penet ports, which ield tank con 0-inch thick long and 5 in	3/4-inch thick stainle ead gamma shield, a 1-1 , and a neutron shield to a 4-inch thick stai om consists of a 3-inch losed by a 3-1/2 inch t forging. The cask lid ign, secured to a 14-1/ diameter bolts. The ca ring and a test port ar rations in the cask cav are sealed with port consists of a 0.24-inch the end plates. The neutro (water solution that is	<pre>/5 inch thic tank. The i nless steel thick, 20-3 hick stainle is 11.3-inch 4 inch thick sk seal is a e provided t ity include overs and te ick stainles n shield reg n shield tan</pre>	roximately er k nner bottom 4 ess thick cring n metallic the eflon s steel jion k
	shell, a 5-3/4 stainless stee and outer shel end forging. inch diameter steel plate an stainless stee forging with t O-ring. A sec test the seal. fill and drain O-rings. The neutron sh shell with 0.5 is 164 inches	inch thick 1 louter shelf ls are welded The cask bott lead disk enc d bottom end l stepped des welve 1-inch ond teflon O- Other penet ports, which ield tank con 0-inch thick long and 5 in	ead gamma shield, a 1-1 , and a neutron shield to a 4-inch thick stai om consists of a 3-inch losed by a 3-1/2 inch t forging. The cask lid ign, secured to a 14-1/ diameter bolts. The ca ring and a test port ar rations in the cask cav are sealed with port co sists of a 0.24-inch th end plates. The neutro	<pre>/5 inch thic tank. The i nless steel thick, 20-3 hick stainle is 11.3-inch 4 inch thick sk seal is a e provided t ity include overs and te ick stainles n shield reg n shield tan</pre>	roximately ner kk nner bottom 4/4 ess thick cring n metallic to leak the eflon ss steel non

U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A CONDITIONS (continued) (6-83) Page 2 - Certificate No. 9225 - Revision No. 8 - Docket No. 71-9225 (a) (2) Description (continued) 5. The cask is equipped with aluminum honeycomb impact limiters. The top impact limiter has an outside diameter of 65.25 inches and a maximum thickness of 27.8 inches. The bottom impact limiter has an outside diameter of 60.25 inches and maximum thickness of 28.3 inches. Both impact limiters extend 12 inches along the side of the cask body. The maximum weight of the package is 52,000 pounds and the maximum weight of the contents and basket is 4,000 pounds. (3) Drawings accordance with the following Nuclear (i) The packaging constructed in Assurance Corporation Drawings: ack Assembly 9-40-01, Rev. 2 LWT 3 LWT 15-40-02, Rev. 4 Bood Assembly LWT 315 40 03, Rev. 9, (Sheets 1 Transport Cask Body 6) 315-40-06 Rev. Cask Lid Assembly Upper Impact Limiter Lower Impact Limiter Nev. WT 315-40-08 Rev. Cask Carts Detail eet Backaging Und Calle ane constructed in accordance with Drawing Bev., 6 / (Sheets 1 - 6). onstructed in accordance with the (ii)fue Comparation Dravings: owing Read PWR Backet Spacer IW 315-40-10, 315-40-10, 215-40-09. LWT Rev. PWR Backet LWT Rev. asket Assembly LWT 315-0 12, Rev. Metal Fuel Basket Assembly 3 LWT 315-40-045 Rev, 42 MTR Element Base Module LWT 315-40-046, Re 42 MTR Element Intermediate Module LWT 315-40-047, Rev. 42 MTR Element Top Module 42 MTR Element Cask Assembly LWT 315-40-048, Rev. 0 28 MTR Element Base Module LWT 315-40-049, Rev. 1 LWT 315-40-050, Rev. 1 28 MTR Element Intermediate Module LWT 315-40-051, Rev. 1 28 MTR Element Top Module LWT 315-40-052, Rev. 0 28 MTR Element Cask Assembly

NRC FORM 618A (6-83)

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

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5. (b) Contents

(1) Type and form of material

(i) Irradiated PWR or BWR uranium oxide fuel assemblies, MTR fuel assemblies, or individual PWR rods of the following specifications:

	PWR	BWR	MTR	PWR Rods
Fuel form	Clad UO ₂ pellets	Clad UO2	Cladded Plates	Clad UO ₂ pellets
Nominal pellet diameter, in.	0. OSLEA	0.487	Cladded Plates 04021 (active fuel thickness)	0.3659
Cladding material	Fircalloy-4	Zircalloy-4	Aluminum	Zircalloy-4
Nominal cladding thickness, in.	0.022	0.032	207.0145 C	0.0242
Maximum fuel rod length, in.	162	1 Rund S	42.64	160
Issembly array	15 15	inin	Parallel 2	25 Rods (max.)
Maximum assembly weight, lbs	1,650		216.0	n/a
Maximum initial fuel pin pressure at 70°F, psig	1 A	565	n/alol?	565
Initial U ²³⁵ enrichment, w/o	3.7 (max	A. Comanter 1	80-94	5.0 (max.)
Maximum initial U content/assembly, kg	475	186	0.377	58.2
Maximum average burnup, MWD/MTU	35,000	30,000	550,000*	60,000**
Minimum cooling time	2 yr.	2 yr.	3 yr.*	150 days
	NICTO L. CH		the minimum cool	time of

The maximum burnup for NISTR is 642,000 MWD/MTU, with a minimum cool time of 会 3.5 years.

** Up to two of the 25 PWR rods may have a maximum burnup of 65,000 MWD/MTU

NRC FORM 518A

5.

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 4 - Certificate No. 9225 - Revision No. 8 - Docket No. 71-9225

- 5. (b) (1) (continued)
 - (ii) Metallic fuel rods containing natural enrichment uranium pellets with aluminum cladding 0.080 inches thick. The fuel pellet diameter is 1.36 inches and the maximum fuel rod length is 120.5 inches. The maximum weight of uranium per rod is 54.5 kg with a maximum average burnup of 1,600 MWD/MTU and a minimum cooling time of one year.
 - (b) (2) Maximum quantity of material per package

Not to exceed 4,000 pounds, including contents and fuel assembly basket.

- (i) For the content described in Icom 5. (b)(1)(i): one PWR assembly or two BWR essemblies positioned with notine respective fuel assembly basket Maximum decay heat not to except 2.5 kilowatts per PWR assembly or 1.1 kilowatts per BWR assembly
- (ii) For the contents described in Item 5 (b) (1)(i): up to 15 intact modilic funl rods positioned within the appropriate basket. Maximum deray heat not to exceed 0.036 kitchatts per rod. Total weight of all rods not the exceed 1.805 pourses
- (iii) for failed men Vic fuel upds of the type described in Item
 - (A) Up to six mentsters containing one defective metallic fuel rod percentister. The unisters are 2.75-ince I.D. failed fuel rod canistics as comments to be enabled for the percention brawing No. 340-rosed, dev. To and are chaced in Osix-hole liner as shown on Nuclear Associate Corporation Drawing No. 315-040-43, Rev. 1. The maximum decay heat load for a defective metallic fuel rod is whited to 5 watter or
 - (b) Up to three canisters containing either up to three defective metallic anel tods per lands or up to 10 failed fuel filters per canister. The canisters are 4.00-inch I.D. failed fuel rod canisters as shown on Nuclear Assurance Corporation Drawing No. 340-108-D1, Rev. 10, and are placed in a three-hole basket as shown on Nuclear Assurance Corporation Drawing No. 315-40-12, Rev. 3. The weight of the filters is limited to 125 pounds per canister. For canisters containing fuel rods, the maximum decay heat load is 15 watts per canister; and for canisters containing filters, the maximum decay heat load is 5 watts per canister. Plutonium content of the filters not to exceed 20 curies plutonium per package.
- (iv) For MTR fuel assemblies as described in Item 5.(b)(1)(i): up to 42 fuel assemblies positioned within an MTR fuel assembly basket. For NISTR fuel the 42 fuel assemblies may be cut in half, producing 84 fuel bearing sections. Maximum decay heat not to exceed 1.26 kilowatts per package and 30 watts per fuel assembly.

U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A **CONDITIONS** (continued) 6-83 Page 5 - Certificate No. 9225 - Revision No. 8 - Docket No. 71-9225 (continued) ã. (b) (2) (v) For PWR rods as described in Item 5.(b)(1)(i): up to 25 intact individual rods in a Type 304 stainless steel spacer canister with a wall thickness of at least 0.12 inches positioned within the PWR or BWR basket. Maximum decay heat not to exceed 1.41 kilowatts per package. (c) Fissile Class For Metallic Fuel Rods, MTR fuel assemblies, (1)and up to 25 PWR Rods: EGULA For BWR and PWR Lesento III (2) Maximum number of packages in Fissile Class III shipment: One Known or suspected ailed fuel assemblies (rods) and fuel with cladding defects greater than pin holes and hairline cracks are not authorized, except as described in Item 5.(b)(2)(01). 6. to a canrier for transport. The cask must be dry (no pres water) man deriv 7. 8. Bolt torque: < The cask lids bolts must be trauled port covers must be torqued to The bolts used to secure 100 inch-1bs. Prior to each shipment, the package mast be level tested to 1 x 10^{-3} std cm³/sec, except that replaced seals must be leak tested to 5.5 x No⁻³ std cm³/sec. Prior to first use, after think use, and at least once within the 12-month period prior to each subsequent use, the package must be leak tested to 5.5 x 10^{-7} std cm³/sec. 9. In addition to the requirements of Submart For OCFR Part 71: 10. (a) The metallic O-ring seal must be replaced prior to each shipment; and (b) Each package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application; and The package shall be prepared for shipment and operated in accordance with the (c) Operating Procedures of Chapter 7 of the application, as supplemented, except that replaced seals must be leak tested to 5.5×10^{-7} std cm³/sec. If the cask is loaded under water or water is introduced into the cask cavity, the cask must be vacuum dried as described in Chapter 7 of the application. The cask cavity must be backfilled with 1.0 atm of helium when shipping PWR or BWR assemblies.

U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A **CONDITIONS** (continued) (6-83) Page 6 - Certificate No. 9225 - Revision No. 8 - Docket No. 71-9225 When shipping PWR, BWR, or MTR assemblies, or individual PWR rods, the neutron 11. shield tank must be filled with a mixture of water and ethylene glycol which will not freeze or precipitate in a temperature range from -40 °F to 250 °F. The water and ethylene glycol mixture must contain at least 1% boron by weight. A personnel barrier must be used when shipping PWR or BWR assemblies. Shipments of 12. MTR fuel assemblies or individual PWR rods must use the ISO container or a personnel barrier. Packages used to ship metallic fuel rods may be shipped in a closed shipping 13. container provided that the closed container, the cask tie-down and support system and transport vehicle (trailer) meet the applicable requirements of the Department of Transportation. When the cask is therefore a closed shipping container, the center of gravity of the combined cask, closed shipping container and trailer must not exceed 75 inches. The package authorized by this certificate is hereby approved for use under the 14. general license provisions of 10 CFR §71.12. 15. Expiration Date: Gebruary 28. 2000. REFERENCE NAC International, C., application dated March and 0 Supplements dated: May 12 REGULATORY COMMISSION R. Chappell, Schion Leader Package Certification Section Spent Fuel Project Office Office of Numear Material Stety and Safeguards SEP 1 5 1995 Date:

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NRC FORM 616 (8-86) 10 CFR 71	CERTIFICA FOR RADIOACT	TE OF COMPLIANCE	ICLEAR REGULAT	ORY COMMISSI
1. & CERTIFICATE NUMBER	b. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	. TOTAL NUMBER PAR
of Federal Regulations, Part 71, "Pac b. This certificate does not relieve the c	aging and Transportation of Re	USA/9228/B(U) F scribed in Item 5 below, meets the applicable sa adioactive Material." any requirement of the regulations of the U.S. untry through or into which the package will t	Department of Trans;	
a ISBUED TO (Nerve and Address) General Electric Comp. Vallecitos Nuclear Ce P.O. Box 460, Valleci Pleasanton, CA 94566	any Ger dat tos Road	r of the PACKAGE DESIGN OR APPLICATION AND IDENTIFICATION OF REPORT OR APPLICATION theral Electric Company app ted May 19, 1988, as suppl REG19228 ET NUMBER	lication emented.	
 CONDITIONS This certificate is conditional upon fulfill 	ing the requirements of 10 CFF	Part 71, as applicable, and the conditions sp	ecified below.	
walled ov overall d inches in gross et The cask cylindric 304 stain shells is approxima inches. inches de	incased lead shift erhadi with succie imensions are and diameter. The sa that of the parkage is constructed of the shells (ASTM 4) less steel forging filled with lead tely 71.0 inches is the cask cavity is ep.	the concentric 1-incites in (240) Joined at the bottom (ASTM A 182). The annul approximately an outer in height and has an outer (Approximately 26.5 inche	height and upright post lbs. ck 304 stain n end to a 6- us between f nick. The ca diameter of es in diameter	. The 72.0 ition. The nless steel -inch thick the two ask is f 38.5 er and 54.0
fully rec body by 1 elastomer is equipp	essed into the cas 5, 1.25-inch diame ic O-rings bonded ed with a seal tes	ess steel and lead, has a sk top flange. The lid is eter socket head screws. to a thin aluminum disc-s st port on the side of the a drain port near the bott	secured to The cask is haped ring. cask body,	the cask sealed by The cask a vent
thick con shells ar horizonta impact li opens jus	centric 304 stain e separated radial lly by two tube se niter is attached t above the lower	hin an overpack constructe less steel cylindrical she lly by eight equally space ections. A 304 stainless to each end of the overpa impact limiter for access to the base by 15, 1-3/8-i	ells (ASTM A ed tubes and steel toroid ack. The over to the cash	240). The dal shell erpack k. The top
		447		

 icate No. 9228 - Revision No. 8 - Docket No. 71-9228 cription (Continued) sets on the top and bottom impact limiters provide tie-down points for package. The cask body is equipped with attachment plates for lifting ices. The cask lifting devices are detached during transport. wings The packaging is constructed and assembled in accordance with General Electric Company Drawing Nos. 129D4946, Rev. 8; 105E9520, Rev. 3; and 105E9521, Rev. 2. Packaging Serial No. 2000 r constructed and assembled in accordance with General Electric Company Drawing Nos. 129D4946, Rev. 8; 101E8718, Rev. 1; and 101E8719, Net. The HETD fuel basket and liner are constructed and assembled in accordance with General Electric Company Drawing No. 105E9523, Rev. 2. The multinear noal rack is constructed and assembled in accordance with General Electric Company Drawing No. 105E955, Rev. 2. The hultinear noal rack is constructed and assembled in accordance with General Electric Company Drawing No. 105E9555, Rev. 2. The barrel race is constructed at the sembled in Accordance with General Electric Company Drawing No. 105E9555, Rev. 2. The barrel race is constructed at the sembled in Accordance with General Electric Company Drawing No. 105E9555, Rev. 2. The mattern basket and the sembled in Accordance with General Electric Company Drawing No. 105E955, Rev. 2.
 sets on the top and bottom impact limiters provide tie-down points for package. The cask body is equipped with attachment plates for lifting ices. The cask lifting devices are detached during transport. wings The packaging is constructed and assembled in accordance with General Electric Company Drawing Nos. 129D4946, Rev. 8; 105E9520, Rev. 3; and 105E9521, Rev. 2. Packaging Serial No 2000 is constructed and assembled in accordance with General Electric Company Drawing Nos. 129D4946, Rev. 8; 101E8718, Rev. 1; and 101E8719, Rev. 3 i) The HEID ruel basket and liner are constructed and assembled in accordance with General Electric Company Drawing Nos. 105E9523, Rev. 3 i) The HEID ruel basket and liner are constructed and assembled in accordance with General Electric Company Drawing No. 105E9523, Rev. 3 j) The multicontrional rack is constructed and assembled in accordance with General Electric Company Drawing No. 105E9555, Rev. 2. The barrel race is constructed altrassembled in Ccordance with General Electric Company Drawing No. 105E9555, Rev. 2. The barrel race is constructed altrassembled in Ccordance with General Electric Company Drawing No. 105E9555, Rev. 2. The barrel race is constructed altrassembled in Ccordance with General Electric Company Drawing No. 105E9555, Rev. 2. The barrel race is constructed altrassembled in Ccordance with General Electric Company Drawing No. 105E9555, Rev. 2. The mategoal basket and provide altrassembled in Ccordance with General Electric Company Drawing No. 105E9555, Rev. 2.
 package. The cask body is equipped with attachment plates for lifting ices. The cask lifting devices are detached during transport. wings The packaging is constructed and assembled in accordance with General Electric Company Drawing Nos. 129D4946, Rev. 8; 105E9520, Rev. 3; and 105E9521, Rev. 2. Packaging Serial No. 2000 is constructed and assembled in accordance with General Electric Company Drawing Nos. 129D4946, Rev. 8; 101E8718, Rev. 21; and 101E8719, Ke. 21 The HEID fuel basket and liner are constructed and assembled in accordance with General Electric Company Drawing Nos. 105E9523, Rev. 21 The multineer real Electric Company Drawing No. 105E9523, Rev. 21 The multineer real Electric Company Drawing No. 105E9555, Rev. 2. The barrel material for Company Drawing No. 105E9555, Rev. 2. The barrel material Sconstructed allocations in Coordance with General Electric Company Drawing No. 105E9555, Rev. 2. The barrel material Sconstructed allocations in Coordance with General Electric Company Drawing No. 105E9555, Rev. 2. The barrel material Sconstructed allocations in Coordance with General Electric Company Drawing No. 105E9555, Rev. 2. The barrel material basket and the sconstructed allocation in Coordance with General Electric Company Drawing No. 105E9555, Rev. 2. The barrel material basket and the sconstructed allocation in Coordance with General Electric Company Drawing No. 105E9555, Rev. 2. The barrel material basket and the sconstructed allocation in Coordance with General Electric Company Drawing No. 105E955, Rev. 2.
 The packaging is constructed and assembled in accordance with General Electric Company Drawing Nos. 129D4946, Rev. 8; 105E9520, Rev. 3; and 105E9521, Rev. 2. Packaging Serial No. 2005 is constructed and assembled in accordance with General Electric Company Drawing Nos. 129D4946, Rev. 8; 101E8718, Rev. 11; and 101E8719, Rev. 41 The HFIL fuel basket and liner are constructed and assembled in accordance with General Electric Company Enwing No. 105E9523, Rev. 5. The multiture ional rack is constructed and assembled in accordance with General Electric Company Enwing No. 105E9523, Rev. 5. The multiture ional rack is constructed and assembled in accordance with General Electric Company Enwing No. 105E9555, Rev. 2. The barrel nactor is constructed allocations No. 105E9555, Rev. 2. The material basket Company Enwing No. 105E9555, Rev. 2. The material basket Company Enwing No. 105E9555, Rev. 2.
 General Electric Company Drawing Nos. 129D4946, Rev. 8; 105E9520, Rev. 3; and 105E9521, Rev. 2. Packaging Serial No. 2005 is constructed and assembled in accordance with General Electric Company Drawing Nos. 129D4946, Rev. 8; 101E8718, Rev. 1; and 101E8719, Rev. 4 The HFIN fuel basket and liner are constructed and assembled in accordance with General Electric Company Drawing No. 105E9523, Rev. 5 The multitum tional rack is constructed and assembled in accordance with General Electric Company Drawing No. 105E9523, Rev. 5 The multitum tional rack is constructed and assembled in accordance with General Electric Company Drawing No. 105E9555, Rev. 2. The barrel race is constructed and assembled in Occordance with General Electric Company Drawing No. 105E9555, Rev. 2. The barrel race is constructed and assembled in Occordance with General Electric Company Drawing No. 105E9555, Rev. 2. The material basket and participation of the product of the pr
 101E8718, Rev. 11; and 101E8719, Rev. 1) The HFID fuel basket and liner are constructed and assembled in accordance with General Electric Company Brawing No. 105E9523, Rev. 2. 1) The multifunctional rack is constructed and assembled in accordance with General Electric Company Draving No. 105E9555, Rev. 2. 1) The barrel race is constructed and assembled in occordance with General Electric Company Draving No. 105E9555, Rev. 2. 1) The material basket and constructed and assembled in occordance with General Electric Company Draving No. 105E9555, Rev. 2. 1) The material basket and constructed and assembled in occordance with General Electric Company Draving No. 166D8066, Rev. 1.
accordance with General Electric Company Brawing No. 105E9523, Rev. 2. The multitum right ack is constructed and assembled in accordance with General Dectric Company Drawing No. 105E0555, Rev. 2. The barrel race is constructed and assembled in occordance with General Electric Company Orawing the 5166D8066, Byv. 1.
The barrel race is constructed all assembled in Occordance with General Electric Company Drawing the S166D8066, Box. 1.
) The mate of basker in good the contraction in secondance with General
may be used with the milt unceional rack and the barrel rack.
W Real S
be and form of material 4400 0
Irradiated uel rods, which may be cut or segmented.
i) Byproduct, source, special ouclear material in solid form.
 ii) Irradiated High Flux Isotope Reactor (HFIR) fuel assembly, positioned within the HFIR fuel basket and liner as specified in 5(a)(3). The HFIR fuel assembly is fabricated in accordance with Oak Ridge National Laboratory Drawing Nos. M-11524-OH-101-D, Rev. 0, and M-11524-OH-102-D, Rev. 0.

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NRC FORM 618A (6-83)	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION	
Page 3 - Ce	ertificate No. 9228 - Revision No. 8 - Docket No	. 71-9228	
5.(b) Conte	ents (Continued)		
(2)	Maximum quantity of material per package		
	Not to exceed 5,450 lbs, including carrier rac containers and shielding liner.	ks, shoring, secondary	
	(i) For the contents described in 5(b)(1)(i)	:	
	600 watts decay heat; and		
	Fissile contents not to exceed 1175 gram initial enrichment not to exceed 5 weigh isotope; minimum pelletryimmeter of 0.3 GWd/MTU, and minimum cooling trime of 120	it percent in the fissile inch, maximum burnup of 45 days; or	
	Fissile Contents not to exceed 1750 gram initial enrichment not to exceed 5 weigh isotope, minimum pellet diameter of 0.35 GWd/MUU, and minimum cooling time of 120 contained in closed, 5-inch schedule 40 437-5 grams co-235 equivalent per proc	days. Fuel rods must be	
	(ii) For the content described in 5(4) (ii 2000 watts decid heat writesile contents 14 235 equivalent mass. Carrier conts sp 5(a) (3) (a) must devised for conts exc ber packaged a	not test xceed 500 grams	
	(iii) For the conserve descended with b) (s) (ii) One UPIR fuel assembly. The fuel desembly fuel prement, with up to 2528 grams U-23 element with up to 6872 grams U-235. enrichment is 93.2 weight percent U-235. assembly is 2366 MWd, the minimum cool t heat not to exceed to write the package	ly is composed of one inner and one outer fuel me maximum uranium The maximum burnup per ime is two years. Decay	
(c) Fissi	le Class	III	
Maxim	num number of packages per shipment	One	
	nium in excess of twenty curies per package mus alloy or reactor fuel elements.	t be in the form of metal,	
	The U-235 equivalent mass is determined by U-235 mass plus 1.66 times U-233 mass plus 1.66 times Pu mass.		
8. Bolt	torque:		
The c	ask lid bolts must be torqued to 690 ft-lbs (lu	bricated).	
The b	polts used to secure the top of the overpack to led to 100 ft-lbs (dry).		

U.S. NUCLEAR REGULATORY COMMISSION

NRC FORM 618A

9.

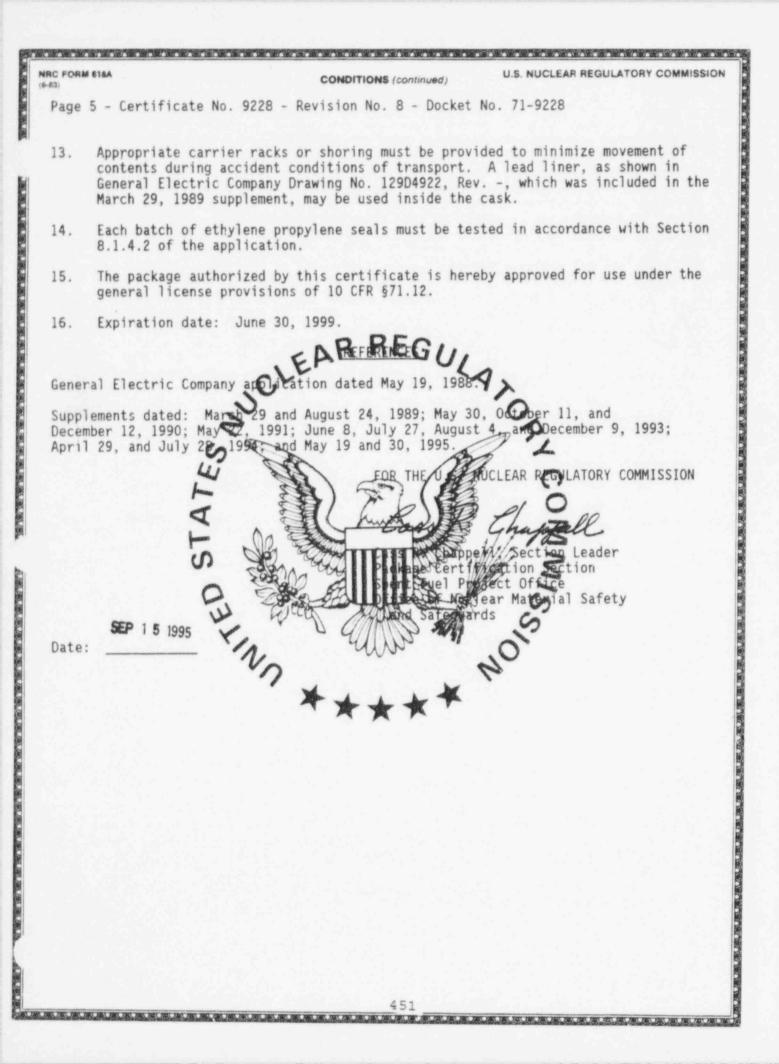
CONDITIONS (continued)

Page 4 - Certificate No. 9228 - Revision No. 8 - Docket No. 71-9228

- (a) For any package containing organic or inorganic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft³ at 14.7 psia and 70°F); or
 - (ii) The secondary container and each cavity must be inerted with a diluent to assure that oxyger must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment one.

- (b) For any package centraling materials with a radioactivity concentration not exceeding that the low spectruc are very materials and shipped within 10 days of preservation or within the second of drums or other second by conteness, the rater material above reed not be made, and the time restriction in the second by.
- 10. Prior to each shipment of score the cover measing the Gequirements of special form radioactive material), the package must be leak tosted to 1×10^3 std cm³/sec. Prior to first use, after the chiral se, and at least once within the 12-month period prior to each subsequent use, the package must be leak tested to 1×10^{-7} std cm³/sec.
- 11. The cask must be vacuum drive prior to shipment if contents are loaded under water, or if water is introduced in the cask cavity. During shipments for which vacuum drying is performed, the cask cavity must be filled with helium.
- 12. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) Prior to each shipment the cask seal must be inspected. The seal must be replaced with a new seal if inspection shows any defects or every 12 months, whichever occurs first; and
 - (b) Each package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application, except that inspections in Section 8.2 of the application must be performed at least once within the 12-month period prior to each use; and
 - (c) The package must be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application.



U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618 CERTIFICATE OF COMPLIANCE (8-65) FOR RADIOACTIVE MATERIALS PACKAGES 10 OFR 71 D. PAGE NUMBER . TOTAL NUMBER PAGES C. PACKAGE IDENTIFICATION NUMBER A REVISION NUMBER 1. 6. CERTIFICATE NUMBER USA/9233/B(U) 9233 2 PREAMBLE a. This certificate is issued to certify that the packaging and contents described in Item 5 below, meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material." b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any cnuntry through or into which the package will be transported. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION a. ISSUED TO (Name and Address) b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION Transnuclear, Inc. application Transnuclear, Inc. dated November 22, 1988, as supplemented. Two Skyline Drive Hawthorne, NY 10532-2120 DOCKET NUMBER 4. CONDITIONS This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the cognitions specified below 5 Packaging (a) (1)Model A RAN Descrution (2)The cask cavity has a length of approximately 111 onches and an inside diameter of 35 inches. The cask body is a constant of a straight straight of the cask body straight of the straight of the packaging are approximately 178 inches long an a conches diameter with the inpact limiters inselled. The cask body is approximately 129 inches input the an enter diameter of 51 inches. The cask cavity has a length of approximately 111 onches and an inside diameter of 35 inches. The cask body is made of a 0.75-inch stainless steel inner shell, a 5.88-inch thrick lead annulas, a 1.5-inch thick stainless steel outer shell, a 0.5-inch thick onner bottom plate and a 2.5-inch thick outside bottom plate. The Stielding is 6 inches 2.5-inch thick outside bottom plate. The read shielding is 6 inches thick in the bottom and of the cask. The outer shell of the cask body is covered with a stainless store thermal shield. The closure lid consists of a 2.5-inch thick outer stainless steel plate and a 0.5-inch thick inner stainless steel plate separated by 6 inches of lead shielding. The lid is secured by sixteen 1.5-inch diameter closure bolts. Two concentric silicone O-rings are installed in grooves on the underside of the lid. The cask is equipped with a sealed leak test port between the O-rings, a vent port in the closure lid and a sealed drain port in the bottom of the cask. Each impact limiter is attached to the cask by eight 1.75-inch diameter bolts. The cask is equipped with 6 trunnions, four at the top and two at the bottom. The gross weight of the package is approximately 80,000 pounds, including maximum contents of 9,500 pounds. 452 *****

RC FORM	618A	CONDITIONS (continu	ed) U.S. NUCLEAR REGULATORY COMMISSION
	2 - Ce	rtificate No. 9233 - Revision No. 2 - D	ocket No. 71-9233
	(3)	Drawings	
		The packaging is constructed in accord Drawing Nos. 990-701, Rev. 5; 990-702, Rev. 3; 990-705, Rev. 4; 990-706, Rev. 4; 990-709, Rev. 1.	Rev. 6; 990-703, Rev. 6; 990-704,
(b)	Conte	nts	
	(1)	Type and Form of Material	
		Dry irradiated and contaminated non-fu contained within a secondary orteiner	
	(2)	Maximum quantity of Ederial per packa	~
		Greater than type A quantities of radi fissile material provided that the fis generally Scensed mass limits specifi 71.22. The contents may not exceed 2, heat of the contents may not exceed 30 of the contents, secondary container a pounds	sile material does not exceed the ed in 10 CFR 1.18, 71.20 and 000 times an A quantity. The decay 0 mpts: The maximum gross weight not fing is mited to 9,500
5.	preve	nt significant novement of the contents	accident Sonditions.
7.		the inner cask contax and the sreeniary the package is defined to a carrier	container mus be free of water or the sport.
8.	In ac	dition to the requirements of subpart G	TO CFR Part 71:
	(a)	Prior to each shipment, the did seals be replaced with new seals if inspecti months, whichever occurs first; and	must be impoected. The seals must on shows any defects or every 12
	(b)	The package shall be prepared for stop with the Operating Procedures of Secti	ment and operated in accordance on 7.0 of the application.
	(c)	The package must meet the Acceptance T Section 8.0 of the application.	ests and Maintenance Program of
9.		ackage authorized by the certificate is al provisions of 10 CFR §71.12.	hereby approved for use under the
10.	Expir	ation date: January 31, 2000	

U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A CONDITIONS (continued) (6-83) Page 3 - Certificate No. 9233 - Revision No. 2 - Docket No. 71-9233 REFERENCES Transnuclear, Inc. application dated November 22, 1988. Supplements dated: January 13, May 18, June 5, July 21, July 28, and August 11, 1989, and January 4, 1990. NUCLEAR RE FOR THE U.S. NUCLEAR REGULATORY COMMISSION Cass R. Chappel ection Leader 0 Cask Certification Section Storage and Transport Systems Branch Division of Industria and Safety, NMSS Medic ear JAN 2 6 1995 Date: NOIS INN 454

CERTIF	CATE	MARES	b. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	6. TOTAL NUMBER PAGE
Contraction of the	9234	UNIDEN	5	USA/9234/B(U)F	1	3
of Fe	certific deral R	aguiations, Part 71, "Packi ste does not relieve the co	aging and Transportation of Rai naionor from compliance with a	cribed in Item 5 below, meets the applicable dioactive MateriaL" any requirement of the regulations of the U intry through or into which the package w	S. Department of Trans	
Nucl P.O.	ear (Box	reisissued on the Basis anne and Address Containers, Inc 1080 hton, TN 37643	a.	Nuclear Containers, Inc. dated January 11, 1993, REG 71,9234	application	ted.
CONDITI This cet	ONS	is conditional upon fulfillin	ng the requirements of 10 CFR	Part 71, as applicable, and the conditions	specified below.	
	(1)	Description Overpack for 3 overpack is a shells with th phenolic-foat The volume bet filled with or glued and naif the top half of "halves" are s overpack is 43	right circular c ne volume between per USAEC Specific tween the 1/4-incl ak wood blocks whi led together. A s of the overpack to secured with ten,	iranium Mexafluoride (UF lincer constructed of t the shells filled with ication SP-9, Rev. 1, ar h thick end closure plat ich are cross-lamination stepped and gasketed hor be removed from the ba 1-inch stainless steel by 92 inches long. Max	The resistant fire resistant of Supplement wes of the two is of 3 layers izontal joint ise. The pack toggle closur	steel nt, K/TL-729. o shells is s of boards t permits kage res. The
		The Model No.		ging is fabricated in ac ED-206-B, Sheets 1 throu		
(b)	Conte	ents				
	(1)	Type and form	of material			
			luoride, which may 1 30B cylinder.	y be recycled uranium he	exafluoride, d	contained
	(2)	Maximum quanti	ity of material pe	er package		
				ide. Uranium enriched t quantity of radioactive		

RC FORM	616A	CONDITIONS	(continued) U.S. NUCLEAR REGULATORY COMMISSIO	
Page	2 -	Certificate No. 9234 - Revision No		
	(c)	Fissile Class	II	
		Minimum transport index	5.0	
6.	For	recycled uranium hexafluoride, the amination must be limited as follow	fission product and activation product s:	
	(a)	Combired alpha activity from pluto (89 pCi) per gram of uranium,	nium and neptunium shall not exceed 3.3 Bq	
	(b)	The concentration of Tc-99 shall	EGU,	
	(c)	The concentration of Trezes shall uranium,	not exclude 1.17×10^{-3} microgram per gram of	
	(d)	Gamma radiation fission produkilogram of tranium,	cts shall not exced 4.4x10 ⁵ MeV/s per	
	(e)	The concentration of 232 shall n uranium,	ot exceed to be microgram per gram of	
	(f)	The concentration of halfn uranium, ad	ot excertized micrograms per gram of	
	(g)	The concentration of U-concentration	of range 0.025 gram per gram of uranium.	
7.	acco fabr Soci stam	ety of Mechanical Engineerty Boy 14h	tested, and maintained in and 174990 Edition). Cylinders must be Division I, of the ASME (American and Pressure Vessed Code and be ASME code	
8.	pres inse pres	At least once every five lears, each packaging must be inspected to verify the presence and condition of the insulation. The prespection shall consist of inserting a probe through each verify here insolve the lid and base to confirm the presence and rigidity of the insulation. For packagings which require drying, the inspection must be performed after drying.		
9.	In a	ddition to the requirements of Subp	art G of 10 CFR Part 71:	
	(a)	Prior to each shipment, the overpa gaskets must be replaced if inspec whichever occurs first.	ck gaskets must be inspected. These tion shows any defects or every 12 months,	
	(b)	Each packaging must meet the Accep Chapter 8 of the application.	tance Tests and Maintenance Program of	
	(c)	The package shall be prepared for the Operating Procedures of Chapte	shipment and operated in accordance with r 7 of the application.	
	(d)		d without a valve protector. The valve rdance with normal handling practice when verpack.	

NRC FORM 618A U.S. NUCLEAR REGULATORY COMMISSION **CONDITIONS** (continued) (8-83) Page 3 - Certificate No. 9234 - Revision No. 5 - Docket No. 71-9234 10. For packages of recycled uranium hexafluoride containing a Type B quantity of radioactive material: (a) The Model 30B cylinder must be leak tested to 4 x 10⁻⁸ atm-cm³/s helium leak rate within the 12 month period prior to transport, in accordance with Chapter 7 of the application, and (b) Prior to each shipment, after loading, the Model 30B cylinder and valve must show no leakage when tested to a sensitivity of at least 1×10^{-3} atm-cm³/s air leak rate, in accordance with Chapter 7 of the application. Packagings manufactured by Nuclear Containers, Incorporated, during the period November 30, 1991, to October 1994, and baring NCI serial Nos. 487 through 619, but excluding 487A and 488A are authorized for ase until October 31, 1995. 12. Prior to each shipment, the stainless steel components of the packaging must be visually inspected. Packagings in which stainless steel components show pitting, visually inspected. Packagings in which stainless steel components corrosion, cracking, or pinholes are not authorized for transport.

13. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 571.12.

REFERENC

1998

14. Expiration dates December

Nuclear Containers, Inc.

LIND

Supplements dated: Septembe

NUCLEAR REGULATORY COMMISSION

Cask Certification Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

NOV 1 5 1994

BIC FORM 818			ATE OF COMPLIANC	GES		TORY COMMISSI
CERTIFICATE NUME	9235	D. REVISION NUMBER	C PACKAGE IDENTIFICATIO		d. PAGE NUMBER	E. TOTAL NUMBER PAR
of Federal Regu	s issued to certify that t lations, Part 71, "Packa does not relieve the cor	ging and Transportation of signor from compliance wit	escribed in Item 5 below, meets th	e applicable safety	partment of Trans	
NAC Servic 655 Engine Norcross,	end Address) ering Drive Georgia 30092	Nu da	AT OF THE PACKAGE DESIGN OF AL E AND IDENTIFICATION OF REPORT Clear Assurance Col ted August 20, 1991 REGULARS	rporation 2, as supp	applicati lemented	on
This certificate is c	onditional upon fulfillin	otherequirements of 10 Cl	FR Part 71, as applicable, and the	contacions speci	fied below.	
(a) Pack (1) (2)	follows Cavi Cask Neutr Lead Neutr Impac Pack	ad and polyment semplies. The test each end y diameter y length body outer diam on shield outer shield thickness on shield thickness on shield thick t limiter diame age length: ithout impact limit	the package has drameter s mess ter miters ers	50 in 50 in 55 in 99 in 3.7 in 5.5 in 124 in 193 in 257 in	r cylinde te dimens ches ches ches ches ches ches ches che	r with an ions as
	weight of The cask bushell is 1 outer shel 86.7 inche with lead. The inner bottom end	the package is 2 ody is made of t .5 inches thick 1 is 2.65 inches s. The annulus and outer shells s of the cask.	contents is 39,650 50,000 pounds. wo concentric stai and has an inside thick and has an between the inner are welded to ste The bottom end of plates which are we	nless stee diameter o outside di and outer el forging the cask o	l shells. f 71 inch ameter of shells is s at the onsists o	The inner es. The filled top and f two
		seen encurar j	458			

NRC FORM 518A (6-83)

Page 2 - Certificate No. 9235 - Revision No. 0 - Docket No. 71-9235

5.(a)(2) Description (Continued)

forging. The inner bottom plate is 6.2 inches thick and the outer bottom plate is 5.45 inches thick. The space between the two bottom plates is filled with a 2-inch thick disk of a synthetic polymer (NS4FR) neutron shielding material.

The cask is closed by two steel lids which are bolted to the upper end forging. The inner lid (containment boundary) is 9 inches thick and is made of Type 304 stainless steel. The outer lid is 5.25 inches thick and is made of SA-705 Type 630 stainless steel. The inner lid is fastened by 42, 1-1/2-inch diameter bolts and the outer lid is fastened by 36, 1-inch diameter bolts. The inner lid is sealed by two metallic O-rings. The outer lid is equipped with a specie metallic O-ring. The inner lid is fitted with a vent and or in port which are sealed by metallic O-rings and cover plates.

The cask body is surrounded by a 1/4-inch thick jacket shell constructed of 24 stainless steel plates. The jacket shell is approximately 99 inches in diameter and is supported by 24 longitudinal stainless steel fins which are connected to the outer shell of the cask body. Lopper plates are bonded to the fluxer the space between the fins is filled with NS4FR shielding material. The package is equilated at each end with an impact limiter made of reaction and bassa.

The fuel basket with a the cost with on accommodate up to 26 PWR fuel assemblies. The fuel scool lies are used within the walls of the of stainless that. Bolton meets are encased within the walls of the sleeves. The startes are the encased within the walls of the inch diameter startless cherring supported by 31, 22-inch thick, 70.86 inch diameter startless cherrings The basket also has 20 fins made of Type 6050 16 alumbus around the support disks and bins are connected by six, 1-5/6 inch diameter by talkinch long threader rods made of Type 17-4 PH stainless steel. PH stainless steel.

Four lifting transions are welded to the top and forging. The package is shipped in a horizontal orientation and is supported by a cradle under the top forging and by twastrunnion sockets pocated near the bottom end of the cask.

(3) Drawings

The package is constructed and assembled in accordance with the following Nuclear Assurance Corporation Drawing Nos.:

2, Rev.	3	423-811,	sheets	1-2,	Rev.	4	
		423-812,			Rev.	0	
	1.000	423-870,			Rev.	2	
3. Rev.	2	423-871,			Rev.	1	
	-	423-872,			Rev.	3	
Rev.	1	423-873,			Rev.	1	
2. Rev.	0				Rev.	1	
					Rev.	1	
		423-900,			Rev.	2	
1 1 1	-6, Rev. Rev. -3, Rev. Rev. Rev. -2, Rev. -2, Rev.	-2, Rev. 3 -6, Rev. 6 Rev. 1 -3, Rev. 2 Rev. 1 Rev. 1 -2, Rev. 0 -2, Rev. 1 -2, Rev. 1 -2, Rev. 1	-6, Rev. 6 423-812, Rev. 1 423-870, -3, Rev. 2 423-871, Rev. 1 423-872, Rev. 1 423-872, Rev. 1 423-873, -2, Rev. 0 423-874, -2, Rev. 1 423-875,	-6, Rev. 6 423-812, Rev. 1 423-870, -3, Rev. 2 423-871, Rev. 1 423-872, Rev. 1 423-873, -2, Rev. 0 423-874, -2, Rev. 1 423-875,	-6, Rev. 6 423-812, Rev. 1 423-870, -3, Rev. 2 423-871, Rev. 1 423-872, Rev. 1 423-873, -2, Rev. 0 423-874, -2, Rev. 1 423-875,	-6, Rev. 6 423-812, Rev. 1 Rev. 423-870, 423-870, Rev. 2 Rev. Rev. Rev. 1 -3, Rev. 2 423-871, 423-872, Rev. 1 Rev. 423-872, Rev. Rev. 1 Rev. Rev. Rev. Rev. 423-873, Rev. Rev. -2, Rev. 0 423-874, 423-875, Rev. Rev. Rev.	-6, Rev. 6 423-812, Rev. 1 Rev. 0 -3, Rev. 2 423-870, 423-871, Rev. 1 Rev. 2 -3, Rev. 1 423-871, 423-872, Rev. 1 Rev. 1 -2, Rev. 0 423-874, 423-875, Rev. 1 Rev. 1

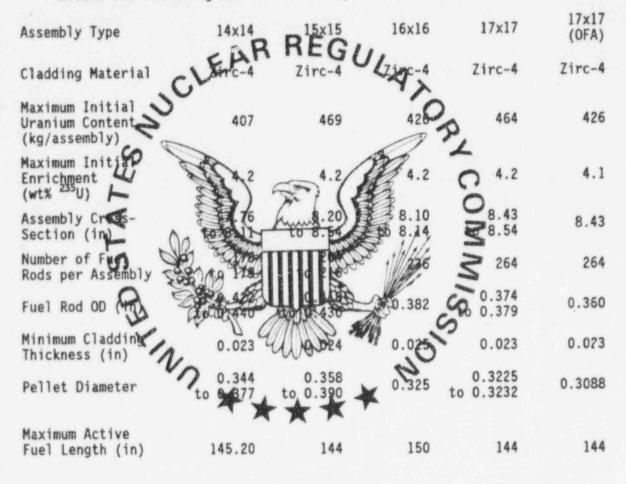
NRC FORM 615A CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION

Page 3 - Certificate No. 9235 - Revision No. 0 - Docket No. 71-9235

(b) Contents

(1) Type and form of material

Irradiated PWR fuel assemblies with solid UO₂ pellets. Each fuel assembly may have a maximum burnup of 40,000 MWD/MTU when cooled for at least 6.5 years, or 45,000 MWD/MTU when cooled for at least 10 years. The maximum heat load per package is 22.1 kilowatts. The maximum heat load per assembly is 850 watts. Prior to irradiation, the fuel assemblies must be within the following dimensions and specifications:

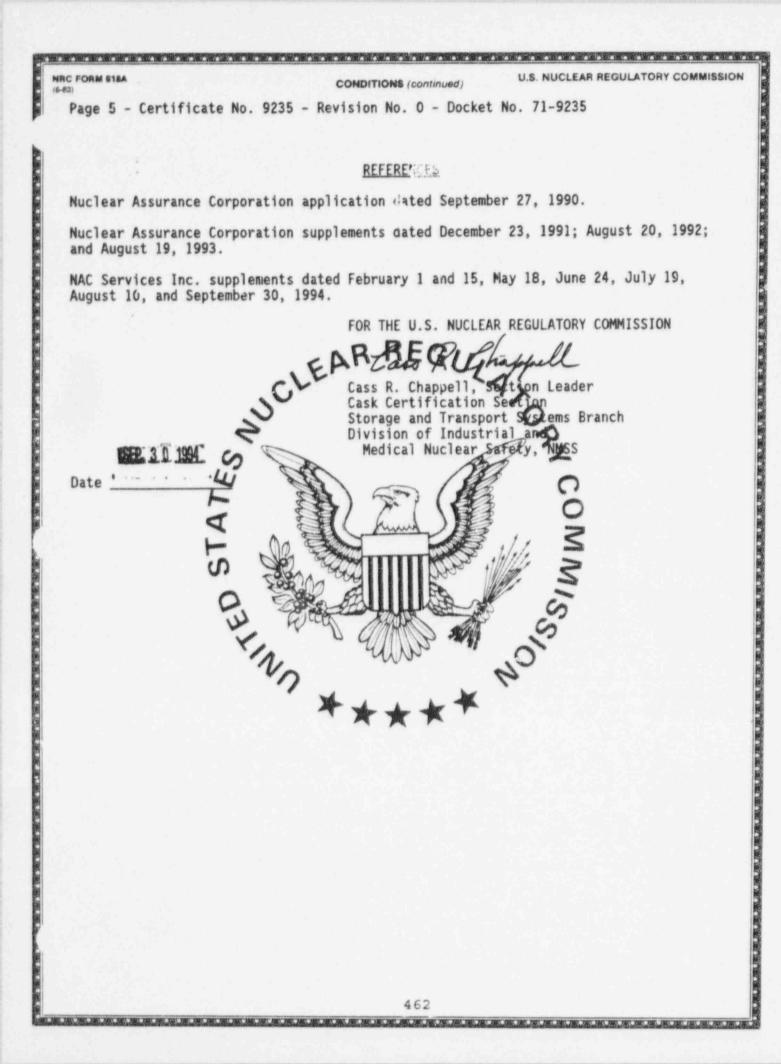


I

Maximum quantity of material per packageTwenty six (26) PWR fuel assemblies

(3) Fissile Class

6.	- Certificate No. 9235 - Revision No. 0 - Docket No. 71-9235
7.	The maximum heat load within the packaging at any time (transport, storage or testing) shall not exceed the decay heat limits in 5(b)(l).
	Known or suspected failed fuel and fuel with cladding defects greater than pin holes and hairline cracks are not authorized.
	We can and residual moisture shall be removed from the containment vessel in accordance with the procedures in Section 7.1 of the application.
	Containment vessel seals must be tested to a sensitivity of at least 2.9 X 10^{-5} std-cm ³ /sec, and shown to have a leak rate no greater than 5.79 X 10^{-5} std-cm ³ /sec:
	(a) Before first use of eap Pick BE:GU
	(b) Within the 12-month period prior to each shipment; and
	(c) After seal semacement.
	All containment vessel 0-rings shall be replaced with new 2-rings after each use.
11.	In addition the requirements of Subpart G the To CFR Part 71:
	(a) Each parkaging must be fabricated in accordance with the fabrication specifications in Charles 8 of the approximation,
	(b) Each package shoch be prepared for shipment and operated in accordance with the operating Procedures to Charter 7 of the apprication; and
	(c) Each package must meet the acceptance tests and be maintained in accordance with the Acceptance Tests acceptance Program in Chapter 8 of the apprivation.
12.	Prior to transport by ril, the Association of American Railroads must have evaluated and approved the milcar and the system used to support and secure the package during transport.
13.	Prior to marine or barge transport, the National Cargo Bureau, Inc., must have evaluated and approved the system used to support and secure the package to the barge or vessel, and must have certified that package stowage is in accordance with the regulations of the Commandant, United States Coast Guard.
14.	The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
15.	Expiration date: September 30, 1999.



NRC FORM 618 (8-66) 10 CFR 71			TE OF COMPLIANCE	UCLEAR REGULATORY COMMISSI
· & CERTIFICATE NUM	BER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER . TOTAL NUMBER PAG
of Federal Reg	dues not relieve the consid	g and Transportation of F nor from compliance with	ascribed in Item 5 below, meets the applicable s Radioactive Material." In any requirement of the regulations of the U.S. ountry through or into which the package will	Department of Transportation or other
estinghouse .0. Box 355 ittsburgh, F	end Address) Electric Corpor A 15230	ation EAF	Westinghouse Electric Con application dated January as supplemented.	rporation / 31, 1991,
This certificate is	conditional upon fulfillings	requirements of 10 CF	R Part 71, as applicable, and the conditions si	pecified below.
(2) [(2) [1 4 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Nodel Nose MCC Description The MCC packages uel assemblies sembly equippe sembly. The couter container /2-inch T-botts /2-inch T-botts /2-inch T-botts /2-inch T-botts /2-inch T-botts /2-inch T-botts	ame sufficiency of the package of high a strong ratio assemble by shear mount . The MCC-4	not accord an adjustable second mounted to a to the difference of the second and the second s	L element cradle Wel element clamping -gauge carbon steel is closed with thirty closed with fifty d with vertical Gd ₂ O ₃ wall of the er plates, mounted
	orizontal Gd ₂ O ₃ d ₂ O ₃ neutron ab opproximate dime 94-1/2 inches 1 544 pounds. 1 opproximate dime nches long. The ounds. The max opproximate dime inches long. The	neutron absor sorber plates ensions of the long. The group The maximum we ensions of the me gross weight cimum weight of ensions of the me gross weight	ently equipped with both to ber plates. Additional v are required for the cont MCC-3 packaging are 44-1/ ss weight of the packaging ight of the contents is 3, MCC-4 packaging are 44-1/ t of the packaging and con f the contents is 3,870 pc MCC-5 packaging are 44-1/ t of the packaging are 44-1/ t of the packaging are 44-1/	ee-shaped, guided ents as specified. /2 inches O.D. by g and contents is ,300 pounds. /2 inches O.D. by 226 htents is 10,533 ounds. /2 inches O.D. by 226 htents is 10,533

NRC FORM 618A (6-83)	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
nge 2 - Ce	rtificate No. 9239 - Revision No. 3 - Docket No. 71-9239
E (A)	Packaging (matingal)
5. (a)	Packaging (continued)
	(3) Drawings
	The MCC-3 packaging is constructed in accordance with Westinghouse Electric Corporation Drawing No. MCCL301, Sheets 1, 2 and 3, Rev. 4.
	The MCC-4 packaging is constructed in accordance with Westinghouse Electric Corporation Drawing No. MCCL401, Sheets 1, 2, 3, and 4, Rev. 5.
	The MCC-5 packaging Pronstructed is accordance with Westinghouse Electric Corporation Drawing No. MCCL01 Sheets 1 through 9, Rev. 2.
(b)	Contents N
	(1) Type and form of material
	Universities of the second state of the second
	Table Tal, Rouge Fuel Assemblies
	Table 14.3, Rev. 6, Fuel Assembly Parameters Fuel Assembly Parameters
	dated July 26, 1994 .16x16 Type Fuel Assemblies*
	Table 1-4.4, Rev 6, Fuel Assembly Parameters dated July 26, 1994 17x17 Type Fuel Assemblies*
	Table 1-4.5, Rev. 4,Fuel Assembly Parametersdated January 14, 1994VVER-1000 Type Fuel Assembly**
	* 16x16 CE fuel assemblies and the 17x17 W-STD/XL fuel assemblies may be shipped only in the Model No. MCC-4 package.
	** VVER-1000 fuel assemblies may be shipped only in the Model No. MCC-5 package.
	(2) Maximum quantity of material per package
	Two (2) fuel assemblies

NRC FORM 618A

5.

6.

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 3 - Certificate No. 9239 - Revision No. 3 - Docket No. 71-9239

(c) Fissile Class I

- For shipments of 14x14, 15x15, 16x16, and 17x17 fuel assemblies with U-235 enrichments of over 4.65 wt% and up to 5.0 wt%, horizontal Gd₂O₃ neutron absorber plates shall be positioned underneath each assembly. The horizontal absorber plates shall be placed horizontally on the underside of the strongback, as shown on Westinghouse Electric Corporation Drawing No. MCCL301, Sheet 1, Rev. 4, or Westinghouse Electric Corporation Drawing No. MCCL401, Sheet 1, Rev. 5.
- 7. For shipments of VVER-1000 fuel assemblies with U-235 enrichments of over 4.80 wt% and up to 5.0 wt%, a guided Gd_0, neutron absorber plate shall be positioned underneath each assembly. The guided theorem plates shall be placed horizontally on the topside of the strongback, as shown on Westinghouse Electric Corporation Drawing NorMCCL501, Sheet 5, Rev. 2.
- 8. Each fuel assembly must be unsheathed or must be enclosed in an unsealed plastic sheath which may not be folded or taped in any manner that would prevent flow of liquids into or work of the sheathed fuel assembly.
- 9. The dimensions, minimum George Jording and corting specifications, and acceptance testing of the neutron absorber plates shall be infaccordance with the "6d₂0₃ Neutron Absorber Plates Specifications," Appendex 1-6, Rev. 2 dated January 14, 1994, of the applications, the minimum conceptance coating area density on the vertical and horizontal beutron dusorber plates chall be 0.051 g-6d₂0₃/cm². The minimum 6d₂0₃ dotting area density on the vertical and horizontal beutron dusorber plates chall be 0.051 g-6d₂0₃/cm². The minimum 6d₂0₃ dotting area density on dusorber plates chall be 0.027 g-6d₂0₃/cm².

10. In addition to the requirements of Storage & of the CFR Part 91:

- (a) The MCC-3 packaging shall be acceptance tested in accordance with Notes 3, 4 and 5 of West Anghouse Electric Corporation Drawing No. MCCL301, Sheet 1, Rev. 4, and with MC Acceptance Tests in supplement dated May 12, 1992.
- (b) The MCC-4 packaging share be acceptage tested in accordance with notes 4, 5, and 6 of Westinghouse Electric Corporation Drawing No. MCCL401, Sheet 2, Rev. 5, and with the Acceptance Tests in supplement dated May 12, 1992.
- (c) The MCC-5 packaging shall be acceptance tested in accordance with the Acceptance Tests in supplement dated May 12, 1992.
- (d) The packages shall be maintained in accordance with the Maintenance Program in supplement dated May 12, 1992.
- (e) The packages shall be operated and prepared for shipment in accordance with the Operating Procedures in supplement dated January 14, 1994, as revised in supplement dated August 2, 1994.

The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.

12. Expiration date: November 30, 1996.

CANAL CANAL

NRC FORM SISA (6-83)

Date:

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 4 - Certificate No. 9239 - Revision No. 3 - Docket No. 71-9239

REFERENCES

Westinghouse Electric Corporation application dated January 31, 1991.

INN

Supplements dated: October 2, October 9, November 1, and November 13, 1991; January 27, March 30, May 12, and June 18, 1992; August 18, 1993; and January 14, April 22, May 24, July 26, and August 2, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

NOIS

NUCLEAR Chapper, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industria and AUG 2 3 1994 y, NMSS Medicai Nuclear Bafet n STA7

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IN CERTIFICATE OF COMPLIANCE IN CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIALS PACKAGES			UCLEAR REGULA	CALL COMMISSIO	
· CERTIFICATE NUMBER		D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	e. TOTAL NUMBER PAGE
of Federa	I Regulations, Part 71, "Packa	ging and Transportation of R signor from compliance with	scribed in Item 5 below, meets the applicable adioactive Material." any requirement of the regulations of the U. buntry through or into which the package wi	S. Department of Trans	
	CATE IS ISSUED ON THE BASIS (OF A SAFETY ANALYSIS REPOR	T OF THE PACKAGE DESIGN OR APPLICATION E AND IDENTIFICATION OF REPORT OR APPLICA	ATION:	
Burn	ley Technology, 1 Office Box 1226 stow, NH 03865	CAR	RTS Technology, Inc., app dated August 20, 1992, a REG 71-9245	olication as supplement	ed.
4. CONDITIONS This certifica	te is conditional upon fulfillin	g the requirements of 10 CFF	R Part 71, as applicable, and the conditions	specified below.	
5.	Dackasing	nat .	0		
(a)	Packaging () Model No. 420	RA	And a	lue.	
(1)	Description	E.	SD (AG	0	
	an outer contain diameter and 17 cover, welded so between the finn molded asbestos polyurethane far drum. Maximum.	ner which is a 1 .25 inches in he eams and a clamp er and outer con free liner on b 11 to position a gnoss weight of of the radiograp	otective overpack. The O-gallon open head steel ight) having a minimum 2 -ring type head closure. tainer is filled with 1- he top, bottom, and side nd secure the radiograph the package not to excee hy devices within the pa	dnum (14 ind gauge body The void sp 1/2 inch thic s, plus molde ic device wit d 75 pounds.	and ace k chin the The
(3)	Drawings	the the	***		
	The overpack mu Inc., Drawing N	st be constructe	d in accordance with Bur 0; 42500, Rev. 0; and 42	nley Technold 600, Rev. O.	ogy
	The radiographi overpack are co	c devices, as se nstructed in acc	condary packaging, autho ordance with the followi	rized for use ng Drawing No	e in the os.:
	2, Rev. 1; 4240 42407, Rev. 0; 42421, Rev.0; 4	2, Rev. 3; 42403 42408, Rev. 0; 4	ology, Inc., Drawing Nos , Rev. 3; 42404, Sheets 2415, Rev. 3; 42416, Rev 423, Sheets 1 & 2, Rev. 0.	1, 2, and 3, . 0; 42417, 1	Rev. 0; Rev. 1;
	42503, Rev. 0;	o. 425: RTS Tech 42505, Sheets 1 and 42558, Rev.	nology, Inc., Drawing No & 2, Rev. 0; 42506, Rev. 0.	s. 42501, Rev 2; 42551, Re	v. 0; ev. 1;
	For the Model N 42605, Rev. 0;	o. 426: RTS Tech 42606, Rev. 0; a	nology, Inc., Drawing No nd 42609, Rev. O.	s. 42601, Rev	v. 0;

HRC FORM 518A (6-83)

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9245 - Revision No. 3 - Docket No. 71-9245

- Contents (b)
 - (1) Type and form of material

Iridium-192 as sealed sources which meet the requirements of special form radioactive material.

(2) Maximum quantity of material per package

200 Curies.

6. The sources shall be secured in the shielded position of the radiographic device by the shipping plug, source assembly taut Decking device. The shipping plug and source assembly used must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintening their positioning function. The ball stop of the source assembly and shipping plug must be of sufficient length and diameter to provide positive positioning of the source in the shielded position.

- 7. In addition to the requirements of Subpart G of the CFR Part 71:
 - (a) Each package must be prevaied for shippen and operated in accordance with the Operating Proceedings in Chapter 7 of the application

Kum

- (b) Each packaging must meet the Maintenance Regram and Acceptance Tests in Chapter 5 of the seplication regrant the container should be visually examined to assure that the container meets the specifications as described in the drawings specified in scales) of the contribute
- 8. The package authorized by the certification by approve of for use under the general provisions of 10 CFR SP1. 12 NO
- 9. Expiration date: September 30, 1997

RTS Technology, Inc., application dated August 20, 1992. RTS Technology, Inc., supplements dated: July 31, 1991; and October 16, 1992. Burnley Technology, Inc., supplements dated: October 16, 1992; and June 17, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cass R. Channell

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Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

NOV 0 1 1994 Date:

NRC FORM ((8-85) 10 OFR 71	18		TE OF COMPLIANCE	NUCLEAR REGULA	TORY COMMISS
1. E. CERTIFIC		D. REVISION NUMBER	C PACKAGE IDENTIFICATION NUMBE	R d. PAGE NUMBER	8. TOTAL NUMBER PA
of Fed b. This ce	eral Regulations, Part 71, "Package intificate does not relieve the con	ging and Transportation of Ra signor from compliance with a	cribed in Item 5 below, meets the applicat dioactive Material." Iny requirement of the regulations of the ntry through or into which the package	U.S. Department of Trans	
ational Standar	FICATE IS ISSUED ON THE BASIS O TO (Neure and Address) Institute of ds and Technology Surg, MD 20899	AR	of THE PACKAGE DESIGN OR APPLICATION AND IDENTIFICATION OF REPORT OR APPL National Institute of Technology application February 7, 1992, as s	CATION: Standards and dated	
4. CONDITION This certifi		.01	Part 71, as applicable, and the condition	s specified below.	
(1)	fuel element. The 71 inches in leng end is closed by diameter, and a g cap screws. A wo assembly within to including the fue Drawing The packaging is	constructed and Techno	port of an unirradiate 2-inch 00 carbon steel d bottom end and flang hich is 1/4-inch thick r plate is secured to ort and top support po ckage weighs approximation assembled in accordanc logy Drawing No. D-04-	pipe, approxi ed top end. T , and 6-1/2 in the pipe flang sition the fue tely 75 lbs., e with Nationa	mately he top hches in he by 8 hl

NAC FORM FISA **CONDITIONS** (continued) Page 2 - Certificate No. 9246 - Revision No. 0 - Docket No. 71-9246 (b) Contents 5. (1) Type and form of material Unirradiated NBSR fuel element composed of enriched uranium and aluminum. (2) Maximum quantity of material per package One fuel element containing 360 grams U-235. III (c) Fissile Class 2 Maximum number of packages per shipn In addition to the requirements of Subpart G of 10 GER Part 71, the package shall 6. be prepared for shipment, operated, and maintained in accordance with the loading, unloading, and quality assurance procedures in the application. Prior to each shipment, the shippen shall make the determinations specified in the NIST "ST" Series Shipping Container Shipper's Checklist in the application .. The package authorazed by this certificate is hereby approved for use under the 7. general license provisions of 10 CFR \$71-12. Expiration dates February 28 1997. 8. REFERENCES National Institute of Standards and Technology application dated February 7, 1992. 1992 Supplement dated: February 14 NUCLEAR REGULATORY COMMISSION THE U 5 es E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS FEB 2 6 1992 Date:

IRC FORM 618 8-85) 0 CFR 71				CATE OF COMP	LIANCE	UCLEAR REGULA	TORY COMMISSI
247	MBER		D. REVISION NUMBER		TIFICATION NUMBER	d PAGE SUMBER	. TOTAL NUMBER PAR
of Federal Re	egulations, te does not	Part 71, "Packaging relieve the consign	and Transportation of from compliance	s described in Item 5 below of Radioactive Material." with any requirement of the y country through or into y	regulations of the U.S	. Department of Tran	
a. ISSUED TO (Aw	1 Serv 7, MS	wices, Inc.	SAFETY ANALYSIS REF		FREPORT OR APPLICAT 1 Services, 1 31, 1992, as	Inc. applica	
CONDITIONS This certificate in	s condition	al upon fulfilling th	e requirements of 10	CFR Fart 71, as applicable	50.	pecified below.	
(a)	Packa (1) (2)	Model No. Descripti Concrete- requireme package i drum, exc 5,000 psi the inner extend ab are 16-ga locking r and a 5/8	on filled, 110- nts of low s s composed of luding lid, compressive drum, concr ove the top ge steel. T ing with dro -inch diamet	gallon drum fo pecific activi f an inner, DO centered withi strength conc ete is poured chime of the the he outer drum op forged lugs, er bolt. The s 2700 pounds.	ty radioactis T specificat n an outer, i rete. After to fill the nner drum. I is closed by a 3/8-inch s maximum weigh	re material. fon 17H, 55- 110-gallon d waste empla inner drum a The outer dr a 12-gage s smooth neopr	The gallon rum by cement in nd to um and lid teel ene gasket,
		The packa		structed in acc MOO34-B, Rev.		Nuclear Fue	1 Services,

SUBURIEUS.

NRC FORM RIBA

6.

CONDITIONS (continued)

Page 2 - Certificate No. 9247 - Revision No. 0 - Docket No. 71-9247

- (b) Contents
 - (1) Type and form of material

Dry, solid waste material meeting the requirements of low specific activity radioactive material. The waste material is in the form of disks composed of super-compacted 40-gallon drums containing noncompactible or compacted wastes.

.

(2) Maximum quantity of material per package

Greater than Type A quantities of radioactive materials. The maximum weight of waste material DS 12,000 pounds. The contents may include fissile materials provided that the total quantity of fissile material per package meets the mass limit specified in 10 CFR §71.53(a)

(a) For any package containing water or organic substances which could radiolytically generate combustible gases, a determination must be made by tests and measurements or by analysis of a representative package that the following criteria are met over a period of time that is twice the expected shipment time:

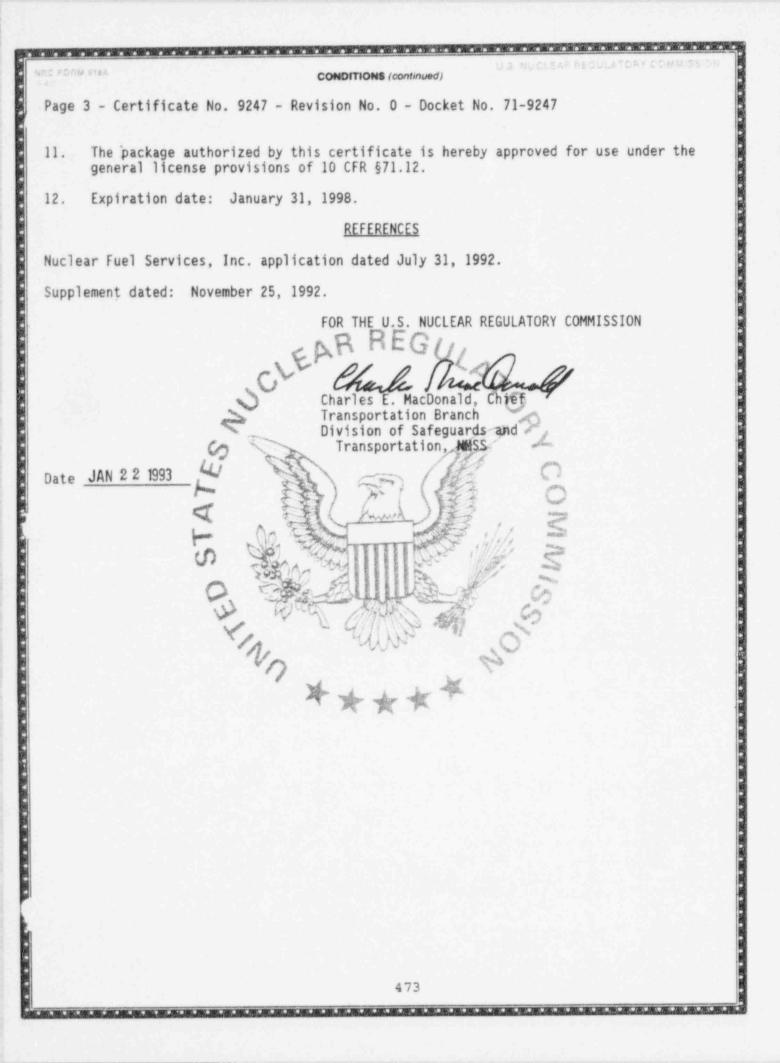
The hydrogen general editust be limited to a nolar quantity that would be no more than 5% by volume for equivalent limits for other inflammable gases) of the package gas would be mesent at SNP (i.e., no more than 0.065 g-moles/ft³ at 14.7 ppia and 30 °F).

For any package delivered to a carrier for transport, the package must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

- (b) For any package shipped within 10 days after sealing of the drum, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
- Radioactivity per package shall be determined in accordance with Sections 1.2.4 and 4.8 of the application.

 In addition to the requirements of Subpart G of 10 CFR Part 71, the package shall be prepared for shipment and operated in accordance with Section 4 of the application.

- 9. This certificate authorizes land transport between the vicinities of Oak Ridge, Tennessee, and Barnwell, South Carolina, only.
- The package authorized by this certificate must be transported on a motor vehicle or railroad car assigned for sole use of the licensee.



OFR 71		ICATE OF COMPLIANCE ACTIVE MATERIALS PACKAGES	Mark Market
CERTIFICATE NUMBER	D. REVISION NUMBE	C. PACKAGE IDENTIFICATION NUMBER	R d PAGE NUMBER . TOTAL NUMBER P
of Federal Regulations, Part 71, b. This certificate does not relieve	"Packaging and Transportation the consignor from compliance	nts described in item 5 below, meats the applical n of Radioactive Material." a with any requirement of the regulations of the my country through or into which the package	U.S. Department of Transportation or other
* ISSUED TO (Name and Address) Siemens Power Corpor 2101 Horn Rapids Roa PO Box 130 Richland, WA 99352-0	ration ad 0130	EPORT OF THE PACKAGE DESIGN OR APPLICATION TITLE AND IDENTIFICATION OF REPORT OR APPL Siemens Power Corporati dated June 28, 1993, as	on application supplemented.
CONDITIONS This certificate is conditional upon	futfilling the requirements of 1	0 CFR Part 71, as applicable, and the coodition	ns specified below.
right recta cushioning The metal 179-1/2 in approximate packagings Cushioning impregnate bolts, late on the inne weight of	h bly and fuel rod angular metal inn material between immer costainer in ches long and is ely 30 inches by differ in the len is provided betwe d honeycomb and e ches or equivalen er container, and	shipping containers. The er container and a wooden the inner and outer conta s approximately 11-1/2 inc positioned within a wooden 31 inches by 207 inches le ngth of the metal inner co een the inner and outer co thafoam, or equivalent. Co thafoam, or equivalent. Co thafoam, or equivalent. Co thafoam, or spi differ is set for 0.5 psi differ contents is 2,800 pounds.	outer container, with iners. bes by 18 inches by outer container ng. The SP-1 and SP-2 ntainer and end piece. ntainers by phenolic losure is accomplished b ather) valve is provided ential. The maximum
Siemens Nu Nos.: EMF-3 EMF-3 EMF-3	ings are fabricat clear Power Corpo 06,416, Rev. 1. 06,424, Rev. 1. 04,416, Rev. 5. 06,272, Sheets 1	ed and assembled in accord ration/Advanced Nuclear Fu through 4, Rev. 6.	ance with the following els Corporation Drawing

NRC FORM E18A (6-83) CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION

age 2 - Certificate No. 9248 - Revision No. 6 - Docket No. 71-9248

- 5.(a) Packaging (Continued)
 - (4) Product Container

Five-inch, Schedule 40, stainless steel pipe fitted with screw type or flange closure. Container shall be vented in the event it contains materials which decompose at less than $1475 \, {}^{\circ}\text{F}$.

5.(b) Contents

- (1) Type and form of material
 - (1) UO_2 fuel rods with a maximum 1-23 Generichment of 6.5% by weight. Rods are clad with Zirocley, Incaloy, Income) or stainless steel such that the ratio of clad to fuel cross sectional area be at least 0.26, and a maximum fuel pellet outside diameter of 0.506 inch. Each rod must have a maximum length of 174 inches. The clad rods must be bundled (contained) in the product container described in 5(a)(4).
 - (ii) UO: fuel assemblies in a 7 x 7, an 8 x 20 or a 9 x 9 square array with a maximum (fuel cross section area of 25 course inches, maximum fuel length of 174 inches and a ximum average environment of 3.5 W/O U-235. Minimum zircaloy clad the course is 0.025 inches, maximum perfect diameter is 0.555 inches. Any number if water was in any arrangement are permitted.
 - (iii) UO₂ fuel as conties the first of the sole, or a 9 x 9 square array with a maximum fuel drogth of 17 the set. And a maximum arrage enrichment between 3.3 to 50 W/o 5.35 IIn maximum pellet diameter is 0.555 inch, and the minimum field through the new is 0.552 shown. Any number of water rods in any maximum arragement are permitting. Each assembly contains at least 4 rods with nominal 2 weight percent Good, which are in non-perimeter locations and are symmetric about the diagonal.
 - (iv) UO_2 fuel assembly is with a maximum U-235 encichment of 5.0 percent by weight, and a maximum average U-235 encichment of 4.0 percent by weight. Each fuel assembly is made uncofficiel rods in a 10 x 10 square array, with a maximum fuel cross section of 5.022 inches square, a nominal pitch of 0.511 inch, and a maximum fuel length of 174 inches. The maximum pellet diameter is 0.3356 inch, the minimum clad thickness is 0.0225 inch, and the maximum U-235 enrichment in any edge rod is 4.0 percent by weight. Each assembly contains at least 6 rods with nominal 2 weight percent Gd_2O_3 , which are symmetric about the diagonal, and each assembly contains at least 4 water rods in the 4 central rod positions.
 - (v) UO_2 fuel rods with a maximum U-235 enrichment of 5.0 percent by weight, and a minimum Gd_2O_3 content of 1.0 percent by weight. The rods may be clad with zircaloy, steel or aluminum. The rods have a maximum fuel pellet diameter of 0.5 inch, and a maximum fuel length of 169 inches.

NRC FORM	1 518A CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
	3 - Certificate No. 9248 - Revision No. 6 - Docket No. 71-9248
aye .	s - certificate no. 5240 - Revision no. 6 - Docket no. 7. 5210
5.(D) Contents (Continued)
	(2) Maximum quantity of material per package
	Total weight of contents (fuel assemblies, fuel rods and rod shipping
	containers, or fuel bundles and product containers) not to exceed 1265 pounds
	(1) For the contents described in 5(b)(1)(1):
	Two fuel bundles. A bundle is defined as an arrangement of rods which i
	contained within a product container.
	(ii) For the contents described in 5(b)(1)(ii), 5(b)(1)(iii), and 5(b)(1)(iv)
	Two full length for lassemblies. Two short fuel assemblies may be substituted for each full length fuel assembly provided the two short assemblies are shipped end-to-end and the total fuel length does not
	assemblies are shipped end-to-end and the total fuel length does not
	exceed 174 inches.
	iii) For the contents described in 5(b)(1)(v);
	Any mucher of reast contained within not shipping containers as shown on Siemens Power Corrected on Arawing No. 1997 610,510, Sheets 1 and 2,
	Rev. 1 and Sheet Rev. 0.
	A (hund) is 3
1-1	F DO SAL SAL S
(c)	Fissile Class on the second state of the secon
6.	Each fuel assembly must be the principle of and and the fuel assembly
	polyethylene sheath which may not be folded or taken in any manner that would
	The ends of the sheath may not be colded or taking in any manner that would prevent the flow of Figuids into or cout of the sheather toel assembly.
*7	Except for the contents described in 5(b)(1)(iv), posthylene shipping shims may
1.	be inserted between rods within the fuel assembly es up to a maximum of 0.20 g H_2O
	hydrogen equivalent per cubic centermeter averaged over the assembly. For contents
	described in 5(b)(1)(iv), polyethylene shipping shims are not permitted.
8	In lieu of the product container specified in $5(a)(4)$, UO_2 fuel rods with a maximu
	enrichment of 3.2 w/o U-235 may be bundled (bound with steel strappings at two or
	more locations) with a maximum cross sectional area of 20.0 square inches. The
	intal breaking strength of the strapping must be 30 times the weight of the bound rois.
9.	Th. maximum spacing between adjacent rods within a bundle must be 0.012 inch. The
	spacing must be maintained by the product container wall, metal strappings or
	peripheral metallic dunnage with a melting point greater than 1475 °F.
10	Maximum average enrichment means the highest average enrichment through any cross
10.	sectional plane of the assembly.

HRC FORM 618A U.S. NUCLEAR REGULATORY COMMISSION CONDITIONS (continued) (6-83) age 4 - Certificate No. 9248 - Revision No. 6 - Docket No. 71-9248 11. In addition to the requirements of Subpart G of 10 CFR Part 71: (a) The package must be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7 of the application dated December 1, 1993. (b) Each packaging must be acceptance tested and maintained in accordance with the Acceptance Tests and Maintenance Program in Chapter 8 of the application dated December 1, 1993. 12. The package author revisions of 10 cristic REGULA, general license provisions of 10 cristic REGULA, 13. Expiration date: December 31, ASR. REGULA, REFERENCES 28, 1993. O 12. The package authorized by this certificate is hereby authorized for use under the Siemens Power Corporation application dated June 28, 1993. 語の語の語の語の語の語の語の語の語の語の語の語の語の語 1993; December 23, 1994; and Appill 28, 1995. Supplements dated: December REGULATORY COMMISSION NUCLEAR sappell, Section Leader a fination Section and Transport Systems Branch Industrial and OF uclear Stety, NMSS MAY 0 2 1995 Date: NC 477

RC FORM 618 66) CFR 71			CERTIFICA FOR RADIOACT	TE OF COMPLIANCE		. TOTAL NUMBER PA
& CERTIFICATE		9249	5. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	1	3
of Federal b. This certif applicable	Regulation icate does regulato	ons, Part 71, "Packagin s not relieve the consig ry agencies, including	g and Transportation of H nor from compliance with the government of any co	any requirement of the regulations of the U.S. buntry through or into which the package will	Department of Trans be transported.	
LISSUED TO / Chem 140	-Nucl Stone	Address) ear Systems, ridge Drive SC 29210	b. TITLE	Chem-Nuclear Systems dated June 25, 1993.		ication
CONDITIONS This certificet	te is cond	itional upon fulfilling t	he requirements of 10 CFI	A Part 71, as applicable, and the conditions s	pecified below.	
(a)	Pack	aging		e e e e e e e e e e e e e e e e e e e		
	(1)	Model No. :	CNS 14-170, Se	eries III		
	(2)	The cask is inches in d inches in d inner steel outer steel plates weld integrally wall. A st of the side thick steel with the st gasket loca the lid is lid contain thick steel welded. Th 3/4-inch st packaging i shell has a accomplishe are four ca	a right circul iameter. The shell, a 1-3/4 shell, a 1-3/4 shell. The back ed together to welded to the eel flange is a wall at the to plates, which eel flange. The ted between the accomplished by s a centrally plates and once e shield plug uds and nuts and s constructed of minimum yield d by four tie-osk lifting lugs	ied cask for low specific lar cylinder 81-1/2 inches cask cavity is 73-3/8 incl cask side wall consists of a inch lead shell, and a ase is comprised of two, a form a 4-inch thick base inner and outer steel shel welded to the inner and ou op. The lid is comprised are stepped and welded to he cask closure is sealed a lid and steel flange, po y eight, 1-3/4 inch ratche located shield plug comprise , 1-inch thick steel plat is sealed by a Neoprene ga re used to provide positiv of A-516, Grade 70, carbor strength of 46,000 psi. down lugs welded to the ca s, three lid lifting lugs ckage gross weight is appr	high by 81 hes high by a 3/8-inch by a 3/8-inch thi c-inch thick which is lls of the s of two, 2-i ogether to m by a Neopre ositive clos t binders. ised of two, te stepped a asket, and e ve closure. h steel. Th Tie-down is ask body. T , and one sh	-1/2 75-1/2 thick ck steel ide hells nch ate ne ure of The 2-inch nd ight, The e outer here ield
				478		

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CONDITIONS (continued)

Page 2 - Certificate No. 9249 - Revision No. 1 - Docket No. 71-9249

5.(a)(3) Drawings

The Model No. CNS 14-170, Series III packaging is fabricated in accordance with Chem-Nuclear Systems, Inc., Drawing Nos.: C-110-D-0016, Sheets 1 and 2, Rev. 4; C-110-D-0017, Sheets 1 and 2, Rev. C; C-110-D-0018, Sheets 1 and 2, Rev. C; and C-110-D-0019, Rev. B.

- (b) Contents
 - (1) Type and form of material

Process solids, either dewatered, solid or solidified, meeting the requirements for low specific activity material, in secondary containers.

(2) Maximum quantity of material per package

Greater than Type A quantity of radioactive material which may contain fissile material provided the fissile material does not exceed the limits in 10 CFR §71.53. The weight of the contents, and secondary containers shall not exceed 17,800 pounds. The internal decay heat load shall not exceed 7 watts.

- 6. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
 - (i) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/ft3 at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

(b) For any package shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

NRC FORM 618/		CONDITIONS (continued)
Pag	je 3 -	- Certificate No. 9249 - Revision No. 1 - Docket No. 71-9249
7.	In	addition to the requirements of Subpart G of 10 CFR Part 71:
	(a)) Prior to each shipment, the packaging lid seals, if opened (or if security seal is broken), must be inspected. The seals must be replaced with new seals if inspection shows any defects or every 12 months, whichever occurs first.
	(b) Each package must meet the Acceptance Tests and Maintenance Program in Chapter 7.0 of the application.
	(c) The package shall be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 6.0 of the application.
8.	То	rque requirements for closure fasteners:
	(a) Primary lid ratchet binders must be torqued to 175-200 ft-1bs.
	(b) Secondary lid bolts must be torqued to 120 ± 10 ft-1bs.
9.	ve	e package authorized by this certificate must be transported on a motor hicle, railroad car, aircraft, inland watercraft, or hold or deck of a agoing vessel assigned for the sole use of the licensee.
10	. Th un	e package authorized by this certificate is hereby approved for use der the general Ticense provisions of 10 CFR §71.12.
11	. Ex	piration date: July 31, 1998. REFERENCES
Ch	em-Nu	clear Systems, Inc., application dated June 25, 1993.
		FOR THE U.S. NUCLEAR REGULATORY COMMISSION
		Hang Dyord for
		Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch
		AUG 0 6 1993 Division of Industrial and Medical Nuclear Safety, NMSS
Da	te:	

語の語の語の語言

86) OFR 71		,		E OF COMPLIANCE		ATORY COMMISSI
& CERTIFICATE NUM	ABER	D. R	EVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	A TOTAL NUMBER PAG
9250 REAMBLE			2	USA/9250/B(U)F		13
a. This certificate of Federal Rep	gulations, e does no	Part 71, "Packaging and t relieve the consignor fr	Transportation of Radi	ribed in Item 5 below, meets the applicable loactive Material." ly requirement of the regulations of the U. try through or into which the package wi	S. Department of Tran	
& ISSUED TO INem	k and Box 7	Wilcox Compa 785		THE PACKAGE DESIGN OF APPLICATION NO IDENTIFICATION OF REPORT OF APPLIC Babcock and Wilcox Comp application dated Octob as supplemented. REG(71-9250	any	
CONDITIONS This certificate is	condition	hal upon fulfilling the red	uirements of 10 CFR P	Part 71, as applicable, and the cognitions	specified below.	
		Cont		0		
(a)	Packa	ing 6 C	*	73		
19. Ch	(1)	Model No .:	RHF015X22	And "	plenar.	
	(1)	- Jane -	2 () F		0	
	(2)	Description	SAL A		0	
		The outer of heavy-dubios (containment welded botto is a blind f eight hex-he seals and a are 5 inches within the o	um is a solution Seeseld is a see and a vange which ad borts // leak-test po ID by 22 inc uter, drum by		atton drum vessel steel pipe he inner ves ck flange wi ble silicone the inner ve essel is cer ed by plywood	with a sel lid ith e O-ring essel itered od
	(3)	Drawing				
				cted in accordance with Rev. 1, and 1220277 E,		ompany
(b)	Conte	ents				
	(1)	Type and for	m of materia			
		which oxides	do not decomp as powder of	um as solid metals, com pose at temperatures up r pellets; and uranyl n of any U-235 or U-233	to 250 °F; itrate as cr	uranium

Page 2 - Certificate No. 9250 - Revision No. 2 - Docket No. 9250

5. (b) (1) Type and form of material (continued)

(ii) Unirradiated liquid uranyl nitrate solution in sealed glass containers or screw top plastic vials, each within one or more additional plastic vials with taped lids, and within a sealed product can or polyethylene bottle containing a sufficient amount of vermiculite to absorb twice the liquid contents present. The uranium may be of any U-235 enrichment. U-233 greater than a Type A quantity is not permitted.

(2) Maximum quantity of material per package and fissile class

The weight of the material shall not exceed 50 pounds, and:

 (i) For the material described in Item 5(b)(1)(i), above, with an H/U ≤ 3 considering all sources of moderation in the inner vessel, each shipment must be limited as follows:

Fissile Class	Fissile Material	Max. Fissile Material per <u>Package (kg)</u>	Max. Number Packages per Shipment
III	U-235	9.0	1

(ii) For the material described in Item 5(b)(1)(i), above, with an H/U ≤ 20 considering all sources of moderation in the inner vessel, each shipment must be limited as follows:

Fissile Class	Fissile <u>Material</u>	Max. Fissile Material per Package (kg)	Max. Number Packages per Shipment	Min. TI
II	U-233	0.5		1.8
III	U-233	0.5	57	
III	U-235	4.0	1	

(iii) For the material described in item 5(b)(1)(ii), above:

I

The fissile material shall not exceed 400 grams U-235. The quantity of uranyl nitrate shall not exceed 1000 mL of solution.

Fissile Class

Page 3 - Certificate No. 9250 - Revision No. 2 - Docket No. 9250

- The vent holes on the DOT Specification 17C drum shall be capped or taped closed during transport and storage to preclude entry of rain water into the packaging.
- 7. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) Each package shall be operated and prepared for shipment in accordance with Chapter 7 of the application.
 - (b) Each package shall be acceptance tested and maintained in accordance with Chapter 8 of the application.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 9. Expiration date: January 31, 1998.

REFERENCES

Babcock and Wilcox Company application dated October 29, 1992.

Supplements dated: January 22, 1993; November 2, 1993; and November 30, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

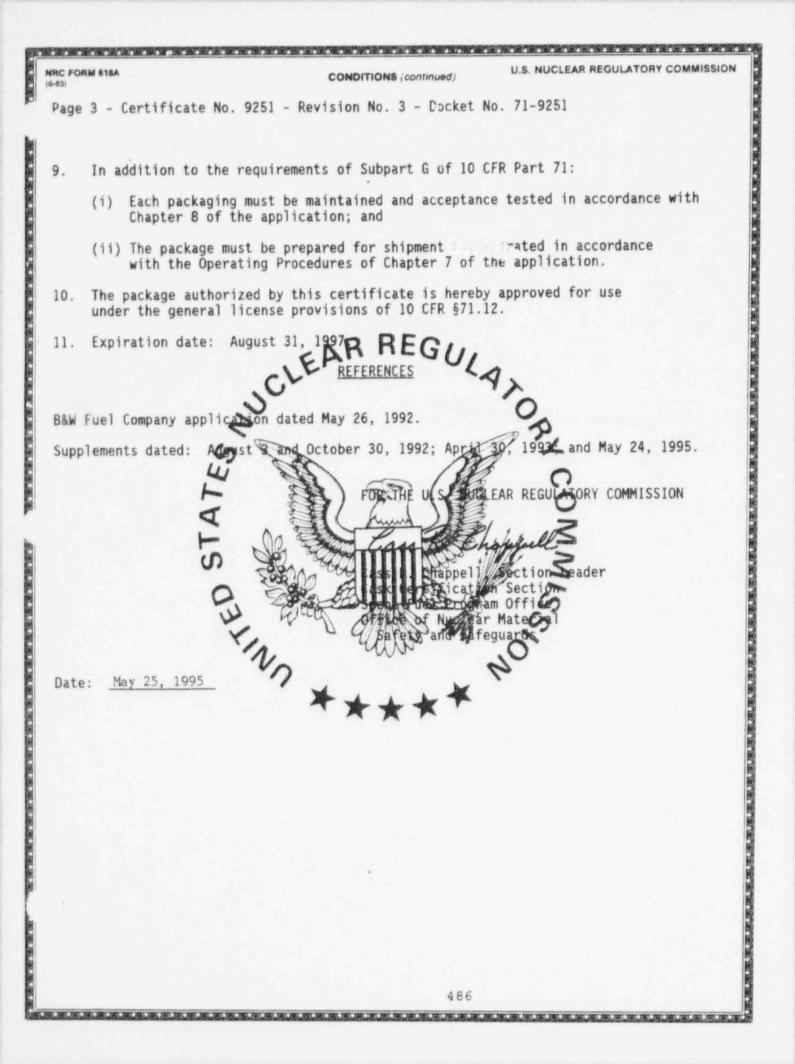
Lass R. Chappell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

Date: DEC 0 8 1994

UCFR 71			TE OF COMPLIANCE		TORY COMMISSI
. CERTIFICATE	NUMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAG
	9251	3	USA/9251/AF	1	3
of Federal I	Regulations, Part 71, "Packag	ing and Transportation of Rac	cribed in Item 5 below, meets the applicable sa dioactive Material." ny requirement of the regulations of the U.S. ntry through or into which the package will t	Department of Trans	
B&W Fue P.O. Bo	Norme and Address)	6 CAR	W Fuel Company application ated May 26 1992, as supp r NUMBER		
CONDITIONS This certificate	is conditional upon fulfilling	the requirements of 10 CFR I	Part 71, as applicable, and the conditions sp	ecified below.	
(1) (2)	composed of an outer drum. Th long inner cont and gasketed to container is ce 18-gauge steel by asbestos or The gross weigh	ainer for low-en inner container, e inner containe ainer constructe p flange closure ntered and suppo drum with 16-gau ceramic sheet, p	riched unaeium oxide powe surroundee by insulating r is a maximum 10.80-inch d of minimum 14-gauge ste and welded bottom sheet. rted in a 22.5-inch ID by ge head and DOT Specifica iywood, hardboard, and in is approximately 660 pou	material, square by The inner 34-inch hi tion 17H cl sulating ma	and an 30-inch 1ted gh osure
(3)		s constructed in Rev. 0, and 1215	accordance with B&W Fuel 599E, Rev. 1.	Company Dr	awing

NRC FORM 618A U.S. NUCLEAR REGULATORY COMMISSION CONDITIONS (continued) 16-821 Page 2 - Certificate No. 9251 - Revision No. 3 - Docket No. 71-9251 (b) Contents (1) Type and form of material (i) Sintered uranium oxide pellets enriched to a maximum 5.1 w/o in the U-235 isotope. The minimum pellet diameter is 0.315 inch, and the maximum pellet diameter is 0.375 inch. (ii) Uranium dioxide as powder, pellets, or any combination thereof, enriched to a maximum 5.1 w/o in the U-235 isotope. (2) Maximum quantity of material per package For the contents de Dr Bed REG (1) (i)370 pounds, with the U-235 content not to exceed 7.6 kg. Pellets must be prevaged on trays in accordance with PAW Fuel Company Drawing Nos. 1215597D, Rev. 1, and 1215600D, Pey. 0. The maximum weight of polyethylene within the inner contained shall not exceed 1500 per package. For the contents described in 5(b)(1) (11) 370 nounds. Uransul dioxide must be packaged in bares in accordance with 88W Fuel Compete Draking nos 15597D, Rev. and 1215600D, Rever. The maximum weight of polytopene within Se inner continer and not exceed PPOC brans per/package and III (c) Fissile Class (1) Minimum transport index o be for Class II V backages per shipment for (2) Maximum number o Class III Prior to each shipment the insert Compriment vessel) gasket shall be 6. inspected. This gasket shall be replaced if inspection shows any defects or every twelve (12) months, whichever occurs first. For the contents described in 5(b)(1)(i) and limited in 5(b)(2)(i), each pellet 7. box must contain at least 10 trays of pellets. Each of these trays must be fully loaded with pellets. Void spaces within a pellet box must be filled with aluminum spacers or empty trays. For packages with fewer than six pellet boxes, solid aluminum or wood pellet box spacers must be substituted for pellet boxes. The pellet boxes, pellet box spacers, and wood boards must provide a snug axial and cross sectional fit in the inner container. For the contents described in 5(b)(1)(ii) and limited in 5(b)(2)(ii), each package must contain no more than four loaded pellet boxes. The remaining spaces must be filled with solid wood or aluminum pellet box spacers. The center board must be nominal 1/2-inch thick stainless steel plate. The pellet boxes, pellet box spacers, and wood boards must provide a snug axial and cross sectional fit in the inner container.



CFR 71			TE OF COMPLIANCE		
CERTIFICATE NUM	BER	D REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAG
9252		1	USA/9252/AF		3
of Federal Reg	ulations, Part 71, "Packaging does not relieve the consign	and Transportation of R	scribed in Item 5 below, meets the applicable adioactive Material." any requirement of the regulations of the 'p puntry through or into which the package w	S. Department of Tran	
THIS CERTIFICATE I	S ISSUED ON THE BASIS OF A	SAFETY ANALYSIS REPOR	T OF THE PACKAGE DESIGN OR APPLI ATION E AND IDENTIFICATION OF REPORT OR APPLIC	ATION:	
B&W Fuel Co PO Box 1164 Lynchburg,		EAF	B&W Fuel Company applic March 9, 1993, as supple REG (SET NUMBER 71-9252	ation dated emented.	
CONDITIONS This certificate is o	conditional upon fulfilling th	e requirements of 10 CF	R Part 71, as applicable, and the coadditions	specified below.	
(a) P	ackaging		2	5	
(1) Model No.:	51032-2	1300 "	ha	
(2) Description		A CH	0	
(and fuel bu container. have a 3/89 are bolted 11 gauge st	ndle clamping Nine separato thick wall ar between fuel t eel shell app	er for fuel bundles, cons assembly, sbock mounted or blocks, which are 6" of a rectangular gusset poundles. The outer cont coximatel, 43" diameter kage, including contents	to a steel of 8 x 8-1/2" plate welded affer is comp by 216" long.	outer 'long and inside, bosed of an The
	following B Rev. 2; 121	&W Fuel Compar 5930 D, Rev. 2	ted and assembled in acc by Drawing Mos.: 1215926 2; 1215931 D, Rev. 2; 121 34 C, Rev. 1; 1215935 D,	5 C, Rev. 1; 15932 D, Rev.	1215929 D, 2;

Page 2 - Certificate No. 9252 - Revision No. 1 - Docket No. 71-9252

- (b) Contents
 - (1) Type and form of material

Unirradiated fuel assemblies, composed of uranium dioxide fuel pellets clad in zircaloy tubes. Uranium is enriched to a maximum of 5.05 w/o in the U-235 isotope. The fuel assemblies may contain inserted control rod assemblies. The fuel assemblies have the following specifications:

Туре	15×15	<u>15x15</u>	<u>17×17</u>	<u>17×17</u>	<u>15x15</u>
Rods Per Assembly	208	204	264	264	204
Nominal Rod Pitch (in.)	0.568	0.563	0.501	0.496	0.5625
Maximum Pellet Diameter (in.)	0.3707	0.3671	0.3252	0.3232	0.3672
Maximum Pellet Density (%TD)	97.5	97.5	97.5	97.5	97.5
Nominal Clad OD (in.)	0.430	0.422	0.379	0.374	0.422
Nominal Clad ID (in.)	0.377	0.370	0.332	0.326	0.368
Assembly Cross Section (in.)*	8.520	8.445	8.517	8.432	8.438
Active Fuel Length (in.)	144 10	144	144	144	120
Maximum U-235 Loading (kg)	25.20	24.24	24.62	24.32	20.20

* Assembly cross section is the product of the nominal rod pitch and the number of rods per edge.

(2) Maximum quantity of material per package

Two fuel assemblies. Total weight of fuel assemblies, including control rod assemblies, not to exceed 3400 pounds.

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(c) Fissile Class

6. Each fuel assembly must be unsheathed or must be enclosed in an unsealed polyethylene sheath which will not extend beyond the ends of the fuel assemblies. The ends of the sheaths must not be folded or taped in any manner that would prevent the flow of liquids into or out of the sheathed fuel assemblies.

7. Hydrogenous shims are not permitted within the fuel assemblies.

8. In addition to the requirements of Subpart G of 10 CFR Part 71:

- (a) The package shall be prepared for shipment and operated in accordance with Chapter 7.0 of the application.
- (b) Each packaging shall be maintained in accordance with Section 8.2 of the application.
- (c) Each packaging shall meet the acceptance tests in Section 8.1 of the application.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 10. Expiration date: September 30, 1998.

REFERENCES

B&W Fuel Company application dated March 9, 1993.

Supplements dated: May 10, and July 7, 1993; April 8, and April 13, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Caro R. Chappell

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

APR. 1 8 1994

Date:

RC FORM 618 46) CFR 71		IFICATE OF CO	MPLIANCE	CLEAR REGULA	
& CERTIFICATE NUMBER	D. REVISION NU	MBER C. PACKAGE	IDENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAG
9253	0		JSA/9253/B(U)F	1	3
supply and the second se		and and taken over a static provident strate in the state of the			
a This certificate is issued to (certify that the packaging and co	ontents described in Item 5 b	elow, meets the applicable sa	fety standards set for	th in Title 10, Code
of Federal Regulations, Par	171, "Packinging and Transport leve the consignor from compli- cies, including the government	ation of Radioactive Materia	of the requiations of the U.S.	Department of Trans	
THIS CERTIFICATE IS ISSUED ON a ISSUED TO (Name and Address) Public Service Co of Colorado Platteville, Colo	ompany	Public Serv	ice Company of C dated March 31,	olorado	
	CLE	AR MEG	71-9253		
CONDITIONS This certificate is conditional i	pon fulfilling the requirements	of 10 CFR Part 71, as appl	cable, and the conditions sp	ecified below.	
	C		0		
(a) Packaging	0		P		
	W SEC		1922 -		
(1) Mode	No.: TN-FSV	NED/	Als C	́р	
(2) Desc	ription	(hund)	13 (0	
cyli	cooled reactor (H nder, with a bals age has approxima Cavity diameter	a and redwood in te dimensions a	mpact limiter at	each end.	The
	Cavity length	s annos :	CO19	9 inches	
	Cask body outer	diameter	3	1 inches	
	Lead shield this		3.4	4 inches	
	Package overal]		And		
	including in	pact limiters		8 inches	
	Package overall			A7 inches	
		pact límiters		47 inches 00 pounds	
	Packaging weigh Gross package w		42,0	oo pounds	
	including co		47,0	00 pounds	
stee has OD o betw is 5 thic	cask body is made 1, welded to a bo an ID of 18 inche f approximately 3 een the inner and .5-inch thick Typ k Type 304 stain ge. The lid is f ure bolts. The 1	ttom plate and s and is 1.12 i O inches and is outer shells i e 304 stainless ess steel, and astened to the id is sealed wi	a top closure fl nches thick. Th 1.5 inches thic s filled with le steel. The clo is fully recesse cask body by 12, th double silico	ange. The e outer she k. The ann ad. The bo sure lid is d into the l-inch diam	inner shell ll has an ular space ttom plate 2.5-inch cask top meter equipped

Page 2 - Certificate No. 9253 - Revision No. 0 - Docket No. 71-9253

5.(a)(2) Description (Continued)

The cask has two lifting sockets bolted to the cask top flange. Two rear trunnions are provided for cask tie-down.

The fuel elements are stacked in a carbon steel fuel storage container, which has an OD of approximately 17.6 inches and an overall length of 195 inches. The fuel storage container has a 0.5-inch thick shell, a 2.0-inch thick bottom plate, and a 1.5-inch thick lid. The lid accommodates a removable depleted uranium plug. 人間にあっていると思いると思いると思いると思いると思いる。この

(3) Drawings

The packaging is constructed and assembled in accordance with the following Transnuclear, Inc. Drawing Nos.:

1090-SAR-1, R	lev. 1	1090-SAR-6,	Rev.	1	
1090-SAR-2, R		1090-SAR-7,	Rev.	1	
1090-SAR-3, R		1090-SAR-8,	Rev.	1	
1090-SAR-4, R		1090-SAR-9,	Rev.	1	
1090-SAR-5, R		1090-SAR-10,	Rev.	1	L

(b) Contents

(1) Type and form of material

Irradiated HTGR fuel elements. Each fuel element consists of a graphite block containing fuel rods. The fuel is composed of thorium/uranium carbide and thorium carbide fuel particles within the fuel rods. The graphite block is hexagonal in cross section and is approximately 14.2 inches across the flats and 31.2 inches long. Each fuel element contains a maximum of 1.4 kg of uranium enriched to a maximum of 93.5 weight percent U-235 and approximately 11.3 kg of thorium. The maximum burnup is approximately 70,000 MWD/MTIHM, and the minimum cool time is 1600 days.

(2) Maximum quantity of material per package

Six fuel elements, with decay heat not to exceed 60 watts per fuel element. The fuel elements are contained within a fuel storage container. Total weight of contents not to exceed 5,000 pounds, including fuel elements, fuel storage container, and depleted uranium shield plug.

(c) Fissile Class

III

Maximum number of packages per shipment

One

Page 3 - Certificate No. 9253 - Revision No. 0 - Docket No. 71-9253

- 6. The package must be leak tested as follows:
 - (a) Within the 12-month period prior to shipment, and after seal replacement, the package must be tested to show a leak rate no greater than 1×10^{-3} std-cm³/sec. The leak test must have a sensitivity of at least 5 x 10^{-4} std-cm³/sec.
 - (b) Prior to each shipment, the package seals (main seal and vent seal) must be leak tested in accordance with Section 7.1.2 of the application. The acceptance criterion is a leak rate no greater than 1×10^{-3} sid-cm³/sec. The test must have a sensitivity of at least 1×10^{-3} std-cm³/sec. The drain seal must also be tested if the drain port cover has been removed since the seal was last leak tested.
- 7. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) The package must be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application.
 - (b) Each packaging must meet the acceptance tests and must be maintained in accordance with the Acceptance Tests and Maintenance Program of Chapter 8 of the application.
 - (c) Prior to each shipment, the cask main closure seal and vent seal must be inspected. The drain seal must be inspected if the drain port cover has been removed during preparation for shipment. All seals must be replaced within the 12-month period prior to shipment, or earlier if inspection shows any defect.
- 8. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 9. Expiration date: May 31, 1999.

REFERENCES

Public Service Company of Colorado application dated March 31, 1993.

Supplements dated: February 24, June 2, and June 14, 1994.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cass R. Chappell

492

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

JUN 1 5 1994

Date

B-651 0 CFR 71	RM 618			CATE OF COMPLIANCE		TORY COMMISSIC
A CERT	TIFICATE N	UMBER	b REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	. TOTAL NUMBER PAG
	9254		0	USA/9254/A	1 1	2
of	his certific / Federal F	egulations, Part 71, "Packag	ing and Transportation of	described in Item 5 below, meets the applicable sa if Radioactive Material." with any requirement of the regulations of the U.S. country through or into which the package will t	Department of Trans	
Nuc1 P.O.	ear Fi Box	re is issued on the Basis of ame and Address/ Jel Services, In 337, MS 123 37650	b. Ti	Nuclear Fuel Services, In application dated July 2 REE G 71-9254		
4. CONE	OTIONS	is conditional upon fulfilling	the requirements of 10	CFR Part 71, as applicable, and the conditions sp	ecified below.	
5.		Mona	8	0	and denote mint or structure and a second structure of the sec	
(a)	Pack	aging	0			
	(1)	Model No 40	G-A	And "	6. Es.	
	(2)	Description	() ()	wastes meeting the requireme) 5 · · · · ·	
		20-gauge carbo carbon steel 1 gasket; 202-g The dimensions	n steel, open id; a 3/8-incl auge, forged of the packa	al. The packaging consists head drum. The drum is clo h, half-round tubular, smoo steel, closure ring; and a ging are 36 inches high by t of the package, including	osed by a 20 M, black ne 0/8-inch dia 18-1/4 inche	D-gauge, eoprene ameter bolt. es outer
	(3)	Drawings	n	www. So.		
		The packaging Drawing No. 00	is constructed 0-M0075-B, Re	d in accordance with Nuclean Vision A.	Fuel Servi	ices, Inc.,
(b)	Conte	ents				
	(1)	Type and form	of material			
		radioactive ma materials and	terial. The compacted ball	eeting the requirements of waste material is in the for es, approximately 16 inches ial shall have no sharp poir in plastic.	rm of non-co by 16 inche	es and 2 to
	(2)	Maximum quanti	ty of materia	l per package		
		of the waste m material provi	aterial is 300 ded that the	ies of radioactive materials D pounds. The contents may total quantity of fissile ma ied in 10 CFR §71.53(a).	include fis	ssile

U.S. NUCLEAR REGULATORY COMMISSION

MRC FORM 618A

CONDITIONS (continued)

Page 2 - Certificate No. 9254 - Revision No. 0 - Docket No. 71-9254

6. (a) For any package containing water or organic substance which could radiolytically generate combustible gases, a determination must be made, by tests and measurements or by analysis of a representative package, that the following criteria are met over a period of time that is twice the expected shipment time:

The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the package gas void if present at STP (i.e., no more than 0.065 g-moles/ft³ at 14.7 psia and 70 °F).

For any package delivered to a carrier for transport, the package must be prepared for shipment in the same manuer in which the determination for gas generation is made. The shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

- (b) For any package shipped within 10 days after sealing of the drum, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.
- Radioactivity per package shall be determined in accordance with Sections 1.2.4 and 4.8 of the application.
- In addition to the requirements of Subpart G of 10 CFR Part 71, the package shall be prepared for shipment and operated in accordance with Section 4 of the application.
- The package authorized by this certificate must be transported on a motor vehicle or railroad car assigned for sole use of the licensee.
- The package authorized by this certificate is hereby approved for use under the general license provision of 10 CFR §71.12.
- 11. Expiration date: September 30, 1998.

REFERENCES

Nuclear Fuel Services, Inc., application dated July 2, 1993.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

. Chappell tass)

494

Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

Date: SEP 1 5 1993

CFR 7	NRISI 618 '1		FOR RADIOACT	TE OF COMPLIANCE				
a. CER	mFICAT	50	D. REVISION NUMBER	USA/9256/A	d PAGE NUMBER	e. TOTAL NUMBER PAGES		
0	This certil of Federa	al Regulations, Part 71, "Packag	ing and Transportation of Ha	icribed in Item 5 below, meets the applicable idioactive Material." any requirement of the regulations of the U untry through or into which the package wi	5. Department of Trans			
THIS	CERTIFIC	CATE IS ISSUED ON THE BASIS O	F A SAFETY ANALYSIS REPORT	OF THE PACKAGE DESIGN OR APPLICATION AND IDENTIFICATION OF REPORT OR APPLIC	ATION			
anke 80 M	ee At Main	omic Electric Com Street MA 01740-1398	ipany	Yankee Atomic Electr dated April 12, 1993 REGU71-9256				
CON This	ENTIONS	ate is conditional upon fulfilling	the requirements of 10 CFF	R Part 71, as applicable, and the conditions	specified below.			
1.		0	2	0				
a)	Pack	aging 5	S	03				
	(1)	Model No.: WNPS	Steam Generato	r All				
	(2)	Description						
		covers, impact 1 steam generator generator is ess inches in the st the tube bundle inches in the tu The length of th inches. The tub approximately 3/ nozzles and othe generator is fil sides. Three sh axial restraint. carbon steel she plates are welde required. The m	imiters, and sh shell, internal entially cylind eam dram region region. The sh be bundle region to bundle region to bundle is com 4 inch, and an er penetrations led with low de mear keys are we Toroidal impa ell, are fixed a	ow density concrete, wit ear keys. The steam gen U-tubles and tube suppor rical with an OD of appr and an OD of approximat ell wall thickness is ap n and 3-1/8 inches in th or package is approximat posed of 1620 U-tubes, w average wall thickness of are covered with welded nsity concrete on both p lded to the steam genera ct limiters, which are p t each end of the steam m generator shell for ra f the package is approxi	erator consists. The stead aximately 8 ely 7 feet 1 proximately 2 e steam drum ely 40 feet 7 hich have an f 0.072 inch closures. Th rimary and se tor shell bot olyurethane generator. S diation shiel	sts of the am feet 6-1/4 inch in 2-3/4 region. 7-3/8 OD of The ne steam econdary ttom for foam with a Steel ding, as		
	(3)	Drawings						
		Chem-Nuclear Sys C-110-B-4 C-110-B-4	tems, Inc. Draw 6063-1, Rev. 1	1 through 4, Rev. 0	with the fol	lowing		
			16063-4, Rev. 0					

NRC FORM STRA

(6-83)

CONDITIONS (continued)

Page 2 - Certificate No. 9256 - Revision No. 0 - Docket No. 71-9256

- (b) Contents
 - (1) Type and form of material

Steam generator containing radioactive contamination, filled with low density concrete, meeting the requirements of low specific activity radioactive material.

(2) Maximum quantity of material per package

Greater than a Type A quantity of radioactive material. Fissile material may be present provided the fissile material meets the exemption standards of 10 CFR §71.53.

In addition to the requirements of Subpart G of IO OFR Part 71: 6.

- (a) The package must be prepared for shipment and transported in accordance with Chapters 7 and 8 of the application.
- The package must be transported in accordance with the operational controls of (b) Table 1.1 of the application.
- (c) Prior to transport, shielding must be welded onto the package in accordance with Chem-Muclear Systems, Inc. Drawing No. C-110-B-46063-1, Rev. 1, as necessary, such that the package meets the external radiation standards of 10 CFR §71.47.
- 7. This certificate authorizes a one-time shipment for each of four packages from the Yankee Nuclear Power Station to a point near Barnwell, South Carolina.
- The package authorized by this certificate must be transported on a motor vehicle 8. and on a railroad car assigned for the sole use of the licensee.
- 9. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 10. Expiration date: September 30, 1998.

THE CROC THE LEE CHARLEN CONTRACTOR CHARLENGE THE CARE THE CARE THE CARE CHARLENGE THE CARE CHARLENGE THE CARE CHARLENGE THE

REFERENCES

Yankee Atomic Electric Company application dated April 12, 1993.

Supplements dated: April 20, July 30, August 2, and September 10, 1993.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

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Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

OCT 2 8 1993

1 CERTIFICATE NUME		D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBER	6. TOTAL NUMBER PA
of Federal Regu	lations, Part 71, "Packaging loss not relieve the consign	and Transportation of Ra	cribed in Item 5 below, meets the applicable disactive Material." any requirement of the regulations of the U intry through or into which the package w	S. Department of Tran	
. ISSUED TO (Marrie) Portland Ge	^{nd Addmas)} neral Electric bia River Highw	Company Port	of THE PACKAGE DESIGN OF APPLICATION AND IDENTIFICATION OF REPORT OF APPLIC land General Electric C ication dated January 2 upplemented. 71+9259	ompany	
CONDITIONS This certificate is co	anditional upon fulfilling the	e requirements of 10 CFR	Part 71, as applicable, and the conditions	specified below.	
s. (a) Packa	ging 6	5	03	5	
(1)	Model No .: Tr	ojan Steam Gen	erator 3	6	
(2)	Description		× (()	0	
	welded nozzle the steam gene sheet and tube with an OD of dome) region, shell (tube bu 3.6 inches in shell region, 67 feet 8 inch have an OD of 0.05 inch. Th closures. The concrete on bo bars are welde Steel plates a shielding, as approximately	covers, and a rator steel st approximately and an OD of a indle) region. the upper shell the length of tes. The tube approximately the nozzles and e steam generat oth primary and ed to the steam are welded onto	h low density cellular shear key. The steam g ell, internal inconel U e steam generator is es 14 feet 8 inches in the pproximately 11 feet 4. The shell wall thickne 1 region and 2.8 to 3.2 the steam generator pa bundle is composed of 3 0.875 inch, and an aver other penetrations are for is filled with low d secondary sides. A se in generator lower shell the steam generator sh e maximum weight of the	enerator con sentially cy upper shell inches in the ss is approx inches in the covered with ensity cellu ries of five for axial re ell for radi	sists of the tube lindrical (steam e lower imately he lower roximately which ckness of welded lar shear key straint.
(3)	Drawings				
		s constructed a r Plant drawing	and assembled in accorda s:	nce with the	following
		Sheet 4, Rev.	igh 4, Rev. 0. 0; Sheet 2, Rev. 0; She 1; Sheet 5, Rev. 0; She 1; Sheet 8, Rev. 1; She	et 6, Rev. 1	5

RC FORM	616A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
	age 2	- Certificate No. 9259 - Revision No. 0 - Docket No. 71-9259
(b)	Conte	ents
	(1)	Type and form of material
		Steam generator containing radioactive contamination, filled with low density cellular concrete, meeting the requirements of low specific activity radioactive material.
	(2)	Maximum quantity of material per package
		Greater than a Type A quantity of radioactive material. Fissile material may be present provided the firster material meets the exemption standards of 10 CFR 5705P. FREGU,
6.	In ac	ddition to the requirements of Subpart G of 10 CFS Part 71:
	(a)	The package must be prepared for shipment and transported in accordance with Chapters 7 and 8 of the application.
	(b)	Prior to bransport objelding must be were not onto the package in accordance with Process Nuclear Plant Practice No. M-9779, Sheets 1 through 4, Rev. 0, Saturdeessary, such the she package meets the external radiation standards of 10 CFR \$71.47.
7.	Prio syst cert acco	r to transport, the National Cargo Bused and and the evaluated the em used to suppresent and the package on the barge, and must have ified that the superior and the package stowage are in rdance with the require instant and the package stowage are in
8.	Prio	r to transport, the united States boast Guard must have inspected the ition of the essel and the starage of the mackage on the barge.
9.	This the	certificate authorizes a one-time shipment for each of four packages from Trojan Nuclear Plant to a point near Richland, Washington.
10.	The assi	package authorized by this orthocace must be transported on a conveyance gned for the sole use of the licensee.
11.		package authorized by this certificate is hereby approved for use under the ral license provisions of 10 CFR §71.12.
12.	Expi	ration date: June 30, 2000.
		498

Page 3 - Certificate No. 9259 - Revision No. 0 - Docket No. 71-9259

REFERENCES

Portland General Electric Company application dated January 23, 1995.

Supplements dated: May 2 and 3, and June 15, 1995.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Caro R. Chappell

Cass R. Chappell, Section Leader Cask Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date ____ June 29, 1995

NOW THE DECOREMENT OF CHARGE AND THE OFFICIAL MEDIA CHARGE AND THE DECORE OF CHEGHES AND THE DECORE OF CHEGHES

OFR 71	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	FOR RADIOACT	VE MATERIALS PACKAGES		. TOTAL NUMBER PAG
CERTIFICATE NUMBER		D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	0. PAGE NUMBER	e. TUTAL NUMBER PAS
9260		0	USA/9260/A	1	3
of Federal Regulation	s, Part 71, "Packagin	ig and Transportation of Rad	ribed in Item 5 below, meets the applicable sa lioactive Material." ny requirement of the regulations of the U.S. ntry through or into which the package will	Department of Trans	
THIS CERTIFICATE IS ISSUE a ISSUED TO (Name and Ad Portland Gener 71760 Columbia Rainier, Orego	al Electric River High	Company Iway appl asps	DF THE PACKAGE DESIGN OR APPLICATION IND IDENTIFICATION OF REPORT OR APPLICAT land General Electric Con ication dated January 23 upplemented.	mpany	
CONDITIONS This certificate is conditi	onal upon fulfilling t	the requirements of 10 CFR	Part 71, as applicable, and the cosiditions sp	ecified below.	
(2) De A Se th pr ar st 2. re 10 Th ke St st	odel No.: 1 escription reactor pre- eal-welded r be pressuriz- ressurizer v oproximately hell wall th 5 inches in egion. The ong, are arr be pressurized y assembly teel plates hielding, as	rezzle covers, a per vessel, the vessel is essent 53 feet, and a nickness is appr the upper head internal heater ranged in concen ver is filled wi is welded to th may be welded o	d with low density cellu nd a shear key. The pre support skirt, and heate ially cylindrical with a n DL of approximately 7 eximately 4 inches along region, and 3 inches in elements, which are app tric rings in the lower th low density cellular e pressurizer shell for nto the support skirt fl maximum weight of the p	ssurizer cor elements. feet 8 inche the cylinde the lower f roximately 9 region of th concrete. A axial restra ange for rac	sists of The ength of es. The er wall, head feet te vessel. shear int.
	rawings				
Ti M	rojan Nuclea -9252, Sheet	ar Plant drawing ts 1 through 3,	Rev. 0.	ce with the	rollowing
		ts 1 through 8, t 1, Rev. 0.	Nev. U.		

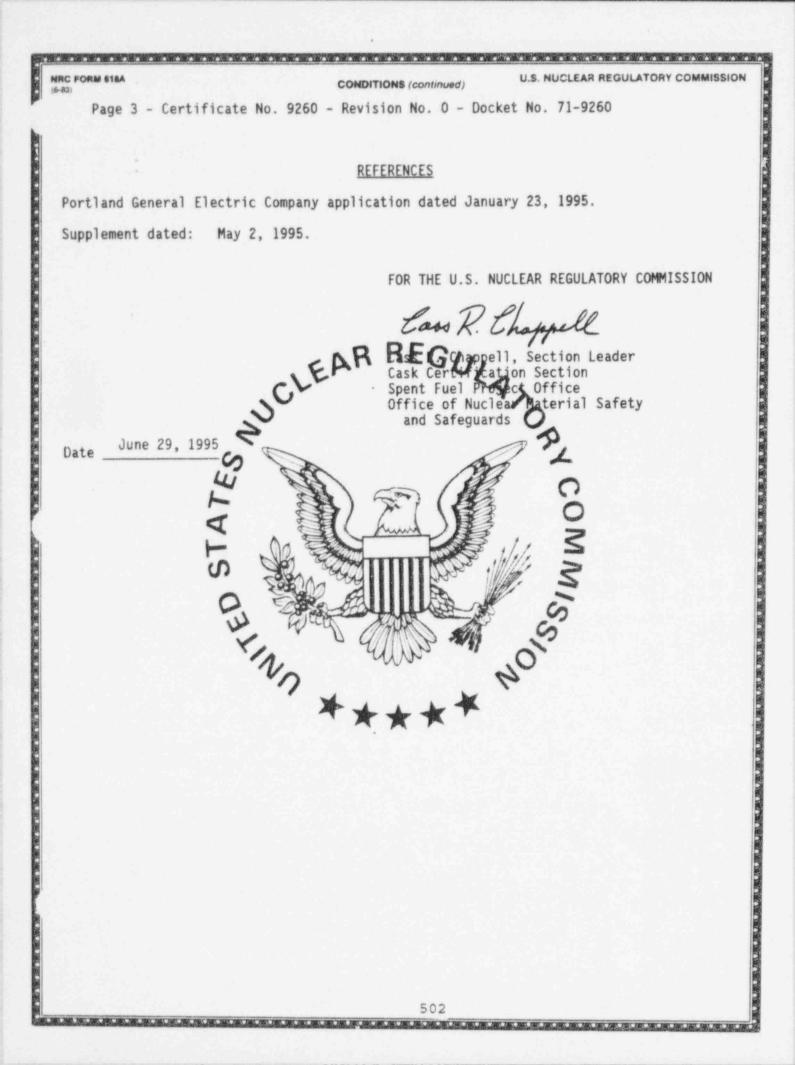
RC FORM (83)	18A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
	Page 2	- Certificate No. 9260 - Revision No. 0 - Docket No. 71-9260
(b)	Conte	ents
	(1)	Type and form of material
		Pressurizer containing radioactive contamination, filled with low density cellular concrete, meeting the requirements of low specific activity radioactive material.
	(2)	Maximum quantity of material per package
		Greater than a Type A quantity of radioactive material. Fissile material may be present provided the fiscile material meets the exemption standards of 10 CFB SR . REGUL
6.	In ac	dition to the confrements of Subpart G of A SER Part 71:
	(a)	The package must be prepared for shipment and Consported in accordance with Chapters 7 and 8 of the application.
	(b)	Prior to transport shielding must be were onto the package in accordance with the package Plant Drawing No. M. 252, Sheet 3, Rev. 0, as necessary such that the package mere the external radiation standards of 10 CFR §71.47
7.	Prior syste certi accor	to transport, the disconal Cargo Europe Inc. must have evaluated the em used to support and the down the stage of the barge, and must have fied that the support and the down system and the pastage stowage are in dance with the feullations of the downandant. United States Coast Guard.
8.	Prior condi	to transport, the limited States boast courd must have inspected the tion of the vessel and the storage of the package on the barge.
9.	This Nucle	certificate authorizes a one-time shipment for one package from the Trojan ar Plant to a point near Richland, Washington.
10.	The p assig	ackage authorized by this perturbicate must be transported on a conveyance ned for the sole use of the licensee.
11.	The p gener	ackage authorized by this certificate is hereby approved for use under the al license provisions of 10 CFR §71.12.
12.	Expir	ation date: June 30, 2000.

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& CERTIFICATE NU	and the second se		IVE MATERIALS PACKAGES		
	9263	b. REVISION NUMBER	C PACKAGE IDENTIFICATION NUMBER USA/9263/B(U)	d PAGE NUMBER	. TOTAL NUMBER PAG
of Federal Re	gulations, Part 71. "Packag a does not relieve the cons	ing and Transportation of Ra	cribed in Item 5 below, meets the applicable a idioactive Material." any requirement of the regulations of the U.S untry through or into which the package will	Department of Trans	
s issued to /Nem	w and Address duction and t Company, Inc treet	. TITLE	OF THE PACKAGE DESIGN OF APPLICATION AND IDENTIFICATION OF REPORT OF APPLICA Source Production and Equapplication dated December supplemented.	uipment Comp	any Inc., as
4. CONDITIONS This certificate is	conditional upon fulfilling	the requirements of 10 CFR	Part 71, as applicable, and the countrions s	pecified below.	
(1) (2) (3)	Primary Compor depleted uran are securely p source safety approximately maximum weight Drawings The packaging Production and 15B001-3, Rev	is constructed	an outer tradiogram an outer tradiogram an outer tranium shell a tritanium se zircalloy is tube by a source cab the smit resembles a rea incress high and 14 is 53 pounds. and assembled to accordan any, Inc. Reawing Nos. 19 w 3; and F5B008, Rev. 2	nternal s ube. The lock assest angular bo 5 inches lo nce with Sou 58000, Rev.	upports, contents mbly and x ng. The rce
(b) Cont					
(1)	Type and form Iridium-192 a: radioactive ma	s sealed sources	which meet the requirem	ents of spec	ial form
(2)	Maximum quant	ity of material	per package		
	150 curies (or	itput)			
	N432-1980, "Ri	are determined adiological Safe Gamma Radiograp	in accordance with Americ ty for the Design and Co hy".	can National nstruction o	Standard f
			503		

U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A CONDITIONS (continued) (6-83) Page 2 - Certificate No. 9263 - Revision No. 0 - Docket No. 71-9263 The source shall be secured in the shielded position of the packaging by the 6. source assembly lock, lock cap and safety plug assembly. The safety plug assembly, lock cap and source assembly used must be fabricated of materials capable of resisting a 1475 °F fire environment for one-half hour and maintaining their positioning function. The locking ball of the source assembly must engage the locking device. The flexible cable of the source assembly and safety plug assembly must be of sufficient length and diameter to provide positive positioning of the source in the shielded position. The nameplates shall be fabricated of materials capable of resisting the fire 7. test of 10 CFR Part 71 and maintaining their legibility. In addition to the requirement CFR Part 71: Subpar 8. The package shall be prepared for shipment and operated in (a) accordance with the Operating Procedures in Section 7, of the application and supplemented, and Each packaging most meet the Acceptance Tests and Maintenance Program in Section 84. of the application, as supplemented. (b) The packaging authorized by thes certificate general licens provisions of a CFR 571.12. eveby approved for use under the 9. 10. Expiration dat ADI dated December 27, 1994. Ton Source Production and Equipment Compan , 1995. 5 March and 19 Supplements dated: Janua AR RESULATORY COMMISSION FOR THE U Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS Date: April 28, 1995

NRC FORM 618 (8-46) 10 CFR 71		ATE OF COMPLIANCE	JCLEAR REGULA	TOWY COWNISSI
CERTIFICATE NUMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d. PAGE MUMBER	. TOTAL NUMBER PAR
2 PREAMRIE	1	USA/9511/B(U)	1 1	Lanna and an article and an
 a. This certificate is issued to of Federal Regulations, P b. This certificate does not it 	art 71, "Packaging and Transportation of relieve the consignor from compliance wit	h any requirement of the regulations of the U.S.	Department of Trans	
applicable regulatory age	encies, including the government of any c	country through or into which the package will	be transported.	
3. THIS CERTIFICATE IS ISSUED C a. ISSUED TO (Name and Address		RT OF THE PACKAGE DESIGN OR APPLICATION LE AND IDENTIFICATION OF REPORT OR APPLICAT	ION:	
	tment of Energy	U. S. Department of Ener	gy	
EH-33.3 Washington,	DC 20545	application dated Februa as REG/fronted	ry 20, 1991.	
4. CONDITIONS This certificate is conditional	upon fulfilling the equirements of 10 Cl	FR Part 71, as applicable, and the cognitions sp	ecified below.	
5.	6	0		
(a) Packag	ing S	A P		
(1)	Moder No: BUSS 8-1	50 (12 (2	
(2)	Description	Anna 183 (0	
		indrical forged stainless		
	cash body is a one pier The cash coverty is 20.	te forgion 54.25/inches 0	by 49 inches hic	ies high.
	sold, stainess steel	asket, 19.95 ipones in a	mameter by 2	2.83
		the case ity the basic		
	receptacles for the son	unce capsules. Eleven 4- in	nch high,	4.5
		in port are located on the		vered vent
	body. The cask lid is	a one-piece for ting, 28.7	B inches in	diameter
	by 12.84 inches hick.	Twelve 1.5 inch diameter	bolts faste	n the
	lid and port covers each	ody through a 3.8-inch this ch have concentric, double	O-rings. 1	The cask
	O-ring is metallic and	retains the helium coolant	t which fill	s the
	cask cavity. The outer	r O-ring is elastomeric and esting the metallic O-ring	d provides a	n annular bas an
	impact limiter on each	end. The impact limiter		
	in a stainless steel st	nroud.		
		of the packaging with impa		
		107 inches high. The maxim		
		unds. The maximum weight of 30,000 pounds. The shipp		
		ch are not part of the pack		

IRC FORM 618A				CONDITIONS (continued)	U.S. NUCLEAR	REGULATORY COMMISSIO
age 2 - C	ertific	cate No. 95		ion No. 1 - Docket	No. 71-9511	
. (a)	Packa	aging (cont	inued)			
	(3)	Drawings				
	(3)		aina in nav	activited in accord	dance with the f	ollowing
		drawings:	ging is co	nstructed in accor	uance with the i	orrowing
		Drawing N	0.	I	itle	
		S48981, S	ht. 1, Rev ht. 1, Rev ht. 1, Rev	. н с	ask with Impact ask Assembly ody, Cask, 304 (
		and Sht	. 2. Rev. I	M		
			ht. 1, Rev	AR REGU	of Unit 1, Heat	N for Upper Port No. 82V65-1-1
			ht Rev		olt, Pasion, 12	Point External
		•	ht. 1, Rev		Wrenching, Fla	nged
		T73685; S	ht. 1, Rev		lug Brain (BUSS	Čask Lid (BUSS))
		199903 5	ht I Rev		Perin Plug (BUS	
		R44676, S R43728, S			pre Plug Assembl Plug, Cash B	
		S48979, S Sht. 3.	hts.		mpact Limiter BU	
		in a local sector of the secto	ht. Revis ht. Alev ht. Alev ht. Rev ht. Rev		Non Conformance radie BUSS ask allet Tock, Mounting sket, Con Body sket, Cosk Body	, 4 Hole (BUSS) , 6 Hole (BUSS)
		\$50054, 5 \$50055, \$		D WWW B	asket, Oask Body asket Cask Body	, 12 Hole (BUSS)
(b)	Cont		×	++++	(
	(1)	Type and	form of ma	terial		
		(SrF ₂) ca material.	psules meet	loride (CsCl) or p ting the requireme ules are as descri	nts of special fo	orm radioactive
	(2)	Maximum q	uantity of	material per pack	age	
		Basket Type	Capsule Type	Maximum Capsule Thermal Power (Watts)	Maximum Cask Thermal Power (Watts)	Maximum Cask Activity (million Ci)
		16-Hole	CsC1	250	4000	0.85
		12-Hole 6-Hole	CsCl SrF.	333 650	4000 3900	0.85
		4-Hole	SrF2	850	3400	0.56

NRC FORM 618A U.S. NUCLEAR REGULATORY COMMISSION **CONDITIONS** (continued) 16-83 - Certificate No. 9511 - Revision No. 1 - Docket No. 71-9511 Page 3 For shipments of CsCl capsules, the shipment period must be completed within thirty (30) days following the placement of the cask lid on the cask body. The lifting lugs must not be used as tie-downs, and the lifting lug holes must be plugged or covered during transit. 8. In addition to the requirements of Subpart G of 10 CFR Part 71: 原していたいないないないないないないないないないないないないない The package shall be operated and prepared for shipment in accordance with (a) Chapter 7 of the application, as supplemented. Each package shall be acceptance tested and maintained in accordance with (b) Chapter 8 of the application, as supplemented. J+Lbe The package authorized by the 9. stransported on a conveyance assigned for the exclusive this package. of 10. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12. 11. Expiration Date: Colly EFERENCE U. S. Department of Eurgy application hated plements dated February 28 REGULATORY COMMISSION Chappell. Section Leader Certification Section Cask Storage and Transport Systems Branch dustrial and Nuclear Safety, NMSS SEP 2 8, 1994 Date: 507

CERTIFIC	ATE NUMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION	NUMBER d.P	AGE NUMBER	. TOTAL NUMBER
9781		5	USA/9781/B()F	1	3
of Fed	eral Regulations, Part 71, "Packag	ing and Transportation of Re	scribed in item 5 below, meets the a adioactive Material." any requirement of the regulations untry through or into which the pa	of the U.S. Depart	ment of Trans	
U.S. Divi	PICATE IS ISSUED ON THE BASIS O TO (Neuron and Address) Department of Ene sion of Naval Reac ington, DC 20585	rgy tors	supplemented.	port for M-	-160 Shi 968, as	pping
CONDITION This cetting	sicate is conditional upon fulfilling	the requirements of 10 CFF	Part 71, as applicable, and the co	oditions specified	below.	
(1) (2)	inches overall he spaced vertical f (fabricated from surface). The in	a right circular ight. The patka ins 151-1/2 inch carbon steel and ner shell, the c	cylinder, 79 inche aging outer shell co tes long, attached i clad with stainles containment vessel,	onsists of to a 1-1/2- is steel or is 1-inch	84 even inch th the ou thick (1	ly ick wall ter having a
	thick. The 9-7/1 with lead. The t fabricated of sta container and sea cover allows for The containment v	6-inch annulus t op of the contat infess steel 15 is the containme individual spent essel has an ins	ess steel cladding) between the outer an iner is covered with inches thick which ent vessel. An oble t fuel cell loading side diameter of 55	a rotatat is bolted ong access or unload inches.	tells is te close to the plug in ing. The cent	filled ure head the ral
	region contains a head. (This heat cylinder, 21 inch containment vesse containment vesse for spent fuel.	secondary heat exchanger is no es in diameter, 1. The annulus 1 shell provides The spent fuel	exchanger which is ot used during ships occupies the centra between the backup s a space 17 inches is contained in the particular spent fue	supported ment.) An al region of cylinder a wide by 16 annulus by	by the inner b of the and of t 0 inche alumin	closure ackup ne s high
	and water vent li rail. The packag	ne, which is cap ing is cradled	rations to the conta oped during shipment in a support which p ment. The maximum	t. Shipmer permits the	ts are packag	ing to

Page 2 - Certificate No. 9781 - Revision No. 5 - Docket No. 71-9781

5. (a) Packaging (continued)

(3) Drawings

The packaging is constructed in accordance with the description and Drawing Nos. contained in the Bettis Atomic Power Laboratory Safety Analysis Reports (WAPD-OP(R)C-243, WAPD-OP(R)C-558 and WAPD-OP(R)C-621 dated May 1973, October 1, 1976 and March 1977.

- (b) Contents
 - (1) Type and form of material

Irradiated fuel assemblies and blanket modules of the following type:

- (i) PWR Core 2 Seed 1 Fuel Assembly.
 (ii) PWR Core 2 Seed 2 Fuel Assembly.
- (iii) PWR Core 2 Blanket Fuel Assembly.
- (iv) S56 Fuel Module, rodded or unrodded.
 (v) S56 Center Cell.

All shipments shall be made ory and shall use one holdown device per PWR module. Each PWR Core 2 Seed 1 or Seed 2 Fuel assembly shall contain a poison rod or a control rod.

- (2) Maximum quantity of material per package
 - 12 fuel assemblies as described in 5(b)(1)(i) or 11 fuel assemblies and one specific blanket fuel assembly, Serial No. 62A-W01-67. Shipment shall not be made prior to 1,614 days after last power openation of the fuel and shall net exceed 12,846 Btu/hr of decay heat per shipment. VIN
 - (ii) 12 fuel assemblies as described in 5(b)(1)(ii) which shall not exceed 1,100 Btwibr per fuel assembly of decay heat or 13,200 Btu/hr per shipment
 - (iii) 12 blanket fuel assemblies as described in 5(b)(1)(iii) which shall not exceed 21,300 Btu/hr of decay heat per shipment. Shipment shall not be made prior to 1,123 days after last power operation of the fuel.

Page 3 - Certificate No. 9781 - Revision No. 5 - Docket No. 71-9781

- (b) Contents (continued)
 - (2) Maximum quantity of material per package (continued)
 - (iv) 8 fuel assemblies as described in 5(b)(1)(ii) and 4 specific blanket fuel assemblies, Serial Numbers G2A-F01-26B, G2A-F01-02, G2A-F01-10 and G2A-W01-73, which shall not exceed 12,016 Btu/hr of decay heat per shipment. Shipment shall not be made prior to 1,487 days after last power operation of the fuel, with the four blanket fuel assemblies located adjacent to each other in a clockwise or counter-clockwise direction as specified by the serial numbers previously stated.
 - (v) 4 fuel assemblies as described in 5(b)(1)(iv) or 3 fuel assemblies and one center cell as described in 5(b)(1)(v). Shipment shall not be made prior to 168 days after last power operation of the fuel rod and shall not exceed 12,800 Btu/hr of decay heat per shipment.
- (c) Fissile Class

Maximum number of packages per shipment

One (1)

III

6. Expiration date: July 31, 1997

REFERENCES

Safety Analysis Report for M-160 Shipping Container: Core independent Analyses, SRSD-106, dated October 18, 1968, as transmitted by Naval Reactors Letter G#2097, dated June 3, 1969.

Supplements: Knolls Atomic Power Laboratory letter ORP-74520-414, dated November 26, 1969; Naval Reactors letter 6#3742, dated May 15, 1973; Bettis Atomic Power Laboratory letters WAPD-OP(R)C-284, dated August 23, 1973 and WAPD-OP(R)C-297, dated October 8, 1973; Naval Reactor letters G#5582, dated December 17, 1976; G#5671, dated April 15, 1977; G#5702, dated May 23, 1977; G#5792, dated September 22, 1977; G#5793, dated September 29, 1977; G#5872, dated December 20, 1977; G#587, dated December 29, 1977; G#5872, dated December 20, 1977; G#5897, dated January 11, 1978; G#6658, dated April 14, 1980, and G#92-03424, Dated March 20, 1992.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles Ma

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

APR 3 0 1992

Date:

	and the second	E MATERIALS PACKAGES	L'ester summer	. TOTAL NUMBER PAG
S CERTURICATE NUMBER	5 REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	1	4
of Federal Regulations, Part 71, "Packa;	ing and Transportation of Rad lignor from compliance with an ig the government of any coun	ny requirement of the regulations of the U.S. stry through or into which the package will the the package beside of application	Department of Trans transported.	
.S. Department of Energy ivision of Naval Reactor ashington, DC 20585	s S3G	No IDENTIFICATION OF REPORT OF APPLICATION Core Basket Disposal Cor ety Analysis Report for F ed Jure 1980, as suppleme NUMBER 71-9786	ntainer Packaging	
CONDITIONS This certificate is conditional upon fulfillin	the requirements of 10 CFR F	Part 71, as applicable, and the conditions sp	ecified below.	
basket packa Removal Cont (S3G Core Ba approximate) The S3G CBDC diameter, 13 5-inch thick cylinder wit The S5W CBRC inner core b of lead shie The 1-inch t The outer sh thick cylind truncated co two shells a backup strap	consists of eithe ged in an inner, ainer (CBRC)) why sket Disposal Cor y 172,000 pounds. is a 4-inch thic inches long, wi bottom end plate h full penetratio , which will be c asket, is basical lding sandwiched hick inner shell ell is made up of rical shell that nical shell which re joined by a fu on the inside sh	ck steel cylinder, 89 inc ith an 8-inch thick top e e. Both end plates are w	C or S7G co 5W Core Bas outer contai kage weighs thes in outs and plate an welded to the steel she ontainer co steel she finch 0.D., and joins a the small en weld and a cration weld	ket ner ide d a e CBDC and comprised 11s. long. 0.5-inch d. The weld s are

NRC FORM FIRE

CONDITIONS (continued)

Page 2 - Certificate No. 9786 - Revision No. 3 - Docket No. 71-9786

..(a)(2) Description (continued)

The S5W CBRC will contain either an S3G, S1C or S7G core basket. The irradiated S3G core basket is an Inconel 600 cylindrical shell. Three, 3-inch thick 304 stainless steel plates are positioned in the core basket prior to removal to provide overhead radiation shielding. The lower plate is 46.2 inches in diameter. The upper plates have the same diameter but contain six extensions that fit inside recessed cutouts within the core basket. The total core basket weight is approximately 9,650 pounds.

The S1C core basket is a 304 stainless steel cylindrical shell positioned inside a 304 stainless steel thermal shield. The overhead shielding consists of a set of 2-inch thick 304 stainless steel plates attached to the S1C core basket to provide radiation shielding during handling. The core basket weight is approximately 8,523 pounds.

The S7G core basket is an Inconel 600 cylindrical shell. A 304 stainless steel laminated plate (8-inches thick) with lifting attachments is attached to the top of the S7G CB to provide radiation shielding during handling. The core basket weight is approximately 8,873 pounds.

The package may alternatively consist of S8G irradiated components positioned within an irradiated components discharge tack (ICDR) which is placed in an S3G CBDC. The ICDR is a steel tack approximately 128 inches high and 80 inches in diameter, and is designed to fit inside the S3G CBDC. The ICDR consists of a center cylinder assembly surrounded by 23 storage tubes, a top plate and a cylinder support base. The center cylinder is HY-80 steel, has a 36-inch outer diameter and a 4.5-inch wall thickness, and is 117 inches high. There are 9 storage tubes positioned inside the center cylinder. The total weight of the irradiated components, the ICDR, and the S3G CBDC is approximately 125,000 pounds.

(3) Drawings

The packaging is constructed in accordance with Bettis Drawing No. 1527E40 for the S3G Core Basket Assembly and KAPL Drawing No. 152D7009 for the S1C Cc.e Basket Assembly and KAPL Drawing No. 232B4874 for the S7G Core Basket Assembly and KAPL Drawing No. 978E644 for the S8G Irradiated Components.

(b) Contents

- (1) Type and form of material
 - (i) An irradiated core basket either the S3G, S1C or S7G and S5W CBRC. The shipment may include surface contamination in the form of activated corrosion products and for the S3G core basket approximately 8 gallons of residual water.
 - (ii) S8G irradiated components within an ICDR. The shipment may include surface contamination in the form of activated corrosion products.

Page 3 - Certificate No. 9786 - Revision No. 3 - Docket No. 71-9786

- (2) Quantity of material in package
 - (i) Item 5(b)(1)(i) above:

One irradiated core basket and S5W CBRC as described in 5(b)(1). Surface contamination not to exceed 20.6 curies for the S3G core basket, 7.45 curies for the S1C core basket or 1.2 curies for the S7G core basket. The activation level of the irradiated S3G core basket is not to exceed 131,000 curies; the irradiated S1C core basket not to exceed 20,000 curies, and the activation level of the irradiated S7G core basket is not to exceed 140,000 curies.

(ii) Item 5(b)(1)(ii) above: ____ [] []

Irradiated components, including 141 instrument lines, 18 lower control drive mechanism assemblies, 4 fill sleeves, and 1 instrument stalk. Surface contamination not to exceed 65.5 curies. Activation level of the irradiated components not to exceed 2,440 curies.

- Shipment of an inradiated S3G core basket must be made no earlier than 75 days after reactor shutdown.
- Shipment of an imradiated SIG core basket must be made no earlier than 60 days after reactor shutdown.

Shipment of an imradiated S76 core basket must be made no earlier than 180 days after reactor shutdown.

 Shipment of S8G inradiated components must be made no earlier that 100 days after reactor shutdown

10. In addition to the pequirements of Subpart 6 of 10 CFR Part 71:

 (a) Each packaging must meet the following Acceptance Tests and Maintenance Program:

* * *

S3G Core Basket

Section 8.0 of application dated June 1980

S1C Core Basket

Section 8.0 of application dated August 1983

S7G Core Basket

Section 8.0 of application dated May 1987

S8G Irradiated Components

Section 8.0 of application dated September 1991

NRC FORM FIEL

CONDITIONS (continued)

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(b) The package shall be prepared for shipment and operated in accordance with the following operating procedures:

S3G Core Basket

Section 7.0 of application dated June 1980

S1C Core Basket

Section 7.0 of application dated August 1983

S7G Core Basket

Section 7.0 of apprication dated May 1987

S8G Irradiated Components

Section 2.0 of application dated September 1991

10. Expiration Date: August 31, 1996.

REFERENCES

S3G Core Basket Disposal Container Safety Analysis Report for Packaging, WAPD-REO(C)-122, dated June 1980, as revised (Revision 2, dated May 5, 1986).

Safety Analysis Report for Packaging an SiC Core Basket-Thermal Shield Assembly in the S3G Core Basket Disposal Container, S1C CB-TS, dated August 1983.

S7G Core Basket in the S3G Core Basket Disposal Container Safety Analysis Report for Packaging dated May 1987.

S8G Irradiated Components in the S3G Core Basket Disposal Container Safety Analysis Report for Packaging, Revision 2, dated September 1991.

DOE memorandums G#7627 dated November 16, 1983; G#C86-3736 dated May 24, 1986; G#C86-3750 dated July 15, 1986; G#87-5663 dated July 7, 1987; G#91-10937 dated July 31, 1991; G#C91-11007 dated September 18, 1991.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

NOV 1 9 1991

Date:

RC FORM 618 8-850 0 CFR 71			U.S. N E OF COMPLIANCE E MATERIALS PACKAGES	UCLEAR REGULA	TORY COMMISSIO		
8. CERTIFICATE NU	9787	6. REVISION NUMBER	ISION NUMBER C. PACKAGE IDENTIFICATION NUMBER C. PAGE NUMBER 0. TOTAL NUMB				
of Federal Re b. This certifica applicable re	egulations, Part 71, "Packagin te does not relieve the consig igulatory agencies, including	ng and Transportation of Radi gnor from compliance with an the government of any count	y requirement of the regulations of the U.S ry through or into which the package will	. Department of Trans			
A ISSUED TO INW		A SAFETY ANALYSIS REPORT O	F THE PACKAGE DESIGN OR APPLICATION ID IDENTIFICATION OF REPORT OR APPLICA	TION			
	ment of Energy Naval Reactors DC 20585	5	AlW-3 Power Unit Shippin Safety Analysis Report f lated August 1980, as su NUMBER 71-9787	for Packaging	1		
This certificate is	s conditional upon fulfilling	the requirements of 10 CFR P	art 71, as applicable, and the conditions s	pecified below.			
6.	600	1	0				
(a)	Packaging 69	2	07	E.			
	(1) Model No.	: AIN-3 Power L	Init Shipping Container	(PUSC)			
	support a attached secured t shipping forty 2.2 locking r control r thick ste over the support o absorber, a height At the bo protectio bottom of bottom er inner dia protectio with twel part of t assembly,	tevice, a punctur to the top end of to the power unit studs and is bol 25-inch diameter buts) and control od motion. The efficience with forty with an 80-inch of 25 inches is of tom end of the on plate with a d the power unit bergy absorber, w umeter, and a hei on plate and is a ve 0.875-inch di the power unit as which extends a	rcular cylindrical stee e protection cover, and f the package. The mod adapter flange with the ted to the upper clamp assembly studs. Module rod holddown devices p top puncture protection d a 5-inch thick steel y and attaches to the b 2-inch diameter bolts. outer diameter, a 54-i welded to the top punct AlW-3 PUSC, a 4-inch th iameter of 50.5 inches thermal shield by eight ith an 89.25-inch outer ght of 36 inches cover ttached to 'he thermal ameter bolts. The supp sembly, and a stainless round the outside of the on for the sides of the	an energy at the support and cradle a support cyl prevent fuel cover, with top plate, f ottom plate The top en nch inner di ure protecti ick steel pu is attached sets of U-b diameter, a the bottom p shield of th ort barrel, steel plug/ e support ba	sorber are device is meter issembly with inders (with module or 4-inch its down of the model ergy ameter, and on cover. ncture to the olts. A 52.5-inch uncture e power unit which is band rrel,		

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U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A CONDITIONS (continued) (6-83) Page 2 - Certificate No. 9787 - Revision No. 2 - Docket No. 71-9787 Description (continued) 5. (a)(2)For shipment, the loaded A1W-3 PUSC is secured horizontally in a shipping pedestal. The shipping pedestal consists of a base on which two support beams are mounted horizontally with rubber shock mounts. The base is bolted to the deck of a 300-ton railcar and to four stop blocks which are welded to the railcar deck. The PUSC is secured to the shipping pedestal using the upper clamp and cradle assembly and the center and lower yoke/saddle assemblies. The yokes span across the upper side of the PUSC and are attached to the support beams while the saddles suspend from the yokes and support the weight of the loaded PUSC. A 0.25-inch thick railcar cover is used to enclose the entire AlW-3 PUSC for shimmer. The loaded AIL 3 PUSC (excluding the shopping pedestal) is 349 inches long, has a maximum diameter of 134 inches, and weighs approximately 397,000 wunds. (3)Drawings Content (b) One uni Fissile Class (c) most be instanded in the power unit as 6. Control rods and control rod to logo de de lices described in the application. In addition to the requirements of Subpart G of 10 CPC 7. 71: The package must be prepared, for shipment and operated in accordance with the (a) Operating Procedures in Charger portion application.

(b) The packaging must meet the Acceptance Tests and Maintenance Program in Chapter 8 of the application.

Expiration date: April 30, 2000

NRC FORM E18A U.S. NUCLEAR REGULATORY COMMISSION CONDITIONS (continued) (5-83) Page 3 - Certificate No. 9787 - Revision No. 2 - Docket No. 71-9787 REFERENCES AlW-3 Power Unit Shipping Container Safety Analysis Report for Packaging, WAPD-REO(c)-118, dated August 1980. Supplements: AlW-3 Power Unit Shipping Container Modified Top Energy Absorber Revised Safety Analysis Report for Packaging, Attachment 1 to WAPD-REO(c)-118, dated February 1985; and Naval Reactors Memorandum G#94-03572 dated November 4, 1994. FOR THE U.S. NUCLEAR REGULATORY COMMISSION UCLEA Cass R. Chappell, Section Leader Cask Certification Section Storage and Transport Systems Branch Division of Industrial and PEPV. NMSS Medical Nuclear DEC 0 5 1994 Date: NO 517

RC FORM \$18 1-86) 1 CFR 71		TE OF COMPLIANCE	
& CERTIFICATE NUMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER . TOTAL NUMBER PA
9788	7	USA/9788/R(U)	1 3
of Federal Regulations, Part 71. "P	sckaging and Transportation of Re consignor from compliance with	acribed in item 5 below, meets the applicable se adioactive Material." any requirement of the regulations of the U.S. suntry through or into which the package will	Department of Transportation or other
U.S. Department of Division of Naval R Washington, DC 205	Energy eactors	T OF THE PACKAGE DESIGN OF APPLICATION AND IDENTIFICATION OF REPORT OF APPLICAT Deactivated S5W Reactor C Analysis Report for packa as Rup Genented.	Compartment Safety
. CONDITIONS This certificate is conditional upon ful	filling the requirements of 10 CFF	R Part 71, as applicable, and the constions sp	ecified below.
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Reacto subman attach compar to the bulkhe overha packag the st remain plant liquid compon within	severator ption ckage consists of a r Compartment which ine hullsand prepar ing handling times thent itself is be package before shy ads define the pack ng of the hull strue to the strength of rength of the ship s in place with is defueled and dra , primarily water. ents and piping from the package and so	week two containment but ipping) Furthip's held a lage containment boundarie ucture beyond the buikhead f all package boundary clo 's bulkhead The deactive the restor compartment du ained except for small ina Potentially radioactive om other locations in the ecured.	S2C, S3W, S4W, or S5W S2C, S3W, S4W, or S5W The remainder of the g all openings and rel, the reactor cheads which are added and the containment es. There is an is at both ends of the osures is equivalent to vated reactor plant aring shipment. The accessible pockets of ly contaminated ship may be placed
with a packag packag end of weight The S3 approx feet. the to ship s hull i	maximum diameter e has a concrete-f e. New containmen the package. The of the S2C package W Reactor Compartm imately cylindrica The S3W package h op of the package. tructure which has s constructed of H	ximilely 42 feet long and of approximately 23 feet. illed tank exterior to the bulkheads made of HS ste hull is constructed of Hy e is 1,344,000 pounds. ent package is between 46 l with a maximum diameter as a concrete-filled tank The containment bulkhead been sealed to form a wat T steel and the containment eight of the S3W package	In addition, the S2C e hull at the top of th eel are added at each (-80 steel. The maximu and 48 feet long and of approximately 25 exterior to the hull a may include existing tertight bulkhead. The nt bulkheads are HT or

NRC FORM 618A

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CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9788 - Revision No. 7 - Docket No. 71-9788

(a) (2) Description (Cont'd)

The S4W Reactor Compartment package is approximately 45-1/2 feet long and approximately cylindrical with a maximum diameter of approximately 25 feet. In addition, the S4W package has a concrete-filled tank exterior to the hull at the top of the package. The containment bulkhead may include existing ship structure which has been sealed to form a watertight bulkhead. The hull is constructed of HT steel and the containment bulkheads are HT or HS steel. The maximum weight of the S4W package is 1,801,000 pounds.

The S5W Reactor Compartment Dickage is between 35 and 45 feet long and approximately cylindrical with a maximum diameter of approximately 33 feet. The forward containment bulkhead may include existing ship structure which has been sealed to form a matertight bulkhead. The hull is constructed of HY-80 steel and the containment bulkheads are HT, HS or HY-80 stepl. The maximum weight of the S5W package is 2,160,000 pounds for the 558 and 585 classes and is 2,262,400 pounds for all other classes.

(3) Drawings

The package is constructed in accordance with the ocawings, figures, and sketches included in the application is supplemented (see References, below):

(b) Contents

Activated service at the province of the set of the set of solution of the set of solution of the set of the s

Ion exchanger resins with up to 3 conces of Co-60 may be shipped in the S5W package.

6. The aft containment bulkheads and stiffeners, horizontal divider plate, and any structure between the pressure hull and the outer non-pressure hull must be recessed at least 7.0 inches from the aft end of the S5W package, or at least 15.0 inches from the aft end of the S2C, S3W and S4W packages. The forward containment bulkhead and stiffeners, existing tank stiffeners, deck structure, and horizontal girder must be recessed at least 15.0 inches from the forward end of the S2C, S3W, S4W, and S5W packages.

7. The Lowest Service Temperature (LST) must be determined for each package. The package shall not be shipped unless its LST is less than or equal to the normal daily minimum temperature expected during the shipment of the package as determined on the basis of weather forecasts.

RC FORA	# 618A						COM	DITICA	IS (con	tinued)		U.S. M	IUCLEAR	REGUL	ATORY C	OMMISSIC
Page	3 - Ce	ertif	icat	e No	9788	8 - Re	evisio	on No	. 7 -	Dock	et No	. 71-	9788			
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NRC FORM 618 (8-65) 10 CFR 71			TE OF COMPLIANCE	ICLEAR REGULAT	ORY COMMISSIC
1. & CERTIFICATE NU	*97 89	D REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9789/B(U)	d PAGE NUMBER	TOTAL NUMBER PAG
of Federal Re	egulations, Part 71, "Packa ite does not relieve the con	ging and Transportation of R signor from compliance with	scribed in Item 5 below, meets the applicable sa adioactive Material." any requirement of the regulations of the U.S. buntry through or into which the package will t	Department of Transp	
3. THIS CERTIFICATI		OF A SAFETY ANALYSIS REPOR	T OF THE PACKAGE DESIGN OR APPLICATION E AND IDENTIFICATION OF REPORT OR APPLICATI	ION.	
	ment of Energy Naval Reactor: DC 20585	EAR	Safety Analysis Report fo AlW-3 Core Barrel and The Container dated April 198 REG (71-9789	ermal Shield	Disposal
4 CONDITIONS This certificate is	s conditional upon fulfillin	g the requirements of 10 CFI	R Part 71, as applicable, and the conditions sp	ecified below.	
5.	0	2	0		
(a)	Packaging 6		03		
	(1) Model No	.: AIN-3 Core I	Barrel and Thermal Shield	Disposal Con	tainer
	(2) Descript	tion	が)(語) 5	1 1965,	
	thick cy and a 12 welded t construct (from bo flange a cylinder shieldir lower ar The AlW- contamin	linder body, a 2-inch thick top to the cylinder to ted of ASIM A731 ottom of crushing and the side crus body have an ou g is provided an nular shield pla 3 CB/TS DC is us	sed for shipment and dispo onents. Maximum weight of	(at the cen). Both end t. The cont height of 1 ugs). Both om the conta hes. Additi er by an upp sal of irrad	ter line), plates are ainer is 85 inches the support iner onal er and iated and
	(3) Drawings				
	1573E43, accordan	1573E40, and 15 ice with the desc	ssembly is shown in Westin 573E49. The packaging is cription and drawings cont Analysis Report dated Apr	constructed ained in Bet	in

NRC FORM 818A (6-63)		CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
Page 2 - Certi	ficate No. 9789 -	Revision No. 1 - Docket	No. 71-9789
(b) :Co	ntents		
(1) Type and form	of material	
	shields), the	rmal shielded shock ring	d Assembly (inner and outer thermal (for shipboard shipments), and Plug with up to 12 gallons of e form of activated corrosion
(2) Maximum quant	ity of material per pack	age
	activation) s	wanting R randac Og a bank hot exceed those u safety Analysis Report	aterial contents (crud and Intities specified in Section
6. Shipment shipboar componer	d components, or	de prior to 180 days aft 2-1/2 years after final	er fin Oreactor shutdown for reactor stotdown for prototype
7. In addit	ion to the requir	ements of Subpart G of	OFR Part C
(a) The action of the second s	cordance with Wes	tindequée drawings 15 per	2 1 1 5
(b) TI 0	ne package must be perating Proceeding	in company of the ap	nd operated in accordance with the prince of a second and
(c) TI CI	napter 8 of the ap	PUHCestion.	and Maintanance Program in
8. Expirat	on date: May 21,	2000 4444	0
	*/	REFERENCES	6
Safety Analys WAPD-REO(c)-3	is for the AlW-3 C D2, dated April, 1	ore Barra and The Cal S 982.	hield Disposal Container,
		morandums G#7486 dated M dated November 4, 1994.	ay 12, 1983, G#C89-2829 dated
		FOR THE U.S. NUCLEA	R REGULATORY COMMISSION
		-14-50 .G.	Nea Cary
		Cass R. Chappell, S Cask Certification	ection Leader

Storage and Transport Systems Branch Division of Industrial and Medical Nuclear Safety, NMSS

"DEC 0 5 1994 Date:

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1 - CERTURICATE NUMBER E NEWSCH NUMBER E NOGE NUMBER E TOTAL NUMBER E TOTAL NUMBER 2 - Tota contracts Is accriticate is issued to certify that the packaging and contents described in Hem 5 below, meets the applicable safety standards set forth in The 10. Code of Feeder Negations, Park T, Packaging and contents described in Hem 5 below, meets the applicable safety standards set forth in The 10. Code of Feeder Negations, Park T, Packaging and contents described in Hem 5 below, meets the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety set for the safety of the safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forth in The 10. Code of the applicable safety standards set forthe applicable safety standards set forth in the 10. Code safety st	NRC FORM 618 (8-86) 10 CFR 71				TE OF COMPLIANCE	UCLEAR REGULA	TORY COMMISSI
 The cartificate is assud to cartly that the packaging and contents described in them 5 below, meet the solutions with the information or other applicable setting with the solution or other applicable setting and an exploration or applicable setting and an exploration of the setting and an exploration or applicable setting and an exploration and applicable setting and an exploration or applicable setting and an exploration applicable setting and applicable setting	1. & CERTIFICATE N	119790	b	REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9790/B(U)	d PAGE NUMBER	e. TOTAL NUMBER PAR
 This certificate does not relieve the consignor from compliance with any neurosment of the use Department of Transportation or other application regulations of the U.S. Department of Transportation or other application regulations of the U.S. Department of Transportation or other application regulations of the U.S. Department of Transportation or other application regulations of the U.S. Department of Energy U.S. Department of Energy U.S. Department of Transportation or other AlW-3 Holddown/Support Barnel and Shroud Disposal Container dated November 30, 1982, as supplemented. C. Department of Energy U.S. Department of 10 CFR Part 71 as applicable, and the conditions specified below. C. Department of U.S. AlW-3 Holddown/Support Barnel and Shroud Disposal Container (AlW-3 HD/SB & SDC). C.D. Description The AlW-3 HD/SB & SDC is a Closed HF 80 steel cylindrical container cost string of an 8,00 inch thick top cover (at list centerline) and a cylinder of four inch wall thicks so the container of the bottom plate (at its centerline), an 8,00 inch thick top cover (at list centerline) and a cylinder of four inch wall thicks so container specified on the finder approximately 33 inches above the bottom plate. The outside diameter of the bottom plate pads maintain the holddown fatte. The outside diameter of the cylinder is 105 inches, the top cover diameter by a 28 inch high by 3.5 inch thick annuar support posts which are welded to the bottom plate pads maintain the holddown fatte. The outside diameter of the cylinder is 105 inches, the top cover diameter by a 28 inch high by 3.5 inch thick annuar support posts which are welded to the bottom plate pads maintain the holddown fatte. The outside diameter of the cylinder is 105 inches, the top cover diameter by a 28 inch high by 3.5 inch thick annuar support posts which are welded to the bottom plate pads maintain the holddown fatte. The overall height of the package is 160,000 pounds. (3) Drawings The container g	a. This certific	ate is issued to legulations, Par	certify that the pac t 71, "Packaging a	kaging and contents des nd Transportation of Ra	cribed in Item 5 below, mests the applicable si dioactive Material."	afety standards set for	th in Title 10, Code
 a Used to Name and address: S. Department of Energy vision of Naval Reactors ishington, DC 20585 C. 20585	b. This certific applicable i	ate does not re regulatory agen	lieve the consignor cles, including the	from compliance with a government of any cou	any requirement of the regulations of the U.S untry through or into which the package will	Department of Trans be transported.	portation or other
 S. Department of Energy vision of Naval Reactors ishington, DC 20585 Safety Analysis Report for Packaging for the AlW-3 Holddown/Support Barrel and Shroud Disposal Container dated November 30, 1982, as supplemented. a concrite Market Page 1	THIS CERTIFICA	TE IS ISSUED ON	THE BASIS OF A SA	AFETY ANALYSIS REPORT	OF THE PACKAGE DESIGN OR APPLICATION AND IDENTIFICATION OF REPORT OR APPLICAT	TION:	
 CONDITIONE This certificate is conditional upon fulfilling therequirements of 10 CFR Part 71. as applicable, and the conditions specified below. (a) Packaging (1) Mode) No.: AlW-3 Holddown/Support Barnel and Shroud Disposal Container (AlW-3 HD/SB & SDC.) (2) Description 	S. Depart vision of	ment of Naval R	eactors	EAR	Safety Analysis Report fo AlW-3 Holddown/Support Ba Disposal Container dated as supplemented.	or Packaging arrel and Sh	roud
 (a) Packaging (1) Mode) No.: AlW-3 Holddown/Support Barnel and Shroud Disposal Container (AlW-3 HD/SB & SDC) (2) Description The AlW-3 HD/SB & SDC is a closed HY 80 steel cylindrical container consisting of an 8,00 inch thick bottom plate (at its centerline), an 8,00 inch thick top cover (at its centerline) and a cylinder of four inch wall thickness. Pads are provided on the finside wall of the cylinder and on the inside surface of the bottom plate to aid in positioning the container contents. Four thin walled rectangular support posts which are welded to the bottom plate pads maintain the holddown farrel assembly at a height of approximately 33 inches above the bottom plate is 121 inches. Additional shrelding is provided at the lower portion of the cylinder by a 28 inch high by 3.5 inch thick annular shield plate. The overall height of the container, including the lifting lugs, mounted on its railcar pad is 137.12 inches above the railcar deck. Total weight of the package is 160,000 pounds. (3) Drawings The container general assembly is shown on Westinghouse drawing 1526E20 The packaging is constructed in accordance with the description and drawings contained in Bettis Atomic Power Laboratory Safety Analysis	CONDITIONS This certificate	is conditional	upon fulfilling the	requirements of 10 CFR		pecified below.	
 Container (AIW-3 HD/SB & SDC) (2) Description The AIW-3 HD/SB & SDC is a closed HY 80 steel cylindrical container consisting of an 8.00 inch thick bottom plate (at its centerline), an 8.00 inch thick top cover (at its centerline) and a cylinder of four inch wall thickness. Pads are provided on the inside wall of the cylinder and on the inside surface of the bottom plate to aid in positioning the container contents. Four thin walled rectangular support posts which are welded to the bottom plate pads maintain the holddown barrel assembly at a height of approximately 33 inches above the bottom plate is 121 inches. Additional shielding is provided at the lower portion of the cylinder by a 28 inch high by 3.5 inch thick annular shield plate. The overall height of the container, including the lifting lugs, mounted on its railcar pad is 137.12 inches above the railcar deck. Total weight of the package is 160,000 pounds. (3) Drawings The container general assembly is shown on Westinghouse drawing 1526E20 The packaging is constructed in accordance with the description and drawings contained in Bettis Atomic Power Laboratory Safety Analysis 	5.		End		2		
 The AIW-3 HD/SB & SDC is a closed HY-80 steel cylindrical container consisting of an 8.00 inch thick bottom plate (at its centerline), an 8.00 inch thick top cover (at its centerline) and a cylinder of four inch wall thickness. Pads are provided on the inside wall of the cylinder and on the inside surface of the bottom plate to aid in positioning the container centents. Four this walled rectangular support posts which are welded to the bottom plate pads maintain the holddown barrel assembly at a height of approximately 33 inches above the bottom plate. The outside diameter of the cylinder is 105 inches, the top cover diameter is 112.50 inches, and the diameter of the bottom plate is 121 inches. Additional shielding is provided at the lower portion of the cylinder by a 28 inch high by 3.5 inch thick annular shield plate. The overall height of the container, including the lifting lugs, mounted on its railcar pad is 137.12 inches above the railcar deck. Total weight of the package is 160,000 pounds. (3) Drawings The container general assembly is shown on Westinghouse drawing 1526E20 The packaging is constructed in accordance with the description and drawings contained in Bettis Atomic Power Laboratory Safety Analysis 						roud Disposa	1
 consisting of an 8,00 inch thick bottom plate (at its centerline), an 8.00 inch thick top cover (at its centerline) and a cylinder of four inch wall thickness. Pads are provided on the inside wall of the cylinder and on the inside surface of the bottom plate to aid in positioning the container centents. Four thin-walled rectangular support posts which are welded to the bottom plate pads maintain the holddown barrel assembly at a height of approximately 33 inches above the bottom plate. The outside diameter of the cylinder is 105 inches, the top cover diameter is 112.50 inches, and the diameter of the bottom plate is 121 inches. Additional shrelding is provided at the lower portion of the cylinder by a 28 inch high by 3.5 inch thick annular shield plate. The overall height of the container, including the lifting lugs, mounted on its railcar pad is 137.12 inches above the railcar deck. Total weight of the package is 160,000 pounds. (3) Drawings The container general assembly is shown on Westinghouse drawing 1526E20 The packaging is constructed in accordance with the description and drawings contained in Bettis Atomic Power Laboratory Safety Analysis 		(2) D	escription	()		0	
The container general assembly is shown on Westinghouse drawing 1526E20 The packaging is constructed in accordance with the description and drawings contained in Bettis Atomic Power Laboratory Safety Analysis		c 8 ii c s h t t 1	onsisting .00 inch to nch wall to ylinder and ositioning upport posi olddown bas he bottom he top cove late is 12 ortion of hield plate ifting lug	of an 8,00 in hick top cove hickness. Pa d on the insi the container ts which are rrel assembly plate. The o er diameter i l inches. Ad the cylinder e. The overa s, mounted on	ch thick bottom plate (at r (at its centerline) and ds are provided on the fr de surface of the bottom r contents. Four thin-wa welded to the bottom plat at a height of approxima utside diameter of the cy s 112.50 inches, and the ditional shrelding is pro by a 28 inch high by 3.5 Il height of the containe its railcar pad is 137.1	its center a cylinder side wall o plate to ai alled rectan tely 33 inc diameter of vided at the inch thick r, includin 2 inches ab	line), an of four f the d in gular tain the hes above 05 inches, the bottom e lower annular g the ove the
The packaging is constructed in accordance with the description and drawings contained in Bettis Atomic Power Laboratory Safety Analysis		(3) D	rawings				
		T d	he packagin rawings con	ng is constru ntained in Be	cted in accordance with t ttis Atomic Power Laborat	he descript	ion and

MRC FORM 618A			CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
age 2 - Ce	rtificate N	o. 9790 - Rev	vision No. 1 - Docket	No. 71-9790
(b)	Contents			
	(1) Type	and form of	material	
			own barrel, support b	arrel and shrouds.
			of material per pack	
	The	maximum quant vation) shall	tity of radioactive m	aterial contents (crud and tities specified in Tables 1.2.3-1,
shipb	ent shall n oard compon nents.	ot be made pr ents, or 2-1)	E Pears after fina	r final reactor shutdown for mactor shutdown for prototype
In ad	dition to t	ne negeriremen	nts of Subpart G of 1	0 CFR PG 71:
(a)	The contai accordance	ver top closu	ure (top plate-to-cyl bouse Drawing 2015D9	inder Twe Pachall be performed in
(b)	Each pack procedures applicatio	described	ared for shipment apter 7.0, "One"	ne operated in accordance with the
(c)	Each packa procedures Program",	e must be te described in 5 the abits	Chandler 6.D Actep	In accordance with the tance tests of Maintenance
Expir	ation date:	10 31, 1200	RELEREINSES	1. S
			-3 Holddown/Support B Notember 30, 1982.	arreland Shroud Disposal
pplements pril 19, 1	: Naval Re 989; and G#	octors Memora 04-03572 date	andum G#7444 dated Ma ed November 4, 1994.	rch 31, 1983; G#C89-2829 dated
			FOR THE U.S.	NUCLEAR REGULATORY COMMISSION
			Muss.	-G. M-Ly
				ell, Section Leader
			Cask Certific	ation Section
			Storage and T Division of I	ransport Systems Branch ndustrial and
DEC (5 1994		Medical Nuc	lear Safety, NMSS
te:				
			524	

NRC FORM 618 (5-65) 10 CFR 71				OF COMPLIANCE	IUCLEAR REGULA	TORY COMMISSION
1.1 CERTIFICATE 9791	NUMBER	D. REVISIO	ON NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9791/B(U)	d PAGE NUMBER	8. TOTAL NUMBER PAGES
of Federal b. This certifi	Regulations, Part 71, " cate does not relieve th	Packaging and Tran	sportation of Radio ompliance with any	bed in Item 5 below, meets the applicable active Material." requirement of the regulations of the U. y through or into which the package wil	5. Department of Trans	
	TE IS ISSUED ON THE B	ASIS OF A SAFETY AN		THE PACKAGE DESIGN OR APPLICATION	TION	
Division o	tment of Ene of Naval Reac 1, DC 20585		fo	R-2 Lower Core Barrel r Packaging dated Janu supplemented G (71-9791		sis Report
4. CONDITIONS This certificate	is conditional upon fu	ulfilling the requirem	nents of 10 CFR Par	t 71, as applicable, and the conditions s	pecified below.	
5.		0		0	a na da na manana ang dinangka kangka na mangka ka	
(a) Pa	ckaging	00		22	e	
(1) Model N	O.: PWR-	2 Lower Co	re Barrel Shipping and	Disposal Cor	ntainer
(2	The pac irradia assembl an oute pounds: The out outside	kage consis ted LWBR co y, packaged r shipping er containe dfameter,	er is a 4-m 212 inches	rradiated PWR-2 lower on-fuel) or an S8G pr ar disposal container, The package weighs a nch thick steel cylind long, with two 6-inch	which is pla which is pla proximately er, 127 inche thick end pl	basket aced inside 400,000 es in lates. The
	and the The pac circumf limiter	top end pl kage is equ erential im rings on t	ate is bol npped with pact limit he ends, an	the cylinder with a ted with 107, 2 Inch d two 2.5 Inch thick by er rings on the side, ad aluminum honeycomb e inner and outer cont	iameter faste 10-inch long two concentri crush blocks	eners. Ic impact
	gussets top fla	attached t	o two hori: I-beam. Th	prizontally on the rai contal plates. Each p he bottom flange of the	late is bolte	ed to the
				525		
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CONDITIONS (continued)

Page 2 - Certificate No. 9791 - Revision No. 3 - Docket No. 71-9791

5. (a) (2) Description (continued)

The inner disposal container is one of the following designs:

For the PWR-2 LCB and the irradiated LWBR components, the inner (1)container is a cylinder with two steel shells containing lead in between. The inner container is 117 inches 0.D. and 181 inches long. The inner steel shell is 1.0-inch thick and the outer steel is 0.5-inch thick. There are 4.25 inches of lead shielding between the shells. The inner container is supported radially in the outer container by two rings, one at each end, which have a radial clearance of 0.25 inches. The inner container is centered axially in the outer container by the aluminum honeycomb crush blocks. The bottom end of the inner container is a 4.5-inch this plate. The top end of the inner container is an 8-inch thick plate attached to the cylinder with 40 one-inch diameter fasteners. A spiral-wound, graphite filled gasket is located Coetween the bolted cover and the cylinder. The gasket is Lipreloaded by the 40 bolts, which have an applied torque of 700 The inner container is made primarily from HY-80 steel, Ft-1b. except for the lead shielding and the top cover, which are made from ASTM AS588.

(ii) For the S85 prototype core basket assembly, the inner container overall dength of 174.4 inches, constructed of 304 stainless steel. The container wall is 5.5 inches thick, with a 4-inch thick bottom plate, and a 13.6 inch thick cover plate. The cover is attached to the container with a seal weld. An 8-inch wide, 3 inch thick guide ring is provided 25 inches above the container bottom plate to provide a close fit between the inner container and the irradiated cargo. A 12-inch wide, 1-inch thick ring is welded to the outside of the inner container near the top of the container to establish a close fit with the outer container. The inner container is certared axially in the outer container by the aluminum honeycomb crush blocks.

(3) Drawings

The packaging is constructed in accordance with Westinghouse Drawing Nos. 1575E12 and 1574E96, and General Electric Drawing Nos. 977E709 and 977E467.

Page 3 - Certificate No. 9791 - Revision No. 3 - Docket No. 71-9791

(b) Contents

(1) Type and form of material

- An irradiated PWR-2 lower core barrel and the following LWBR irradiated contents: (a) six blanket support tubes, (b) 11 seed support shaft assemblies, (c) seven sectioned flux thimbles, and (d) five sectioned BIF supply tubes. In addition, the shipment may include approximately 33 gallons of residual water and surface contamination in the form of activated corrosion products.
- (ii) An irradiated S86 prototype core basket assembly, including core basket-thermal shield and six surveillance trains. In addition, shipment may include approximately 8 gallons of residual water and surface contamination in the form of activated corrosion products.
- (2) Quantity of material in package
 - (i) For the contents listed in 5(b)(1)(1):

One irradiated lower core barrel assembly and irradiated LWBR structurals as described in 5(b)(1)(1). Surface contamination not to exceed 18.9 curies. The irradiated lower core barrel and LWBR structurals not to exceed 32,000 curies.

(ii) For the contents listed in 5(b)(1)(ii):

One irradiated S8G prototype core basket assembly, as described in 5(b)(1)(ii). Surface contamination not to exceed 148 curies. The irradiated components not to exceed 29,900 curies.

6. The package will be operated in accordance with the procedures described in Chapter 7 of the application and Naval Reactors Jetter G#84-452 dated March 28, 1984, or in accordance with Naval Reactors Jetter G#692-03331 dated January 29, 1992. The package will be tested and maintained in accordance with the procedures in Chapter 8 of the application.

7. Expiration date: December 31, 1997.

U.S. NUCLEAR REGULATORY COMMISSION CONDITIONS (continued) Page 4 - Certificate No. 9791 - Revision No. 3 - Docket No. 71-9791 REFERENCES PWR-2 Lower Core Barrel Safety Analysis Report for Packaging, WAPD-LP(CES)CS-670 dated January 1982. Supplements: Naval Reactors letters G#7241 dated December 2, 1982, G#84-452 dated March 28, 1984, G#C92-03331 dated January 29, 1992, G#92-03546 dated June 5, 1992, and CLEAR FOR THE OS NUCLEAR REGULATORY COMMISSION G#92-03589 dated July 2, 1992. Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS AUG 0 7 19 Date: ND 528

AC FORM 618 (46) (CFR 71			TE OF COMPLIANCE	ICLEAR REGULA	TORY COMMISSIC
A CERTIFICATE N 9792	UMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9792/B(U)	d PAGE NUMBER	e. TOTAL NUMBER PAG
of Federal 1	Regulations, Part 71, "Pack cate does not relieve the co	aging and Transportation of Rac onsignor from compliance with a	bribed in Item 5 below, meets the applicable sa dioactive Material." ny requirement of the regulations of the U.S. ntry through or into which the package will t	Department of Trans	
a issued to iA J.S. Depa Jivision Mashington	TE IS ISSUED ON THE BASIS Interne and Address/ rtment of Energ of Naval Reacto n, DC 20585	b. TITLE A	Department of Energy April 22, 1991. REG 71-979	application	n dated
CONDITIONS This certificate	is conditional upon fulfilli	ng the requirements of 10 CFR I	Part 71, as applicable, and the conditions sp	ecified below.	
a) Pack (1) (2)	aging Model No.: Mo Description The Model 1 DI Container is a diameter and e loading provid of the cylind construction w covered with a encased by a 3 inside the cor bolted to the Closure of the closure head w bolts. A stee containment. end of the clo	ontainer G Core Basket The a right circular c either 209 inches led by a removable rical side walls a with a steel inner a removable rical side walls a with a steel inner pproximately nine 28-inch thick out a tainer with an 8- inner vessel with a containment vess which is fastened el closure ring is A carbon steel inner	sket-Thermal Shield Ships rmal Shield (CB-TS) Ships ylinder approximately 1H long or 216 inches long, closure head. The conta nd the bottom end, has a vessel approximately nin inches of reinforced con er shell. The CB-TS is s inch thick steel preload 72 high strength bolts. el is provided by the 6- to the inner vessel with welded over the bolts an ner impact limiter is weld outer impact limiter is	ing and Sto inches in with access iner, consi three layer inches th crete which ecured in p ring which nch thick s 72 high str d provides ded to the	for sting nick nis place is steel rength top
			ported with its axis hort The loaded container weig		

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CONDITIONS (continued)

Page 2 - Certificate No. 9792 - Revision No. 2 - Docket No. 71-9792

5. (a) Packaging (Continued)

(3) Drawings

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The packaging is constructed in accordance with the General Electric Company Drawings contained in Appendix 2.10.4 of the application.

(b) Contents

6.

One irradiated DIG core basket-thermal shield assembly, and not more than one core's worth of irradiated DIG support assemblies, DIG lower control rod drive mechanisms, and DIG upper support assemblies; surface contamination in the form of activated corrosion products; and not more than 3.5 gallons of residual water.

- a. Preloading of the preload plate and the closure head and sealing the container must be done with a temperature at or above +40°F.
 - b. Shipment shall be made when the average daily temperature is above +40°F.
 - c. Shipment shall be made no sooner than 150 days after shutdown of the reactor.
- 7. The package shall be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7.0 of the application, and each packaging shall be tested and maintained in accordance with the Acceptance Tests and Maintenance Program in Chapter 8.0 of the application.
- 8. Expiration Date: September 30, 1997

REFERENCES

Department of Energy, Division of Naval Reactors, application dated April 22, 1991.

Supplement dated: Naval Reactors Letter G#92-03668, dated August 27, 1992.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief Transportation Branch Division of Safeguards and Transportation, NMSS

SEP 1 1 1992

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NRC FORM 618 (8-65) 10 CFR 71		ATE OF COMPLIANCE	ICLEAN NEGULA	TORY COMMISSIO
. CERTIFICATE NUMBER	D. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	. TOTAL NUMBER PAG
9793	4	USA/9793/B(U)F	1 1	6
or Federal Regulations, Par	171, "Packaging and Transportation of F ieve the consignor from compliance with	escribed in item 5 below, meets the applicable sa Radioactive Material." In any requirement of the regulations of the U.S. ountry through or into which the package will t	Department of Trans	
THIS CERTIFICATE IS ISSUED ON a. ISSUED TO (Norme and Address)	THE BASIS OF A SAFETY ANALYSIS REPOR	T OF THE PACKAGE DESIGN OR APPLICATION	ION:	allen annan a sann a faiste lea a sa sann a lean an
U.S. Department Division of Nava Washington, DC 2	1 Reactors F	Core Independent M-140 Saf Packaging" and "S3G-3 Recover the M-140 Safety Analysis F ranging February 27, 19 KET NUMBER 7 9793	verable Irra Report for F	adiated Fuel Packaging"
CONDITIONS This certificate is conditional u	pon fulfilling the requirements of 10 CF	R Part 71, 29 applicable, and the coordinas ap	ecified below.	
 (a) Packaging (1) Model (2) Descri A stai The ca positi 	aless steel cash for t sk is a night chert	insporting recoverable in cylinder and is transport provide dimensions and 70 incm	ed in the u	pright
	Cavity heighte Body outervdiameter Body steel wall thick Package overall outer Package overall heigh Packaging weight, inc standard internals Maximum package weigh including contents	1 15,000 pound		
14 inc	hes thick and the bott	04 stainless steel forging om plate is 12 inches thic urface for the closure head	ck. The cas	

14 inches thick and the bottom plate is 12 inches thick. The cask body flange provides a seating surface for the closure head and its protective dome. The flange contains 36 wedge assemblies located radially around the inside diameter. Retention of the closure head is achieved by engaging the wedges in a tapered groove in the circumferential edge of the closure head. The cask body has 180 external cooling fins welded to the exterior wall. A support ring is welded to the external cooling fins at a point above the center of gravity. The support ring seats on and is bolted to the rail car mounting ring during transport. The cask bottom is equipped with an energy absorber which is composed of five concentric stainless steel rings varying in thickness and height.

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NRC FORM 618A

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CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9793 - Revision No. 4 - Docket No. 71-9793

5.(a)(2) Description (continued)

The closure head is made from forged 304 stainless steel, and is approximately 13 inches thick and 81.7 inches in diameter. The closure head is equipped with an access port, which is approximately 24 inches in diameter, and is offset from the center of the closure head. The access port plug is a stepped design with a maximum diameter of approximately 31 inches and is attached to the closure head by 24 bolts. The closure head and access port are sealed with double ethylene propylene O-ring seals. Seal test ports are provided for the closure head and access port seals. A stainless steel protective dome is positioned over the closure head and is secured to the cask body flange by 12 1.38-inch diameter, 38.5-inch long studs installed in a verified direction and 6, 2.5-inch diameter, 9-inch long shear bolts installed in the radial direction.

The containment system is composed of the cask body, the closure head and the closure head access port plug. There are file penetrations in the containment system: a drain port and vent port in the closure head, and a thermocouple penetration, a water inlet penetration, and a water outlet penetration in the task body. Each penetration is sealed with a plug and a double environe providence O-ring seal, and a sealed with a leak test port.

The fue modules are politioned in an internals assembly. The internals assembly is composed on statked internal spacer/plates which have openings for the fuel modules. The internal spacer/plates which have openings subassembly which is presented of springs against a retaining ring fitted in a groove in the effect cavit scall internals assembly may be a standard internals sembly an additional assembly.

(3) Drawings

The packaging to constructed and assembled in accordance with the Westinghouse Electric Corporation Drawings in Appendix 1.3.2 of the application.

(b) Contents

(1) Type and form of material

Recoverable irradiated fuel modules, limited to the following types, including associated activated corrosion products:

- (i) S3G-3 recoverable irradiated fuel modules.
- (ii) S8G recoverable irradiated fuel modules.
- (iii) DIG Core 2 recoverable irradiated fuel modules.
- (iv) D2W recoverable irradiated fuel modules.

U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A **CONDITIONS** (continued) 15.231 Page 3 - Certificate No. 9793 - Revision No. 4 - Docket No. 71-9793 5.(b) Contents (continued) (2) Maximum quantity of material per package Total package weight, including fuel modules and internals assembly, not to exceed 375,000 pounds; and (i) For contents described in 5(b)(1)(i): S3G-3 recoverable irradiated fuel modules, not to exceed 62,300 Btu/hr decay heat per package. For contents describe (11))(11):S8G recoverable irradiated fuel modules, not to exceed 51,609 Btu/hr decay heat package (prototype modules) or 45,713 Btu/hr decay heat per package (shipboard modules). (iii) For contents described in 5(b)(1)(iii): 2 manuerable irradiated for Rodules, not to exceed 37,750 D1 ore B deca per package eat. (iv) ibed 5(b)(Sdescr contents andes, /not to Exceed 63,000 Btu/hr fue adiated recov dent yee core fuel modules, 53,000 Btu/hr hes board 100 3 corsfuel modules, or de hea shipbeard Type 5 core fuel 45 mod (c) Fissile Class NC One Maximum number of packages per shipment 533

	CONDITIONS (continued)
4 -	Certificate No. 9793 - Revision No. 4 - Docket No. 71-9793
For	S3G-3 recoverable irradiated fuel shipments:
(a)	Only a full load is authorized. A minimum of twelve fuel modules must have either control rods or poison shipping rods. All rodded and unrodded modules must be positioned as specified on page 6-11 (Rev. 1) of "S3G-3 Recoverable Irradiated Fuel in the M-140 Safety Analysis Report for Packaging."
(b)	Minimum fuel cooling time is 130 days after shutdown.
(c)	Core age must be at least 4,000 logging corrected full power hours.
(d)	Control rod hold-down depices mester Gritalled on cells which have control rods.
(e)	All cells must have top and bottom energy absorbers
(f)	(Rev. 2) of "\$31-3 Recoverable Irradiated Fuel in the M-140 Safety Analysis Report for Packagings
(g)	
For	S8G recoverable irradiated fueldstringents
(a)	Only a full load of automation of an antial fuel modules may be shipped in any componention of all full and partial fuel modules must have control rods.
(b)	Minimum fuel cooling there is 246 bers after shutdown for prototype modules, and 157 days after shutdown for shippear modules.
(c)	All fuel modules must have lower supports and onapple adapters.
(d)	Standard internals assembly must be used for shipment of S8G fuel modules. Full fuel modules must have two sorlineside) spacers, partial fuel modules must have two full (side) spacers and one partial (inside) spacer.
(e)	The weight of the fuel modules must be limited as specified on page 1.23 (Rev. 4) of "S8G Recoverable Irradiated Fuel in the M-140 Safety Analysis Report" for Packaging."
	For (a) (b) (c) (d) (c) (d) (c) (d) (c) (d)

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NRC FORM	618A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
	5 -	Certificate No. 9793 - Revision No. 4 - Docket No. 71-9793
8.	For	DIG Core 2 recoverable irradiated fuel shipments:
	(a)	Up to eight fuel modules may be shipped per package. Fuel modules of different types may be shipped in any combination.
	(b)	Minimum fuel cooling time is 181 days after shutdown.
	(c)	All normally rodded fuel modules must have control rods. Control rod hold- down devices must be installed on rodded modules.
	(d)	Rodded modules must have top and bottom energy absorbers. Unrodded modules must have top energy absorbers
	(e)	Standard internals astendity must be used for shipment of DIG Core 2 fuel modules. Fuel module cavity spacers must be used for all fuel modules.
9.	For	D2W recoverable rradiated fuel shipments:
	(a)	Up to eight fuel modules may be shipped per peckage. Fuel modules of different uppes may be shipped in any combination. Op to nine fuel modules may be shipped per peckage, provided that the of the fael modules is the prototype removable that assembly (RFA).
	(b)	Minimum Tel cooling the is 180 days after shutdown.
	(c)	All normally reduce fuel methods was an experience control rods. Control rod holddown devices out becaused an all rodden modules. The universal grapple adapters serve as the rod no radiown devices.
	(d)	The standard interparts assembly must be used for shipment of D2W fuel modules. All fuel modules pust be ships with the appropriate cell spacers, as shown in Appendix . A pr the application dated October 14, 1994.
10.	ship	package must contain no more than 6 gallons of residual water, except that oments of D2W recoverable cirradiated fuel my contain up to 11 gallons of idual water.
11.	Fai	led fuel, or fuel with defective cladding is not authorized for shipment.
12.		n packaging must meet the Acceptance Tests and Maintenance Program of oter 8 of the application, except:
		All containment seals, including the main closure head seal, must be replaced with new seals within the 12-month period prior to each shipment, or earlier if inspection shows any defect.
13.		package must be prepared for transport and operated in accordance with oter 7 of the application, except:
		The containment seals, excluding the main closure head seal, must pass a leak test after final closure prior to each shipment. The leak test must have a sensitivity of at least 1 x 10^{-3} std-cm ³ /sec.
		535

NRC FORM 618A (6-83) Page 6 - Certificate No. 9793 - Revision No. 4 - Docket No. 71-9793

- 14. Prior to first use, and within the 12-month period prior to each shipment, all containment seals, including the main closure head seal, must be leak tested to show a leak rate no greater than 1×10^{-4} std-cm³/sec. The leak test must have a sensitivity of at least 5×10^{-5} std-cm³/sec.
- 15. Expiration date: October 31, 1996.

REFERENCES

"Core Independent M-140 Safety Analysis Report For Packaging," and "S3G-3 Recoverable Irradiated Fuel in the M-140 Safet Analysis Report For Packaging," transmitted February 27, 1991. bruary 4 and 7, August 17, June 21, and July 17, 1991; Supplements dated: May 23 October 14, 1994. 800 and December 2, 1992; FOR THE U.S. NUCLEAR REGUL COMMISSION ion Lei Section Cortif lect. Office Bear Material SEP 0 3 1995 C Date: NO

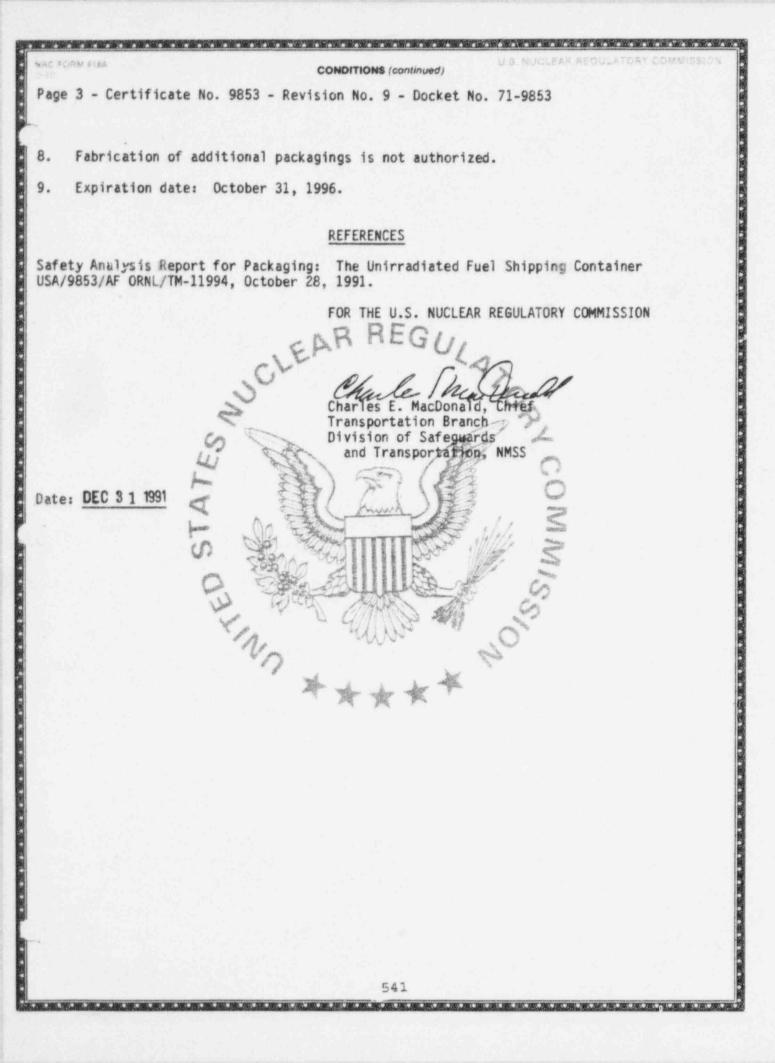
RC FORM 611 965) 9 OFR 71				OF COMPLIANCE	IES		
& CERTIFICAT	E NUMBER	D REVISION N	UMBER	C PACKAGE IDENTIFICATION	NUMBER d.	PADE NUMBER	. TOTAL NUMBER PA
97	'94	1	0	USA/9794/B	(U)	1	22
of Feder	al Regulations.	to certify that the packaging and c Part 71, "Packaging and Transpor relieve the consignor from compl pencies, including the government	tation of Radio	active Material." requirement of the regulation	s of the U.S. Depa	rtment of Trans	
N ISSUED TO U. Di Wa	S. Depar vision o shington	tment of Energy f Naval Reactors , DC 20585	b. TITLE ANI	Safety Analysis for CGN Reactor C Rec Uly 12, 19	Report for compartment 194, as sup	t Disposa	1,"
CONDITIONS This certific	ate is condition	al upon fulfilling the requirements	of 10 CFR Pa	rt 71, as applicable, and the c	oportions specifie	d below.	
		~			D		
(a	 Pack (1) 	Model No.: CON	25×35 Re	actor Compensationt	Disposal	Package	
	(2)	Bescription	17		ö		
		compartment that cruiser hull and reactor compartment is approximated and the compartment of high strength components are pockets. The may Potentially radio areas outside the package.	prepare ent with privation der. The mentane tely 10, its for steel (I steel (I steel of kinen we bactive of	in a welded steel beat welded steel beat welded steel beat repackage hed base containing the package. The MIL-S-22698). We water backage for ght of the packa contaminated comp	enclosing container is a sixte no support is meter of container or small i ge is 2,78 onents and	g the ent r. The p high and een-sided t fixture f the pac r is cons compartm inaccessi 30,000 po d piping	ire ackage about s, which kage and tructed ent ble unds. from
	(3)	Drawing					
		The packaging is Appendix 1.3 of 1			e with the	e drawing	s in
(b) Cont	ents					
	(1)	Type and form of	materia				
		Activated structure reactor compartme be removed or lef with radioactive gallons of residu low level radioactive	ents, pla ft instal corrosic ual liqu	ant piping, purif lled), and other on products (crud id, primarily wat	ication me components l). A maxi er, some c	edia (whi s contami imum of 7 of which	ch may nated 50 contains

NRC FOR	M 618A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
(9-9-2)	Page 2	2 - Certificate No. 9794 - Revision No. 0 - Docket No. 71-9794
	5.	(b) Contents (continued)
		(2) Maximum quantity of material per package
		The maximum quantity of radioactive material contents (crud and activation) shall not exceed the quantities specified in Section 1.2.3.1 of the application.
	6.	The shipment shall be no earlier than 365 day after shutdown.
	7.	The Lowest Service Temperature (LST) must be determined for each package. The package shall not be shipped unless its LST is less than or equal to the daily minimum temperature expected during shipment of the package, as determined on the basis of the atterized sets.
	8.	The radioactivity of the ion exchanger resin may be no more than the value listed in Table 4.1 of the application.
	9.	The reactor essel shall have been operated for less than 28,530 effective full power hours.
	10.	In addition to the action mements of Subpart of 10 CFR Part 71:
		(a) The package most of prepared for streamt and operated in accordance with theater Aufliche and tration.
		(b) The package must be accordance with Chapter 8
	11.	Expiration date: Seconder SUIPLICES
		ty Analysis Report for Packaging for CGN Reactor compartment Disposal," July 12, 1994.
	Suppl	ements Dated: November 10, 1994; and July 14, 1995.
		FOR THE U.S. NUCLEAR REGULATORY COMMISSION
		William Jrous
		William D. Travers, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards
	Date:	SEP 2 5 1995

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INC FORM 616 8-65) 0 CFR 71		OF COMPLIANCE	CLEAR REGULAT	TORY COMMISSI
9853	5. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9853/AF	d. PAGE NUMBER	. TOTAL NUMBER PAG
PREAMBLE a. This certificate is issued to certify that the p of Federal Regulations. Part 71, "Packaging b. This certificate does not relieve the consignapplicable regulatory agencies, including the second sec	g and Transportation of Radio nor from compliance with any	active Material." requirement of the regulations of the U.S. I	Department of Trans	
THIS CERTIFICATE IS ISSUED ON THE BASIS OF A a ISSUED TO (Nume and Address) U.S. Department of Energy EH-33 Washington, DC 20585	SAFETY ANALYSIS REPORT OF b. TITLE AND c. DOCKET N	Safety Analysis Report The Unirradiated Fuel S USA/9853/AF ORNL/TM-119 October 28, 1991.	for Packagi hipping Con	
CONDITIONS This certificate is conditional upon fulfilling th	e requirements of 10 CFR Par	rt 71, as applicable, and the conditions spe	cified below.	
(2) Description A right cylin provided with blocked to pr ll-gauge stee in place by s from 16-gauge ll-gauge stai lid (0.125" t The basket is remaining spainsulation.	drical stainless seven (7) caviti event their use. 1 and the base is ix (6), 5/8° bolt stainless steel. nless steel. Eig nick aluminum) in supported on 2° ce around the bas	Fuel Shipping Container steel drum enclosing a les. Five (5) of the se The outer shell and the s 1/4" thick plate. The ts and nuts. The basket The basket top and bo out (8), 3/8" bolts and h place. by 6" timbers inside the sket is filled with phen d weight as follows:	fuel basket ven (7) cav d are fabri outer lid shell is f ttom plates nuts retain e outer she	ities are cated from is held abricated are the basket
Outcido	dimension in	24-1/2		
	dimension, in r length, in	75-1/2		
Base, in		29 x 29		
	avity cross	4 × 4		
Gross we	ight, 1b	590		

INC FOR	(M 618)	CONDITIONS (continued)
Page	2 -	Certificate No. 9853 - Revision No. 9 - Docket No. 71-9853
5.	(a)	Packaging (continued)
		(3) Drawings
		The packaging is constructed in accordance with the following ORNL Drawing Nos.:
		M-11518-GH-001-F, Rev. 0, M-11518-OH-002-Z, Rev. 0 and M-11518-OH-003-D, Rev. 0.
	(b)	(1) Type and form of material REGULA
		(1) Type and form of material
		Unirradiated uranium fuel elements as U_3O_8 -AL cermet enriched up to 95 w/o in the U-235 isotope, and clad in aluminum at least 10 mils thick.
		The contents are described in the Babcock & Wilcox Company Drawing Nos. 4-8002-D, Rep. E, and 9-8025-E, Rev. K, as modified by Brookhaven National Laboratory letter dated October 17, 1991 (Chapter 1, Appendix B, of the application)
		(2) Maximum quantity of material per package
	(c)	Two (2) fuel elements combaining up to 355 grams U-235 per fuel element. Fissile Class
	(-)	Maximum number of packages per shipment one (1)
6.	The and	fire resistant prepalic foam shall be in accordance with AEC Materials Equipment Specification SP-9 or as modified by ORGOP Report K/TL-729.
7.	In	addition to the requirements of Subpart G of 10 CFR Part 71:
	(a)	The package shall be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7.0 of the application; and
	(b)	The package must meet the Acceptance Tests and Maintenance Program in Chapter 8.0 of the application.



-96) CFR 71		E MATERIALS PACKAGES	d PAGE NUMBER	. TOTAL NUMBER PAG
A CERTURICATE NUMBER	-		1	3
CERTIFICATE NUMBER 9932 PREAMBLE This certificate is issued to certify that the p of Federal Regulations, Part 71. "Packaging to This certificate does not relieve the consig applicable regulatory agencies, including THUS CERTIFICATE IS ISSUED ON THE BASIS OF A ISSUED TO (Nerves and Address) This certificate is conditional upon tulfilling t CONDITIONS This certificate is conditional upon tulfilling t (a) Packaging (1) Model No.: U (2) Description Packaging for 1/8-inch thic long. An alu containment c and the alumi containment c accomplished closure is se seal. A valv A manifold co center of the	b. REVISION NUMBER 3 ackaging and contents descr g and Transportation of Radi nor from compliance with an the government of any court SAFETY ANALYSIS REPORT O b. TITLE AN a Safe ratory Pach c. DOCKET No. requirements of 10 CFR F C-689 large quantities a Safe ratory Pach c. DOCKET No. requirements of 10 CFR F C-689 large quantities a Safe pach c. DOCKET No. requirements of 10 CFR F C-689 large quantities a Safe pach c. DOCKET No. requirements of 10 CFR F c. DOCKET c. DOCKET No. requirements of 10 CFR F c. DOCKET No. requirements of 10 CFR F c. DOCKET c. DOCKET	C. PACKAGE IDENTIFICATION NUMBER USA/9932/B() toed in Item 5 below, meets the applicable oactive Material." y requirement of the regulations of the U try through or into which the package w F THE PACKAGE DESIGN OR APPLICATION NO IDENTIFICATION OF REPORT OR APPLIC ety Analysis report on cage, Report No. UCRL-5 REGULATION 71-993	antery standards set for S. Department of Trans ill be transported. ATION: Model UC-609 2424, August 2 specified below. 2 tainment vess ameter by 44 31-inch long 5 steel outer comb. Access ening at one er plate is bolts. The outer for leak gage is weld is centered a	Shipping 1977 sel is inches r shell s to the end. cover -ring testing. ded to the and

CONDITIONS (continued)

Page 2 - Certificate No. 9932 - Revision No. 3 - Docket No. 71-9932

(3) Drawings

The packaging is constructed in accordance with Lawrence Livermore Laboratory Drawing Nos.: AAA76-109771-0C, AAA75-113967-0B, AAA75-113083-0A, AAA77-102165-00, AAA75-112930-0A, AAA77-104161-00, AAA77-104165-0A and AAA77-104163-0B.

- (b) Contents
 - Type and form of material

Tritium in any form held within secondary containers.

(2) Maximum quantity of material per package

Decay heat not to exceed 48 watts. Not more than 25 gm-moles (150 grams) of tritium.

- 6. The initial pressure within the containment vessel and secondary containers shall be such that if all gases were released from the secondary containers the maximum pressure within the containment vessel, at 20°C (68°F) would not exceed:
 - (i) 84 psig when no water is present, or
 - (ii) (45 psig when water is present.
- 7. The weight of the secondary containers shall not exceed a total of 120 pounds.
- 8 Acceptance tests and maintenance small be in accordance with Section 8.0 of Lawrence Livermore Laboratory Report No. UCRL-52424, August 1977.
- Operating procedures equivalent to those specified in Section 7.0 of Lawrence Livermore Laboratory Report No. UCRL-52424, August 1977, shall be established for use.
- The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 11. Expiration date: November 30, 1995.

CONDITIONS (continued)

Page 3 - Certificate No. 9932 - Revision No. 3 - Docket No. 71-9932

REFERENCES

Lawrence Livermore Laboratory Report No. UCRL-52424, August 1977.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald, Chief

Transportation Branch Division of Safeguards and Transportation, NMSS

Date: NOV 2 9 1990

TYPE OF PACKAGING: BYPROD. NORM. FORM

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MODEL	PACKAGE ID #	EXPIRATION DATE
CI-20WC-2	USA/9098/B()	02/28/1998
CI-20WC-2A	USA/9098/B()	02/28/1998
GE-8500	USA/6697/B()	09/30/1996
PAS-2	USA/9184/B(U)	07/31/1999
PAS-2	USA/9181/B(U)	08/31/1995
PAS-2A	USA/9181/B(U)	08/31/1995
UC-609	USA/9932/B()	11/30/1995

TYPE OF PACKAGING: BYPROD. SPEC. FORM

MODEL	PACKAGE ID #	EXPIRATION DATE
A-0109	USA/6280/B()	01/31/2000
AI 500 SU	USA/9006/B(U)	08/31/1996
AI 520	USA/9007/B(U)	12/31/1995
BUSS R-1	USA/9511/B(U)	07/31/1997
C-1	USA/9036/B(U)	10/31/2000
C-8	USA/9128/B(U)	02/28/1996
E-MEH-00-00004	USA/9011/B()	08/31/1996
GE-500	USA/9049/B()	12/31/1995
IR-100	USA/9157/B(U)	01/31/1998
IR-50	USA/9156/B(U)	01/31/1998
LCG-25A	USA/4888/B()	12/31/1996
LCG-25B	USA/4888/B()	12/31/1996
LCG-25C	USA/4888/B()	12/31/1996
MW-3000	USA/9030/B()	10/31/1995
NATICK IRRADI	USA/5362/B()	01/31/2000
NPI-20WC-6	USA/9102/B()	10/31/1998
NPI-20WC-6 MKII	USA/9215/B(U)	10/31/1997
OP-100	USA/9185/B(U)	01/31/1998
ORNL TRU CALIF	USA/5740/B()	06/30/1996
SENTINEL-100F	USA/5862/B()	09/30/1995
SENTINEL-25A	USA/4888/B()	12/31/1996
SENTINEL-25B	USA/4888/B()	12/31/1996
SENTINEL-25C	USA/4888/B()	12/31/1996
SENTINEL-25C3	USA/4888/B()	12/31/1996

TYPE OF PACKAGING: BYPROD. SPEC. FORM

MODEL	PACKAGE ID #	EXPIRATION DATE
SENTINEL-25D	USA/4888/B()	12/31/1996
SENTINEL-25E	USA/4888/B()	12/31/1996
SENTINEL-25F	USA/4888/B()	12/31/1996
SENTINEL-8	USA/9030/B()	10/31/1995
SNAP-21	USA/5830/B()	11/30/1995
SPEC 2-T	USA/9056/B(U)	12/31/1999
SPEC-150	USA/9263/B(U)	04/30/2000
URIPS-8A	USA/6786/B()F	04/30/1998
URIPS-8B	USA/6786/B()F	04/30/1998
100	USA/9127/B(U)	10/31/1999
100A	USA/9127/B(U)	10/31/1999
181361	USA/5796/B(U)	07/31/1997
181375	USA/5796/B(U)	07/31/1997
20	USA/9126/B(U)	10/31/1999
20A	USA/9126/B(U)	10/31/1999
200	USA/9127/B(U)	10/31/1999
200A	USA/9127/B(U)	10/31/1999
3206B	USA/9167/B(U)	12/31/1998
3218	USA/9167/B(U)	12/31/1998
3227B	USA/9167/B(U)	12/31/1998
4.5 TON CF	USA/6642/B()	10/31/1996
420	USA/9245/B(U)	09/30/1997
50	USA/9126/B(U)	10/31/1999
50A	USA/9126/B(U)	10/31/1999

TYPE OF PACKAGING: BYPROD. SPEC. FORM

MODEL	PACKAGE ID #	EXPIRATION DATE
5979	USA/5979/B()	09/30/2000
5984	USA/5984/B()	03/31/1995
650	USA/9032/B(U)	10/31/1999
660	USA/9033/B(U)	10/31/2000
660A	USA/9033/B(U)	10/31/2000
660AE	USA/9033/B(U)	10/31/2000
660B	USA/9033/B(U)	10/31/2000
660BE	USA/9033/B(U)	10/31/2000
660E	USA/9033/B(U)	10/31/2000
6717-B	USA/6717/B(U)	09/30/1998
676	USA/9029/B(U)	10/31/1999
676A	USA/9029/B(U)	10/31/1999
676AE	USA/9029/B(U)	10/31/1999
676B	USA/9029/B(U)	10/31/1999
676BE	USA/9029/B(U)	10/31/1999
676B	USA/9029/B(U)	10/31/1999
680	USA/S035/B(U)	04/30/2000
680A	USA/9035/B(U)	04/30/2000
680AE	USA/9035/B(U)	04/30/2000
680B	USA/9035/B(U)	04/30/2000
680BE	USA/9035/B(U)	04/30/2000
680E	USA/9035/B(U)	04/30/2000
683	USA/9053/B(U)	11/30/1995
684	USA/9028/B(U)	01/31/1996

TYPE OF PACKAGING: BYPROD. SPEC. FORM

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PACKAGE ID #	EXPIRATION DATE
USA/9028/B(U)	01/31/1996
USA/6613/B(U)	03/31/1998
USA/9039/B(U)	06/30/1995
USA/9027/B(U)	11/30/1995
USA/9148/B(U)	03/31/1997
USA/9107/B(U)	05/31/1998
USA/9137/B(U)	11/30/1995
USA/9147/B(U)	11/30/2000
USA/9165/B(U)	12/31/1998
USA/9166/B(U)	01/31/1998
USA/9187/B(U)	12/31/1998
USA/9141/B(U)	11/30/1995
USA/9143/B(U)	01/31/1996
	USA/9028/B(U) USA/9028/B(U) USA/9028/B(U) USA/9028/B(U) USA/9028/B(U) USA/9028/B(U) USA/9028/B(U) USA/9027/B(U) USA/9027/B(U) USA/9027/B(U) USA/9027/B(U) USA/9027/B(U) USA/9027/B(U) USA/9148/B(U) USA/9148/B(U) USA/9107/B(U) USA/9137/B(U) USA/9165/B(U) USA/9187/B(U) USA/9187/B(U)

TYPE OF PACKAGING: FISSILE URANIUM

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MODEL	PACKAGE ID #	EXPIRATION DATE
MODEL		
ANF-250	USA/9217/AF	01/31/2000
ATR	USA/9099/B(U)F	01/31/1999
A1W-3 PUSC	USA/9787/B(U)F	04/30/2000
BU-7	USA/9019/AF	11/30/1998
BW-2901	USA/9251/AF	08/31/1997
DHTF	USA/9203/AF	01/31/1996
D2G POWER UNIT	USA/6441/B()F	12/31/1997
FL 10-1	USA/9009/B()F	06/30/1999
FPD-100	USA/9057/AF	09/30/1995
FSV-3	USA/6347/AF	03/31/1997
GE-21PF-1	USA/4909/AF	11/30/1999
HFBR UNIR CONT	USA/9853/AF	10/31/1996
INNER HFIR UN	USA/5797/B(U)F	10/31/1996
MCC-3	USA/9239/AF	11/30/1996
MCC-4	USA/9239/AF	11/30/1996
MCC-5	USA/9239/AF	11/30/1996
MODEL B	USA/6206/AF	09/30/2000
MODEL 1 S-6213	USA/9186/B(U)F	07/31/1997
MODEL 2 S-6213	USA/9186/B(U)F	07/31/1997
NCI-21PF-1	USA/9234/B(U)F	12/31/1998
NFS-URANYL NIT.	USA/5059/AF	08/31/1996
NNFD 5X22	USA/9250/B(U)F	01/31/1998
NNFD-10	USA/6357/AF	04/30/1996
NONE SPECIFIED	USA/6406/AF	12/31/1997

TYPE OF PACKAGING: FISSILE URANIUM

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MODEL	PACKAGE ID #	EXPIRATION DATE	
OUTER HFIR UN	USA/5797/B(U)F	10/31/1996	
PADUCAH TIGER	USA/6553/AF	11/30/1998	
RA-2	USA/4986/AF	10/31/1997	
RA-3	USA/4986/AF	10/31/1997	
RCC	USA/5450/AF	09/30/1996	
RCC-1	USA/5450/AF	09/30/1996	
RCC-3	USA/5450/AF	09/30/1996	
RCC-4	USA/5450/AF	09/30/1996	
SP-1	USA/9248/AF	12/31/1998	
SP-2	USA/9248/AF	12/31/1998	
ST	USA/9246/AF	02/28/1997	
S5W POWER UNIT	USA/5580/B()	12/31/1997	
TRIGA-I	USA/9034/AF	05/31/1995	
TRIGA-II	USA/9037/AF	05/31/1995	
TROJAN PRESSUR.	USA/9260/A	06/30/2000	
TROJAN STEAM	USA/9259/A	06/30/2000	
UNC-2600	USA/5086/B(U)F	01/31/1999	
UNC-2901	USA/6294/AF	09/30/1995	
UX-30	USA/9196/AF	01/31/1995	
2.7 NEW FUEL	USA/5894/AF	07/31/1997	
235R001	USA/6386/B(U)F	07/31/1997	
51032-1	USA/6581/AF	05/31/1999	
51032-2	USA/9252/AF	09/30/1998	
814A	USA/5149/B()F	06/30/2000	

TYPE OF PACKAGING: FISSILE URANIUM

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MODEL	PACKAGE ID #	EXPIRATION DATE
927A1	USA/6078/B()F	10/31/2000
927C1	USA/6078/B()F	10/31/2000

TYPE OF PACKAGING: IRRADIATED FUEL

MODEL	PACKAGE ID #	EXPIRATION DATE
BMI-1	USA/5957/B()F	06/30/1996
CNS 1-13G	USA/9216/B()F	12/31/1997
FSV-1	USA/6346/B()F	04/30/1996
GE-100	USA/5926/B()F	02/28/1998
IF-300	USA/9001/B()F	09/30/2000
M-130	USA/6003/B()F	12/31/1997
M-140	USA/9793/B(U)F	10/31/1996
M-160	USA/9781/B()F	07/31/1997
NAC-LWT	USA/9225/B(U)F	02/28/2000
NAC-STC	USA/9235/B(U)F	09/30/1999
NLI-1/2	USA/9010/B()F	03/31/1996
NLI-10/24	USA/9023/B()F	03/31/1997
T-2	USA/5607/B()F	05/31/1998
T-3	USA/9132/B(M)F	03/31/1996
TN-BRP	USA/9202/B(U)F	06/30/1999
TN-FSV	USA/9253/B(U)F	05/31/1999
TN-REG	USA/9206/B(U)F	05/31/2000
TN-8	USA/9015/B()	05/31/1996
TN-8L	USA/9015/B()	05/31/1996
TN-9	USA/9016/B()F	05/31/1996
125-B	USA/9200/B(M)F	05/31/1996
2000	USA/9228/B(U)F	06/30/1999

TYPE OF PACKAGING: LSA

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MODEL	PACKAGE ID #	EXPIRATION DATE
BS-33-180	USA/6722/A	04/30/1996
CNS 14-170 III	USA/9249/A	07/31/1998
CNS 14-195-H	USA/9094/A	10/31/1995
CNS 21-300	USA/9096/A	09/30/2000
CNS 6-75	USA/9108/A	09/30/1998
CNS 6-80-2	USA/9111/A	01/31/1999
CNS 6-80-2A	USA/9111/A	01/31/1999
CNS 8-120A	USA/6601/A	02/28/1996
CNSI 14-215H A	USA/9176/A	05/31/1998
HN-100 SERIES 3	USA/9151/A	10/31/1997
HN-190-1	USA/9086/A	07/31/1998
HN-190-2	USA/9224/A	06/30/1998
HN-194S	USA/9089/A	02/28/1999
LL-60-150	USA/6568/A	03/31/1996
LN 10-135A	USA/9177/A	05/31/1998
LN 14-170 1	USA/9151/A	10/31/1997
LN 14-270H	USA/9159/A	05/31/1998
LN 14-170L	USA/9159/A	05/31/1998
LN 14-170M	USA/9159/A	05/31/1998
LN 14-195H	USA/9176/A	05/31/1998
LN 14-195L	USA/9176/A	05/31/1998
LN 6-80H	USA/9179/A	05/31/1998
LN 6-80L	USA/9179/A	05/31/1998
LN 7-100	USA/9178/A	05/31/1998

TYPE OF PACKAGING: LSA

49

MODEL	PACKAGE ID #	EXPIRATION DATE
NUPAC 10/140	USA/9177/A	05/31/1998
NUPAC 14/190H	USA/9159/A	05/31/1998
NUPAC 14/190L	USA/9159/A	05/31/1998
NUPAC 14/190M	USA/9159/A	05/31/1998
NUPAC 14/210H	USA/9176/A	05/31/1998
NUPAC 14/210L	USA/9176/A	05/31/1998
NUPAC 14D-2.0	USA/9079/A	06/30/1998
NUPAC 50-1.5L	USA/9145/A	03/31/1996
NUPAC 50-2.5L	USA/9145/A	03/31/1996
NUPAC 50-3.0L	USA/9145/A	03/31/1996
NUPAC 50-4.0L	USA/9145/A	03/31/1996
NUPAC 6/100H	USA/9179/A	05/31/1998
NUPAC 6/100L	USA/9179/A	05/31/1998
NUPAC 7/100	USA/9178/A	05/31/1998
YNPS STEAM GEN.	USA/9256/A	09/30/1998
10-142A	USA/9073/A	02/28/1999
110G-A	USA/9247/A	01/31/1998
14-215	USA/9222/A	03/31/1999
40G-A	USA/9254/A	09/30/1998
589	USA/9139/A	12/31/1996

TYPE OF PACKAGING: PU AIR

H.

MODEL	PACKAGE ID #	EXPIRATION DATE
PAT-1	USA/0361/B(U)F	09/30/1998
PAT-2	USA/9150/B(U)	07/31/1996

TYPE OF PACKAGING: PU NORM. FORM

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MODEL	PACKAGE ID #	EXPIRATION DATE
B-3	USA/6058/B()	12/31/1995
BETTIS WASTE	USA/6142/B()	12/31/1997
NRBK-41	USA/9221/B()F	01/31/1996
TRUPACT-II	USA/9218/B(U)F	06/30/1999
WAPD-40	USA/5874/B()F	07/31/1997
6400	USA/6400/B()F	06/30/1997

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TYPE OF PACKAGING: PU SPEC. FORM

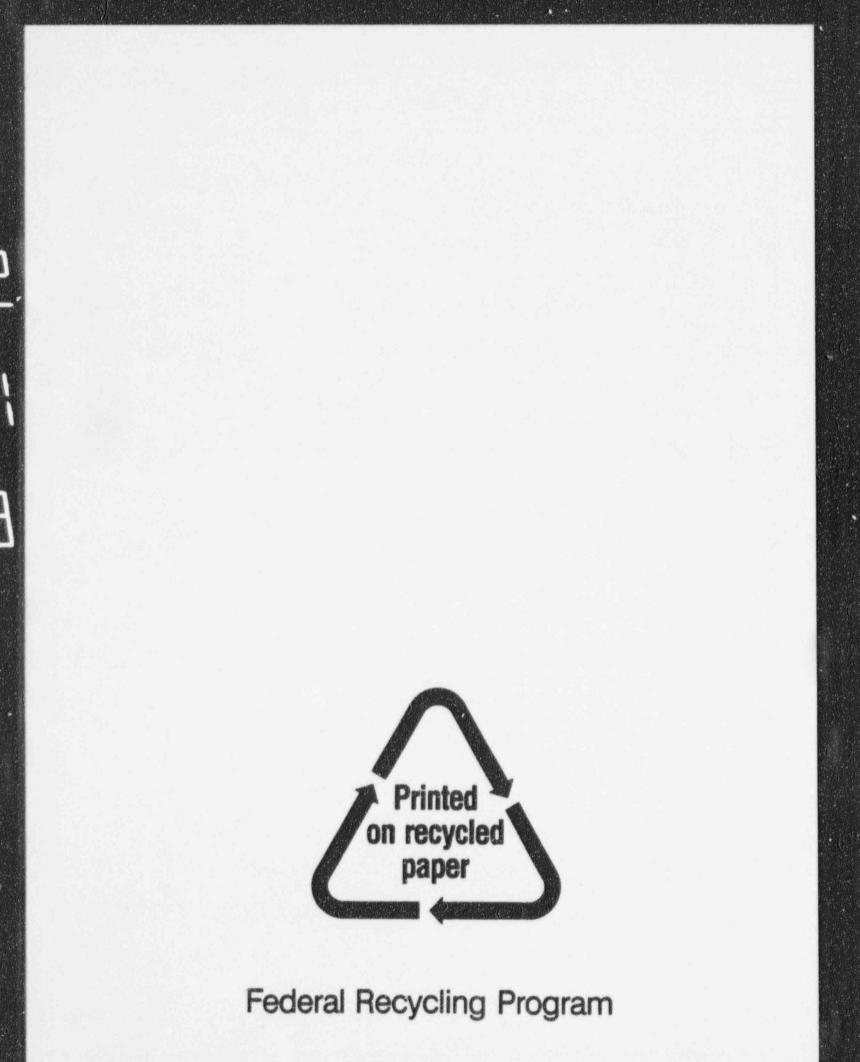
MODEL	PACKAGE ID #	EXPIRATION DATE	
BCL-2	USA/9068/B()F	05/31/1997	
BCL-3	USA/9067/B()F	05/31/1997	
BCL-4	USA/5950/B()F	08/31/1996	
MO-1	USA/9069/B()	01/31/1997	
S5W REFUEL.SRCE	USA/5757/B()F	12/31/1997	
1500	USA/5939/B()F	12/31/1997	

TYPE OF PACKAGING: WASTE, B

PACKAGE ID #	EXPIRATION DATE
USA/9071/B()	12/31/1996
USA/9789/B(U)	05/31/2000
USA/9790/B(U)	05/31/2000
USA/9794/B(U)	09/30/2000
USA/9081/B()	12/31/1997
USA/9152/B()F	05/31/1999
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