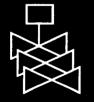


Directory of Certificates of Compliance for Radioactive Materials Packages

Certificates of Compliance





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



AVAILABILITY OF REFERENCE MATERIALS IN NRC PUBLICATIONS

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IN NRC PUE	BLICATIONS				
NRC Reference Material	Non-NRC Reference Material				
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Commission papers and their attachments.	Copies of industry codes and standards used in a substantive manner in the NRC regulatory				
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Washington, DC 20402–9328 www.access.gpo.gov/su_docs 202–512–1800 2. The National Technical Information Service Springfield, VA 22161–0002 www.ntis.gov 1–800–533–6847 or, locally, 703–805–6000	These standards are available in the library for reference 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— American National Standards Institute 11 West 42 nd Street New York, NY 10036–8002				
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from the site.

NUREG-0383 Volume 2 Revision 23

Directory of Certificates of Compliance for Radioactive Materials Packages

Certificates of Compliance

Manuscript Completed: October 2000 Date Published: November 2000

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 packaging 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 Quality Assurance programs. The reports include a listing of all users of each package design and approved Quality Assurance programs prior to the publication date of the directory.

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MODEL #	CERTIFICATE #	ļ	MODEL #	CERTIFICATE #
		ł		
A-0109	6280	ł	D1G CB-TS	9792
ABB-2901	9274		D2G POWER UNIT	6441
ANF-250	9217	1	EAGLE	9287
AP-101	9071	I	ECO-PAK OP TU	9288
ATR	9099	I	ESP-30X	9284
A1G ICDC	9795		F-294	9258
A1W-3 PUSC	9787	1	FL 10-1	9009
B-3	6058	I	FPD-100	9057
BCL-2	9068	I	FSV-1	6346
BCL-3	9067	ļ	FSV-1 UNIT 3	9277
BMI-1	5957		FSV-3	6347
BUSS R-1	9511	1	GA-4	9226
BW-2901	9251	I	GE-100	5926
C-1	9036	Ι	GE-500	9049
CE-B1	9272	I	HI-STAR 100	9261
CGN RCDP	9794		IF-300	9001
CI-20WC-2	9098	ł	INNER HFIR UN	5797
CI-20WC-2A	9098	1	IR-100	9157
CNS 1-13C	9081	Ι	LCG-25A	4888
CNS 1-13C II	9152	1	LCG-25B	4888
CNS 1-13G	9216	ł	LCG-25C	4888
CNS 10-160B	9204		M-130	6003
CNS 3-55	5805	I	M-140	9793
CNS 8-120B	9168	1	M-160	9781
DHTF	9203	I	MCC-3	9239

MODEL #	CERTIFICATE #	1	MODEL #	CERTIFICATE #
MCC-4	9239	Ι	ORNL TRU CALIF	5740
MCC-5	9239	I	OUTER HFIR UN	5797
MO-1	9069	Ι	PADUCAH TIGER	6553
MODEL B	6206		PAS-1	9184
MODEL 1 S-6213	9186		PAT-1	0361
MODEL 2 S-6213	9186	1	PAT-2	9150
MW-3000	9030		PATRIOT	9292
N-55	9070	1	PWR-2 CORE BAR.	9791
NAC-LWT	9225		RA-3	4986
NAC-STC	9235	1	RH-TRU 72-B	9212
NAC-1	9183	I	SENTINEL-100F	5862
NCI-21PF-1	9234	1	SENTINEL-25A	4888
NFS-URANYL NIT.	5059		SENTINEL-25B	4888
NLI-1/2	9010		SENTINEL-25C	4888
NLI-10/24	9023		SENTINEL-25C3	4888
NNFD 5X22	9250		SENTINEL-25D	4888
NNFD-10	6357		SENTINEL-25E	4888
NONE SPECIFIED	6406		SENTINEL-25F	4888
NPI-20WC-6	9102	I	SENTINEL-8	9030
NPI-20WC-6 MKII	9215		SNAP-21	5830
NRBK-41	9221		SP-1	9248
NUHOMS-MP187	9255	1	SP-2	9248
OP-100	9185	1	SP-3	9248
OP-660	9283	1	SPEC 2-T	9056
OPL-660	9283	I	SPEC-150	9263

MODEL #	CERTIFICATE #	1	MODEL #	CERTIFICATE #
		Ι		
SPEC-300	9282	I	URIPS-8B	6786
SRP-1	9285	1	UX-30	9196
ST	9246	I	WE-1	9289
S3G CBDCA	9786	Ι	10-135B	9210
S5W POWER UNIT	5580	Ι	10-142	9208
S5W REC. COMPT.	9788	1	125-B	9200
S5W REFUEL.SRCE	5757	Ι	1500	5939
S6G REC. COMPT.	9788	[181361	5796
T-2	5607		181375	5796
T-3	9132	1	2000	9228
TN-BRP	9202	1	235R001	6386
TN-FSV	9253	1	3-82B	6574
TN-RAM	9233	1	4.5 TON CF	6642
TN-REG	9206	Ι	420	9245
TN-8	9015		51032-1	6581
TN-8L	9015	I	51032-2	9252
TN-9	9016		5979	5979
TRIGA-I	9034]	5984	5984
TRIGA-II	9037	1	6400	6400
TRUPACT-II	9218	1	650L	9269
UBE-1	9280		6717-B	6717
UBE-2	9281	Ι	680-OP	9035
UNC-2600	5086	Ι	702	6613
UNC-2901	6294	1	715	9039
URIPS-8A	6786	1	741-OP	9027

MODEL #	CERTIFICATE #	ł	MODEL #	CERTIFICATE #
		1		
770	9148	1		
771	9107	I		
81 4A	5149	l		
855	9165]		
865	9187	Ι		
9 27 A1	6078	Ι		
927C1	6078	I		
934	9243			

(3-96) 10 CFR 71				U.S. N ATE OF COMPLIANCE TIVE MATERIALS PACKAGES	NUCLEAR REGUL	ATORY COMMISSI
1. a. CERTIFICATE	NUMBER		b. REVISION NUMBER	c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PA
036	1		7	USA/0361/B(U)F-85	1	4
Code of Fed b. This certific:	leral Reg ate does 1	ulations, Part 71, "Pack not relieve the consigno	aging and Transportati or from compliance wit	described in Item 5 below, meets the applicable s on of Radioactive Material." h any requirement of the regulations of the U.S. I untry through or into which the package will be	Department of Trans	
	TE IS ISSU	JED ON THE BASIS OF	A SAFETY ANALYSIS R	EPORT OF THE PACKAGE DESIGN OR APPLICAT LE AND IDENTIFICATION OF REPORT OR APPLIC	ION	
U.S. Nucle Commiss Washingto	sion			NUREG-0361; Safety Analys Plutonium Air Transportable No. PAT-1, as supplemented	Package Mod	
CONDITIONS	is condition	onal upon fulfilling the		CKET NUMBER 71-0361 TR Part 71, as applicable, and the conditions spec	ified below	
(a)	Pack	aging				
	(1)	Model No.:	PAT-1			
	(2)	Description				
		stainless stee	el product can	k (designated AQ-1). The cont (designated PC-1) inside the co nt circular cylinder, approximat	o <mark>nta</mark> inment v	led within a essel.
		stainless stee The AQ-1 ov 24-1/2 inches 8 inches of g ends of the d aluminum loa The TB-1 cor	el product can erpack is a rigi s outside diam rain oriented ru lrums are doub id distributer a ntainment vess	(designated PC-1) inside the control circular cylinder, approximate eter. The walls of the overpace edwood encased within double by closed. A copper heat cond re encased within the redwood rel is approximately 8-1/2 inchest	ents are seal ontainment v ety 42-1/2 in k consist of stainless ste lucting eleme so outside	led within a essel. aches long by approximately eel drums. The ent and an
		stainless stee The AQ-1 ov 24-1/2 inches 8 inches of g ends of the d aluminum loa The TB-1 cor length by 6-3 of the vessel circular cylind closed by 12	el product can erpack is a rigl s outside diam rain oriented ro lrums are doub d distributer a ntainment vess 8/4 inches outs is approximate der, 4-1/4 inch	(designated PC-1) inside the control circular cylinder, approximate eter. The walls of the overpace edwood encased within double by closed. A copper heat cond re encased within the redwood rel is approximately 8-1/2 inches side diameter. The minimum we ely 1/2 inch. The interior cavit es diameter, with hemispherica neter bolts and doubly sealed we	ents are seal ontainment v ety 42-1/2 in k consist of stainless ste lucting eleme soutside vall thickness y of the vess al ends. The	led within a essel. aches long by approximately eel drums. The ent and an sel is a right vessel is
		stainless stee The AQ-1 ov 24-1/2 inches 8 inches of g ends of the d aluminum loa The TB-1 cor length by 6-3 of the vessel circular cylind closed by 12	el product can erpack is a rigi s outside diam rain oriented ru lrums are doub d distributer a ntainment vess 3/4 inches outs is approximate der, 4-1/4 inch , 1/2-inch diam	(designated PC-1) inside the control circular cylinder, approximate eter. The walls of the overpace edwood encased within double by closed. A copper heat cond re encased within the redwood rel is approximately 8-1/2 inches side diameter. The minimum we ely 1/2 inch. The interior cavit es diameter, with hemispherica neter bolts and doubly sealed we	ents are seal ontainment v ety 42-1/2 in k consist of stainless ste lucting eleme soutside vall thickness y of the vess al ends. The	led within a essel. aches long by approximately eel drums. The ent and an sel is a right vessel is
		stainless stee The AQ-1 ov 24-1/2 inches 8 inches of g ends of the d aluminum loa The TB-1 cor length by 6-3 of the vessel circular cylind closed by 12	el product can erpack is a rigi s outside diam rain oriented ru lrums are doub d distributer a ntainment vess 3/4 inches outs is approximate der, 4-1/4 inch , 1/2-inch diam	(designated PC-1) inside the control circular cylinder, approximate eter. The walls of the overpace edwood encased within double by closed. A copper heat cond re encased within the redwood rel is approximately 8-1/2 inches side diameter. The minimum we ely 1/2 inch. The interior cavit es diameter, with hemispherica neter bolts and doubly sealed we	ents are seal ontainment v ety 42-1/2 in k consist of stainless ste lucting eleme soutside vall thickness y of the vess al ends. The	led within a essel. aches long by approximately eel drums. The ent and an sel is a right vessel is
		stainless stee The AQ-1 ov 24-1/2 inches 8 inches of g ends of the d aluminum loa The TB-1 cor length by 6-3 of the vessel circular cylind closed by 12	el product can erpack is a rigi s outside diam rain oriented ru lrums are doub d distributer a ntainment vess 3/4 inches outs is approximate der, 4-1/4 inch , 1/2-inch diam	(designated PC-1) inside the control circular cylinder, approximate eter. The walls of the overpace edwood encased within double by closed. A copper heat cond re encased within the redwood rel is approximately 8-1/2 inches side diameter. The minimum we ely 1/2 inch. The interior cavit es diameter, with hemispherica neter bolts and doubly sealed we	ents are seal ontainment v ety 42-1/2 in k consist of stainless ste lucting eleme soutside vall thickness y of the vess al ends. The	led within a essel. aches long by approximately eel drums. The ent and an sel is a right vessel is

I RC FC	RM 618	A		CONDITIONS (continued) U.S. NUCLEAR REGULATOR	Y COMMISSIC
-	e 2 - C	ertific	ate No	o. 0361 - Revision No. 7 - Docket No. 71-0361	
F	(-)	Deel		(continued)	
5.	(a)	Faci	caging	g (continued)	
		(2)	Desc	cription (continued)	
			the ⁻	weight of the package is approximately 500 pounds. The weight of TB-1 containment vessel, when loaded with 4.4 pounds of contents pproximately 41.7 pounds.	
		(3)	Drav	wings and Specifications	
			spec supp	Model No. PAT-1 packaging is fabricated in accordance with the drawi cifications in Section 9.0 of the Safety Analysis Report, NUREG-0361 a plemented by Issue B of Drawing Nos. 1004, 1009, 1013, 1016, 1017 9, 1020 and 1022.	s
	(b)	Con	tents		
		(1)	Туре	e and form of material	
				onium oxide and its daughter products, in any solid form. The plutoniur be mixed with uranium oxide and its daughter products, in any solid for	
		(2)	Max	kimum quantity of material per package and additional permissible conte	ents
			(i)	Maximum 2.0 kg total radioactive material, plus: maximum 16 grams and 10 grams of polyethylene or polyvinylchloride bagging material. maximum decay heat load of the contents may not exceed 25 watts.	The
			(ii)	Maximum 200 grams total radioactive material, plus: maximum one g water, maximum 200 grams of metal canning material (in addition to product can, Drawing No. 1024), maximum 64 grams of aluminum fo honeycomb (in addition to the top spacer, Drawing No. 1015), maxim grams of glass and maximum 35 grams polyethylene or polyvinylchloo bagging material. The maximum decay heat load of the contents may exceed 25 watts.	the PC-1 bil or num 175 ride
	(c)	Trar	nsport	Index for Criticality Control	
				transport index to be shown on nuclear criticality control: 0.4	
6.				act can (Drawing No. 1024) and the top spacer (Drawing No. 1015) and when the contents include 20 curies or less of plutonium.	
7.				e, each packaging shall meet the acceptance tests and standards specifi and Section 9.0 of the Safety Analysis Report.	ied in
8.				nipment, the package shall meet the tests and criteria specified in Subse nalysis Report.	ction 8.2
				2	

NRC FC 3-96)	0RM 618A	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
-	e 3 - Certificate No. 0361 - Revisior	n No. 7 - Docket No. 71-0361	
9.	The package shall be prepared f specified in Section 7.0 of the S		accordance with the procedures
10.	The systems and components o specified in Subsection 8.3 of the section 8.3 of the sectio		the periodic tests and criteria
11.	Repair and maintenance of the p Safety Analysis Report.	backaging shall be in accorda	ance with Sections 8.0 and 9.0 of the
12.	The packaging shall be designed repaired in accordance with a qu Commission for this purpose.		
13.	Through special arrangement wi following operational controls fo		
			main deck in the aft-most location ther type cargo may be stowed aft of
	the aircraft. The tie-down the following inertia forces	ecurely cradled and tied-dow system must be capable of acting separately relative to Sideward, 1.5g; Downward	providing package restraint against o the deck of the aircraft:
	(c) Cargo which bears one of aboard an aircraft carrying		terial labels may not be transported
	Explosive A Explosive B Explosive C Spontaneously Com Dangerous When We Organic Peroxide		quid olid
	This restriction does not a	pply to hazardous material c	argo labeled solely as:
	Radioactive I Radioactive II Radioactive III	Poison Poison Gas Irritant	
	Magnetized Material		nt
14.	The package authorized by this provisions of 10 CFR §71.12.	certificate is hereby approve	d for use under the general license
15.	The package authorized by this a air.	certificate is hereby approve	d for transportation of plutonium by
16.	Expiration date: September 30,		
		3	()285 ()285 ()285 ()285 ()285 ()285 ()285 ()285 ()285 ()285 ()285 ()285 ()285 ()285 ()285 ()285

NRC FORM 618A Page 4 - Certificate No. 0361 - Revision No. 7 - Docket No. 71-0361

CONDITIONS (continued)

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

U.S. NUCLEAR REGULATORY COMMISSION

Cars K. Chappell

Cass R. Chappell, Chief Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: Sept. 15, 1998

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NRC FOR (3-96)	M 618		CER	FIFICA	TE OF CON	IPLIANCE	U.S. NU	ICLEAR REGUL	ATORY COMMISSIO
10 CFR 71			FOR RA	DIOACT	IVE MATERIA	LS PACKAGES	5		
1. a. CERTIF	ICATE NU	JMBER	b. REVISION	NUMBER	c. PACKAGE IDEN	TIFICATION NUMB	ER	d. PAGE NUMBER	e. TOTAL NUMBER PA
4888 13					USA/48	88/B()		1	4
2. PREAMBI									
Code	e of Feder	e is issued to certify that the p al Regulations, Part 71, "Pack e does not relieve the consigno	aging and Tra	nsportation	of Radioactive M	aterial."		-	
applic	cable reg	latory agencies, including the	e government o	of any coun	try through or into	which the package	will be tra	ansported.	portation or other
a. ISSUE	D TO (Nai	IS ISSUED ON THE BASIS OF ne and Address)	A SAFETY ANA			TION OF REPORT O			
Tech 6000	nical Patr	t of the Air For Operations Divi ol Road	sion/CC			Energy Sys ril 26, 198 emented.			
McC1	ellan	AFB, CA 95652-1	.709			71 4000			
				c. DOCK	ET NUMBER	71-4888			
CONDITIC This cert		conditional upon fulfilling the	requirements	of 10 CFR	Part 71. as applies	ble, and the condition	ons specif	ied below	
, .	. ·	•							
(a)	Pack	aging					49 () 19		
	(1)	Model No.: Sen	tinel-25 tinel-25	5A, LC(5C, LC(G-25A; Sen G-25C; Sen	tinel-25B, tinel-25C3,	LCG-2 -25D	5B; , -25E, an	d -25F
	(2)	Description							
		The packages ar main housing, t The approximate follows:	ungsten	shield	d, housing	flange, ar	nd ele	ctrical co	nnectors.
		Model No.			<u>Dimensio</u>	ns (inches)		Weig	<u>ht (lbs.)</u>
		Sentinel-25A, L				OD x 25			000
		Sentinel-25B, L Sentinel-25C, L				DD x 25 DD x 32			300 000
		Sentinel-25C3			24	OD x 32		1	300
		Sentinel-25D			25	OD x 27			300
		Sentinel-25E Sentinel-25F			25 24	OD x 34 OD x 32			200 400
		Sent men 25			L T			1	-00

\mathcal{O}	Ω	077057							
	NRC (3-96)	FORM	618A		CONDITION	NS (continued)	U.S. I	NUCLEAR REGULATO	
	Page	2 -	Certificate No.	4888 - Rev	vision No.	11 - Docket	No. 71-48	388	
	5.	(a)	Packaging (Cont	inued)					
		(3)	Drawings						
			The packagings	are const	ructed in a	ccordance wi	th the fo	ollowing Drawir	ng Nos:
			<u>Model No.</u>			<u>Drawing Nos.</u>			
<u>DEN DEN DEN DEN DEN DEN DEN DEN DEN DEN </u>			All Models			Isotopes, In 001-20000, R 001-20001, R 001-20002, R 001-20003, S 001-80003	ev. E ev. F ef. F		
			Sentinel-25A,	LCG-25A		Martin Compa N0013100, Re N0013108, Re 001-40000, R	ev. A ev. D	ng Nos.:	
						Isotopes, Ir 001-10000, F 001-70024, F 001-70025, S 001-70033, S 001-70036 001-80005	Rev. B Rev. C Sht. 1, R	ev. D	ng Nos:
			Sentinel-25B,	LCG-25B		Martin Compa N0013200, Re 001-40012	ev. C		
						Isotopes, II 001-70024, I 001-70025, 001-70033, 001-70036 001-80005	R ev. C Sht. 1, R	Rev. D	
			Sentinel-25C,	LCG-25C		Martin Comp 001-40004, 001-70010 001-70012, 001-80004	Rev. A	ing Nos.:	
						Isotopes, I 001C10000, 001-70009,	Sht. 1 Re	ing Nos.: ev. D, & Sht. 3	
and and an a Description of the second s			Sentinel-25C3			Isotopes, I 001C10000 S 001-70009, 001-70057, 001-70060, 001-40019,	Shts. 1 & Rev. D Rev. D Rev. C	ing Nos.: 2, Rev. D	

NRC (3-96)	NRC FORM 618A (3-96)						CONDIT	IONS (co	ntinued)		U.S. N	UCLEAR REGULATORY COMM	
Page	3 -	Certi	ficate	e No.	4888	- 1	Revis [.]	ion No	. 11	- Dock	et No	. 71-48	38
		Sent	inel∙a	25D						tin Co -80004		Drawing	g No.
									001 001 001 001 001 001	D10000 - 70036 - 70033	Shts Shts Sht. , Rev , Rev	. 1 & 2 1, Rev . C . C	, Rev. C , Rev. A
		Sent	inel-2	25E					001 001 001 001 001	E10000 - 70039 - 70025 - 70024	, Sht , Rev , Sht , Rev , Sht	.C .1,Rev .C s.1&2	g Nos.: 2, Rev. E, & Sht. 3 7. D & Sht. 2 2, Rev. D
		Senti	nel-2	25F					001 001 001 001		, Sht , Rev , Rev , Rev	. C . C . D	y Nos.: 2, Rev. H*
									*As the	modif April	ied b 26,	y Figure 1985, ag	e 1 of oplication.
	(b)	Conte	ints										•
		(1)	Туре	and	form c	ofπ	nateri	al					
			(i)	Stro Unil radi	ntium oy fue pactiv	90 el c /e m	titar capsul nateri	nate do le whic al; or	oubly h me				Hastelloy or s of special form
			(11)	Mode enca C-27 radi	l No. osulat 6 line oactiv	Ser ced er w ve n	ntinel in Ha which materi	istello	ay ha oy or the i	Unilo	y fue	l capsul	oride doubly le, with a Hastelloy ecial form
		(2)	The m	naxim	um qua	inti	ity of	f mater	ial į	per pa	ckage		
			125,0)00 c	uries								
5.	A ba suff met.	rrier icient	(pern sepa	nitti arati	ng the on dis	e fr star	ree ci nce to	rculat ensur	ion o e th				ovided with of §71.43(g) will be

IRC FORM 3-96)	618A	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
Page	4 - Certificate No. 4888	3 - Revision No. 11 - Docket N	o. 71-4888
7.	Eye-bolts shall be remov tie-down devices of pack	ved or covered during transpor cages.	tation to prevent their use a
8.		rements of Subpart G of 10 CF or shipment and maintained in Maintenance Programs:	
	Model No.	Operating Procedures	Maintenance Program
	Sentinel-25A, LCG-25A	Appendix E of TES-3206, as revised	Appendix F of TES-3206, as revised
	Sentinel-25B, LCG-25B	Appendix E of TES-3209, as revised	Appendix F of TES-3209, as revised
	Sentinel-25C, LCG-25C	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 TES-3212, as revised	Appendix F of TES-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.	The packages authorized general license provisio	by this certificate are hereb ons of 10 CFR §71.12.	y approved for use under the
10.	Expiration date: Januar	ry 31, 2002.	
		REFERENCES	
Teleo	lyne Energy Systems appli	ications dated April 26, 1985;	and August 19, 1986.
Teleo	lyne supplements dated:	November 3, 1986; September 1	7 and December 2, 1991.
Depar	tment of the Air Force s	supplement dated: November 12	, 1993; and December 11, 1996
		FOR THE U.S.	NUCLEAR REGULATORY COMMISSION
		Cass R. Ch	spell
		Cass R. Chapp Package Certi Spent Fuel Pr	ell, Chief fication Section oject Office
		Office of Nuc and Safegua	lear Material Safety

REFERENCES

RC FOR -96). CFR 71	KM 618		FOR RADIOAC	ATE OF COMPLIANCE TIVE MATERIALS PACKAGES		
	FICATEN	IUMBER	b. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PA
۸d	86		38	USA/4986/AF	1	4
Cod	s certifica le of Fed	eral Regulations, Part 71, "Pack	aging and Transportation w from compliance with	described in Item 5 below, meets the applicabl on of Radioactive Material." In any requirement of the regulations of the U.S untry through or into which the package will b	S. Department of Trans	
THIS CE	RTIFICAT ED TO (N	TE IS ISSUED ON THE BASIS OF Came and Address)	A SAFETY ANALYSIS R	EPORT OF THE PACKAGE DESIGN OR APPLIC LE AND IDENTIFICATION OF REPORT OR APP		
P.O	. Box		s, L.L.C.	General Electric Company a September 10, 1997, as su	application date oplemented.	bd
vv an	ningic	on, NC 28402		CKET NUMBER 71-4986		
CONDIT	IONS				necified below.	
This ce	rtificate i	is conditional upon fulfilling the	requirements of 10 Cr	R Part 71, as applicable, and the conditions s		
(a)	Pack	aging		· · · ·		
(-/	(1)	Model No.: RA-3				
	(2)	Description				
		by cushioning mate The metal inner compositioned within a inches long. Cushi impregnated honey (breather) valve is t	rial. ntainer is appro wooden outer o oning is provide rcomb and etha provided on the	wooden construction and a m ximately 11 inches by 18 inche container approximately 30 inc ed between the inner and oute foam. Closure is accomplishe inner container, and is set for ents is 2,800 pounds.	es by 178 inch hes by 30 inch r containers by ed by bolts. A r	es long and is es by 207 phenolic pressure relief
	(3)	Drawings	n an the second s			
		The packaging is c Drawing Nos.:	onstructed in a	ccordance with the following G	ieneral Electric	Company
		769E229, Re 769E231, Re				
	(4)	Product Container			General Flort	ric Company
		The fuel rod produ Drawing No.:	ct container is o	constructed in accordance with	I GENCIAI LICU	no company
		0028B98, Re	evision O			
		227, 227, 227, 237, 227, 227, 227, 227,		9		

NRC FORM 618A

(3-96)

CONDITIONS (continued)

Page 2 - Certificate No. 4986 - Revision No. 38 - Docket No. 71-4986

5.(b) Contents

- (1) Type and form of material
 - (i) Unirradiated UO₂ fuel assemblies. Each fuel assembly is made up of either 60 or 62 rods in an 8 x 8 square array with maximum fuel cross-sectional area of 25 square inches and a maximum fuel length of 150 inches. The maximum U-235 enrichment is 5.0 percent by weight, and the maximum average enrichment is 5.0 percent by weight. The maximum pellet diameter, minimum clad thickness, water rod specifications, and poison rod specifications are a accordance with Section 6.1, Appendix 8-H, of the supplements dated June 27 and November 1, 1995.
 - (ii) Unirradiated UO_2 fuel assemblies. Each fuel assembly is made up of 74 full and partial length rods in a 9 x 9 square array with maximum fuel cross-sectional area of 25 square inches and a maximum fuel length of 150 inches. The maximum U-235 enrichment is 5.0 percent by weight, and the maximum average enrichment is 4.6 percent by weight. The maximum pellet diameter, minimum clad thickness, water rod specifications, and poison rod specifications are in accordance with Section 6.1, Appendix 8-I, of the supplements dated June 27 and November 1, 1995.
 - (iii) Unirradiated UO₂ fuel assemblies. Each fuel assembly is made up of 92 full and partial length rods in a 10 x 10 square array with maximum fuel cross-sectional area of 25 square inches and a maximum fuel length of 150 inches. The maximum U-235 enrichment is 5.5 percent by weight, and the maximum average enrichment is 5.0 percent by weight. The maximum pellet diameter, minimum clad thickness, water rod specifications, and poison rod specifications are in accordance with Section 6.1, Appendix 8-J, of the supplements dated June 27 and November 1, 1995.
 - (iv) Unirradiated UO_2 fuel rods, which are contained within the product container specified in 5(a)(4). The maximum U-235 enrichment is 5.0 by weight. The fuel rods are clad with zircaloy, incaloy, inconel, or stainless steel. The minimum pellet diameter is 0.340 inch, and the maximum pellet diameter is 0.515 inch.
 - (v) Unirradiated UO₂ fuel rods, which may be loose or may be strapped together. The maximum U-235 enrichment is 5.0 by weight. The fuel rods are clad with zircaloy, incaloy, inconel, or stainless steel. The minimum pellet diameter is 0.340 inch, and the maximum pellet diameter is 0.515 inch.

RC FORM 61 -96)	A CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
•	Certificate No. 4986 - Revision No. 38 - Docket No. 71-4986
5.(b) Co	ntents (Continued)
(2)	Maximum quantity of material per package
	(i) For the contents described in 5(b)(1)(i), 5(b)(1)(ii), and 5(b)(1)(iii):
	Two (2) fuel assemblies. Total quantity of radioactive material within a package may no exceed a Type A quantity.
·	(ii) For the contents described in 5(b)(1)(iv):
	Two (2) fuel bundles. A fuel bundle is defined as any number of fuel rods contained within the product container specified in $5(a)(4)$.
	(iii) For the contents described in 5(b)(1)(v):
	Two (2) fuel bundles. A fuel bundle is defined as a maximum of 14 fuel rods positioned within one side (channel) of the inner container.
(c)	Transport Index for Criticality Control
	Minimum transport index to be shown on label for nuclear criticality control:
	For the contents described in 5(b)(1)(i), 5(b)(1)(ii) and 5(b)(1)(iii), and limited in 5(b)(2)(i): 0.4
	For the contents described in 5(b)(1)(iv), and [imited in 5(b)(2)(ii): 6.3
	For the contents described in 5(b)(1)(v), and limited in 5(b)(2)(iii):
wi fo	ch fuel assembly must be unsheathed or must be enclosed in an unsealed, polyethylene sheath ich may not extend beyond the ends of the fuel assembly. The ends of the sheath may not be ded or taped in any manner that would prevent the flow of liquids into or out of the sheathed fuel sembly.
pl ci	lyethylene holders with a maximum effective thickness of 0.151 inches (0.3835 cm) may be ced surrounding the fuel assembly up to a maximum of 0.13 grams H_2O hydrogen equivalent pe bic centimeter averaged over the assembly. The effective holder thickness is the linear average the maximum and minimum thickness.
	lyethylene shipping shims may be inserted between rods within the fuel assemblies up to a ximum of 0.10 grams H_2O hydrogen equivalent per cubic centimeter averaged over the sembly. The shipping shims may be used with or without the polyethylene holders.
	11
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NRC FORM 618A (3-96)

CONDITIONS (continued)

Page 4 - Certificate No. 4986 - Revision No. 38 - Docket No. 71-4986

- 9. For shipment of fuel rods described in 5(b)(1)(iv) and 5(b)(1)(v), each fuel rod may be contained within a polyethylene sheath with a maximum thickness of 0.01 inch. Dunnage is permitted within the product container, and within the inner container, provided that the dunnage does not have a hydrogen density greater than that of water.
- 10. Maximum average enrichment means the highest enrichment averaged over any axial zone of the assembly.
- 11. 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.
- 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: March 31, 2003.

REFERENCES

General Electric Company application dated September 10, 1997.

Supplements dated: November 20, 1997; June 5 and 25, July 1 and 21, and August 14, 1998; and October 14, 1999.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: May 10, 2000

NRC FORM 618 3-96) 0 CFR 71				ICATE OF CO ACTIVE MATERI	MPLIANCE	J.S. NUCLEA	R REGUL	ATORY COMMISSI
. a. CERTIFICATE NUM	BER		b. REVISION NUM	BER c. PACKAGE IDE	NTIFICATION NUMBER	d. PAG	ENUMBER	e. TOTAL NUMBER P
5059			12	USA	/5059/AF		1	2
. PREAMBLE					. <u> </u>			<u> </u>
Code of Federal I	Regulations	s, Part 71, "Pack	aging and Transpor	tation of Radioactive N	below, meets the applic faterial." f the regulations of the			
	ory agencie	es, including the	government of any	country through or int	o which the package wi	ill be transport		·
a. ISSUED TO (Name a					ATION OF REPORT OR A			
Nuclear Fue P. O. Box 3 Erwin, TN 3	337, M		C.	Nuclear Fue dated March	l Services, I 27, 1981, as	nc., app suppler	nented.	ion
			c.	DOCKET NUMBER	71-5059			
. CONDITIONS This certificate is con	ditional up	on fulfilling the			able, and the conditions	s specified belo		· · · · · · · · · · · · · · · · · · ·
(a)	Pack	aging						
	(1)		NFS U	ranvl Nitrat	e Tank Traile	'n		
	• •					• • •		
	(2)	Descrip	tion					
		Bulk li trailer	quid insul is of all	ated cargo t welded cons	an <mark>k tra</mark> iler. truction of t	The 3,8 ype 3041	300 gal _ stair	llon tank nless steel.
	(3)	Drawing						
		The tan Specifi		is construct	d in seconds			
(1)			Cation mu-	312.	ed in accorda	nce with	n DOT	
(b)	Conto	ents	Cation PC-	312.		nce with	n DOT	
(D)	Conto (1)		d form of			nce with	n DOT	
(D)		Type an Uranyl enrichm	d form of nitrate in ent in the	material dilute acid uranium mus	solution. T t not exceed not exceed 10	he maxir 5% by we	num U-2 eight.	The U-235
(D)		Type an Uranyl enrichm content The tot (1.5 <u>M</u>). percent	d form of nitrate in ent in the of the so al uranium The UO ₂ (. The HNO	material dilute acid uranium mus lution must content mus NO ₃) ₂ -6H ₂ 0 col 3 concentrati	solution. T t not exceed	he maxir 5% by we grams p 357 gram t exceed ormally	num U-2 eight. ber lit ns per 1 50 we 0.4 <u>M</u> .	The U-235 cer. liter eight The
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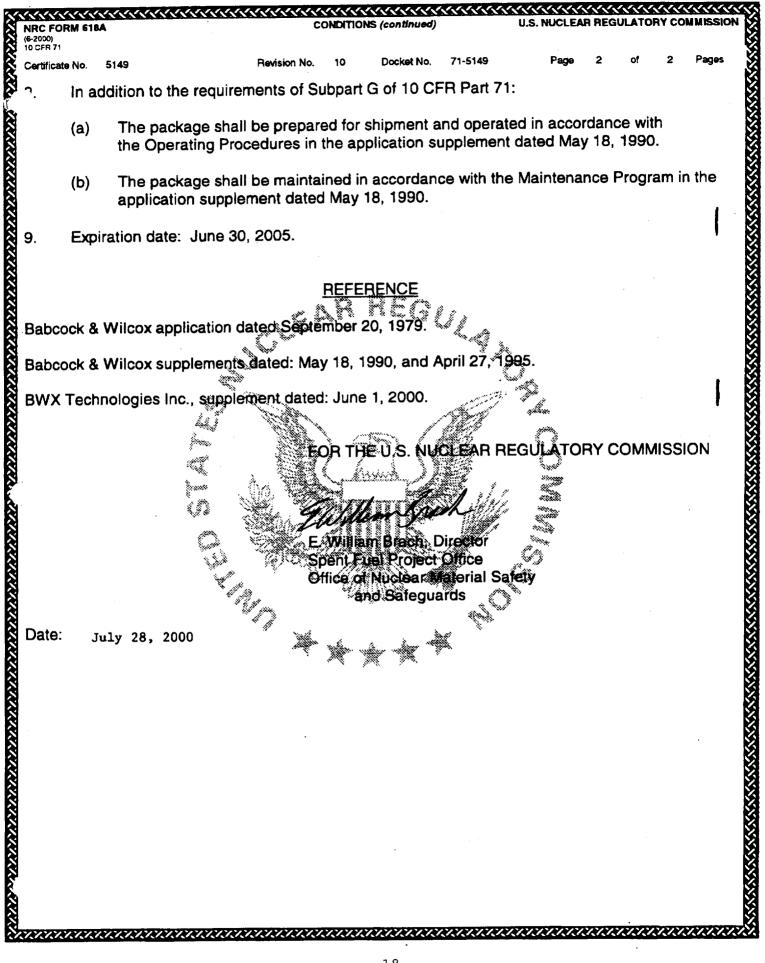
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NRC FOF (3-96)	RM 618A		CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
Page	2 - Certi	ficate No. 50	59 - Revision No. 🕻	12 - Docket No	
5.	(b) Cont	ents (continu	ed)		
	(2)	Maximum quan	tity of material p	er package	
		Not more tha Total quanti Type A quant	ty of radioactive I	t weight of ura material within	anyl nitrate acid solution. n a package may not exceed a
	(c) Tran	sport Index f	or Criticality Con	trol	
	Mini labe	mum transport] for nuclear	index to be shown criticality contr	on ol:	100
6.	The solut	ion must be a	t a temperature of	68°F or above	at the time of packaging.
	4% by wei route tha weather i Nuclear F	ght, the ship It the ambient Is encountered	per must ensure th temperature will , the administrati Inc., application	at at no point be less than 3 ve procedures	anyl nitrate acid solution. n a package may not exceed a 100 at the time of packaging. 5 enrichments greater than along the proposed shipping 2'F. In the event freezing and controls as specified in 7, 1981, must be complied Part 71: ined in accordance with hipment in accordance he application, as
8.	In additi	on to the req	uirements of Subpa	rt G of 10 CFR	Part 71:
	(a) Each Sect	package must tion 8.0 of th	be acceptance tes e application, as	ted and mainta supplemented.	ined in accordance with
	with	n package shal the Operatin Demented.	1 be operated and g Procedures in Se	prepared for s ction 7.0 of t	hipment in accordance he application, as
	The packa general 1	age authorized license provis	by this certifications of 10 CFR §71	te is hereby a .12.	pproved for use under the
10.	Expiratio	on date: Augu		ENCES	
Nucle	ear Fuel S	Services, Inc.	, application date	d March 27, 19	981.
Supp	lements da	ated: August	6, 1986, and July	18, 1991.	
9. 10. Nucle Supp			le	ulliam /r	
	1	(Spent Offic	am D. Travers, Fuel Project e of Nuclear M Safeguards	, Director Office Material Safety
Date	: 412	696			
\sim			1.		28 (28 (28 (28 (28 (28 (28 (28 (

(3-96) 10 CFR 71	1		U.S. NUCLEAR REGULATORY COMMISSION FOR RADIOACTIVE MATERIALS PACKAGES						
1. a. CERTIFICATE 5086			b. REVISION	NUMBER 11	c. PACKAGE IDENTIFIC USA/5	ATION NUMBER	d. PAGE NUMBER 1	e. TOTAL NUMBER PA	
b. This certific	deral Regulati cate does not r	ions, Part 71, "Pack relieve the consigno	aging and Trai	nsportation	escribed in Item 5 below, n of Radioactive Materia any requirement of the r ntry through or into whic	I." egulations of the U.S.	Department of Trans		
B. THIS CERTIFICA a. ISSUED TO () BWX P.O.	TE IS ISSUED Name and Addr Techno Box 785	ON THE BASIS OF ess) logies, Inc.	A SAFETY AN	ALYSIS RE	PORT OF THE PACKAGE AND IDENTIFICATION Babcock and V dated Novemb	DESIGN OR APPLICA OF REPORT OR APPL Wilcox Compa	non Ication: any applicatio	n	
CONDITIONS				c. DOC	KET NUMBER	71-5086	· · · · · · · · · · · · · · · · · · ·	·	
CONDITIONS This certificate	is conditional	upon fulfilling the	requirements	of 1 0 CFR	t Part 71, as applicable, a	nd the conditions spe	cified below.		
i.									
(a)	Packag	ging							
	(1)	Model No.:	UNC-26	00					
	(2)	Description							
		41							
		The inner of 7" wide x 9 long, 14-ga 3/8" thick s through the with a 14-g	ontainer i)6" long. uge steel steel plate center o auge dru	The in drum es, spa of the p m lid v	1-gauge steel be nner container is by an insertable aced approximat plates by angle is with 12-gauge b ng a 5/8" diamet	s supported in cage formed ely 12" apart, rons. The out olt locking rin	a 22-1/2" ID by nine 21-1 with a chani ter container	by 102-1/2" /2" diameter b nel formed closure is made	
	(3)	The inner of 7" wide x 9 long, 14-ga 3/8" thick s through the with a 14-g	ontainer i)6" long. uge steel steel plate center o auge dru	The in drum es, spa of the p m lid v	nner container is by an insertable aced approximat plates by angle is with 12-gauge b	s supported in cage formed ely 12" apart, rons. The out olt locking rin	a 22-1/2" ID by nine 21-1 with a chani ter container	by 102-1/2" /2" diameter b nel formed closure is made	
	(3)	The inner of 7" wide x 9 long, 14-ga 3/8" thick s through the with a 14-g of which is Drawing The packag	ontainer i)6" long. uge steel steel plate center o auge dru threaded ing is cor	The in drum es, spa of the p m lid v l, havir	nner container is by an insertable aced approximat plates by angle is with 12-gauge b	s supported in cage formed ely 12" apart, rons. The out olt locking rin ter bolt.	a 22-1/2" ID by nine 21-1 , with a chan ter container g with drop fo	by 102-1/2" /2" diameter b nel formed closure is made orged lugs, one	
(b)	(3) Conter	The inner of 7" wide x 9 long, 14-ga 3/8" thick s through the with a 14-g of which is Drawing The packag Drawing No	ontainer i)6" long. uge steel steel plate center o auge dru threaded ing is cor	The in drum es, spa of the p m lid v l, havir	nner container is by an insertable aced approximat blates by angle is with 12-gauge b ng a 5/8" diament ted in accordance	s supported in cage formed ely 12" apart, rons. The out olt locking rin ter bolt.	a 22-1/2" ID by nine 21-1 , with a chan ter container g with drop fo	by 102-1/2" /2" diameter b nel formed closure is made orged lugs, one	
(b)		The inner of 7" wide x 9 long, 14-ga 3/8" thick s through the with a 14-g of which is Drawing The packag Drawing No	ontainer i 96" long. uge steel steel plate center o auge dru threaded ing is cor 9. B-2600	The in drum es, spa of the p m lid v , havin havin	nner container is by an insertable aced approximat blates by angle is with 12-gauge b ng a 5/8" diament ted in accordance	s supported in cage formed ely 12" apart, rons. The out olt locking rin ter bolt.	a 22-1/2" ID by nine 21-1 , with a chan ter container g with drop fo	by 102-1/2" /2" diameter b nel formed closure is made orged lugs, one	
(b)	Conter	The inner of 7" wide x 9 long, 14-ga 3/8" thick s through the with a 14-g of which is Drawing The packag Drawing No nts Type and fo	ontainer i 96" long. uge steel steel plate center o auge dru threaded ing is cor 5. B-2600 orm of ma	The in drum es, spa of the p m lid v havin hatruct 0-2, Sh aterial n-zirco	nner container is by an insertable aced approximat plates by angle is with 12-gauge b ng a 5/8" diamet ted in accordance eets 1 through of onium, Naval fue	s supported in e cage formed ely 12" apart, rons. The out olt locking rin ter bolt. e with Thoma 6, Rev. 3.	a 22-1/2" ID by nine 21-1 , with a chan ter container g with drop fo as Gutman Co	by 102-1/2" /2" diameter by nel formed closure is made orged lugs, one	
(b)	Conter	The inner of 7" wide x 9 long, 14-ga 3/8" thick s through the with a 14-g of which is Drawing The packag Drawing No nts Type and fo Unirradiated	ontainer i 96" long. uge steel steel plate center o auge dru threaded ing is cor 5. B-2600 orm of ma	The in drum es, spa of the p m lid v havin hatruct 0-2, Sh aterial n-zirco	nner container is by an insertable aced approximat plates by angle is with 12-gauge b ng a 5/8" diamet ted in accordance eets 1 through of onium, Naval fue	s supported in e cage formed ely 12" apart, rons. The out olt locking rin ter bolt. e with Thoma 6, Rev. 3.	a 22-1/2" ID by nine 21-1 , with a chan ter container g with drop fo as Gutman Co	by 102-1/2" /2" diameter by nel formed closure is made orged lugs, one	

	/ 618A		ificate No. !		CON	DITIONS (co	ontinued)		U.S. NI			Y COMMISSION	
		(2)	Maximum	quantit	y of mate	erial per	packa	age					
5 7 8			Up to 8.9 weight of t contents s	U-235	plus zirco	nium sh	all no	-			-	235 to the of the	
5	5.(c)	Transp	oort Index fo	or Criti	cality Cor	ntrol							
			um transpo or nuclear c					1.4					
6	5.	In addi	ition to the	require	ments of	Subpart	t G of	10 CFR P	art 71:				
		(a)	The packa Chapter 7	-			shipn	nent and o	perate	d in acc	ordance	with	
		(b)	The packa 8 of the ap	-		ptance	testec	d and main	tained	in accoi	dance w	ith Chapter	
7	7.	•	ackage auth provisions				e is he	ereby appro	oved fo	r use ur	nder the g	general	
8	3.	Expirat	tion date:	January	, 31, 200	94.							1
				an the second se		REFE	RENC	<u>ES</u>					
E E	Babco	ck and	Wilcox app	lication	dated N	ovember	- 29 , 1	1993.	14 14				
5	Supple	ements	Dated: Sep	tember	19, 199	4; Janua	ary 5,	1995; and	d Dece	mber 21	, 1998.		1
						FOR T	'HE U	.S. NUCLE	AR RE	GULATO	DRY COM	MISSION	
						Par	u k	? Chapy	rel				
						Cass I	R. Cha	appell, Chi	ef	_			
						Spent	Fuel	rtification Project Off uclear Mat	ice				
							Safeg			arety			
	Date:	annor	29, 1999	7									
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						1.6							
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5-2000) 0 CFR							E OF COMP			
							E MATERIAL			. TOTAL NUMBER PAGES
•	s. CERT	IFICATE N			► REVISION N		C. PACKAGE IDENT	149/B()F	d. PAGE NUMBER	2
	PREA		5149		1 10	/	03403	149/D()r	 •	<u>_</u>
	ь Т	his certif	icate is issue le 10, Code o	d to certify t f Federal R	hat the package egulations, Part) (packagir 71, "Pack	ng and contents) de Laging and Transpor	scribed in Item 5 b tation of Radioacti	elow meets the applic ve Materiel."	cable safety standards set
	b. Ti ot	his certif her appl	icate does no icable regulat	t relieve the ory agencie:	consignor from s, including the	compliane governme	ce with any requiren Int of any country thr	ent of the regulati ough or into which	ons of the U.S. Depar the package will be t	rtment of Transportation or ransported.
	THIS C	ERTIFI	CATE IS ISS	UED ON TI	HE BASIS OF	ASAFETY			KAGE DESIGN OR A	
	a. IS	SUED 1	10 (Name an	d Address)			b. TITLE AND	IDENTIFICATIO	N OF REPORT OR A	APPLICATION
	P	.O. B	echnolog ox 785 ourg, VA						Company app 9, as suppler	lication dated nented.
									71-5149	
	00115	TIONS							/ 1*J 143	
		ITIONS rtificate	is conditional	upon fulfilli	ng the requirer	ents of 10	CFR Part 71, as ap	plicable, and the c	onditions specified b	alow.
	(8	a) Pa	ckaging				•	- AS	>.	
			(1) (2)	(1) (1)	No.: 814	+A			Den en e	
			(-)	Steel		as des et 20,	scribed in Ba 1979.	beock & Wi	lcox Company	's application
		(b)	Conte							
			(1)	1 alice	and form of the state of the st					
			(2)	Maxin	num quant	tity of r	naterial per p	ackage		
									d poison fixtur ated Septemb	e as specified er 20, 1979.
		(c)	Trans	sport In	dex for Cri	iticality	Control			
					nsport ind lear critica		e shown on ntrol:		25.0	
4	6.				rized by th of 10 CFR			eby approve	ed for use unc	ler the general
	7.	Use	e of pack	aging fa	abricated a	after A	ugust 31, 19	36, is not au	ithorized.	

.



NRC FO (3-96) 10 CFR 71	RM 618			CATE OF CON	IPLIANCE	. NUCLEAR REGUL	ATORY COMMISSION
1. a. CERT	1FICATE 1 5580		b. REVISION NUMBE		TIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAG
Co b. Thi	iis certific de of Fed is certifica	ate is issued to certify that the eral Regulations, Part 71, "Pa the does not relieve the consig gulatory agencies, including t	ckaging and Transportat nor from compliance wi	ion of Radioactive Mathematics Mathematics (Mathematics) is the second sec	the regulations of the U.	S. Department of Trans	
		E IS ISSUED ON THE BASIS C ame and Address)			AGE DESIGN OR APPLIC TION OF REPORT OR APP		· · · · · · · · · · · · · · · · · · ·
	Divi	Department of En sion of Naval Re ington, DC 20585	actors		Analysis Repo ng container d nded.		
			c. DC	CKET NUMBER	71-5580		<u></u>
L CONDI This ce		s conditional upon fulfilling t	he requirements of 10 C	FR Part 71, as applica	ble, and the conditions sp	pecified below.	
5.					· · · ·		
(a)	Pack	aging					
	(1)	Model No.: S5W	Power Unit				
	(2)	Description					
		the inner frame shipping contai Two trunnions w the lower end o container can b vertical (loadi turn in trunnio and shipping co 80 elastic shoc outer frame.	ner is bolted elded to the f the contain e rotated fro ng-unloading) n bases which ntainer are s	to the inno middle sect er and also m the horizo attitude in are bolted upported by	er frame in a ion of the shi provide the m ontal (shippin o the inner fr to the inner the outer fra	horizontal p pping contai eans whereby g) attitude ame. The tr frame. The me and pedes	osition. ner support the to the unnions inner frame tal through
		Approximate dim shipping contai inches width by inches width by loaded PUSC is	ner: 95 inch 52 inches he 56 inches he	es diameter ight by 269 ight by 236	by 234 inches inches length	; Inner Fram ; Outer Fram	e: 109
	(3)	Drawings					eight of the
		-					eight of the
		The packaging i Corporation Dra			s. nce with Westi		eight of the
					s. nce with Westi		eight of the

NRC FORM 618	A	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
(3-96)		Devicion No. 7 Dockot	t No. 71-5580
Page 2 – U	ertificate No. 5580	- Revision No. 7 - Docket	
J. (b)	Contents		
	(1) Type and form o	f material	
	Unirradiated fu installed and s	el in the form of S3G Con ecured in place by holdd	re 3 power units with control rods own mechanisms.
	(2) Maximum quantit	y of material per package	e
	One fuel assemb	ly.	
(c)	Transport Index for	Criticality Control	
	Minimum transport in label for nuclear cr	dex to be shown on iticality control:	100
6. Expir	ration Date: Decembe	r 31, 2002.	
		REFERENCE	
Safety Ana August 9,	alysis Report for S5W 1968; Addendum to WA	Power Unit Shipping Con PD-OP(R)SA-820 dated Sep	tainer, WAPD-OP(R)SA-820 dated tember 28, 1987.
Naval Read [G#97-035]	ctors Supplements dat	ed: March 2, 1992 (G#92	-03388) and June 11, 1997
<u>_</u> u#97−0351			UCLEAR REGULATORY COMMISSION
		승규는 것 같은 것 같은 것 같은 것 같은 것 같아요. 가지 않는 것 않는 것 같아요. 가지 않는 것 않는 것 같아요. 가지 않는 것 않는	
		Cass R. C Cass R. Chappe	happell 11 Chief
		Package Lertit	TCATION SECLION
		Spent Fuel Pro Office of Nucl	ject Office ear Material Safety
		and Safeguar	
	1007		
Date: <u>J</u>	uly 11, 1997		
		20	

ATE NUMBER		b. REVISION N			S PACKAGES			
			UMBER	c. PACKAGE IDENTIF		d. PAGE	NUMBER	e. TOTAL NUMBER
		11		USA/5607	7/B()F	1		3
f Federal Reg	ued to certify that the p ulations, Part 71, "Pack not relieve the consigno	aging and Trans	sportation	of Radioactive Mater	ial."			
ole regulatory	agencies, including the	e government of	any count	ry through or into wh	ich the package wi	ll be transporte	d.	
TO (Name and A	Address)	A SAFETY ANAL	b. TITLE	AND IDENTIFICATIO	N OF REPORT OR A	PPLICATION:		
			Rep	ort, Draft: A	oril 1980,	^r Analysis		
			c. DOCKI	ET NUMBER 71-	5607			
S cate is condition	onal upon fulfilling the	requirements of	f 10 CFR F	Part 71, as applicable	, and the conditions	specified belo	w.	
Packagir	ng							
-	- -							
(2) D	escription							
St Ca T in ca ei W 1	teel cask, remo he cask is a do enter portion. he lead shieldin aches at each 3 ask. Cask clos nclosed in the velded to a 4-fo 8,400 pounds.	ovable con puble-walke The centrong is 8.0 in 36-inch en sure is acc shipping c pot by 6-fc	tainme ed stee al cavin nches n d secti complis ase wh	ant vessel ins of circular cylin ty is 6.065 in thick along a ion. The cont shed by a gas hich is 36 inc	ert and shipp nder with thi ches in diam 45-inch cen tainment ves keted and bo hes in diame	bing case. ickened sineter by 1 ter section sel is pos olted stee ster by 13	hielding 00 incl n reduc itioned I plug. 3 inche	g in the hes long. ced to 4.2 l within the The cask is es long
(3) D	rawings							
(i)	W71653 180194,	9, Rev. 0; Rev. 0; 1	18019 80197	91, Rev. 1; 18 ', Rev. 0; W7'	30192, Rev.	0; 18019)3, Rev	. 1;
(ii	919D75 0; or it is	5, Rev. 0; construct	135C5 ted in a	5202, Rev.0; [•] accordance w	153F966, Re ith DuPont I	ev. 0; and Drawing N	106D: los.: V	3721, Rev. V239534,
As provic	led in the Apri	12, 1983	3, supp					
	As provid	Packaging (1) Model No.: T-2 (2) Description Packaging for ir steel cask, remo The cask is a do center portion. The lead shieldin inches at each 3 cask. Cask clos enclosed in the welded to a 4-fo 18,400 pounds. (3) Drawings (i) The ship W71653 180194, 180196, (ii) The cask 919D755 O; or it is Rev. 2 [*] ;	 (Name and Address) epartment of Energy ington, DC 20585 atte is conditional upon fulfilling the requirements of Packaging (1) Model No.: T-2 (2) Description Packaging for irradiated resteel cask, removable con The cask is a double-walke center portion. The centres of the cask is a double-walke center portion. The centres of the cask. Cask closure is acces and cask. Cask closure and cask. Cask closure and cask. Cask closure and cask. Cask closu	(Name and Address) b. TTLE epartment of Energy T-2 hgton, DC 20585 Rep as s atte is conditional upon fulfilling the requirements of 10 CFR I Packaging (1) Model No.: T-2 (2) Description Packaging for irradiated reactor steel cask, removable containmed The cask is a double-walled steel center portion. The central cavi The lead shielding is 8.0 inches inches at each 36-inch end sect cask. Cask closure is accomplise enclosed in the shipping case is cons W716539, Rev. 0; 180197 180194, Rev. 0; 180197 180195, Rev. 0; 135CE 0; or it is constructed in 919D755, Rev. 0; 135CE 0; or it is constructed in 719D755, Rev. 15 As provided in the April 12, 1983, supp	 (1) Model No.: T-2 (2) Description Packaging for irradiated reactor fuel and composed in the shipping case is constructed in accordance y190755, Rev. 0; 135C5202, Rev. 0; 0; or it is constructed in accordance w190755, Rev. 0; 135C5202, Rev. 0; 0; or it is constructed in accordance w190755, Rev. 0; 135C5202, Rev. 0; 0; or it is constructed in accordance w190755, Rev. 0; 135C5202, Rev. 0; b. TITLE AND IDENTIFICATION To Packaging Packaging (1) Model No.: T-2 (2) Description Packaging for irradiated reactor fuel and composed in the shipping case is constructed in accordance w190755, Rev. 0; 135C5202, Rev. 0; (i) The cask is constructed in accordance w190755, Rev. 0; 135C5202, Rev. 0; 	10 Water and Address) epartment of Energy igton, DC 20585 12 Shipping Package, Safety Report, Draft: April 1980, as supplemented.	appartment of Energy ington, DC 20585 T-2 Shipping Package, Safety Analysis Report, Draft: April 1980, as supplemented. c. DOCKET NUMBER 7I-5607 ate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified belo Packaging 10 Model No.: T-2 (2) Description Packaging for irradiated reactor fuel and components consisting of steel cask, removable containment vessel insert and shipping case. The cask is a double-walled steel circular cylinder with thickened si center portion. The central cavity is 6.065 inches in diameter by 11 The lead shielding is 8.0 inches thick along a 45-inch center sectio inches at each 36-inch end section. The containment vessel is pos cask. Cask closure is accomplished by a gasketed and bolted stee enclosed in the shipping case which is 36 inches in diameter by 13 welded to a 4-foot by 6-foot steel pallet. The maximum weight of 18,400 pounds. (3) Drawings (i) The cask is constructed in accordance with DuPom W716539, Rev. 0; 180197, Rev. 0; W716538, Rev. 0; 18019 180196, Rev. 0; and 180089, Rev. 0. (ii) The cask is constructed in accordance with General Electric 919D755, Rev. 0; 135C5202, Rev. 0; 153F966, Rev. 0; and 147216, F As provided in the April 12, 1983, supplement 21	00.70mm and Address. epartment of Energy gigton, DC 20585 Image: State is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below. Packaging (1) Model No.: T-2 (2) Description Packaging for irradiated reactor fuel and components consisting of a lead steel cask, removable containment vessel insert and shipping case. The cask is a double-walled steel circular cylinder with thickened shielding center portion. The central cavity is 6.065 inches in diameter by 100 incl The lead shielding is 8.0 inches thick along a 45-inch center section reduce inches at each 36-inch end section. The containment vessel is positioned cask. Cask closure is accomplished by a gasketed and bolted steel polited. Cask is 00 pounds. (3) Drawings (i) The shipping case is constructed in accordance with DuPont Draw W716539, Rev. 0; 180191, Rev. 0; W716538, Rev. 0; 180195, Rev. 0; 180195, Rev. 0; 130196, Rev. 0; 130195, Rev. 0; W716538, Rev. 0; 130195, Rev. 0; W716538, Rev. 0; and 106D1 0; or it is constructed in accordance with DuPont Drawing Nos.: V Rev. 2'; 147214, Rev. 15; 147215, Rev. 2*; and 147216, Rev. 1.

-96)	/ 618A		CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
P	Page 2 -	Certificate No. 56	607 - Revision No. 11 - Docket	No. 71-5607
5.(a) ((3) Dra	wings (Continued)		
-	<i>(</i> :::)	The ANI incort in	constructed in accordance wit	th Argonne National Laboratory
	(11)	Drawing Nos.: W	/0147-0227-DD, Rev 7; W0143	7-0228-DD, Rev. 6; W0147-0229-DC, DC, Rev. 4; and W0147-0312-DE,
(b)	Conte	nts		
	(1)	Type and form of	material	
		uranium, p insert. Th	olutonium, or mixed uranium-plu	etal, oxides, nitrides, and carbides of utonium contained within the ANL quantities of Na or NaK. The minimum ays.
		contained megawatt	within the ANL insert. Averag	de enriched to up to 3.0 w/o in U-235 le exposure of fuel not to exceed 18 uel may contain small quantities of Na t be no less than 90 days.
	(iii)	Irradiated reactor W0147-0234-DC		ontainer shown in Drawing No.
	(2)	Maximum quantit	ty of material per package.	
		Internal decay he	at not to exceed 208 watts, ar	nd
		(i) For the ma	aterial described in 5(b)(1)(i), fi	ssile material not to exceed 1.71 kg.
		(ii) For the ma 300 grams		ssile material (U-235) not to exceed
(c)	Trans	port Index for Criti	cality Control	
			described in 5(b)(l)(i) d limited in 5(b)(2)(i)	
		Minimum transpo label for nuclear	ort index to be shown on criticality control:	0.4
			22	

NRC FORM 618A (3-96)

CONDITIONS (continued)

Page 3 - Certificate No. 5607 - Revision No. 11 - Docket No. 71-5607

- 6. The contents must be shipped dry. When loaded underwater, the package must be dried using Consumer Power Company's procedure, "T-2 Cask Liner Assembly Drying Procedure," Proc. No. EE&T-C12, Rev. 1, 11/12/81.
- 7. The ANL Insert must be leak tested prior to first use and annually thereafter in accordance with the procedures specified in Argonne National Laboratories Document No. W0195-0054-ES-00.
- 8. Prior to each shipment, the package must be leak tested in accordance with procedures specified in Appendix A to HFEF/N OMM 6202, Rev. 2, March 17, 1981.
- 9. In addition to the requirements of Subpart G of 10 CFR Part 71 and the other conditions of this certificate:
 - (a) The package shall be operated and prepared for shipment in accordance with the Operating Procedures in Chapter 7 of the application, as supplemented; and
 - (b) The package must be maintained in accordance with the Maintenance Program of Chapter 8 of the application, as supplemented.
- 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: May 31, 2003.

REFERENCES

DuPont Safety Analysis Report, Draft April 1980.

Department of Energy supplements dated: February 11, April 8 and 20, 1982; April 12, 1983; February 26, 1992; February 3, 1993; and April 22 and June 4, 1998.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cars R. Chappell

Cass R. Chappell, Chief Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: July 24, 1998

NRC FORM 618 (3-96) 10 CFR 71			U.S ATE OF COMPLIANCE TIVE MATERIALS PACKAGES	. NUCLEAR REGUL	ATORY COMMISSION		
1. a. CERTIFICATE N 5740		b. REVISION NUMBER	c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAGES 3		
2. PREAMBLE a. This certific: Code of Fed b. This certifica applicable re	eral Regulations, Part 71, "Pack ate does not relieve the consigno	aging and Transportation r from compliance with	described in Item 5 below, meets the applicable on of Radioactive Material." h any requirement of the regulations of the U, untry through or into which the package will I	S. Department of Tran			
3. THIS CERTIFICAT a. ISSUED TO (N		b. ТТТ	EPORT OF THE PACKAGE DESIGN OR APPLIC ILE AND IDENTIFICATION OF REPORT OR APP	LICATION:			
U.S. De Washing	partment of Energ ton, DC 20585	t S R	afety Analysis Report for he Oak Ridge National Lak hipping Container, August eport No. ORNL-5409/R1, a 71-5740	ooratory TRU : 7, 1981, Re	Californium ev. of		
4. CONDITIONS This certificate i	s conditional upon fulfilling the	I	TR Part 71, as applicable, and the conditions s	pecified below.			
5. (a) Pack	aging						
(1)	Model No.: ORNL	TRU Califor	nium Shipping Container				
(2)	Description						
NRC FORM 618 (3-96) 10 CFR 71 1. a. CERTIFICATE N 5740 2. PREAMBLE a. This certific: Code of Fed b. This certificat a. ISSUED TO (N U.S. De Washing 4. CONDITIONS This certificate i 5. (a) Pack (1) (2)	A 304L stainless steel encased concrete shipping cask. The outer shell consists of two, 1/2-inch thick, 66-inch diameter hemispherical heads joined by a 6-inch cylindrical section. The cylindrical cavity has a 1-inch thick stainless steel wall and is 3 inches in diameter x 6 inches lon Shielding consists of 30 inches of Blackburn Limonite concrete having a density of approximately 175 lb/ft3. Upper and lower level ball valves located at the end of concrete filled plugs define, isolate, and seal the cavity. Both of these plugs have 0-ring seals, are bolted in place and are protected with a gasketed cover plate. Fusible plugs are located in the cover plates and the shell.						
	The top ball val shipments. Sour	ve and plug ces are cont	plugs for m ner containe	ultiple source rs.			
	inch NPS Schedul	e 40 pipe st	-inch thick steel base p ruts. The cask is trans weight is 23,500 pounds.	late by eigh ported on a	t steel 2-1/2 special		
			24				
X	10 () 1 ()	<u>, 286, 286, 286, 286, 286, 286</u>	24	<u>, 745, 745, 745, 745, 745, 74</u>	ער אות את את אות אות אות אות אות אות אות א		

VRC F(3-96)	ORM 618	A	CONDITIO	NS (continued)	U.S. NUCLEAR REGULATORY COMMISSI
Pag	e 2 -	Certificate No). 5740 - Revision No	o. 5 – Docke	t No. 71-5740
_		- ·			
5.	(a)(3)	Drawing			
			nd special trailer a pratory (ORNL) Drawin		ted in accordance with Oak Ridge
		M-11230-EN-00		Ig NOS.:	
		M-11230-EN-00 M-11230-EN-00			
		M-11230-EN-00			
		M-11230-EN-00 M-11230-EN-00			
		M-11230-EN-00			
		M-11230-EN-00 M-11230-EN-01			
		M-11230-EN-01	4-E Rev. 3		
		M-11230-EN-01 M-11230-EN-01			
				ion of ORNL	-5409/R1, as supplemented.)
	(b)	Contents			
		(1) Type and	form of material		
					ricium (Am), Curium (Cm), einium (Es), and Fermium (Fm) as
		a solid	(metal, oxide, oxysu	ilfate, or di	ry salt), contained in capsule(s) orm radioactive material.
			quantity of material		
		For the	contents described i	n 5(b)(1):	
		Three (3) grams and the maxi	mum interna ^v	l heat not to exceed 5 watts.
6.	The inne	contents descr r container as	ibed in 5(b)(l) must described in sectio	be shipped n 5.2.1 of 1	in a seal welded special form the application.
7.	In a	ddition to the	requirements of Sub	part G of 1(D CFR Part 71:
	(i)	Each packagin May 10, 1991;		in accordar	nce with the supplement dated
	(ii)		ust be prepared for ted May 10, 1991.	shipment and	d operated in accordance with the
8.	A mi	nimum of two l	ifting ribs shall be	used to lif	ft the package.
9.	The gene	package author ral license pr	ized by this certifi ovisions of 10 CFR §	cate is here 71.12.	eby approved for use under
10.	Expi	ration date:	July 31, 2001.		
				25	
$\mathcal{Q}\mathcal{Q}$	24242				

NRC FORM 618A (3-96)

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 3 - Certificate No. 5740 - Revision No. 5 - 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; June 4, 1992; and May 13, 1996.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Vra an

William D. Travers, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: 7/15/96

10 CFR 71			CERTIFIC FOR RADIOA	CATE OF COMPLIANCE	S. NUCLEAR REGULA	IURY COMMISS				
1. a. CERTI	FICATE NUN	ABER	b. REVISION NUMBE	R c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER e.	TOTAL NUMBER F				
5757	7		7	USA/5757/B()F	- 1	2				
2. PREAMB										
b. This	certificate o	ate is issued to certify that the packaging and contents described in Item 5 below, meets the applicable safety standards set forth in Title 10. eral Regulations, Part 71, "Packaging and Transportation of Radioactive Material." the does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other								
3. THIS CER		SISSUED ON THE BASIS OF	A SAFETY ANALYSIS I	buntry through or into which the package will REPORT OF THE PACKAGE DESIGN OR APPL ILE AND IDENTIFICATION OF REPORT OR A	ICATION					
U.S. Department of Energy				Safety Analysis Report for S5W						
		aval Reactors		Refueling Source shipping container						
vvasi	nington,	DC 20585		lated February 14, 1968, as su	pplemented					
4. CONDITIC			c. DO	CKET NUMBER 71-5757						
This cert		nditional upon fulfilling the	requirements of 10 CI	R Part 71, as applicable, and the conditions	specified below.					
5. (a)	Pack	aaina								
(a)	Fack	aging								
	(1)	Model No.: S5V	Refueling Sou	Irce						
		Description of								
	(2)	Description								
		assembly consis	ts of a 6-1/2 inc	ntainer, fits into the cavity of th th OD, 79-5/8 inches long stail and stainless steel forging. Th	nless central tube.	which is				
		the bottom end p thick, encircles the gamma radiation	lug to contain t ne central tube . A wall of poly	he neutron source assemblies and this innermost layer of shi rethylene, 8-1/2 inches thick, s rbon steel plate. Gross weigh	A jacket of lead, elding to attenuate urrounds the lead s	6 inches the shield and				
	(3)	the bottom end p thick, encircles the gamma radiation is canned with a	lug to contain t ne central tube . A wall of poly	he neutron source assemblies and this innermost layer of shi rethylene, 8-1/2 inches thick, s	A jacket of lead, elding to attenuate urrounds the lead s	6 inches the shield and				
	(3)	the bottom end p thick, encircles th gamma radiation is canned with a pounds. Drawings The packaging is	lug to contain t ne central tube . A wall of poly 1/2-inch thick ca	he neutron source assemblies and this innermost layer of shi rethylene, 8-1/2 inches thick, s	A jacket of lead, elding to attenuate urrounds the lead s t is approximately f	6 inches the shield and 19,000				
	(3)	the bottom end p thick, encircles th gamma radiation is canned with a pounds. Drawings The packaging is	lug to contain t ne central tube . A wall of poly 1/2-inch thick ca	he neutron source assemblies and this innermost layer of shi rethylene, 8-1/2 inches thick, s rbon steel plate. Gross weigh accordance with Westinghou	A jacket of lead, elding to attenuate urrounds the lead s t is approximately f	6 inches the shield and 19,000				
	(3)	the bottom end p thick, encircles th gamma radiation is canned with a pounds. Drawings The packaging is	lug to contain t ne central tube . A wall of poly 1/2-inch thick ca	he neutron source assemblies and this innermost layer of shi rethylene, 8-1/2 inches thick, s rbon steel plate. Gross weigh accordance with Westinghou	A jacket of lead, elding to attenuate urrounds the lead s t is approximately f	6 inches the shield and 19,000				
	(3)	the bottom end p thick, encircles th gamma radiation is canned with a pounds. Drawings The packaging is	lug to contain t ne central tube . A wall of poly 1/2-inch thick ca	he neutron source assemblies and this innermost layer of shi rethylene, 8-1/2 inches thick, s rbon steel plate. Gross weigh accordance with Westinghou	A jacket of lead, elding to attenuate urrounds the lead s t is approximately f	6 inches the shield and 19,000				
	(3)	the bottom end p thick, encircles th gamma radiation is canned with a pounds. Drawings The packaging is	lug to contain t ne central tube . A wall of poly 1/2-inch thick ca	he neutron source assemblies and this innermost layer of shi rethylene, 8-1/2 inches thick, s rbon steel plate. Gross weigh accordance with Westinghou	A jacket of lead, elding to attenuate urrounds the lead s t is approximately f	6 inches the shield and 19,000				
	(3)	the bottom end p thick, encircles th gamma radiation is canned with a pounds. Drawings The packaging is	lug to contain t ne central tube . A wall of poly 1/2-inch thick ca	he neutron source assemblies and this innermost layer of shi rethylene, 8-1/2 inches thick, s rbon steel plate. Gross weigh accordance with Westinghou	A jacket of lead, elding to attenuate urrounds the lead s t is approximately f	6 inches the shield and 19,000				

	$\Delta \Delta \Delta \Delta$		576576			O(O)O(O)			
	NRC FOR! (3-96)	M 618A			CONDITIONS (continued)		U.S. NUCLEAR REGULATORY COMMISSION		
	F	age 2	- Certific	ate No. 5757 - Re	o. 71-5757				
ALLAN	5.(b)) Contents							
(1) Type and form of material									
			(i)	Radium-Berylliu may be either ne previous use.	ive material e surface c	neutron source. These sources ontamination as a result of	T VER VER VER VER		
			(ii)	Plutonium 238- sources may be of previous use.	either new or irradiated	idioactive m and have s	naterial neutron source. These surface contamination as a result		
		(2)	Maxin	num quantity of m	aterial per package			1 1 1 1	
AUXURURURURURURURURURURURURURURURURURURU			(i) One, two, or three neutron sources as described in $5(b)(1)(l)$ 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 3.8×10^7 n/sec. These sources are limited to a combined surface contamination of not more than an A ₂ quantity of radioactive material.						
VININI			(ii)	content of not m These sources	nore than 925 curies and	I total emiss	5(b)(1)(ii) and limited to a total sion rate of 1.48 x 10 ⁹ n/sec. ontamination of not more than an		
(c)Transport Index for Criticality ControlMinimum transport index to be shown on label for nuclear criticality control:11.2									
								면	
	10.	Expi	ration da	te: March 31, 200	03.				
					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. Naval Reactors letter G#92-03738, dated October 15, 1992; and G#C97-03621 dated October 17, 1997.								
							REGULATORY COMMISSION		
KIK					Cars R. 2	Chappe	ll		
					Cass R. Chappe	ell, Chief			
	Package Certification Section Spent Fuel Project Office								
					Office of Nuclear and Safeguards		afety		
	Date	31 N	<u>14</u> R 98			-			
					28			_	
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NRC FORM 611 (3-96) 10 CFR 71	}		CATE OF COMPLIANCE	U.S. NUCLEAR REGU	LATORY COMMISSI
I. a. CERTIFICATE		b. REVISION NUMBE	ER c. PACKAGE IDENTIFICATION NUMBE		e. TOTAL NUMBER P
Code of Fe b. This certifi	deral Regulations. Part 71. "Pa cate does not relieve the consig	ckaging and Transporta nor from compliance w	ith any requirement of the regulations of th	e U.S. Department of Tran	
			country through or into which the package v REPORT OF THE PACKAGE DESIGN OR API	-	
Advanced	Name and Address) Medical Systems a Eagle Street	b. TI	TTLE AND IDENTIFICATION OF REPORT OR Advanced Medical Syst dated June 3, 1997, a	application: ems, Inc. appl	ication
		c. D	OCKET NUMBER 71-5796		
CONDITIONS This certificate	is conditional upon fulfilling the	he requirements of 10 C	CFR Part 71, as applicable, and the condition	ns specified below.	
				·	
	aging	1075 d 1017			
(1)	Model Nos.: 18	1375 and 1813	301		
(2)	Description		ct and thermal protectio		
	inches. Skid ru of the Model No weight of 3,750	unners are pr . 181375 are pounds. Dim	t the openings between t rovided to facilitate fo 43.5"L x 39.75"W x 41"H mensions of the Model No imum gross weight of 4,0	rk lift usage. with a maximu . 181361 are 3	Dimensions m gross
(3)	Drawing				
	Medical Sys D16479; D16 pages); D18	stems, Inc. D 6568; C16580E 81375N; D1847	Ackaging is constructed Drawing Nos.: E590G; D16 E; B46411; A46686A; E637 705; D184713; D200016G; D0079C; C200742-1 THRU 5	423A; D16423B; 90F; D181368G; D200043; D2000	D16424D; D181369E (2 73F;
	Medical Sys C55103-B; (stems, Inc. D C55105-B; D13	ackaging is constructed Drawing Nos.: D-T60-478- B706A-D (2 pages); D-181 Dd D-200017-A.	B; C50104-B; D	55100-A;
		·			
			29		

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NRC FOI (3-96)	RM 618	A		cc	ONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
Page	2 -	Certi	ficat	e No. 5796 - Revisi	on No. 14 - Do	ocket No. 71-5796
5.	(b)	Cont	ents			
		(1)	Туре	and form of materi	al	
			(1)	Cobalt 60 sealed s form radioactive m		eet the requirements of special
			(ii)	Cesium 137 in the sources that meet material.	form of cesiun the requirement	m chloride encapsulated in sealed nts of special form radioactive
		(2)	Maxi	mum quantity of mat	erial per pac	kage
			(I)	13,680 curies of to exceed 200 wat		h a radioactive decay heat load not
			(ii)	2,200 curies of c to exceed 17 watt		h a radioactive decay heat load not
6.	In a	dditi	ion to	the requirements o	f Subpart G o	f 10 CFR Part 71:
	(a)	The the	packa Opera	ges must be operate ting Procedures of	d and prepare Chapter 7 of	d for shipment in accordance with the application.
	(b)			aging must meet the of the application		ests and Maintenance program of
7.	Use	of pa	ackagi	ng fabricated after	August 31, 1	986, is not authorized.
8.				uthorized by this c e provisions of 10		e hereby approved for use under the
9.	Expi	iratio	on dat	e: July 31, 2002.		
					REFERENCES	
Adva	nced	Medio	cal Sy	stems, Inc. applica	tion dated Ju	ne 3, 1997.
Supp	lemer	nts da	ated:	July 17, 1997.		
					FOR TH	E U.S. NUCLEAR REGULATORY COMMISSION
					Non	gol good for
					Cass R	. Chappell, Chief
					Spent	e Certification Section Fuel Project Office
						of Nuclear Material ty and Safeguards
Date	:: _	07/31	/97			
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					30	
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NRC FOr M 61 (3-96) 10 CFR 71	8		U.S ATE OF COMPLIANCE TIVE MATERIALS PACKAGES	. NUCLEAR REGUI	ATORY COMMISSIC
1. a. CERTIFICATI	NUMBER 797	b. REVISION NUMBER	c. PACKAGE IDENTIFICATION NUMBER USA/5797/B(U)F	d. PAGE NUMBER	C. TOTAL NUMBER PA
Code of Fe b. This certifi	deral Regulations, Part 71, "Pa cate does not relieve the consig	ckaging and Transportation mor from compliance with	scribed in Item 5 below, meets the applicab of Radioactive Material." any requirement of the regulations of the U. atry through or into which the package will b	S. Department of Trans	
L ISSUED TO	ATE IS ISSUED ON THE BASIS C Name and Address Department of Ene shington, DC 20585	DFA SAFETY ANALYSIS RE Igy b. TITL	PORT OF THE PACKAGE DESIGN OR APPLIC E AND IDENTIFICATION OF REPORT OR APP U.S. Department of Energy application dated May 30, 1 as supplemented. 71-5797	LICATION:	-
		c. DOCI	KET NUMBER		
4. CONDITIONS This certificate	is conditional upon fulfilling t	he requirements of 10 CFR	Part 71, as applicable, and the conditions sp	ecified below.	
s. (a)	Packaging				
(1)			Fuel Element Shipping Cont Fuel Element Shipping Cont		
(2)	Description		a an	press Springer	
	with stacked fir ply thick polyethylene The packaging for inches high, a 10-7 The packaging for	wood rings. The j foam. the inner HFIR fu 7/8-inch diameter l the outer HFIR fu	vith sixteen 3/8-16x1-inch ste olywood rings form a central of el element has overall dimens by 30-1/4-inch deep cavity, ar el element has overall dimens by 31-1/8-inch deep cavity, ar	cavity which is i sions of 25 inch nd a 660 pound sions of 31.5 in	lined with 1-inch nes OD by 45 I gross weight. ches OD x 45.7
(3)	Drawings				
	with Martin N	larietta Energy Sy	FIR fuel is constructed in access stems, Inc., Drawing Nos. d M-20978-EL-008E, Rev. C.		
	with Martin N	larietta Energy Sy	FIR fuel is constructed in acc stems, Inc., Drawing Nos. d M-20978-EL-008E, Rev. C.		

0		7 197	NY 1 1 1 1 1 1	MY MY MY					W W W W	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	(Jac Jac Jac Jac Jac
	NRC FO M 6	18A				CONDITIONS (c	ontinued)	U.S.	NUCLEAR R		OMMISSION
	•	ade	2 - Cer	tificate N	o. 5797 - Rev	vision No. 14-	Docket No. 71	1-5797			
		-9-									
	5.	(b)	Conter	nts							Ĩ
		(1)	Type a	and form (of material						
		(')				net, enriched u	in to 95% in th	he 1-235	5 isotope.	and clad in	aluminum.
			10-	-mils thick	k, and:						
			(i)	"Specific following	ations for Hi Oak Ridge	escribed in 5(a gh Flux Isotop National Labo 42113, Rev. G	e Reactor Fue ratory Drawing	el Eleme g Nos: E	-42118, R	ev. Q;	TM-9220, in the
	•		(ii)	"Specific	ations for Hi Oak Ridge	escribed in 5(a gh Flux Isotop National Labo 42121, Rev. H	e Reactor Fue ratory Drawing	el Eleme g Nos: E	-42126, R	ev. M	TM-9220, in the
		(2)	Maxim	um quan	tity of materia	al per package)				
			(i)	For the i	contents des	cribed in 5(b)(1)(i) not more	than 2.6	63 kg of U	-235.	1
NIN.			(ii)	For the (contents des	cribed in 5(b)(1)(ii) not more	than 6.8	88 kg of U	1-235.	
		(c)	Transp	port Index	for Criticality	y Control			1		
NICE I					oort index to i r criticality co		0.4				
	6.	Dra	e lid lifti awing N nsport.	ng attach Io. M-209	ments must 78-EL-009E	be blocked as , Rev. 2, to pre	shown on Ma event inadverte	artin Mari ent use d	ietta Ener of the atta	gy Systems chments du	, Inc., ring
			•								
K	7.				- -	of Subpart G o					
		(a)		backage s plication;	shall be main	tained in acco	rdance with th	ne Mainti	enance Pr	rogram in C	hapter 8 of
		(b)	Each j Proce	backage s dures in C	shall be oper Chapter 7 of 1	ated and prepared and prepared the application	ared for shipm ; and	nent in a	ccordance	e with the O	perating
		(c)	The fu *Speci	el elemer	nt shall meet for High Flux	the fabrication Isotope Reac	n inspection re tor Fuel Eleme	equireme ents HFI	ents of OR IR-FE-3."	INL/TM-922	0,
	8.	ບ	se of pa	ackaging	fabricated af	iter December	31, 1976, is n	not autho	orized.		
The second											
							32				

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CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 3 - Certificate No. 5797 - Revision No. 14- Docket No. 71-5797

- 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: March 31, 2002.

REFERENCES

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

Supplement dated: February 26, 1992, April 2, 1993, and September 23, 1996, September 2, 1998 and February 24, 2000.

> FOR THE U.S. NUCLEAR REGULATORY COMMISSION

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11997) 1197 - 1197

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: May 12, 2000

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NRC FORM 618 (3-96) 10 CFR 71			U. ATE OF COMPLIANCE FIVE MATERIALS PACKAGES	S. NUCLEAR REGUL	ATORY COMMISSIC
1. a. CERTIFICATE N 5805	UMBER	b. REVISION NUMBER 17	c. PACKAGE IDENTIFICATION NUMBER USA/5805/B()	d. PAGE NUMBER	e. TOTAL NUMBER PA
Code of Fede b. This certifica	ral Regulations, Part 71, "Pac e does not relieve the consign	kaging and Transportation or from compliance with	escribed in Item 5 below, meets the applica n of Radioactive Material." any requirement of the regulations of the I ntry through or into which the package wil	J.S. Department of Trans	
3. THIS CERTIFICAT a. ISSUED TO (M Chem-Nu 140 Ston	E IS ISSUED ON THE BASIS OF me and Address) clear Systems, Inc. eridge Drive	A SAFETY ANALYSIS RE	PORT OF THE PACKAGE DESIGN OR APPLI E AND IDENTIFICATION OF REPORT OR AL Chem-Nuclear Systems, dated February 25, 1994	CATION PPLICATION: Inc. application	
Columbia	, SC 29210	c. DOC	71-5805 Ket number		
4. CONDITIONS This certificate is	conditional upon fulfilling the		Part 71, as applicable, and the conditions	specified below.	
5.					
(a) Pack	aging				
(1)	Model No.: CNS	3-55			
(2)	Description				
	basic cask is a sto maximum cavity o inches by the shie	eel cylinder 133 dimensions of 3 eld ring attached	ead-shielded cask with crus -3/4 inches long by 50-1/2 6 inches in diameter by 11 I to the lid cover. Shielding sure base plate and 5-1/4	inches in diame 6 inches long re 1 is provided by	eter with duced to 111 6 inches of
	plates totaling 2-	5/8 inches on th 2-inch end plate	made up of two, 1/2-inch p e end. The containment ve . The shells are welded to spaces.	essel is a 1/4-ind	ch thick
		-	ssed base plate weldment on inside plate. The space b		
			cask body by means of twe vo silicone O-rings.	lve, 1-1/2-inch	high strength
		ne is sealed by	it line at the closed end and a gasketed and shielded plu		
			34		

NRC FORM 618A (3-96)

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 5805 - Revision No. 17 - Docket No. 71-5805

5.(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, 8-inch 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-0001, 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.

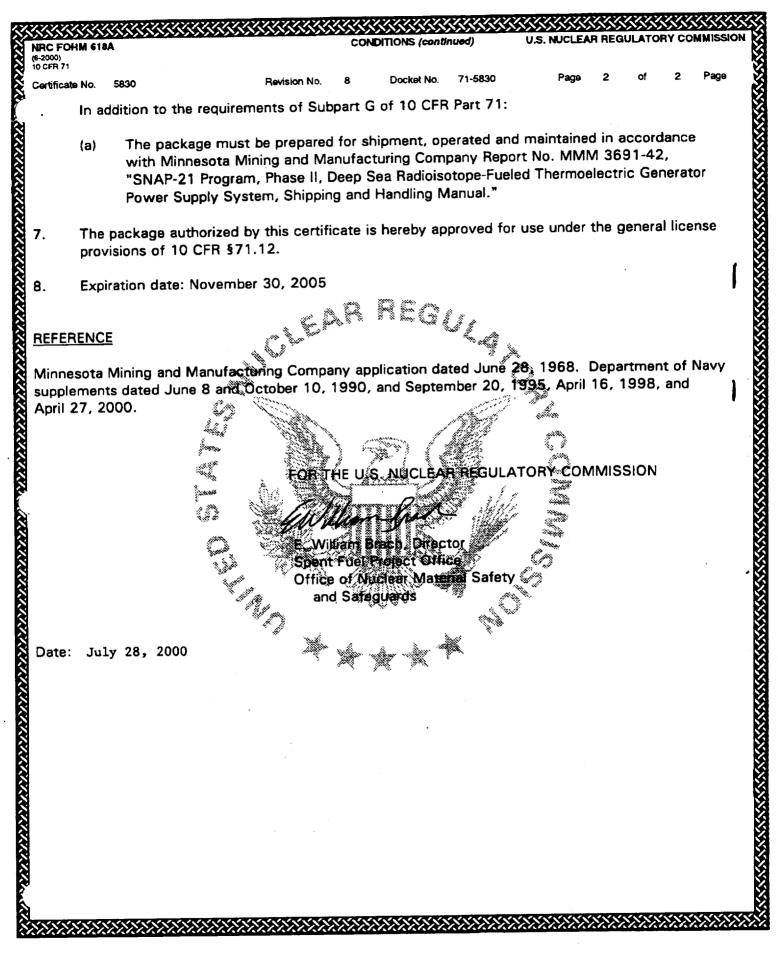
(2) Maximum quantity of material per package

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.

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	NRC FORM 618A (3-96)		CONDITION		U.S. NUCLEAR REGULATORY COMMISSION	
	Page 3 - Certi	ificate No. 5805 - Ri	evision No. 17 - Do	ocket No. 71-5805		
	the seals		with new seals if		vent plug) must be inspected, any defects or every six (6)	
	be leak t addition,	ested. The sensiti the packaging cor	ivity of the test sh ntainment cavity s	all be at least 1 x 1	ickage containment cavity shall 10 ⁻¹ atm-cm ³ /sec (STP). In at least once every twelve (12) n-cm ³ /sec (STP).	
		kage shall be prepa res of Section 7.0			cordance with the Operating	
	10. Each pao the appli		: the Acceptance 1	Tests and Maintena	nce Program of Section 8.0 of	
		ns of 10 CFR §71.			or use under the general license ngs after December 31, 1983 is	
UNINIU	12. Expiratio	on date: March 31				
	Chem-Nuclea	ır Systems, Inc. ap		RENCES bruary 25, 1994.		
	Supplement of	dated: February 16				
				na an a	AR REGULATORY COMMISSION	
				ors R. Chopp		ę Į
			Pac Spe	s R. Chappell, Chie kage Certification s ent Fuel Project Off ice of Nuclear Mate	Section ice	
WAYA	D Marc	h 11, 1999		nd Safeguards		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
	Date <u>Marc</u>					
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1 AC 3-200	C FORM 618		-		ULATORY COMMISSIC
0 CF	FR 71				
			C. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	. TOTAL NUMBER PAGES
1.	CERTIFICATE NUMBER 5830	8	USA/5830/B()	1	2
	PREAMBLE		00.10000.2(7	<u>.</u>	A
	a. This certificate Is issued to ce set forth in Title 10, Code of F	ederal Regulations, Part 71, '	ing and contents) described in Item 5 Packaging and Transportation of Rac	NOSCIVE WAtenes.	
	Transportation or other applic transported.	able regulatory agencies, incl	nce with any requirement of the regul uding the government of any country	through or into whic	n the package will be
3.			ANALYSIS REPORT OF THE PACK	OF REPORT OR A	
	a. ISSUED TO (Name and Addi	8SS)			
	Department of the Na		Minnesota Mining a	nd Manufactur	ring Co.
	Naval Sea Systems C	command	Application dated Ju	une 28, 1968, -	as
	Detachment		supplemented		
3.	Radiological Affairs S	upport Office			
	PO Drawer 0260		den den kal number	71-5830	
	NWS Yorktown, VA 2	3691-0260		/ 1-5050	
4.	CONDITIONS	L KIN	0 CFR Part 71, as applicable, and the	e conditione enertific	ad below.
	i nis centricate is conditional upon	running we requirements of 1	U UI II Fait / 1, as approprie and un		
5.	(a) Packaging	N ⁻			
		<u>_</u>	O	A	
	(1) Model No	SNAP-21		P,	
	Ģ			~	
	(2) Descrip tio			•	
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			$\mathbf{O}$	
	- Ant	hermoelectereneral	o 76 inchester by	30 inches lon	g
	Pa	kaged in circu	tu metal plot the enclosu	ire 32 inches i	n diameter
	-by	68 inches Rouse Main	components the general	tor consist of a	an outer
	(P)	ryicos hoto	and the source of the source o	inermal insula	uon;
	The	modenteriormodules	arpine wer south otal	weight of the	package is
	E.	00 poets			
				ろ	
	(3) Drawings			<b>)</b>	
			cted in accordance with Mir		
			Drawing No. B-SK 401	4 and Drawing	is included
	in :	BM Report Ne_MMM-:	3691-33		
		<b>T</b>	**		
	(b) Contents				
	(1) Type and	orm of material			
		41		a this issue	
			lets doubly encapsulated by		which
			Hastelloy C primary contai		
	. me	ets the requirements	of special form radioactive	material.	
	(2) Maximum	quantity of material pe	er package 33,000 curies.		



NRC FOF (8-2000) 10 CFR 71	RM 618			TE OF COMPI		GULATORY	COMM	ISSIC
1. a. C		IUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAG
		5862	8	71-5862	USA/5862/B( )	1	OF	
a. T			ify that the package (packaging ations, Part 71, "Packaging and		d in Item 5 below meets the applicable cactive Material."	safely standa	rds set l	iorth
8	applicable re	egulatory agencies,	including the government of any	y country through or into	f the regulations of the U.S. Departmen which the package will be transported		tation or	othe
I. THIS	CERTIFIC	ATE IS ISSUED O	N THE BASIS OF A SAFETY /		F THE PACKAGE DESIGN OR APPL			
a I	ISSUED TO	(Name and Addre			DENTIFICATION OF REPORT OR A	PPLICATION		
 	HQ ATA 1030 S. Patrick A DITIONS	Highway A1A NFB, FL 3292	5-3002		Energy Systems application 1985, as supplemented.			
5. (a)	Packa	«Ţ		R				
	(1)	Model No	Sentinel-100F		¥ ././. S			
	(2)	Description			i 🖉 s			
		24.5 inches components aluminum (6	excluding mounting p include a Tungsten b	ads), and weigh ological shield housing. Four 6	aches in height with a base approximately 2,600 pou 10.705" X 13.837" OD) whi 061-T6 mounting pads at th chment points.	nds. The ch is with	in the	
	(3)	Drawings	۲ × ۲	***	* * * * * * * * * * * * * * * * * * *			
		The packagi	ng is constructed in a	ccordance with th	he following Isotopes, Inc. I	Drawing N	los.:	
		010F10000 010-20000 010-70003	Sheets 1-3 (Rev. C) Sheets 1-2 (Rev. B) (Rev. A) Shield Bod	, Fuel Capsule A	embly Sentinel 100F Assembly			

- 010-70004
- 001-90064
- Shield Plug Sheets 1-2 (Rev. A), Shipping Crate Sentinel RTG Sheets 1-2 (Rev. J), Sheet 3 (Rev. H), and Sheet 4, Pallet Assembly 001-90039

NRC (8-200 10 CF			TE OF COMPL		IULATORY	COMM	issioł
-	. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
1	5862	8	71-5862	USA/5862/B()	2	OF	2

## 5. (b) Contents

(1) Type and form of material

Strontium-90 titanate doubly encapsulated in a stainless steel liner and Hastelloy or Uniloy HC capsule which meets the requirements of special form radioactive material.

4,

(2) Maximum quantity of material per package

370,000 curie

6. Fabrication of additional packagings is not authorized.

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 August 30, 1985.
- (b) The package must be maintained in accordance with the Maintenance Program in the supplement dated August 30, 1985.

REFERENCES

- 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: September 30, 2005.

Teledyne Energy Systems application dated June 26, 1985.

Teledyne supplements dated: August 30, 1985; and July 26, 1990.

Department of the Air Force supplements dated: November 12, 1993; August 15, 1995; and August 25, 2000.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

William Just

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: October 6, 2000

NRC FORM 618 3-96) 0 CFR 71			CERTIF FOR RADIO	ICATE OF COMPLIANCE ACTIVE MATERIALS PACKAGES	U.S. NUCLEAR REGU	LATORY COMMISS
1. a. CERTIFICATE N	UMBER		b. REVISION NUM	IBER c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER I
592	6		17	USA/5926/B( )F	1	3
Code of Fede	eral Regu te does n	lations, Part 71, "Pack ot relieve the consigno	aging and Transpo or from compliance	ents described in Item 5 below, meets the appli rtation of Radioactive Material." with any requirement of the regulations of the y country through or into which the package w	U.S. Department of Tran	
. THIS CERTIFICAT a. ISSUED TO (No	E IS ISSU ame and A	ED ON THE BASIS OF ddress)		IS REPORT OF THE PACKAGE DESIGN OR APP . TITLE AND IDENTIFICATION OF REPORT OR		
	460, ^v	c Company Vallecitos Roa 94566		General Electric Compar dated November 19, 19 DOCKET NUMBER 71-5926		nted.
CONDITIONS This certificate is	conditio	nal upon fulfilling the		CFR Part 71, as applicable, and the condition	s specified below.	<u></u>
(a)	Pack	aging				
	(1)	Model No.:	GE-100			
	(2)	Description				
		is accomplis shielding lead	hed by a gas d, tungsten (	cavity drain line and lifting de sketed and bolted steel lead f or uranium liners may be inse packaging is 4,800 pounds.	illed plug. For a	
	(3)	Drawings				
			727, Rev. 5;	icted in accordance with Gen 129D4729, Rev. 5; 129D47		npany Drawin
				41		

NRC FOF (3-96)	RM 618	A				CONDITION	<b>iS</b> (continued)	U.	S. NUCLEAR REGULATORY COMMISSI	ON
Page	2 - C	ertifica	te No	. 5926	- Revisio	n No. 17 - D	ocket No.	71-5926		
5.	(b)	Conte								
		(1)	Туре		m of mat					
			(i)	Byprod plates, materia	fuel asso	irradiated spe emblies, or n	ecial nucle neeting the	ar material i requiremer	n the form of fuel rods, or hts of special form radioactive	e
			(ii)		onfissile lades).	irradiated m	etal hardw	are and read	ctor control	
		(2)	Maxi	mum qu	antity of	[;] material per	package			
			mass	s fissile i	material.	at not to exc (U-235 equ times Pu mas	ivalent ma	vatts and 50 ss equals U	00 grams U-235 equivalent -235 mass plus 1.66 times U-	-
						of twenty (20 elements,	)) curies pe	er package i	must be in the form of metal,	
	(c)	Trans	port	Index fo	r Criticali	ity Control				
		For th	ne co	ntents d	escribed	in 5.(b)(1)(i)				
					t index to riticality o	o be shown o control:		5.6		
6.	Shoi cond	ing sha litions (	all be of tra	provide nsport.	d to mini	mize movem	ent of con	tents during	accident	
7.	pacl	ne time tage co less th	ntent	ts shall l	of the loa be dry an	ded package nd the fissile	to a carrie material u	er for transp nmoderated	oort, the (H to X atomic	
8.	In a	dition	to th	e require	ements o	of Subpart G	of 10 CFR	Part 71:		
	(a)	The p subm	backa litted	ge must with GE	t be main E applicat	ntained in acc tion dated Ja	cordance w nuary 18,	vith the main 1993.	ntenance procedures	
	(b)	The p the o	oacka perat	ige must ing proc	t be prep edures s	ared for ship submitted wit	ment and ( h GE appli	operated in cation dated	accordance with d January 18, 1993.	
9.	The gen	packaç eral lice	je au ense p	thorized provisior	by this one of 10	certificate is CFR §71.12	hereby app	proved for u	se under the	
10.	Exp	ration (	date:	May 31	, 2003.					
							42			

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

<u>THE THE FULLE FULLE FOR THE FOR THE</u>

Page 3 - Certificate No. 5926 - Revision No. 17 - Docket No. 71-5926

#### REFERENCES

General Electric Company application dated January 18, 1993.

Supplements dated: March 3, 1993 and November 19, 1997.

### FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cass R. Chappell, Chief Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: May 15, 1998

-96) CFR 71	RM 61	8						OMPLIA RIALS PAC	NCE	. NUCLEA	AR REGUL	ATOR	Y COMMISS
		ENUMBER		ł	. REVISION N	UMBER		DENTIFICATIO		d. PAG		e. TO	TAL NUMBER
593	39				28		USA/	5939/B(	)F		1		4
PREAM													
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THIS CE	ERTIFIC		JED ON THE			LYSIS REP	ORT OF THE	PACKAGE DES	e package will b IGN OR APPLIC REPORT OR APP	ATION			
P.0	. Box	( <b>46</b> 0, [•]	: Compa Vallecito 94566	os Road					pany appli 1992, as		mented.		
						c. DOCK	ET NUMBER	/1-593					
CONDII This ce		e is conditi	onal upon fu	lfilling the re	equirements of	f 10 CFR	Part 71, as ap	plicable, and t	he conditions sp	pecified bel	low.		
						· · · ·			<b>r</b>				
(a)	Pac	kaging											
(a)		പ്പപ്പിപ്പ											
	(1)	Mode	l No.: 1	500									
		D	inti										
	(2)	Descr	iption										
		cylind appro	er, appr ximately	oximate 7-inch	ly 30 1/4 diameter	1-inch by 25	diameter 5 inches	by 48 1 high. Th	k is double 2 inches l e diameter	high wi r is red	ith a cei uced fro	ntral	cavity
		cylind appro inches Appro cavity lead-f bottor sides 7/8 in 36 1/	er, appr ximately s to 17 vimately drain li illed plug m and a attaches iches hig 2 inches	oximate y 7-inch 1/2 inch y 11 inc ne and I g. A pro protrud s to a so gh by 50 s and the	ely 30 1/4 diameter nes by con- ches of le lifting dev otective j ling box s quare pall 0 inches	1-inch by 25 ne con ad sur vice. ( jacket section let. Di wide a s 59 1/	diameter 5 inches 5 inches 5 inches 7 ound th Closure is consistin 6 diametr imension 5 inches 72 inches	by 48 1, high. The e central s accomp ig of an t ically acr s of the e box sec	2 inches I	high wi r is reduces of the cash a gaske cular cy p and v jacket e outer	ith a cer uced fro e cask. k is equi eted and vlinder v vertically are app cylindrio	ntral om 3 ippe d bol vith y do vroxir cal d	cavity 60 1/4 d with a lted steel open wn the mately 60 iameter is
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18A		CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISS
je 2-	Certifica	te No. 5939 - Revision No. 28- Docket No.	71-5939
Conte	ents		
(1)	Type a	nd form of material	
	(i)	Byproduct material and special nuclear r of special form radioactive material and steel, or	
	(ii)	Byproduct material as ⁹⁰ SrF ₂ or ¹³⁷ CsCl o below, or	capsules meeting Condition No. 6,
	(iii)	Solid nonfissile irradiated metal hardwar or	e and reactor control rods (blades),
	(iv)	Stainless steel encapsulated solid metal	Co-60 sources, or
	(v)	Byproduct material as ¹³⁷ CsCl capsules r	neeting Condition No. 7, below.
(2)	Maxim	um quantity of material per package	
	Not to	exceed a decay heat generation of 3,120 v	watts and
	(i)	Item 5(b)(1)(i) above:	
		500 grams U-235 equivalent mass. (U-2 mass plus 1.66 times Pu mass). Plutoni package must be in the form of metal, m	um in excess of 20 curies per
	(ii)	Item 5(b)(1)(ii) above:	
		458,000 curies.	
	(iii)	Item 5(b)(1)(iv) above:	
		200,000 curies.	
	(iv)	Item 5(b)(1)(v) above:	
		157,000 curies.	
kimum	Transpor	rt Index for Criticality Control	
	•		5.7
		45	
	(2) (2) (2)	ge 2 - Certifica Contents (1) Type a (i) (ii) (ii) (iii) (iv) (2) Maxim Not to (i) (ii) (ii) (ii) (ii) (ii) (ii) (ii) (ii) (ii)	<ul> <li>(i) Type and form of material</li> <li>(i) Byproduct material and special nuclear r of special form radioactive material and steel, or</li> <li>(ii) Byproduct material as ⁹⁰SrF₂ or ¹³⁷CsCl of below, or</li> <li>(iii) Solid nonfissile irradiated metal hardwar or</li> <li>(iv) Stainless steel encapsulated solid metal</li> <li>(v) Byproduct material as ¹³⁷CsCl capsules r</li> <li>(2) Maximum quantity of material per package</li> <li>Not to exceed a decay heat generation of 3,120 x</li> <li>(i) Item 5(b)(1)(i) above:</li> <li>500 grams U-235 equivalent mass. [U-2 mass plus 1.66 times Pu mass). Plutoni package must be in the form of metal, n</li> <li>(ii) Item 5(b)(1)(ii) above:</li> <li>200,000 curies.</li> <li>(iii) Item 5(b)(1)(iv) above:</li> <li>157,000 curies.</li> <li>(iv) Item 5(b)(1)(i)</li> <li>imum Transport Index for Criticality Control</li> <li>contents described in 5(b)(1)(i)</li> <li>limited in 5(b)(2)(i):</li> <li>imum transport index to be shown on al for nuclear criticality control:</li> </ul>

NRC FORM 618A

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 3 - Certificate No. 5939 - Revision No. 28- Docket No. 71-5939

- 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, Incorporated 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 lid on the canister insert.
- 8. In addition to the requirements of Subpart G of 10 CFR 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, as supplemented.
  - (b) The silicone rubber lid gaskets must be replaced within the 12-month period preceding each shipment. 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.
- 9. The package authorized by this certificate is hereby approved for use under the general license provision of 10 CFR §71.12.
- 10. Expiration date: October 31, 2003.

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**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

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#### **REFERENCES**

General Electric Company application dated November 19, 1992.

General Electric Company supplements dated December 12, 1997 and August 13, 1998.

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

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cass R. Chappell, Chief Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Dated: October 8, 1998

3-96) ) CFR 71					E OF CON E MATERIA		E	UCLEAR RE	EGULA	ATORY CO	DMMISSIC
a. CERTIFICATE NU	MBER		b. REVISION NUM	1BER c.	PACKAGE IDEN	TIFICATION NU	MBER	d. PAGE NUI	MBER	e. TOTAL N	UMBER PA
5957		;	26		USA/5	957/B(_)F					8
b. This certificate	al Regulatio does not re	ons, Part 71, "Pack	aging and Transpo or from compliance	rtation of with any	f Radioactive Ma	aterial." the regulations	of the U.S.	Department of			
THIS CERTIFICATE I a. ISSUED TO (Nam					RT OF THE PACK						
Departmer Washingto					partment o ril 18, 1995						
			c	DOCKE	T NUMBER	71-5957					
CONDITIONS This certificate is c	conditional	upon fulfilling the	requirements of 1	0 CFR P	art 71, as applica	ble, and the co	nditions spec	ified below.			
(a)	Pack	aging									
	(1)	Model No.:	BMI-1			•					
	(2)	Description									
		33.37 inche steel shells has a 0.12-	ased lead sh es in diamete whose annu inch thick pl	er by 7 Jar re ate sp	3.37 inche gion is fille ot welded	s high form d with lead to it, provid	ned by t d. The o ding a 0.	wo conce uter 1/2-i 06-inch th	entric nch t nick a	stainle hick sh air gap	SS
		33.37 inche steel shells has a 0.12- insulator. T length. The shielding. welded to th and plug, p	es in diamete whose annu- inch thick pla The inner sho e cask lid is The cask lid he cask body ressure gau	er by 7 ular re ate sp ell is 1 a stair is sec y. Tho ge, ar	73.37 inche gion is fille ot welded 5.5 inches nless steel sured to the e cask is p nd a pressu	s high form d with lead to it, provid inside dia weldment cask by t rovided with the relief values	med by t d. The o ding a 0. meter by having 7 welve st th a drain alve. Th	wo conce uter 1/2-ii 06-inch th 54 inche 7.75 inche eel studs n line with	entric nch t hick a es ins es of whic n nee	stainle hick sh air gap side lead h are dle val	ss ell
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	(3)	33.37 inches steel shells has a 0.12- insulator. The shielding. welded to the and plug, p including m Drawings The cask is	es in diamete whose annu- inch thick pla The inner sho e cask lid is a The cask lid he cask body ressure gau haximum con	er by 7 Jar re ate sp ell is 1 a stair is sec y. The ge, an itents	73.37 inche gion is fille ot welded 5.5 inches nless steel sured to the e cask is p nd a pressu of 1,800 lb	s high form d with lead to it, provide inside dia weldment cask by t rovided with the relief va s, is 23,66 with the fo	med by t d. The o ding a 0. meter by having 7 welve st th a drain alve. Th 50 lbs.	wo conce uter 1/2-ii 06-inch th 54 inche 2.75 inche eel studs n line with e total ca	entric nch t nick a es ins es of whic n nee sk wa	stainle hick sh air gap side lead h are edle vah eight,	ss ell ve
	(3)	33.37 inches steel shells has a 0.12- insulator. The shielding. welded to the and plug, p including m Drawings The cask is	es in diamete whose annu- inch thick pla The inner sho e cask lid is a The cask lid he cask body ressure gau haximum con	er by 7 Jar re ate sp ell is 1 a stair is sec y. The ge, an itents	73.37 inche gion is fille ot welded 5.5 inches nless steel sured to the e cask is p nd a pressu of 1,800 lb	s high form d with lead to it, provide inside dia weldment cask by t rovided with the relief va s, is 23,66 with the fo	med by t d. The o ding a 0. meter by having 7 welve st th a drain alve. Th 50 lbs.	wo conce uter 1/2-ii 06-inch th 54 inche 2.75 inche eel studs n line with e total ca	entric nch t nick a es ins es of whic n nee sk wa	stainle hick sh air gap side lead h are edle vah eight,	ss ell ve

NRC F( (3-96)	ORM 618A		CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
	Page 2	- Certificate	No. 5957 - Revision No. 26 - Docket No. 71-5957
5.	(a)	Packaging (	(continued)
		(4) Produ	ict Containers
			arious authorized product containers are constructed in accordance with the ing Drawing Nos.:
		(i)	Inner can assembly as shown in BMI Drawing No. 00-000-421, Rev. C.
		(ii)	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 Element copper casting assembly as shown in BMI Drawing No. K5928-5 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 No. 9590001, Rev. A. Failed fuel assemblies must be seal welded in aluminum or stainless steel tubes with wall and end cap thicknesses of at least 0.015 inch.
		(v)	Basket Assembly defined by BMI Drawing No. BCL-000-500, Rev. A, as modified by BMI Drawing Nos. 00-000-236, Rev. C, and BCL-000-502, Rev. B.
		(vi)	Basket Assembly and storage can defined by BMI Drawing No. 00-000-391, Rev. C, and Atomic International Drawing No. AIHL, S8DR 0019-01, Rev. A, respectively.
		(vii)	Inner can assembly as shown in Union Carbide Corporation Drawing No. 101501, Rev. A.
		(viii)	Basket Assembly as shown in University of Missouri Research Reactor (MURR) Drawing No. 2234, Sheets 1 through 5, Revision 0.
		(ix)	HFBR assembly basket and spacer plate as shown in Brookhaven National Laboratory Drawing 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.
	(a)	Contents	
		(1) Type a	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.
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NRC FORM 618 (3-96)	BA		CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
Pag	e 3 - Ce	rtificate N	lo. 5957 - Revision No. 26 - Docket No. 71-5957
-			
5. (b)			ontinued)
	(1)	Туре а	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 of metal, 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 as metal, oxides, or compounds which are thermally stable up to 600°F.
		(vi)	Irradiated Triga Type fuel assemblies described in Section 6.6 of the application (pp. 6-23 through 6-27).
		<b>(vii)</b>	Irradiated S8DR fuel elements 0.56-inch OD by 18.7 inches long by 0.010-inch wall thickness of Hastelloy-N. The fuel material is UZrH fully enriched in U-235.
		(viii)	Intact irradiated CP-5 fuel assemblies containing not more than 176 grams U-235 per assembly prior to irradiation. Uranium may be enriched to a maximum 93 w/o in the U-235 isotope. Active fuel length shall be 28.5 inches.
2 ¹		(ix)	Solid nonfissile irradiated hardware which may contain encapsulated fission monitors.
		(x)	Irradiated uranium oxide waste 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.
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1 × (***		RM 618A		CONDITIONS (continued)
		Page 4	- Certifi	cate No. 5957 - Revision No. 26 - Docket No. 71-5957
ľ	5.	(b)	Conten	ts (Continued)
			(1) T	ype and form of material (Continued)
			(1	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.
			(1	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 93.5 w/o in the U-235 isotope. Active fuel length shall be nominal 24 inches.
			(1	xv) 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 in the U-235 isotope. Active fuel length shall be approximately 25 inches.
			()	<ul> <li>CONDITIONS (continued)</li> <li>U.S. NUCLEAR REGULATORY COMMISSION</li> <li>cate No. 5957 - Revision No. 26 - Docket No. 71-5957</li> <li>tts (Continued)</li> <li>Type and form of material (Continued)</li> <li>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.</li> <li>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 93.5 w/o in the U-235 isotope. Active fuel length shall be nominal 24 inches.</li> <li>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 in the U-235 isotope. Active fuel length shall be approximately 25 inches.</li> <li>Irradiated MTR-type fuel sections containing not more than 176 grams U-235 per fuel section 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.</li> <li>Irradiated MTR-type fuel sections containing not more than 176 grams U-235 per fuel section prior to irradiation. Uranium may be enriched to a maximum 93.5 w/o in the U-235 isotope. Active fuel length per fuel section shall be approximately 11 inches. The fuel assembly shall be sectioned only in the non-fuel bearing regions of the assembly.</li> <li>Intact irradiated MTR-type fuel assemblies containing not more than 282.7 grams U-235 per assembly prior to irradiation. Uranium may be enriched to a maximum 20 w/o in the U-235 isotope. Active fuel length shall be approximately 25 inches.</li> </ul>
			()	xvii) Intact irradiated MTR-type fuel assemblies containing not more than 282.7 grams U-235 per assembly prior to irradiation. Uranium may be enriched to a maximum 20 w/o in the U-235 isotope. Active fuel length shall be approximately 25 inches.
_			(2) N	A sector contract and the sector of the sect
			d	The minimum cooling time of each fuel assembly and rod is 90 days, maximum ecay heat generation per package not to exceed 1.5 kW, and the external dose ate not to exceed 10 mrem/hr 3 feet from the external surface of the cask and:
			(i	) For the contents described in 5(b)(1)(i):
				<ul> <li>the minimum cooling time of each fuel assembly and rod is 90 days, maximum lecay heat generation per package not to exceed 1.5 kW, and the external dose ate not to exceed 10 mrem/hr 3 feet from the external surface of the cask and:</li> <li>For the contents described in 5(b)(1)(i):</li> <li>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).</li> <li>For the contents described in 5(b)(1)(ii):</li> <li>One (1) fuel assembly as contained in product container specified in 5(a)(4)(iii).</li> <li>For the contents described in 5(b)(1)(iii):</li> <li>One (1) fuel assembly as contained in product container specified in 5(a)(4)(iii).</li> <li>For the contents described in 5(b)(1)(iii):</li> <li>A80 grams U-233 or 480 grams Pu-239 or 800 grams U-235 as contained in product container specified in 5(a)(4)(i).</li> </ul>
			(i	i) For the contents described in 5(b)(1)(ii):
				One (1) fuel assembly as contained in product container specified in 5(a)(4)(iii).
			(i	ii) 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).
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2.2	2020.20	202020	23, 23, 23, 2, 2,	

			() TO THE AND
NRC F( (3-96)	0RM 618A		CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
	Page 5	5 - Certificate N	o. 5957 - Revision No. 26 - Docket No. 71-5957
5.	(b)	Contents (Co	ntinued)
		(2) Maximu	um 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 product containers specified in 5(a)(4)(i) and limited to 200 thermal watts.
		(vi)	For the contents described in 5(b)(1)(vi):
			Thirty-eight (38) fuel assemblies as contained in product containers specified in $5(a)(4)(iv)$ . Fuel assemblies with an initial enrichment (U-235 in U) of greater than 70 w/o U-235 are limited to 19 assemblies per product container. Shipments of less than 19 assemblies with a U-235 enrichment greater than 70 w/o may be combined with assemblies of 70 w/o U-235 or less provided: $x/38 + y/19 \le 1$ ; x = no. assy's $\le 70$ w/o U-235, y = no. assy's $\ge 70$ w/o U-235.
		(vii)	For the contents described in 5(b)(1)(vii):
			Twenty-four (24) fuel elements per can and six sealed cans per basket as described in 5(a)(4)(vi). Each of the six cans may contain up to 818 g U-235 and 158 g hydrogen. The cask is limited to 4.908 kg U-235.
		(viii)	For the contents described in 5(b)(1)(viii):
			Twelve (12) fuel assemblies.
		(ix)	For the contents described in 5(b)(1)(ix):
			Thermal heat generation rate is limited to 200 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.
		(xi)	For the contents described in 5(b)(1)(xi):
			Twenty-four (24) capsules each limited to 100 grams U-235.
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NRC FO 3-96)	RM 618A		CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSI
	Page 6	- Certificate	No. 5957 - Revision No. 26 - Docket No. 71-5957
5.	(b)	Contents (C	Continued)
		(2) Maxir	mum quantity of material per package (Continued)
		(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 minimum cooling time of each fuel assembly is 150 days. The maximum radiation source term is 400,000 curies.
		(xiii)	For the contents described in 5(b)(1)(xiii):
			Eight (8) fuel assemblies, contained in the product container specified in 5(a)(4)(viii). The maximum decay heat per package is 200 watts.
		(xiv)	For the contents described in 5(b)(1)(xiv):
			Twenty (20) fuel assemblies contained in two baskets separated by a spacer plate as specified in 5(a)(4)(ix). Each shipment must contain twenty fuel assemblies. The maximum burnup is approximately 130 MWD/assembly, and the minimum cooling time is 470 days.
		(xv)	For the contents described in 5(b)(1)(xv):
			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 sections.
		(xvii)	For the contents described in 5(b)(1)(xvii):
			Eight (8) fuel assemblies contained in the peripheral locations of the basket specified in $5(a)(4)(v)$ . The maximum burnup is 14%, the maximum decay heat is 15 watts per fuel assembly, and the minimum cool time is 120 days. Four aluminum inserts, as shown in Lockheed Martin Drawing No. 507584, Rev. 1, must be positioned in each of the four center basket locations.
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<b>IRC</b> FOR 3-96)	im 618A	<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISSION
	Page 7 - Ce	rtificate No. 5957 - Revision No. 26 - Docket No. 71-59	57
5.	(c) Trar	nsport Index for Criticality Control	
		mum transport index to be shown on label nuclear criticality control:	
	(1)	For the contents described in 5(b)(1)(iii) and 5(b)(1) limited in 5(b)(2)(iii) and 5(b)(2)(xv):	(xv), and 0.4
	(2)	For the contents described in $5(b)(1)(i)$ , $5(b)(1)(i)$ , $5$ 5(b)(1)(vii), $5(b)(1)(viii)$ , $5(b)(1)(x)$ , $5(b)(1)(xi)$ , $5(b)(1)(xi)$ , $5(b)(1)(xii)$ , $5(b)(1)(xvi)$ , and $5(b)(1)(xvi)limited in 5(b)(2)(i), 5(b)(2)(ii), 5(b)(2)(vi), 5(b)(2)(vii)5(b)(2)(viii)$ , $5(b)(2)(x)$ , $5(b)(2)(xi)$ , $5(b)(2)(xii)$ , $5(b)(2)(xi)$ , $5(b)(2)(xi)$ , $5(b)(2)(xvi)$ , and $5(b)(2)(xvi)$ .	(b)(1)(vi), )(xii), i), and ,
6.		5(b)(1)(iii), mixtures of fissile material are authorized, p is satisfied:	rovided the following
	Y =	+ $\frac{Y}{480}$ + $\frac{Z}{800} \leq 1$ , where Grams U-233 to be shipped Grams Pu-239 to be shipped Grams U-235 to be shipped	
7.		r the contents described in 5(b)(1)(ii), 5(b)(1)(iv) and 5( , 5(b)(2)(iv) and 5(b)(2)(xii), the cask must be shipped o	
8.	confirm th sufficient	k contents of 5(b)(1)(ii), 5(b)(1)(iv) or 5(b)(1)(xii) are sh nat the pressure relief valve is operable (set pressure - antifreeze in the cask must be used to prevent damage by freezing.	75 psig). When needed,
9.		and unloading operations of the contents described in 5 ) must preclude contact of water with the contents.	5(b)(1)(iii) and limited in
10.	When the must be p	e contents of 5(b)(1)(vi) are loaded wet, the optional 0.5 present in the primary basket lower plate to assure prop	5-inch diameter drain hole per draining of the basket.
11.	in BMI Dr verified by	ence and effectiveness of the Boral poison plate in the awing Nos. BCL-000-500, Rev, A; 0048, Rev. A; and 0 y neutron measurements prior to first use and records on. Verification of the presence of the Boral must be ma	0-000-236, Rev. C, must be maintained of such
12.		5(b)(1)(i) and 5(b)(1)(x) may be mixed provided the subassemblies does not exceed 24.	m of the product containers
13.	correctly	vement of fuel assemblies must be limited so that the a positioned with respect to the poisoned section of the b sed in each section of the basket to limit axial moveme	basket. Removable spacers
		54	

# NRC FORM 618A **U.S. NUCLEAR REGULATORY COMMISSION CONDITIONS** (continued) (3-96) Page 8 - Certificate No. 5957 - Revision No. 26 - Docket No. 71-5957 Contents must be securely confined in the cask cavity to minimize movement. 14. 15. Prior to each use, adequacy of containment vessel must be demonstrated by performance of the leak test described in Section 7.1.1.1 of the application. 16. Gaskets and seals (cask and fuel canister) must be replaced at least every 12 months or earlier if visible degradation occurs. 17. For contents described in 5(b)(1)(iii) and limited in 5(b)(2)(iii), the mass of fissile material contained in reactor fuel must be based on the mass prior to irradiation. 18. 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 the (a) Operating Procedures of Chapter 7 of the application. Additionally, for the contents described in 5(b)(1)(xvii), the package must be prepared for shipment in accordance with the procedures specified in the supplement dated January 29, 1999. The packaging must meet the Acceptance Tests and Maintenance Program of Chapter (b) 8 of the application. The package authorized by this certificate is hereby approved for use under the general 19. license provisions of 10 CFR §71.12. 20. Expiration date: March 31, 2001. REFERENCES Department of Energy application dated: April 18, 1995 Department of Energy supplement dated: November 20, 1995, September 4, 1998, January 29, 1999, and April 20, 1999

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cars R. Chappell

Cass R. Chappell, Chief **Spent Fuel Licensing Section** Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: <u>May 12, 1999</u>

RC FORM	618				_	J.S. NUCLEAR REG	ULATORY COMMISSIC
CFR 71							
- CER1	IFICATE NUMB			C. PACKAGE IDENTIFICATION		d. PAGE NUMBER	e. TOTAL NUMBER PAGES
a. Cent		979	10	USA/5979/B		1	2
PREA					••••		
fc	orth in Title 1	0, Code of Federal Re	gulations, Part 71, "Pack	g and contents) described in i aging and Transportation of R	achoactive	Material.	
0	ther applicab	le regulatory agencies	, including the governme	e with any requirement of the the of any country through or in	to which t	ne package will be t	ansported.
		E IS ISSUED ON TH (Name and Address)	IE BASIS OF A SAFETY	ANALYSIS REPORT OF TH	IE PACK/ ICATION	AGE DESIGN OR A OF REPORT OR A	APPLICATION
g	156 Ros	nega Services, e Street r, CA 90706	Inc.	Alpha-Omega S June 1980, as s			ition dated
				c. DOCKET NUMBER		71-5979	
COND This c	NTIONS ertificate is c	onditional upon fulfillir	ng the requirements of 10	CFR Part 71, as applicable, a	nd the co	nditions specified be	ałow.
(a)	Packa	iging	SOY.	~~~	72		
	(I)	Model No.: 5	<b>)79</b>			, \$2.	
	(2)	Description	ntainer for telethe	rapy cobalt sources.	Confi	iguration of the	e outer
		container is b of plywood w Transverse s provided at th lead-filled, ba bolted end ca	ox-like measuring ith a 0.125" outer trips across the bo le four top comen tref-shaped configures provide flexibi	approximately 38" x steel shell welded to ottom facilitate use of s. The inner shield v juration. Three diffe ity to accommodate oximately 5,000 lbs.	50" x an ext a fork essel i rent cy	40° I he box terior angle fra -lift and lifting s essentially a /lindrical plug i	is lined with 4.5" imework. lugs are 24" diameter, nserts and
	(3)	Drawings The packagir Services, Inc 0093, Rev. 0	Drawing Nos.: 0	n accordance with A 090, Rev. 0; 6091, F	pha-O lev. 0;	mega 0092, Rev. 1;	and
(b)	Conte						
	(I)	Type and for	m of material				
		Cobalt 60 or form radioac		aled sources which r	neet th	ne requirement	ts of special
				****			

NRC FOF (6-2000) -20 CFR 71	M 618A			ONDITION	NS (continued)		U.S. NUCLEA	R REG	ULATO	RY CO	MMISSION
Certificate	No. 59	979	Revision No.	10	Docket No.	71-5979	Page	2	of	2	Pages
5.(b) C	ontents	(continued)									
	(2)	Maximum quantity o	f material pe	er pack	age						
		13,000 curies Co-60	or 3,000 cu	iries Cs	s-137, with	decay hea	t load not to	exce	ed 20	)0 wa	itts.
6.	Lifting	eyes shall be covere	d or blocked	l to pre	vent use as	tie-down	attachments	5.			
7.	The sh	ield vessel closures s	shall be equ	ipped v	with gaskets	S.					
8.		sed to secure the shi transport.	ield vessel c	losure	caps shall	be secure	d against loo	osenii	ng by	vibra	tion
9.	In addi	tion to the requireme	nts of Subp	art G o	110 CFR P	art 71:					
	a)	Each package must August 20, 1990; an		aintena	ance Inspec	tion Progr	am of the su	ıppleı	ment	dated	l
	b)	The package must b of the supplement da		•		cordance	with the Ope	eratin	g Pro	cedui	res
10.		ckage authorized by ons of 10 CFR 71.12		te is h	ereby appro	eved for us	se under the	gene	eral lic	ense	;
11. Alpha-(		ion date: September Services, Inc. applica	E	all	<u>ENCES</u> 980.		2				
		ated: April 12, 1983,	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	- 1993		and Jane	AN 30 Nov	omha	or 16	1995	•
	y 5, 20				SIEQ, 1990		ary 00, 110v	embe	, 10,	1000	,
			A I	FÓR TI	HE U.S. NU	CLEAR R	EGULATOF		OMMIS	SSIO	N
			q	<i>EU</i>	lliang	Trach					
			5	Spent F Office d	am Brach, I Fuel Project of Nuclear M d Safeguar	Office Aaterial Sa	lfety				
Date:	08 (2	3/00									
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					TE OF COMPL		U.S. N		ILATORY COMMISSIO		
3-96) ) CFR 71					TIVE MATERIALS P						
a CERTIFI	ICATE NUM	BER	b. REVISION N	ON NUMBER C. PACKAGE IDENTIFICATION NUMBER d. PAGE NUMBER C. TOTAL N							
5984			6		USA/5984/B	()		1	2		
Code	certificate is of Federal	s issued to certify that the p Regulations, Part 71, "Pac oes not relieve the consign	kaging and Tran	sportatio	n of Radioactive Material	."					
applic	able regula	tory agencies, including th	e government of	any cou	ntry through or into which	h the	package will be	transported.	•		
	TIFICATE IS D TO (Name	ISSUED ON THE BASIS OF and Address)	A SAFETTANA		E AND IDENTIFICATION						
1010	Arroyo	erd and Associ Avenue lo, CA 91340-8		J. da	L. Shepherd a ted September	12,	1974, a:	es applica s suppleme	tion nted.		
				c. DOC	KET NUMBER 71-5	984	<u>ا</u>				
CONDITIC This certi		nditional upon fulfilling th	e requirements o	f 10 CF	R Part 71, as applicable. a	nđ th	e conditions spe	cified below.			
(a)	Packa	aina									
(a)			n asin Tu								
	(1)	Model No.: 5	984								
	(2)	<b>Description</b>		19 ₂₅ 1945	3 ¹		andi et atl	iliku. Tafa a			
	(3)	steel jackete overpack are thickness is	d, lamin approxim approxim	ated ately ately	tainer. The e plywood outer 28" in diamet 4" on the sic weight of the	coi er les	by 43" h and 6" o	igh and th n the top	s of the e plywood and bottom.		
		The overpack Associates Di dated April 2	rawing No	s. A-	d in accordanc 0068-2C-1 date	e v ed l	with J. L March 8,	. Shepherd 1969; and	and A-0068-2C		
		Shepherd and dated April a form source	Associat 26, 1995, capsule i	es Dr or A s cor	ers are constr awing Nos. A-( -0068-1B-A, da structed in ac 1068-10 dated	006 ate cco	B-1B, Rev d April 2 rdance wi	. 2, or A- 6, 1995 . th J. L. S	0068-1B-B, The special		
(b)	Cont	ents									
	(1)	Type and form	n of mate	terial							
		Cesium 137 a steel tubes w material.	s cesium which mee	chlor t the	ride sources de requirements	oub of	ly encaps special	ulated in form radio	stainless bactive		
	(2) Maximum quantity of material per package										
	12,000 curies.										
					58						

- The package shall be prepared for shipment and operated in accordance with "Inspection Operation, Handling and Maintenance Procedures" in the J. L. Shepherd and Associates submittal dated May 1, 1995.
- b. The package must meet the "Acceptance Tests" and "Checkout and Maintenance Procedures" in the J. L. Shepherd and Associates submittal dated February 20, 1990.
- 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: April 30, 2001.

### REFERENCES

J. L. Shepherd and Associates' application dated September 12, 1974.

Supplements dated: January 20, 1975; February 20, 1990; February 6, and May 1, 1995; and April 11, 1996.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

William D. Travers, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safequards

Date: 4123/96

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(3-96) 10 CFR 71	/ 618		U.S. NUCLEAR REGULATORY COMMISS CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIALS PACKAGES						
1. a. CERTIFI	CATE NUMB	6003	b. REVISION NUMBI		ENTIFICATION NUMBER	d. page number 1	e. TOTAL NUMBER 5		
Code b. This c applic	certificate is of Federal R certificate do table regulato	Regulations, Part 71, "Pack es not relieve the consign ory agencies, including th	kaging and Transporta or from compliance w e government of any c	tion of Radioactive ith any requirement ountry through or i	5 below, meets the applicable Material." of the regulations of the U.S. nto which the package will be CKAGE DESIGN OR APPLICA	. Department of Tran e transported.			
	TO (Name a		b. T	ITLE AND IDENTIF	CATION OF REPORT OR APPL	ICATION:			
Divisi	ion of Na	ent of Energy aval Reactors DC 20585							
CONDITIO			c. D	OCKET NUMBER	71-6003				
This certi		ditional upon fulfilling th	e requirements of 10 0	CFR Part 71, as app	licable, and the conditions spe	ecified below.			
5.									
(a)	Packa	aging							
	(1)	Model No.:	M-130						
	(2)	Description							
		closure head w opening with a spent fuel. The pressure v secondary hear steel backup cy backup cylinde high for spent f for the particula The container h lines and a fill a line which rema penetrations wi (which are cap	hich is bolted to bolted shield p essel has an in t exchanger (no vlinder 29 inche r and the press uel. The spent ar core to be sh has external pe and drain line (no ains open to a p hich do not ope ped during ship	b the contained ug is provide side diameter of used during is in diameter ure vessel pri fuel is contain ipped. Internations to which are cap pressure gage in to the pres- iment) and a	top of the container er and seals the pre- d in the closure hea r of 55 inches. The shipment) surround The annulus whic ovides a space 13-in ned in the annulus the pressure vessel ped during shipment. Sure vessel for seco temperature sensing	ssure vessel. d for loading a central region ded by 1/2-inc h remains bet nches wide an oy module hold for steam and to and a press The container ondary heat ex- g line.	An access and unloading contains a h thick carbon ween the id 130-inches ders designed I water relief sure sensing also has changer lines		
		of the loaded c	ontainer withou	t its support	vehicle by an "A" fra structure is approxin	nately 228,000	pounds.		

NRC FORM 618A (3-96)

**CONDITIONS** (continued)

Page 2 - Certificate No. 6003 - Revision No. 19 - Docket No. 71-6003

- 5. (a) Continued
  - (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:

- (i) Deleted.
- (ii) Deleted.
- (iii) Deleted.
- (iv) D1G fuel modules of core types 1 or 2.
- (v) D1G removable fuel assemblies of core types 1 or 2.
- (vi) Deleted.
- (vii) Deleted.
- (viii) S3G-3/3A fuel module with or without control rods. The core age must be at least 4000 logging-corrected full-power hours.
  - (ix) Deleted.
  - (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) Deleted.
- (xiv) Deleted.
- (xv) D2W fuel cells with control rods.
- (xvi) NR-1 fuel modules with or without control rods.
- (xvii) Deleted.
- (xviii) A1W-3 recoverable irradiated fuel modules. Fuel modules that use control rods shall have control rods inserted.

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NRC FORM 618A (3-96)		CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO		
Page 3 - Cer	tificate N	lo. 6003 - Revision No. 19 - Docket No. 71-6003		
5.(b)(2)	Maximum quantity of material per package.			
	(i)	Deleted.		
	<b>(</b> ii)	Deleted.		
	<b>(iii)</b>	6 fuel assemblies as described in 5(b)(1)(iv) and 4 fuel assemblies as described in 5(b)(1)(v).		
	(iv)	Deleted.		
	(v)	10 fuel assemblies as described in 5(b)(1)(viii).		
	(vi)	9 fuel assemblies as described in 5(b)(1)(viii).		
	(vii)	9 fuel assemblies as described in 5(b)(1)(viii) and 1 structure as described in 5(b)(1)(x).		
	(viii)	4 fuel cells as described in $5(b)(1)(xi)$ or 2 fuel cells as described in $5(b)(1)(xi)$ and 2 fuel cells as described in $5(b)(1)(xii)$ .		
	(ix)	Deleted.		
	(X)	Deleted.		
	(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)	Deleted.		
	(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)	Deleted.		
	(iii)	Shipment of contents specified in 5(b)(1)(viii), 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)	Deleted.		
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NRC FORM ( 3-96)	618A	<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISSI	
Page	4 - Certificate N	lo. 6003 - Revision No. 19 - Docket No. 71-6	6003	
5.(b)(3	3) Continued			
(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)	Deleted.		
	(vii)	Deleted.		
	(viii)	Shipment of contents specified in 5(b)(1)(x) heat load not to exceed 19,100 Btu/hr and s after shutdown.		
	(ix)	Shipment of contents specified in 5(b)(1)(x) heat load not to exceed 6,000 Btu/hr and sh after shutdown.		
	(x)	Deleted.		
	(xi)	Shipment of contents specified in 5(b)(1)(x) a heat load not to exceed 43,800 BTU/hr ar days or 175 days for A1W-3E and A1W-3J	nd shall be made no earlier than 400	
(c)	Transport Ind	ex for Criticality Control		
		sport index to be shown on ear criticality control:		
	5(b)(1	t for the contents described in 5(b)(1)(iv) (Co )(v) (Core 2) and 5(b)(1)(viii) and limited in )(iii) and 5(b)(2)(v)	ore 2), 100	
	For the 5(b)(2)	e contents described in 5(b)(1)(viii) and limite )(v)	ed in 25	
		e contents described in 5(b)(1)(iv) (Core 2) as )(v) (Core 2) and limited in 5(b)(2)(iii)	nd O	
<b>6</b> .	Deleted.			
7.	For shipments involving the contents specified in 5(b)(1)(viii) 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.			
8.	Shipments sh	nall be made in the dry condition, except for residual water as limited in 5(b)(1).		
9.	steel plates we inches from the	nber three (M-130-3) has been modified by a elded between fins 25 and 50 and between fi ne bottom of the container. The cooling fins in nent of the plate directly to the outer shell of t	ins 110 and 135 at approximately 14.75 n this localized area are removed to	
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**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 5 - Certificate No. 6003 - Revision No. 19 - Docket No. 71-6003

- 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 the contents specified in 5(b)(1)(xvi) only.
- 13. Deleted.
- 14. Expiration date: September 30, 2002.

### REFERENCES

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

Supplements: Naval Reactors (NR) letters A#2256 dated February 24, and G#1931 dated March 3, 1969: General Electric Company (GE) letter ONP-74520-526 dated April 3, 1972; NR letter G#3207 dated April 27, 1972; GE letter ONP-74520-528 dated April 28, 1972; NR letter G#3250 dated June 6, 1972; GE letters ONP-74570-635 dated October 25, ONP-74570-654 dated December 4, and ONP-14570-666 dated December 12, 1972; ONP-74570-682 dated January 12, ONP-74570-698 dated January 31, ONP-74570-687 dated February 6, ONP-74390-65 dated March 26, and DLGN-85570-854 dated September 24, 1973; and DLGN-85570-901 dated January 10, 1974; NR letter G#4061 dated January 29, 1974; GE letters DLGN-85570-924 dated February 15, DLGN-85570-923 dated March 6, and DLGN-85570-969 dated May 24, 1974; NR letter G#4991 dated November 25, 1975; GE letters ONP-74340-JTT-73 dated December 17, 1975; CGN-85570-1145 dated September 9, CGN-85570-1146 dated September 10, and CGN-85570-1148 dated September 14, 1976; Bettis Atomic Power Laboratory letters WAPD-R(K)-1378 dated August 30, 1976, and WAPD-OP(PP)S-4401 dated June 29, 1979; NR letters G#6197 dated July 13, 1979, G#7022 dated July 14, WAPD-LP-(CES)SE-170 dated July 1981; and WAPD-LD-(CES)SE-181 dated September 1981; WAPD-LP(CES)SE-96 dated February 1982, G#7136 dated March 17, 1982; G#7160 dated May 18, 1982; G#7582 dated September 7, 1983; G#C87-5692 dated September 2, and G#C87-5689 dated September 23, 1987; G#C87-8008 dated January 19, G#C88-5931 dated May 12, and G#C88-5961 dated July 25, 1988; G#C89-2825 dated March 29, and G#C89-2863 dated August 11, 1989; G#C92-03392 dated March 30, and G#92-03729 dated October 20, 1992; G#C93-10935 dated October 8, 1993; G#96-03344 dated March 6, and G#96-03610 dated December 9, 1996; G#97-03543 dated July 10, and G#C97-03685 dated December 19, 1997.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles J. Haughney, Acting Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: March 12 , 1998

			ATE OF COMPLIANCE		UCLEAR REGUL	ATORY COMMISSI
1. a. CERTIFICATE N	UMBER	b. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBE	R	d. PAGE NUMBER	e. TOTAL NUMBER P/
6058		13	USA/6058/B(	) F	1	4
Code of Fede b. This certificat	ral Regulations, Part 71, "Pacl e does not relieve the consign	caging and Transportati or from compliance wit	described in Item 5 below, meets the app on of Radioactive Material." h any requirement of the regulations of th untry through or into which the package	юU.S. E	Department of Trans	
3. THIS CERTIFICATI a. ISSUED TO (No	IS ISSUED ON THE BASIS OF me and Address)	A SAFETY ANALYSIS R	EPORT OF THE PACKAGE DESIGN OR AF	PLICATI R APPLIC	ON ATION:	
	t of Energy n, DC 20585		ntichem, Inc., applica rch 31, 1985, as suppl			
		c. DO	CKET NUMBER 71-6058			
	conditional upon fulfilling the	requirements of 10 CF	R Part 71, as applicable, and the condition	ns speci	fied below.	
5. (a) Paci	aging					
(a) Pac (1)	<pre>kaging Model No.: B</pre>	-3				
(2)	Description	nter State State State State State				
<ul> <li>The packaging consists of a lead shielded steel weldment in the a right hollow cylinder with a bottom and a recessed, plug typ and bolted lid. The packaging provides a minimum of 6 inches shielding. Packaging features include lifting and tie-down de drain to the central cavity. The maximum weight of the loaded is 30,000 pounds.</li> <li>The outer shell is of a laminated steel construction and is 41 diameter and 57 inches high. The two laminates are of plate m 1/2-inch and 1/4-inch in thickness. The inner shell is of 1/2 steel plate. The internal cavity dimensions are 26-1/2 inches diameter and 43-1/4 inches high. The lid is of the same const the sides and bottom and is secured to the body of the packagit twelve, 1-1/4-inch diameter by 2-inch long high strength bolts with a silicone O-ring.</li> <li>(3) Drawing</li> <li>The packaging is as described and constructed in accordance wi Cintichem, Inc. Drawing No. 330E2053E, Revision E.</li> </ul>						of lead vices and a packaging inches in terial vinch thick in vuction as og by
(2)	Drawing					
(3)						
(3)			bed and constructed in . 330E2053E, Revision		ordance wit	:h

NRC FOR: (3-96)	M 618A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
,	Page 2	- Certificate No. 6058 - Revision No. 13 - Docket No. 71-6058
(b)	Cont	ents
	(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 (24-inch 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)(iii):
		The HIC must be limited to 200 $A_2$ quantities of solidified liquid radioactive material and not more that 50 $A_2$ quantities of other 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 Maximum per <u>Material Package (grams)</u>
		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.
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	NRC FORM (3-96)	618A			CONDITIONS (contin	uued)	U.S. NUC	LEAR REGULA	TORY COMMISSIO	
	F	Page 3	- Certifica	te No. 6058	- Revision N	lo. 13 - Docke	et No.	71-6058		<u>र भार भूत स</u>
	5.	(c)	Transport	Index for C	riticality Co	ntrol				
			For conten	ts containi	ng special nu	clear materia	11:			
			Minimum tr on label f	ansport ind or nuclear	ex to be show criticality c	n ontrol:		10.0		
	6.	For g shie cavit	lding may be	ng special added as r	form material equired as a	s, at least 5 lining on all	inche sides	es of addin s within tl	tional lead he internal	
	7.	The trequ	total weight ired shall n	of the con ot exceed 9	tents includi ,000 pounds.	ng additional	lead	shielding	as may be	
	8.	repla	r to each sh aced with a m hs, whicheven	new O-ring	if inspection	hall be inspe shows any de	cted. fects	The O-rin or every 1	ng shall be twelve (12)	Z.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A
	9.	Prior leak	r to the shi tested as s	pment of con pecified in	ntents descri Section I of	bed in 5.(b)( the applicat	1)(i), ion.	the packa	age must be	
	10.	In ac	ddition to t	ne requirem	ents of Subpa	rt G of 10 CF	R Part	71:		
		(a)	Each packag application	ge shall be n, as supple	maintained in emented; and	n a <b>ccord</b> ance	with S	ection I c	of the	
111		(b)	Each packag with Sectio	ge shall be on I of the	operated and application,	prepared for as supplemen	shipm ted.	ent in acc	cordance	
	11.	Fabri	ication of ac	lditional pa	ackagings is i	not authorize	d.			11.11.11
	12.	The p the g	backage autho general licer	orized by th nse provisio	nis certifications of 10 CFR	te is hereby §71.12.	approv	ed for use	e under	11.11
	13.	Expir	ation date:	December 3	31, 2000.					12023
ORANGAN SAANA ANA ANA ANA ANA ANA ANA ANA ANA										<u> </u>
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					67					UTATION AND A DECIMAL OF A DECI
			23,23,23,23,23,23	2302302302302302		2122212121221	23(22) 23	23,225,225,225,225	28, 28, 28, 28, 28, 2	

NRC FORM 618A (3-96)

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 4 - Certificate No. 6058 - Revision No. 13 - Docket No. 71-6058

#### **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, and November 20, 1995.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

William D. Travers, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date:

(8-2000) 10 CFR 71	RM 618			U.S. NUCLEAR REGULATORY CON CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIAL PACKAGES							
1. a.C	ERTIFICATE	NUMBER	<b>b. REVISION NUMBER</b>	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGE			
		6078	28	71-6078	USA/6078/AF	1	OF				
a	AMBLE This certific Title 10, Co	ate is issued to certify the de of Federal Regulation	at the package (packaging is, Part 71, "Packaging and	and contents) described Transportation of Radio	d in Item 5 below meets the applicable bactive Material."	safety stand	ards set	forth			
é	applicable i	egulatory agencies, inclu	iding the government of an	y country through or into	the regulations of the U.S. Departme which the package will be transported	3.	rtation or	other			
3. THIS	CERTIFIC	ATE IS ISSUED ON TH	E BASIS OF A SAFETY	ANALYSIS REPORT OF	F THE PACKAGE DESIGN OR APP	LICATION					
al	ISSUED TO	) (Name and Address)		b. TITLE AND I	DENTIFICATION OF REPORT OR A	PPLICATIO	N				
4. CON	P.O. Bo Pittsbur DITIONS	gh, PA 15230-03	55		9, 1996, as supplemente						
5.	···			- 55 (2							
(a)	Packa	aging									
	(1)	Model Nos.: 92	27A1 and 927C1		\$ /// <b>S</b>						
	(2)	assembly, shoe 3/16" thick, hig strongback. Th segments to fo Model No. 927 approximate gi	* mounted to a sto h carbon steel seg ne segmented sep rm a continuous b A1 package is app ross weight of 6,70	eet outer contain mented separato arator blocks are lock for the entire roximately 43" in 10 lbs. The Mode	f a strongback and fuel bu er. The fuel bundles are s in blocks permanently attac 6" x 8" and are installed ( active length of the fuel a diameter by 189" long wit el No. 927C1 package is a gross weight of 7,300 lbs.	eparated ched to th welded) in issembly. h an	by ne n . The				
		45 in diameter	by 210 long with	anapproximato	g.000		·				
	(3)	Drawings			e constructed in accordance	e with					

- (1) Type and form of material
  - (i) <u>Model No. 927A1</u>: unirradiated fuel bundles consisting of 0.38" diameter uranium dioxide fuel pellets clad in 0.028" 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 5.0 w/o enrichment in the U-235 isotope, and contains not more than 19.6 kg U-235.

NRC FORM 618			U.S. NUCLEAR REG	ULATOR	Y COMM	ISSION		
(8-2000) 10 CFR 71	CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIAL PACKAGES							
1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES		
6078	28	71-6078	USA/6078/AF	2	OF	3		

# 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) <u>Model No. 927A1</u>: unirradiated fuel bundles consisting of 0.33" diameter uranium dioxide fuel pellets clad in 0.025" thick zircaloy tubes in a 16 x 16 square array with a 0.506" pitch. Each fuel bundle consists of a maximum of 236 fuel rods with a maximum 5.0 w/o enrichment in the U-235 isotope, and contains not more than 20.76 kg U-235.
- (iv) <u>Model No. 927A1</u>: unirradiated fuel bundles consisting of 0.31" diameter uranium dioxide fuel pellets clad in 0.024" thick zircaloy 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 w/o enrichment in the U-235 isotope, and contains not more than 11.68 kg U-235.
- (v) <u>Model No. 927C1</u>: unirradiated fuel bundles consisting of 0.33" diameter uranium dioxide pellets clad in 0.025" thick zircaloy tubes in a 16 x 16 square array with a 0.506" pitch. Each fuel bundle consists of a maximum of 236 fuel rods with a maximum 5.0 w/o enrichment in the U-235 isotope, and contains not more than 22.77 kg U-235.
- (vi) <u>Model No. 927C1</u>: unirradiated fuel bundles consisting of 0.324" diameter uranium dioxide fuel pellets clad in 0.0235" thick zircaloy tubes in a 17 x 17 square array 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

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

Model No. 927C1: Two fuel bundles weighing not more than 1506 lbs. each.

(c) Transport Index for Criticality Control

Minimum transport index to be shown on label for nuclear criticality control: 15.7

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.

1	NRC FORM 618	ULATORY COMMISSION					
	(8-2000) 10 CFR 71	LIANCE PACKAGES					
1	1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
	6078	28	71-6078	USA/6078/AF	3	OF	3

- 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 of Chapter 7 of the application, as supplemented.
  - (b) The packaging must be maintained in accordance with the Maintenance Program of Chapter 8 of the application, as supplemented.
- 8. Fabrication of additional packagings is not authorized.
- 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, 2005.

## REFERENCES

Combustion Engineering, Inc. application dated July 9, 1996.

Supplements dated May 7, June 2, June 5, June 19, July 31 and August 14, 1998.

ABB Combustion Engineering Nuclear Power, Inc. supplement dated June 10, 1999.

ABB C-E Nuclear Power, Inc. supplements dated: March 28, and April 4 and 12, 2000.

CE Nuclear Power, LLC supplements dated: September 7 and 14, 2000.

Westinghouse Electric Company LLC supplement dated: September 18, 2000.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

GUllion Srach

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: October 10, 2000

	NRC FORM 618	ULATORY	COMM	ISSION				
	(8-2000) 10 CFR 71 CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIAL PACKAGES							
	a. CERTIFICATE NUMBER	b. REVISION NUMBER	C. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES	
K	6206	26	71-6206	USA/6206/AF	1	OF	3	

- 2. PREAMBLE
  - a. This certificate is issued to certify that the package (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 country through or into which the package will be transported.
- 3. 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

Framatome Cogema Fuels P.O. Box 11646 Lynchburg, VA 24506-1646 B&W Fuel Company application dated April 23, 1990, as supplemented.

#### 4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

- (a) Packaging
  - (1) Model No.: Model B
  - (2) Description

A fuel assembly shipping container consisting of a steel strongback clamping assembly, shock mounted to a steel outer container. Two, 3/16-inch thick, 8-5/8-inch high and full length stainless steel plates containing 1.5% minimum boron are positioned between adjacent fuel assemblies. The outer container is approximately 40 inches in diameter by 200 inches long. Gross weight of the loaded container not to exceed 7,600 pounds.

#### (3) Drawings

The container is constructed in accordance with Framatome Cogema Fuels Drawing Nos. 1273422, Rev. 0; 1273423, Rev. 0; 1273424, Rev. 0; 1273425, Rev. 0; 1273426, Rev. 0; and 1273427, Rev. 0.

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

Unirradiated, sintered  $UO_2$  pellets in fuel rods. The maximum inner diameter and the minimum outer diameter of the fuel rod cladding, guide tubes and instrument tubes are in accordance with Table 3 of B&W Fuel Company supplement dated October 27, 1995; and the minimum guide tube outer diameter and minimum wall thickness are in accordance with Framatome Cogema Fuels supplement dated February 7, 1996. The locations of the guide tubes and instrument tubes are in accordance with Figures 2 through 5 of B&W Fuel Company supplement dated October 27, 1995. The rods are assembled into fuel assemblies. The fuel assemblies may contain inserted control rod assemblies.

5. (b)(1) Contents (continued)

NRC FORM 618 **U.S. NUCLEAR REGULATORY COMMISSION** (8-2000) 10 CFR 71 CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIAL PACKAGES a. CERTIFICATE NUMBER b. REVISION NUMBER c. DOCKET NUMBER d. PACKAGE IDENTIFICATION NUMBER PAGE PAGES 6206 71-6206 26 USA/6206/AF 2 OF 3 Fuel assemblies as described above have the following specifications: Assembly Type 15x15 <u>15x15</u> 15x15 17x17 <u>17x17</u> <u>15x15</u>

No. fuel rods	208	208	208	264	264	204
No. non-fuel tubes	17	17	17	25	25	21
Fuel rod pitch, in.	0.568	0.568	0.568	0.496	0.502	0.563
Maximum fuel pellet OD, in.	0.3707	0.3742	0.3622	0.3232	0.3252	0.3671
Tube material	Zr-4	Zr-4	Zr-4	Zr-4	Zr-4	Zr-4
Maximum active fuel length, in.	144	144	144	145.825	144	144
Maximum enrichment w/o U-235	5.05	5.05	4.98	5.05	5.05	5.05
Maximum U-235 Loading (kg)	25.1 <b>978</b>	25.6758	23.7220	24.3108	24.6126	24.2355

(2) Maximum quantity of material per package

Two fuel assemblies. Total quantity of radioactive material within a package may not exceed a Type A quantity.

(c) Transport Index for Criticality Control

Minimum transport index to be shown on label for nuclear criticality control:

- 6.3
- 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 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.
- 7. There must be a bow clamp to restrain each spacer grid and end fitting. The ratio of assembly weight to the number of clamp bows must not exceed 168 pounds per clamp.
- 8. The weight of the contents (fuel assemblies, control rods, spacers, etc.) must not exceed 3,360 pounds.
- 9. Fabrication of additional packagings is not authorized.

			U.S. NUCLEAR REG	ULATORY	COMMI	ISSION
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- 10. In addition to the requirements of Subpart G of 10 CFR Part 71, the package shall be operated and maintained in accordance with Section 7.0 of the 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: September 30, 2005.

## 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 8, May 2, and November 23, 1994; February 26, March 17, April 7, July 31, October 27, and December 1, 1995.

Framatome Cogema Fuels supplements dated February 7, 1996 and January 20, March 19 and 26, and il 17, 1998, and August 29, and September 8, 2000.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Fullham Crach

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: September 28, 2000

			MANA MANA	ST(ST(			
NRC FORM 618 (3-96) 10 CFR 71					U. ATE OF COMPLIANCE IIVE MATERIALS PACKAGES	S. NUCLEAR REGL	ILATORY COMMISSION
1. a. CERTIFICATE N	MBER	] ,			c. PACKAGE IDENTIFICATION NUMBER	d PAGE NUMBE	R e. TOTAL NUMBER PAG
6280				7	USA/6280/B()	1	2
2. PREAMBLE						I	
a. This certificat Code of Feder	al Regulations, Pa	rt 71, "Packag	ging and Trans	sportation	escribed in Item 5 below, meets the applica n of Radioactive Material."		
applicable reg	ilatory agencies, i	ncluding the g	government of	any cou	any requirement of the regulations of the U ntry through or into which the package wil	be transported.	nsportation or other
3. THIS CERTIFICATE a. ISSUED TO (Nat		E BASIS OF A	SAFETY ANAI		PORT OF THE PACKAGE DESIGN OR APPLI E AND IDENTIFICATION OF REPORT OR A		
1010 Arr	pherd and A oyo Avenue hando, CA	•	S		Shepherd and Associates and September 5, 1979, as su		
Jairren				c. DOC	KET NUMBER 71-6280		
4. CONDITIONS This certificate is	conditional upon f	fulfilling the r	equirements o	f 10 CFF	R Part 71, as applicable, and the conditions	specified below.	
5.				<u></u>			
(a)	Packaging	en e				<b>`</b> ,	
	(1) Mod	el No.: A	-0109 Irra	adiato	or in A-0117 Overpack		
	(2) Desc	cription	•				
	The top p abso ft. de The spac dime the s	irradiator olug closu orbing and ensity, 12 void betw ers. The ensions of	is a right ire. The d thermal inches the veen the i overpac f the pack	cyline overp insula nick of rradia k cove kage a	n outer protective enclosure der, 31 inches diameter by 3 ack is a double-walled steel ation core of glue-bonded lay n the sides). The irradiator i ator and inside wall of the over er is secured by 30, 5/8-inch are 50.5 inches diameter by 00 lbs and the weight of the	6 inches high, cylinder enclos yers of balsa w s held in place erpack is filled diameter bolts 73 inches long	with a bolted ing a shock ood (11 lbs/cu at each end. with hardwood . The . The weight of
			··· .				
	(3) Drav	vings					
	Asso 3, 19	ociates Di 970; A-01	r <mark>awing N</mark> o 09-20, da	os.: A ated F	are constructed in accordan A-0109-A1, dated June 6, 19 ebruary 5, 1970; A-0117-B, A-0117-C1, dated April 2, 19	69; A-0109-10, change D (not	dated February

C FORM	4 618A			<b>CONDITIONS</b> (continued)	)	U.S. NUCLEAR REGULATORY COMMIS	Sł
Pag	je 2 - (	Certifica	ate No. 6280 - Revis	sion No. 7 - Docket No	o. 71-6280		
5.	(b)	Conte	ents			-	
		(1)	Type and form of	material			
			source(s) is in an	annular configuration	approximate	c welded in stainless steel. The ly 6 inches in diameter by 6 ents for special form radioactive	
		(2)	Maximum quantity	of material per pack	age		
			30,000 curies				
6.	the c hole mus	buter sh s each, t be sea	ell (two each in the at 90° separation, v	I by the addition of no top cap and cap side, with each tier located	t less than 14 , two in the b about one fo	4-1/4-inch diameter vent holes i ottom, and in two side tiers of 4 ot from each end). The holes affect their capability of venting	•
7.	in ac	dition t	o the requirements	of Subpart G of 10 Cl	FR Part 71:	ginana . ginana	
	(a)	The p in the	ackage must be ma J. L. Shepherd and	aintained in accordance Associates submittal	ce with the M I dated Febru	aintenance Program described lary 2, 1990.	
	(b)	Opera	backage must be pro ating Procedures de Jary 2, 1990.	epared for shipment a scribed in the J. L. Si	nd operated hepherd and	in accordance with the Associates submittal dated	
8.			pe authorized by this of 10 CFR §71.12.	s certificate is hereby	approved for	use under the general license	
9.	Expi	ration d	late: February 28, 2	005.			
			- 54	REFERENCE	<u>is</u>		
J. L	She	pherd a	and Associates' app	lication dated Septem	ber 5, 1979.		
Su  Fel	pplem oruary	ents da 2, 1990	ted: November 29 0, December 6, 199	and December 31, 19 4, and December 29,	84, January 1999.	16, 1985, November 22, 1989,	
			F	OR THE U.S. NUCLE		ATORY COMMISSION	
			4	William Grant			
			E S C	William Brach, Direct pent Fuel Project Offi Office of Nuclear Mate and Safeguards	ice		
Da	te	Mar	L 2, 202				
•					'6 [']		

	NRC FORM 618	U.S. NUCLEAR REG	ULATORY	COMM	ISSION					
	NRC FORM 618 (#2000) 10 CFR 71 U.S. NUCLEAR REGULATORY COMMISSI									
''		FOR RADIOACT	IVE MATERIAL P.							
	1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES			
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#### 2. PREAMBLE

- a. This certificate is issued to certify that the package (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 country 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 3.
  - a. ISSUED TO (Name and Address)

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Combustion Engineering, Inc. application

dated July 27, 1990, as supplemented.

Westinghouse Electric Company LLC P.O. Box 355 Pittsburgh, PA 15230-0355

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

- 5.
  - (a) Packaging
  - (1) Model No.: UNC-2901
  - (2) Description

A maximum 10.80-inch square by 30-inch long inner container constructed of minimum 14-gauge steel, with bolted and gasketed top flange closure and sealed welded bottom sheet. Inner container is centered and supported in a 22.5-inch ID by 34-inch high 18-gauge steel drum with 16-gauge head and DOT Specification 17H closure by aspestos or ceramic sheet, plywood, hardboard, and insulating material. Gross weight of the package is 660 pounds. (e ye ye P

(3) Drawings

The packaging is constructed in accordance with Combustion Engineering, Inc., Drawing Nos. D-5007-8086, Rev. 6, and B-5007-8112, Rev. 1.

- (b) Contents
- (1) Type and form of material
  - (i) Sintered uranium oxide pellets and rejected pellets enriched to a maximum 5.0 w/o in the U-235 isotope.
  - (ii) Uranium oxide as powder enriched to a maximum 5.0 w/o in the U-235 isotope.
  - (iii) U₃O₈ powder, placed in polyethylene bags then pressed and compacted into blocks, with a maximum enrichment of 4.5 w/o in the U-235 isotope. Water may be injected into the blocks.

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### 5. (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 Compustion Engineering, Inc. Drawing Nos. NPM-C-3389, Rev. 0 or Rev. 3, and NFM-D-4750, Rev. 1.

- (c) Transport Index for Criticality Control
  - (1) For the material described in Items 5(b)(1)(i) and 5(b)(1)(ii):

Minimum transport index to be shown on label for nuclear criticality control: 0.5

(2) For the material described in Item 5(b)(1)(iii):

Minimum transport index to be shown on label for nuclear criticality control 1.3

6. Prior to each shipment the insert (containment vessel) gasket shall be inspected. This gasket shall be replace if inspection shows any defects.

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- 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. For the contents specified in 5(b)(1)(iii), the packaging may be constructed in accordance with Combustion Engineering, Inc., Drawing Nos. D-5018-8454, Rev. 1 and D-5007-8112, Rev. 1.
- 10. 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 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, 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: March 31, 2001.

## REFERENCES

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

Supplements dated: October 19, 1990; January 27, and July 28, 1994; August 17, 1995; and July 14, 1998.

ABB Combustion Engineering Nuclear Power, Inc., supplement dated June 10, 1999.

ABB C-E Nuclear Power, Inc. supplements dated: March 28, and April 4 and 12, 2000.

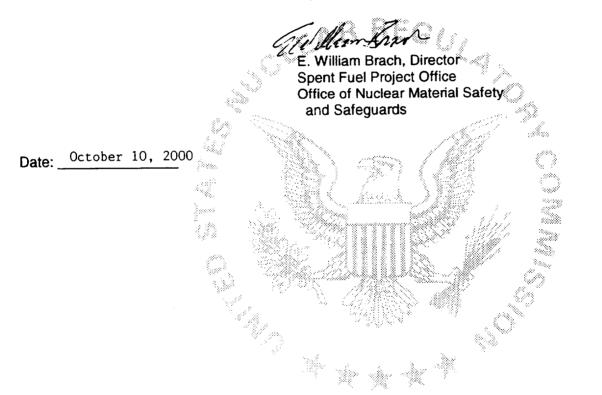
	NRC FORM 618			U.S. NUCLEAR REG	ULATOR	YCOMM	ISSION
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4	1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
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# REFERENCES con't.

CE Nuclear Power, LLC supplement dated: September 14, 2000.

Westinghouse Electric Company LLC supplement dated: September 18, 2000.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION



NRC FORM 618 (3-96)	CEDTIFIC		U.S	NUCLEAR REGUL	ATORY COMMISSIO
10 CFR 71			MPLIANCE IALS PACKAGES		
1. a. CERTIFICATE NUMBER			ENTIFICATION NUMBER	d PAGE NUMBER	e. TOTAL NUMBER PAG
6346					
2. PREAMBLE	27		USA/6346/B()F	1	5
a. This certificate is issued to certify that Code of Federal Regulations, Part 71,	the packaging and contents Packaging and Transportati	described in Item on of Radioactive	5 below, meets the applicabl Material."	e safety standards set i	forth in Title 10,
b. This certificate does not relieve the con applicable regulatory agencies, includir	signor from compliance wit g the government of any co	h any requirement untry through or i	of the regulations of the U.S nto which the package will b	Department of Trans e transported.	portation or other
3. THIS CERTIFICATE IS ISSUED ON THE BASI a. ISSUED TO (Name and Address)			CKAGE DESIGN OR APPLIC CATION OF REPORT OR APP		
Chem-Nuclear Systems, 140 Stoneridge Drive Columbia, SC 29210	а	pplicatior	vice Company of dated March 28		supplemented
	c. DO	CKET NUMBER	71-6346		
4. CONDITIONS This certificate is conditional upon fulfillin	g the requirements of 10 CF	R Part 71 as anni	cable and the conditions sn	ecified helow	
5.			cable, and the conditions sp		
	4.4				
(a) Packaging					
(a) Packaging					
(1) Model No.:	FSV-1				
(2) Descriptio	n katalan National				
•					
The cask b except for	ody is a cylind the top flange	er 208-inc area, whi	sed, depleted L hes long and 28 ch is 31 inches in diameter an	inches in c in diameter	liameter, . The
depending solid, non lid consis thick deple 1.25-inch o seal ring l require an steel shie	on contents. C fissile irradi ing of a 3.75- eted uranium sh liameter fasten between the out inner containe	onfigurati ated hardw inch thick ield. The ers. The er lid and r. Configu er plate.	n configuration ons A, B, C, an are. These con stainless stee lid is bolted primary seal is cask body. Co ration C uses a Configuration plate.	d D are used figurations l plate and to the cask a silicone nfiguration supplementa	I to ship use an outer a 2.25-inch body by 24 elastomeric B does not I stainless
reactor (H inner conta Rev. C, and container 4.15-inches by 12 0.5-i elastomeric	GR) fuel element iner (as shown GADR 55-2-2, f id is a stainle thick. The in nch diameter fa seal ring betw	nts. This in Genera Rev. A) as ess steel nner lid i asteners. ween the i	t St. Vrain (FS configuration l Atomic Drawin the containmen shell containin s secured to th The primary se nner lid and in impact limiter	uses the sta g Nos. GADR t vessel. T g depleted u e inner cont al is a sili ner containe	inless steel 55-2-1, he inner ranium ainer body cone r body.
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NRC FORM 618A (3-96)	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
Page 2 - Ce	rtificate No. 6346 - Revision No. 27- 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 24 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)	Drawings
	The FSV-1 package is constructed in accordance with the following drawings:
	<u>Configuration A</u>
	National Lead Company Drawing Nos.: 70086F, Rev. 7; 70296F, Rev. 2; and General Atomics Drawing No. 1501-003, Rev. C.
	Configuration B
	Same as for Configuration A except that an inner container is not required.
	<u>Configurations C and D</u>
	In addition to the drawings for Configuration A, General Atomics Drawing Nos. GADR 55-2-10, Issue D, and GADR 55-2-14, Issue N/C (optional). Configuration C 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 carbon steel shield ring and cover plate constructed in accordance with Drawing No. GADR 55-2-11, Issue A.
	<u>Configuration E</u>
	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.
	<u>Configurations F and G</u>
	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.
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# NRC FORM 618A **CONDITIONS** (continued) **U.S. NUCLEAR REGULATORY COMMISSION** (3-96) Page 3 - Certificate No. 6346 - Revision No. 27- Docket No. 71-6346 5. (b) Contents (1)Type and form of material Irradiated fuel elements consisting of graphite body, hexagonal in (j) 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 (ii)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 mass limits of 10 CFR §71.53 and neutron source components, or (iii) Solid, nonfissile, irradiated and contaminated hardware which has been removed from the Fort St. Vrain High Temperature Gas Cooled Reactor and the surface contamination does not exceed 51 millicuries per package. (2)Maximum quantity of material per package Decay heat not to exceed 4.1 kw and: (i) Item 5(b)(1)(i) above: Six fuel elements each containing a maximum of 1.4 kg of enriched uranium, having a thorium/uranium ratio greater than 8.1:1 and weighing approximately 300 pounds. The gross weight of the cask cavity contents, including the component spacers, inner container. and irradiated fuel elements shall not exceed 4,430 pounds. Contents must be shipped in Configuration E. (ii) Item 5(b)(1)(ii) above: The gross weight of 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 pounds. Contents must be shipped in Configurations 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 Configurations F or G.

2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**, 2**8**,

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5.	(c)	Transport Inc	lex for Criticality Control	
		Minimum trans label for nuc	port index to be shown on lear criticality control:	100
6.	shipp	ing the conter	ate component spacers must its described in paragraph {	be used in the cask cavity when 5(b) to limit movement of contents
7.	rate i purpo:	measured on th se of this rec	he surface of the package mu puirement, the surface of an	ust not exceed 200 mr/hr. For the 📲
8.	the c rate	ontents descri does not excee	bed in Item 5(b)(1)(ii) or ed 500 watts. The applicab	reinforced plastic when shipping (iii) provided the heat generation le requirements of 10 CFR §71.87
9.	Use o	f packaging fa	bricated after August 31, 1	
10.	In ad	dition to the	requirements of Subpart G of	of 10 CFR Part 71:
	(a)	prepared for Procedures of The package s	shipment and operated in a Section 7.0, Volume I, of shall be maintained in acco	cordance with the Operating the application, as supplemented. rdance with the Maintenance Program
	(b)	prepared for Procedures of The package s	shipment and operated in a f Section 7.0, Volume II, o shall be maintained in acco	cordance with the Operating f the application, as supplemented. rdance with the Maintenance Program
	(c)	The main flam any use of th defect.	nge seals must be replaced the packaging and must be re	within twelve (12) months prior to placed if inspection shows any ner primary plug in Configuration E
	(d)	must be repla	aced within the twelve (12)	
			84	
	NRC FORM 6 (3-96) Раде 4 5. 6. 7. 8. 8.	NRC FORM 618A Page 4 - Ce 5. (C) 6. As ner shipp durin 7. For t rate f purpo consi 8. The M the c rate must 9. Use o 10. In ad (a) (b)	<ul> <li>NRC FORM 618A <ul> <li>(3:96)</li> <li>Page 4 - Certificate No.</li> <li>5. (c) Transport Incombinity International Internation International Internation International Internation International Internation International International Internation International Internation International Internation Inter</li></ul></li></ul>	<ul> <li>Page 4 - Certificate No. 6346 - Revision No. 27- Doc</li> <li>5. (c) Transport Index for Criticality Control Minimum transport index to be shown on label for nuclear criticality control:</li> <li>6. As needed, appropriate component spacers must shipping the contents described in paragraph 5 during shipment.</li> <li>7. For transport of the contents of Item (b)(1)( rate measured on the surface of the package m purpose of this requirement, the surface of at considered the surface of the package.</li> <li>8. The Model No. FSV-1 cask may be wrapped with i the contents described in Item 5(b)(1)(ii) or rate does not exceed 500 watts. The applicab must be satisfied prior to wrapping the cask.</li> <li>9. Use of packaging fabricated after August 31. 1</li> <li>10. In addition to the requirements of Subpart 6 of The package shall be maintained in acco in Section 8.0, Volume I. of the applic</li> <li>(b) Configurations E. F. and G of the Model prepared for shipment and operated in a Procedures of Section 7.0, Volume I. of The package shall be maintained in acco in Section 8.0, Volume I. of the applic</li> <li>(c) The main flange seals must be replaced any use of the packaging and must be re defect.</li> <li>(d) The silicone 0-ring on the inner contai must be replaced within the twelve (12) packaging and must be replaced if inspendent of the package if the package if the packaging and must be replaced if the packaging and must be replaced if inspendent of the packaging and must be replaced if inspendent of the packaging and must be replaced if inspendent of the packaging and must be replaced if inspendent of the packaging and must be replaced if inspendent of the packaging and must be replaced if inspendent of the packaging and must be replaced if inspendent of the packaging and must be replaced if inspendent of the packaging and must be replaced if inspendent of the packaging and must be replaced if inspendent of the packaging and must be replaced if inspendent of the packaging and must be replaced if inspendent</li></ul>

NRC FORM 618A (3-96)

**CONDITIONS** (continued)

Page 5 - Certificate No. 6346 - Revision No. 27- Docket No. 71-6346

- 11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 12. Effective date: June 13, 1997 Expiration date: May 31, 2001.

## REFERENCES

Public Service Company of Colorado application dated March 28, 1996, as supplemented by Chem-Nuclear Systems, L.L.C. letter dated May 19, 1997.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

William F. Kane, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: July <u>10</u>, 1997

CORRECTED PAGE 5

NRC FORM (3-96) 10 CFR 71	1 618				U.S. I MPLIANCE IALS PACKAGES	NUCLEAR REGUL	ATORY COMMISSIO			
1. a. CERTIFI	CATE NUME	BER	b. REVISION NUMBER c. PACKAGE IDENTIFICATION NUMBER d. PAGE NUMBER c. TOT. 9 USA/6347/AF 1							
6347			9	1	2					
2. PREAMBL	E			1	· · · · · · · · · · · · · · · · · · ·		I			
		issued to certify that the pace Regulations, Part 71, "Pack			below, meets the applicable Material."	safety standards set t	forth in Title 10,			
applic	able regulat	ory agencies, including the	government of any cou	ntry through or in	of the regulations of the U.S. to which the package will be	transported.	portation or other			
	IFICATE IS I TO (Name a				CKAGE DESIGN OR APPLICAT					
P.O. 3550			Fe		nic Company Appl , 1982, as suppl		ed			
			c. DOC	KET NUMBER	71-6347					
4. CONDITIO This certif		ditional upon fulfilling the	requirements of 10 CFI	Part 71 as annli	cable, and the conditions spe	cified below				
5.										
	<b>.</b> .									
(a)	Packa	ging								
	(1)	Model No.: F	SV-3							
	(2)	Description								
		steel drum.	Void spaces b tainer are fi	etween th	high, 18-gage s in a 22.5" ID x inner and oute vermiculite. T	r container	and within			
	(3)	Drawing								
		The packaging Drawing No. F	is construct FE-613, Issue	ed in acc D.	ordance with Gen	eral Atomic	Company			
(b)	Conte	nts								
	(1)	Type and form	of material							
		transverse cr high. Dispers maximum 1.41	oss-section a ed in columns kg U-235 plus is about 1:0.	pproximat within t U-238 an 07:8.3.	g of a graphite ely 14.2" across he fuel element d Th-232. The U The atomic ratio	the flats body there -235: U-23	and 31.2" is a 8: Th-232			
	(2)	Maximum quant	ity of materi	al per pa	ckage					
		more than 320 package may n	pounds. Tot ot exceed a T	al quanti ype A qua		e material	within a			
					245, 245, 245, 245, 245, 245, 245, 245,					
				0.6						

NRC FOR (3-96)	M 618A		CONDITIONS (co	ontinued)	U.S. NUCLEAR REGULATORY COMMISSIO
Page 2	2 – Cer	rtificate No. 6347	- Revision No.	9 - Docket No	o. 71–6347
5. (0	c)	Transport Index	for Criticality C	ontrol	
			t index to be sho lear criticality		1.3
6.	In ad	dition to the req	uirements of Subp	art G of 10 C	FR Part 71:
	(1)	The package must		prepared for	shipment in accordance with
	(ii)	Each packaging m Chapter 7 of the	ust meet the Acce application.	ptance Tests	and Maintenance Program of
7.	The p gener	oackage authorized al license provis	by this certific ions of 10 CFR §7	ate is hereby 1.12.	approved for use under the
8.	Expir	ation date: May	31, 2002. <u>REFEREN</u>		
Gener	al Ato	mic Company appli	cation dated Febru	uary 19, 1982	•
Suppl	ements	dated: March 9,	1982, February 24	4, 1992, and	February 28, 1997.
					EGULATORY COMMISSION
			Tan k	? Chappe	R and a second sec
			Lass K. LI	nappell, Chie ertification	t
			Spent Fuel	l Project Off	ice
			Office of and Safe	Nuclear Mate	rial Safety
Date:	Mav	<u>19, 199</u> 7			
		<u> </u>			
			87		

		01010		1051051051051	117 11 ( )17 ( )17 ( )17	<u> </u>		0000000	
	NRC FORM 61 (3-96) 10 CFR 71	8			FICATE OF		LIANCE	S. NUCLEAR REG	ULATORY COMMISSION
	1. a. CERTIFICATI	E NUMBEI	^R 6357		UMBER C. PACKA			d. PAGE NUMB	ER e. TOTAL NUMBER PAGES
	Code of Fo b. This certific applicable 3. THIS CERTIFIC	ederal Reg icate does regulatory ATE IS ISS	sued to certify that the p gulations, Part 71, "Pacl not relieve the consign y agencies, including th UED ON THE BASIS OF	kaging and Trans or from compliar e government of	portation of Radios ace with any requir any country throug YSIS REPORT OF T	active Materia ement of the r sh or into whic HE PACKAGE	l." egulations of the U th the package will	J.S. Department of Transported.	
	a. ISSUED TO (Name and Address) Babcock & Wilcox Company P.O. Box 785 Lynchburg, VA 24505			any	c. DOCKET NUME	Babcock dated F		Company app	lication
	4. CONDITIONS This certificate	e is condit	ional upon fulfilling the	e requirements of		a. An t ^{ar} th		specified below.	
	5.	Dack	aging						······································
	(a)	(1)	Model No.:	NNFD-10					
	(2) Description								
			with a screw	es high, o w-type cap entered a	constructed and a we nd supporte	d from a ded bot ed in a	5-inch so tom plate. 55-gallon	cheduled 40	steel pipe inment
			The nominal	gross we	ight of the	e packag	ing and co	ontents is 3	50 pounds.
		(3)	Drawing	11				Babaaak and	Wilcox
			Fuel Compan	y Drawing	No. 11987(	67E.		Babcock and	
CILVIT/II/II/	28 (28) 28) 28)	25, 25, 2	<u>11, 281, 281, 281, 281, 281, 281, 281</u>	<u>, 200, 200, 200, 200, </u>	25, 22, 23, 23, 23, 23,	88	285, 285, 285, 285, 28	<u>(, 28), 28(, 28), 28), 28), 28)</u>	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

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	IRC FORM 618A CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISS	ON
	Page 2 - Certificate No. 6357 - Revision No. 7 - Docket No. 71-6357	
VII VII	5.(b) Contents	
	(1) Type and form of material	
	Uranium metal, alloys or compounds. Uranium may be enriched to any degre 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. Maximum quantity of radioactive material within the package may not exceed a Type A quantity.	0 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
	(c) Transport Index for Criticality Control	
	Minimum Transport index to be shown on label for nuclear criticality control: 2.1	
	6. In addition 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.	
ĥ.	(b) Each package shall be operated and prepared for shipment in accordance with the Operating Procedures in Chapter 7 of the application.	
	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: April 30, 2001.	ž
ALL A	REFERENCES	A A A A A A A A A A A A A A A
	Babcock & Wilcox application dated February 28, 1991.	
<b>WW</b>	Supplement dated: March 21, 1996.	21.22
	FOR THE U.S. NUCLEAR REGULATORY COMMISSION	21/27
	William Trans	17.17
	William D. Travers, Director	17/12/
	Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards	
		1.11.1
	Date: $4 23 ab$	
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RC FORM 618 3-96)						TE OF CO		U.S. N			
D CFR 71						TVE MATERI					
. A. CERTIFICATE N	UMBER		b	REVISION N	UMBER	c. PACKAGE IDE	NTIFICATION	NUMBER	d. PAGE NU	MBER	e. TOTAL NUMBER PAC
6386				15			<u>USA/63</u>	386/B(U)F	11		3
Code of Fede	eral Regu ite does n	ulations, Part	71, "Packag consignor f	ing and Tran from complia	sportation ince with	escribed in Item 5 n of Radioactive I any requirement	daterial." of the regulation	ions of the U.S.	Department of		orth in Title 10,
THIS CERTIFICAT	E IS ISSU	UED ON THE I			LYSIS RE	ntry through or in PORT OF THE PAG E AND IDENTIFIC	KAGE DESIG	IN OR APPLICAT	10N		
LISSUED TO (Name and Address) U.S. Department of Energy Division of Naval Reactors Washington, DC 20585				S	afety Analys hipping Cor as supplem	sis Repor Itainer da Iented.	rt for 235R ated Augus	001	0,		
					c. DOC	KET NUMBER	71-638	6			
CONDITIONS			fillion the	An inemants	ک ۲۰۰۲ ۲۰	R Part 71, as appli	cable and the	conditions ener	ified below		
		ional upon tul		aquirements (	л 10 CPI	x ran /1, as appn	Laure, and the	. conditions spec	MICA UCIUW.	·	,
•			¢				~~~				
(a) Pa	ackagi	ing	A Star				-	6 <u>6</u> 5			
	•	-							S.		•
(1)	)	Model No	o.: 235F	1001					je.		
	\ <b>'</b>	Decorinti	00	and the second	"The state of the		1 840				
(2)	jl	Descriptio					ويتحقى محم		0		
	a           	and is fat long and dimensio originally the conta of a spec support a	bricated has a m ns are a designe iner has ial fram assembl	from 0.1 naximum approxim ed to shij s been a e assem ies, rodd	04-ind weigh ately 3 p unirr dapted bly an led or	ch thick cart nt of 4,640 p 35.5 inches adiated fue d to ship sta d cradle cla	oon shee oounds, e high by 3 modules ndard siz mps, S3 IG fuel n	t steel. The empty. The 33.0 inches s of the AIC ze or partia G-3 refueli nodules, ar	e contain e oblong ( wide. The A/A4W ty I S8G fue ng modul nd rodded	er is cross he ca pe. el mo es u:	ontainer was Subsequently, idules by use
(3	)	Drawings	ې ۲	9		tin tanan sana sana sana sana sana sana sa	à.	Carlo Carlo			
	1	Drawing Westingh	Nos. 23 nouse E	5R001, I lectric Co	Rev. C orpora	n accordance, 235R004, ition Drawin J076, Rev. (	Rev. C, g Nos. 9	and 235RC	005, Rev.	0, a	nd
5.(b)	Con	itents									
	(1)	Туре а	ind form	n of mate	rial						
		Unirrad	diated fu	uel asser	nblies	of the follow	wing type	es:			
		(i)				out upper n lled on rodd			control r	od, le	eadscrew and

NRC FORM 618A (3-96)		CONDITIONS (continued)	S. NUCLEAR REGULATORY COMMISSI
Page 2	- Certifica	te No. 6386 - Revision No. 15 - Docket No. 71-6386	3
5.(b)(1) cont	inued		
	(ii)	Standard size S8G reactor cluster with regular or and regular control rods. If only one cell is shipp shall be installed for balance.	
	(iii)	Partial size S8G reactor cluster with regular or su regular control rods. If only one cell is shipped po shall be installed for balance.	
	(iv)	S3G-3 refueling cells, with a maximum of one 0-1 container.	I reactor cell assembly per
	(v)	D1G fuel module, rodded. EG	
	(vi)	D1G removable fuel assembly (RFA), unrodded.	
	(vii)	A1G fuel cluster, fueled end only of full A1G reac assembly type is not authorized for transport.	tor cell, rodded. This fuel
	<b>(viii)</b>	D2W side or central fuel cells with control rod and	
	(ix)	D2W corner fuel cells, without shear blocks, unro	dded.
	(X)	D2W side or central fuel cell and shear block with rodded fuel cell.	n control rod inserted in
	(xi)	D2W corner fuel cell, with shear block, unrodded.	
(2	) Maxin (i)	One fuel assembly as described in 5(b)(1)(i), 5(b)	
	(ii)	Two fuel assemblies as described in 5(b)(1)(ii), 5(	
	-	5(b)(1)(vii), 5(b)(1)(viii), 5(b)(1)(ix).	
	(iii)	Four fuel assemblies as described in 5(b)(1)(vi).	
	·	dex for Criticality Control	
		Insport index to be shown on clear criticality control:	
(1)		e contents described in 5(b)(1)(vii) nited in 5(b)(2)(ii):	Not authorized for transport.
		91	

<b>IRC</b> FORM 3-96)	61 <b>8A</b>	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
	Page 3 - C	ertificate No. 6386 - Revision No. 15 - Docket No. 71-6	386
5.(c)	continued		
	(2)	For the contents described in 5(b)(1)(viii), 5(b)(1)(ix), and limited in 5(b)(2)(ii).:	50.0
	(3)	For contents described in 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1) 5(b)(1)(iv), 5(b)(1)(v), 5(b)(1)(vi), 5(b)(1)(x), and 5(b)( and limited in 5(b)(2)(i), 5(b)(2)(ii), and 5(b)(2)(iii):	)(iii), 1)(xi) 25.0

# REFERENCES

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

Supplements: Knolls Atomic Power Laboratory letter A1G 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 A1G 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#5905, 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#68l3, dated October 17, 1980; G#C85-0467, dated July 17, 1985; G#C88-8112, dated October 18, 1988; G#90-03655, dated August 10, 1990; G#92-03560, dated June 15, 1992; G#96-03371, dated March 15, 1996, G#C97-03444 dated April 8, 1997, G#C99-03514, dated June 1, 1999, and G#C99-03688, dated December 30, 1999.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

M. Wayne Holges

Dated: 31 March, 2000

6400	FICATE NUI	MBER	b. REVISION NUMBER	c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER c. TOTAL NUM 1 9	MBER
2. PREAMBI						
a. This Code	certificate e of Federa	is issued to certify that the pace Regulations, Part 71, "Package	ckaging and contents d ging and Transportatio	escribed in Item 5 below, meets the applica n of Radioactive Material."	ble safety standards set forth in Title 10,	
applic	cable regul	atory agencies, including the g	government of any cou	any requirement of the regulations of the L intry through or into which the package will	be transported.	her
a. ISSUE	TIFICATE I D TO (Nami	S ISSUED ON THE BASIS OF A e and Address)	SAFETY ANALYSIS RE	EPORT OF THE PACKAGE DESIGN OR APPLI LE AND IDENTIFICATION OF REPORT OR AF	CATION PLICATION:	
LLC	tinghou C (WEL Box 35	•		estinghouse Electric Corpora Ited August 7, 1981, as supp		
Pittst	ourgh, I	PA 15230-0355	c. DOC	71-6400 KET NUMBER		
CONDITIC This certi		onditional upon fulfilling the re	equirements of 10 CFR	R Part 71, as applicable, and the conditions	specified below.	
			The first			
(a)	Pack	aging				
	(1)	Model No.: 6400				
					ada a	
	(2)	Description				
		inner shell (cavity gauge mild steel. rubber gasket wh in an outer 3/16" t	) is approximat Closure of the ich is bolted to thick steel jack	vides impact and thermal pro- tely 76" x 76" x 172" construct cavity is by a 1/4" thick alun the main inner shell. The ca et by approximately 32" of po	ted of 3/16" thick and 10- ninum plate with silicone vity is centered and suppo lyurethane foam insulation	orte n ai
		inner shell (cavity gauge mild steel. rubber gasket whi in an outer 3/16" t the end and 10" o of polyurethane fo the main outer ste 8' x 20'. Vent hole corner of the oute	) is approximat Closure of the ich is bolted to thick steel jack on the sides. A bam insulation bel jacket. The es are provided r container are	tely 76" x 76" x 172" construct cavity is by a 1/4" thick alunt the main inner shell. The ca et by approximately 32" of po removable section or cap co encased in steel with a silico overall dimensions of the pa d on the sides and ends of th standard I.S.O. steel casting	ted of 3/16" thick and 10- ninum plate with silicone vity is centered and suppo plyurethane foam insulation insisting of approximately the rubber gasket is bolted ickage are approximately to e container. Set into each	orte n a 34' to 8' x
	(3)	inner shell (cavity gauge mild steel. rubber gasket whi in an outer 3/16" t the end and 10" o of polyurethane fo the main outer ste 8' x 20'. Vent hole	) is approximat Closure of the ich is bolted to thick steel jack on the sides. A bam insulation bel jacket. The es are provided r container are	tely 76" x 76" x 172" construct cavity is by a 1/4" thick alunt the main inner shell. The ca et by approximately 32" of po removable section or cap co encased in steel with a silico overall dimensions of the pa d on the sides and ends of th standard I.S.O. steel casting	ted of 3/16" thick and 10- ninum plate with silicone vity is centered and suppo plyurethane foam insulation insisting of approximately the rubber gasket is bolted ickage are approximately to e container. Set into each	orte n al 34" to 8' x
	(3)	inner shell (cavity gauge mild steel. rubber gasket whi in an outer 3/16" to the end and 10" of of polyurethane for the main outer stee 8' x 20'. Vent hold corner of the oute weight of the cont Drawings Packaging is cons Protective Packag 0; or (2) Westingh or (3) Babcock an Packaging, Inc., D modified by Nucle (5) Protective Packag by Sandia Laborat	) is approximat Closure of the ich is bolted to thick steel jacket on the sides. A barn insulation bel jacket. The es are provided r container are ents is 45,000 structed in acco jing, Inc, Drawi iouse Electric C d Wilcox Comp Drawing Nos. 32 ar Packaging I kaging, Inc. Dr tories letter dat	tely 76" x 76" x 172" construct cavity is by a 1/4" thick alunt the main inner shell. The ca et by approximately 32" of po removable section or cap co encased in steel with a silico overall dimensions of the pa d on the sides and ends of th standard I.S.O. steel casting	ving sets of drawings: (1) /. F and 32106, Sheet 2, Rev. 0, at 0, Sheets 1 and 2, Rev. 0, at 0, Sheets 1 at (Sheet 2, Rev. 0, at 0, Sheets 1 at (Sheet 2, Rev. 0, at 0, Sheets 1 at (Sheet 2, Rev. 0, at 0, Sheet 2, Rev	Rev v. 0;

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NRC FORM 618A (3-96)

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**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION 

Page 3 - Certificate No. 6400 - Revision No. 25 - Docket No. 71-6400

5.(b) Contents (continued)

(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/100 cm² prior to fixation or until successive decontamination cleaning operations do not reduce the smearable contamination levels 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 foam 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 heavy 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) Ci 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. 0. 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.

NRC FORM 618A (3-96)

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**CONDITIONS** (continued)

**U.S. NUCLEAR REGULATORY COMMISSION** 

Page 4 - Certificate No. 6400 - Revision No. 25 - Docket No. 71-6400

### 5.(b) Contents (continued)

Sealed packages and boxes of hard waste 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); 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).

- Glove box absolute (HEPA) filters must be double bagged within 12-mil thick PVC, with (3) each bag heat sealed 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); 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 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).
- (4) Soft waste items such as sheeting, gloves, paper, prefilter media, polyethylene bottles, shoe covers, etc., must be double bagged in 12-mil 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).

NRC FORM 618A (3-96)

**CONDITIONS** (continued)

Page 5 - Certificate No. 6400 - Revision No. 25 - Docket No. 71-6400

Page 5 - Certificate No. 6400 - Revision No. 25 - Docket No. 71-6400
5.(9) Contents (continued)
(9) Claution much timust be sealed in a plastic bag and centered and supported in a DOT Specification TJ in a 712-55 gallon steel drum by absorbent material. The 55-gallon drum must be twoede a fissile quantity of 60 grams.
Alternatively, liquid waste is solidified in concrete in maximum size one (1) gallon packages which as the double bagged and the standard drum closure. Each 55-gallon the double bagged and the standard drum closure. Each 55-gallon drum must not exceed a fissile quantity of 60 grams. For drums smaller than 55 gallons, the total fissile quantity of 71 be 717-55 ed (drum (maximum size of 55 gallons). The drum is lined with a sealed plastic liner and equipped with an closure. Each 55-gallon drum that the exceed a fissile quantity of 60 grams. For drums smaller than 55 gallon drum that net exceed a fissile quantity of 60 grams. For drums smaller than 55 gallon drum that the sealed plackages (drums) in one container must not exceed 20 fissile quantity of 61 grams. For drums smaller than 55 gallon drum fuel to exceed 200 (modified or unmodified): enclosed in a tight-fitting 3/16 thick corrugated ateel box constructed in a contrainer maximal Rev. 1 and 908Ef01, Rev. 2 or 908Ef64, Rev. 0 or 908Ef64, Rev. 0 or oneolesed in a tight-fitting No. FC-70016 H, Rev. 2 me space between the drums and the box must be filled with foam (dr." minimum to an initiation set).
(9) Cranium 233 oxide and thorium oxide in the form of intact LWBR-type fuel rods with the second or extensions that the second or extensions and the closen second and thorium oxide in the form of intact LWBR-type fuel rods with the second or aluminum sitm stock.
(9) Cranium 233 oxide and thorium oxide in the form of intact LWBR-type fuel rods with the area of aluminum sitm stock.
(10) Cranium 230 oxide and thorium oxide in the form of intact LWBR-type fuel rods with the area of aluminum s

NRC FORM 618A	CONDITIONS (continued)
(3-96)	
Page 6 - Cer	tificate No. 6400 - Revision No. 25 - Docket No. 71-6400
5.(b) Content	ts (continued)
(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 12 g and 435 Ci of fission products.
	Six (6), 55-gal sealed drum assemblies will be enclosed in a tight-fitting 3/16-in thick corrugated steel box constructed in accordance with Rockwell-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.
	* 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:
	<ul> <li>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);</li> </ul>
	(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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IRC FORM 618A		CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISS
Page 7 - Ce	rtificate	No. 6400 - Revision No. 25 - Docket No. 71-6400	
5.(b) Conten	ts (con	tinued)	
(9)	Maxi	mum of four (4) Cf-252 sources with the following limi	tations:
	(i)	Each source must be doubly encapsulated with the requirements for special form radioactive material;	inner capsule meeting the
	(ii)	The total Cf-252 content must not exceed 6.1 mg;	
	(iii)	The sources must be packaged in a shielded conta WAPD-LP(CE)POB-591 (January 1984); and	iner as described in Chapter 1 of
	(iv)	The decay heat generation from the source materia	al must not exceed one watt.
(10)	chem	pressed krypton-85 gas in mixture with other non-radi nically compatible with the 3AA2015 cylinder. No fissi not apply). Shipment of krypton-85 gas is subject to	e material (Requirement of 5.(c)
	(i)	Radioactivity not to exceed 2,700 curies. Maximum exceed 15 watts. Maximum volume of krypton-85 a shall not exceed 1480 liters at STP (1 atm, 25°C);	
	(ii)	The maximum initial fill pressure shall not exceed 5	00 psig at 25°C;
	(iii)	The DOT Specification 3AA2015 gas cylinder shall of 2,015 psig, at least once every 5 years by testing	
	(iv)	A minimum of 24 hours after loading with krypton-8 primary containment shall have a leak rate of less to second. The leak test shall be performed with the clead shield container prior to placement within its th	han 0.0014 microcuries per containment vessel within the
	(v)	Content of the package shall be verified by mass sp	bec analysis;
(vii	(vi)	Acceptance, maintenance and use of the krypton pa with the procedures and requirements of Chapter 7 Nuclear Company, Inc. Report No. WIN-236, Revisi retaining ring shall be tightened around the gas cylin torque;	and 8 of Westinghouse Idaho ion 1, March 1988. The
	(vii)	The position and securement of the krypton packag as specified in Westinghouse Idaho Nuclear Compa	
(vii	ii)	Krypton package must be enclosed within a tight fitt accordance with Westinghouse Idaho Nuclear Com	
		99	

NRC FORM 3-96)	A 618A CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
Page	8 - Certificate No. 6400 - Revision No. 25 - Docket No. 71-6400
5.(c)	Transport Index for Criticality Control
	Minimum transport index to be shown on
	label for nuclear criticality control: 100
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
3.	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.
10.	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.
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: July 31, 2002.
	100

NRC FORM 618A (3-96)

**CONDITIONS** (continued)

**U.S. NUCLEAR REGULATORY COMMISSION** 

Page 9 - Certificate No. 6400 - Revision No. 25 - Docket No. 71-6400

# 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 supplements dated: April 14, 1992; and April 14, 1997.

Westinghouse Electric Company, Division of CBS Corporation supplement dated: December 22, 1997, September 28, 1998 and February 22, 1999.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cors R. Chopyred

Cass R. Chappell, Chief Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: 3/3/99

REELENCE REFERENCES

NRC FORM 618 3-96) 0 CFR 71			U.S ATE OF COMPLIANCE TIVE MATERIALS PACKAGES	S. NUCLEAR REGL	LATORY COMMISSI
. a. CERTIFICATE NU	MBER	· · · · · · · · · · · · · · · · · · ·	c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBE	R e. TOTAL NUMBER PA
6406		11	USA/6406/AF	1	4
PREAMBLE		·!		I	· · · ·
Code of Feder b. This certificate	al Regulations, Part 71, "Pac does not relieve the consign	kaging and Transportation or from compliance with	escribed in Item 5 below, meets the applicab n of Radioactive Material." any requirement of the regulations of the U. ntry through or into which the package will I	S. Department of Tra	
	IS ISSUED ON THE BASIS OF	A SAFETY ANALYSIS RE	PORT OF THE PACKAGE DESIGN OR APPLIC LE AND IDENTIFICATION OF REPORT OR APP	ATION	
Division o	tment of Energy f Naval Reactor , DC 20585	s	U.S. Energy Research Administration applic July 19, 1977, as su	cation dated	
		c. DOC	KET NUMBER 71-6406		
CONDITIONS This certificate is a	conditional upon fulfilling th	e requirements of 10 CFF	R Part 71, as applicable, and the conditions sp	pecified below.	
(a) Pack	aging				
(1)	Model No.: N	one specified			
(2)	Description				
	Specific pack	aging is not r	required. Safety is ind	ependent of	packaging.
(b) Cont	ents				
(1)	Type and form	of material			
	Unirradiated	fuel assemblie	es of the following type	S:	
	(i) S5G Fue contain		Assembly (FEA) in the Mo	del No. FEA	shipping
	(ii) S5G Dou shippin	ble Fuel Expen g container.	riment Assembly (DFEA) i	n the Model	No. DFEA
			strumented Subassembly ( ing container.	RUS) in the	
			Module or AlW-3 Shipboar ipping container.	d "A" Module	e in the
		instrumented S g container.	S1C fuel module in the M	odel No. 748	B1E12
		l module or S ge shipping c	1C peripheral assembly i ontainer.	n the Model	No. S1C
	(vii) S1W-3 R Box.	emovable Suba	ssembly (RSA) in the Mod	el No. S1₩	RSA/Metal
	(viii) S5W-2 R Cage.	emovable Suba	ssembly (RSA) in the Mod	el No. S5₩	RSA/Bird
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NRC FORM 618A ⁽³⁻⁹⁶⁾	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
Page 2 - Cer	tificate No. 6406 - Revision No. 11 - Docket No. 71-6406
5.(b) Contents (	Continued)
(1) Туре	and form of material (Continued)
(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. 9SK218 shipping container.
(xii	) D2W rodded fuel cell or unrodded corner type D2W fuel module in a Model No. 658H1AB 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 No. 660B1/660C1 container.
(xv)	D1G fuel module in a model 572Al or 572Bl shipping container and D1G Removable Fuel Assembly (RFA) in a Model No. 573Al or 573Bl shipping container. A control rod and control rod holddown device need not be installed in the D1G fuel module.
(xvi)	DIG Removable Fuel Assembly (RFA) in a Model No. 573Al or 573Bl shipping container.
(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) unrodded 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)	A1W-3 Prototype Peripheral Subassembly or A1W-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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NRC FORM 618A 3-96)	<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
Page	3 - Certificate No. 6406 - Revision No. 11 $\cdot$	- Docket No. 71-6406
5.(b) Co	itents (Continued)	
(1	) Type and form of material (Continued)	
	(xxiii) S5G Central Subassembly	
	(xxiv) S3G-3 Removable Noninstrumented Fue No. 95K-218 shipping container.	el Assembly (RNFA) in a Model
(2	Maximum quantity of material per package	
	<pre>(i) One fuel assembly as described in ! 5(b)(1)(iii), 5(b)(1)(iv), 5(b)(1) 5(b)(1)(viii), 5(b)(1)(ix), 5(b)(1) 5(b)(1)(xiii), 5(b)(1)(xiv), 5(b)(1) 5(b)(1)(xviii), 5(b)(1)(xix), 5(b) 5(b)(1)(xxiii), and 5(b)(1)(xxiv).</pre>	(v), 5(b)(1)(vi), 5(b)(1)(vii), )(x), 5(b)(1)(xi), 5(b)(1)(xii), 1)(xvi), 5(b)(1)(xvii),
	(ii) Two fuel assemblies as described in	n 5(b)(l)(xv).
	(iii) Three fuel assemblies as described	in 5(b)(1)(xxi).
(c) Tr	ansport Index for Criticality Control	
	nimum transport index to be shown on Del for nuclear criticality control:	
(1	For the contents described in $5(b)(1)(iv)$ 5(b)(1)(xi), $5(b)(1)(xii)$ , $5(b)(1)(xiii)5(b)(1)(xv)$ , $5(b)(1)(xvii)$ , $5(b)(1)(xii)5(b)(1)(xxi)$ , $5(b)(1)(xxii)$ , $5(b)(1)(xxi)and 5(b)(1)(xxiv), and limited in 5(b)(2)5(b)(2)(ii)$ , and $5(b)(2)(iii)$ :	, 5(b)(1)(xiv), , 5(b)(1)(xx), ii),
(2		i),
(3	For the contents described in 5(b)(l)(viii) and limited in 5(b)(2)(i):	41.7
(4	For the contents described in 5(b)(1)(vii) and limited in 5(b)(2)(i):	31.3
(5	For the contents described in 5(b)(1)(xvi) and limited in 5(b)(2)(i):	12.5
(6	For the contents described in 5(b)(1)(i) and limited in 5(b)(2)(i):	41.7
(7	For the contents described in 5(b)(1)(ii) and limited in 5(b)(2)(i):	100
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NRC FORM 618A (3-96)

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

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Page 4 - Certificate No. 6406 - Revision No. 11 - Docket No. 71-6406

6. Expiration date: July 31, 2002.

# **REFERENCES**

U.S. Energy Research and Development Administration application dated July 19, 1977.

Supplements:

Department of Energy letters G#5868 dated January 4, 1978, with enclosures; #6291 dated July 13, 1979; G#7609 dated September 30, 1983; G#C85-0435 dated April 19, 1985; G#C87-8027 dated December 23, 1987; G#92-03690 dated September 11, 1992; and G#97-03513 dated June 11, 1997.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

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Cass R. Chappell, Chief Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

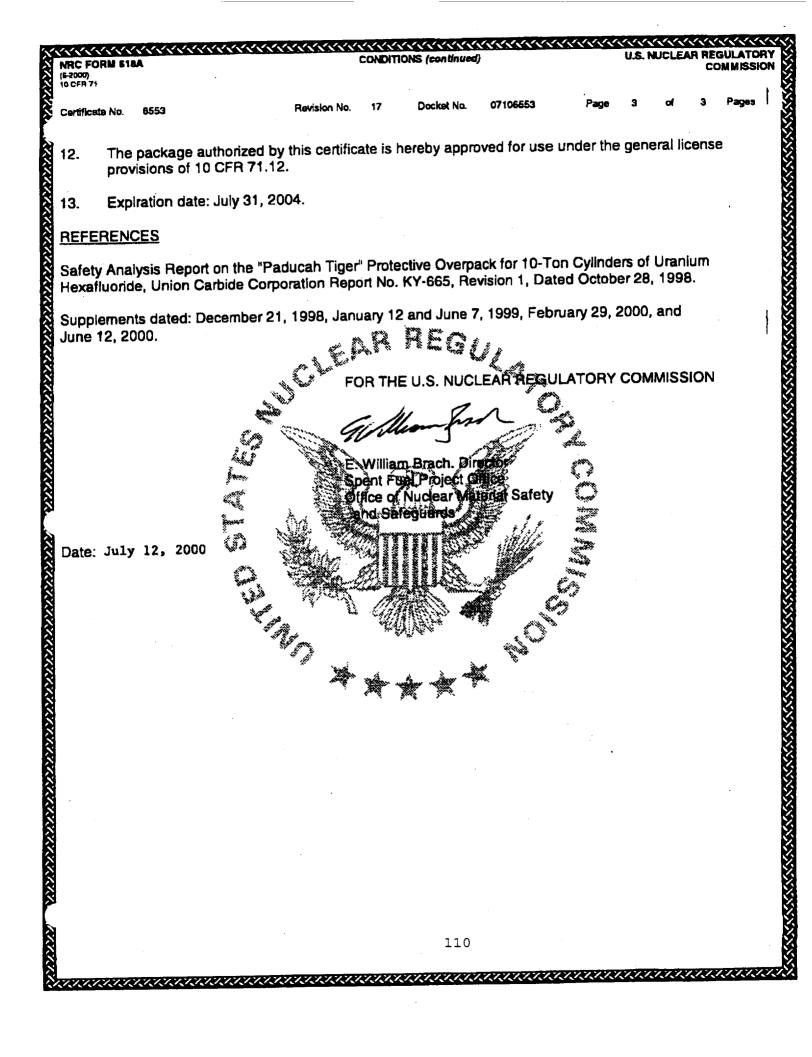
Date: 07/23/97

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NRC FORM 618 3-96) 0 CFR 71		U.S ATE OF COMPLIANCE TIVE MATERIALS PACKAGES	S. NUCLEAR REGULAT	ORY COMMISSIO
a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER e.	TOTAL NUMBER PA
6441	7	USA/6441/B( )	F 1	2
PREAMBLE		· · · · · · · · · · · · · · · · · · ·		· · · · ·
<ul><li>a. This certificate is issued to certify that the Code of Federal Regulations, Part 71, "Pace</li><li>b. This certificate does not relieve the consign</li></ul>	kaging and Transportation or from compliance with	n of Radioactive Material." any requirement of the regulations of the U	S. Department of Transpor	
applicable regulatory agencies, including the THIS CERTIFICATE IS ISSUED ON THE BASIS OF		ntry through or into which the package will PORT OF THE PACKAGE DESIGN OR APPLIC	<u>-</u>	
a. ISSUED TO (Name and Address)		LE AND IDENTIFICATION OF REPORT OR AP		
U.S. Department of Energ Division of Naval Reacto Washington, DC 20585	rs SI	afety Analysis Report fo hipping Container dated s supplemented.		
	c. DOC	CKET NUMBER 71-6441		
CONDITIONS This certificate is conditional upon fulfilling th	ne requirements of 10 CF	R Part 71, as applicable, and the conditions s	pecified below.	
		non an	······································	<u> </u>
(a) Packaging				
(1) Model No.: D2	G Power Unit			
(2) Description				
cover, (4) the To prepare the the container is removed and container with and the contai container asse to a governmen the maximum he configuration. and mechanisms	e main shippin e power unit s barrel is rot l the power un a eight (8) sh ner is rotate embly is 31 fe it owned perma eight above th The power u s installed.	assembly, (2) the upper g skid, and (5) the barr hipping container for sh ated to the vertical pos it is loaded into the ba ipping studs. The upper d to the horizontal posi et long and 8-1/2 feet w nently assigned depresse e rails is 13 feet, 10 i nit is shipped complete	el trunnion su ipment of a po ition, the uppo rrel and secur cover is then tion for shipm ide and it is d center railr nches in the s with design co	pports. wer unit, er cover ed in the installed ent. The attached oad car; hipping ntrol rods
shipping bolts and core carty container. Th and outmotion	s. A special ridge assembly ne control rod latches locat sms. The cont	are retained in the cont shipping ring is used to to the barrel upper fla s are restrained in the ed in the latching porti ainer assembly weighs ab aded.	clamp the clo nge of the shi unit by means on of the cont	sure head pping of rebound rol rod
(3) Drawings				
Corporation D	rawing Nos. R- Electric Corpo	d in accordance with Bal 126361, Rev. E, and R-12 ration Drawing Nos. 955F	26347, Rev. K,	and
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(3-96)	618A			CONDITIONS (continued)	U.S. NUCLEAR REGULATOR	COMMISS
Pa	age 2 – C	ertificate	No. 6441	- Revision No. 7 -	Docket No. 71-6441	
5. (b)	) Cont	ents			,	
	(1)	Type and	form of ma	terial		
		E power u closure h	nits consi ead, mecha	sting of core barre	ined in Naval Reactors Typel, unirradiated fuel assered hardware, with all design	mblies,
	(2)	Maximum q	uantity of	material per packa	ge	
		One power	unit as d	escribed in 5(b)(1)		
(c)	) Tran	sport Inde	x for Crit	icality Control		
				to be shown ticality control:	100	
6.	Expirati	on date: /	August 31,	2002.		
				REFERENCES		
30, 19 letter	973; WAPD CGN 855	-DP(CH)-140 42-250, da [:]	56, dated ( ted Februa	October 18, 1974; K ry 5, 1981; Naval R	WAPD-DP(CH)-1252, dated No nolls Atomic Power Laborat eactors letter NR:RR:ESSNI	ory DER
30, 19 letter G#92-0	973; WAPD CGN 855	-DP(CH)-14 42-250, da ted October	56, dated ( ted Februa	October 18, 1974; K ry 5, 1981; Naval R and Naval Reactors	nolls Atomic Power Laborat eactors letter NR:RR:ESSNI letter NR:RR:SLDUNN G#97-	ory DER
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(8-200 10 CFI	FORM 61 0) R 71			CERTIFICA	TE OF COMPLIANCE		
				FOR RADIOACT	IVE MATERIAL PACKAGES		. TOTAL NUMBER PAGES
	. CERTIF		ER	b. REVISION NUMBER	0. PACKAGE DENTIFICATION NUMBER	d. PAGE NUMBER	. TOTAL NUMBER PAGES
			553	17	USA/6553/AF		
2	PREAM a. Thi		is issued to certify ), Code of Federal	y that the package (packa Regulations, Part 71, "Pa	iging and contants) described in Item 5 Ickaging and Transportation of Radioac	below meets the applic tve Material."	able salety standards set
	b. Thi	a certificate	does not relieve ti	he consignor from compli tea, including the governm	ance with any requirement of the regulat ment of any country through or into whic	ions of the U.S. Depar h the package will be t	
3	THIS C	ERTIFICAT	E IS ISSUED ON	THE BASIS OF A SAFE	TY ANALYSIS REPORT OF THE PAC	KAGE DESIGN OR A	PPUCATION
•			Name and Addres		b. TITLE AND IDENTIFICATIO	IN OF REPORT OF A	PPLICATION
		-itad Sta	ates Enrichm	ent Com	Safety Analysis Rep	ort on the "Pad	ucah Tiger"
		nieu Sid	kledge Drive		Protective Overpack	; for 10-Ton Cyli	inders of Uranium
			MD 20817		Hexafluoride, Repor	t No KY-665, R	evision 1, dated
	D	suicsud,			October 28, 1998, a	s supplemented	1.
						07106553	
	CONDI						
4.		tificate is m	nditional upon fulf	ling the requirements of	10 CFR Part 71, as applicable, and the	conditions specified be	ilow.
				\$ \$ *°	· · · · · · · · · · · · · · · · · · ·		
5.		<b>-</b> ·	_•		" start	24.	
	(a)	Packa	ging "			d'an	
			» 	Deditash Tisat	والالترجيبين المسترجين الم	S.	
		(1)	Model No	Paducah Tiger	All and a set of the s	giften	
		465	. 443	and the second sec	a state of the second se		
		(2)	Description				
			5			I maistance for	the Model No.
			A protective	overpack unica	provides impact and therma	AQ inclusion dis	amotor 121
			48X 10-ton	cylinder. The cyli	inder is welded state, and is		olume and is
			inches, long	, and has a 570-10	th thick wall. The cylinder I	125 2000.7 IL V	dimensions of
			rated at 200	) psig service pre-	ssure. The protective overp	ack las overall	te of two narts
			approvimpt	ly pageora y j	おおちていわえ え シン いていらればめ いし	DVENDEUR CUIISIS	
			الالاستية مراميات		1217 STARA STARS SPECIFICATION (1)		
			hindors art		100140728715.11112028041(1)3/4-1	gerengi suchy	
			The closed	assembled over	rack consists of an outer 14	SHACH SLEEP SHE	Dackey on
			both long si	des top and bott	om by two, 10-gauge stame	ss steel Dreaka	way plates.
			The velue of	ad the attention of he	a 3/8-inch stainless-steel (	reakaway Diale	anu a z-inun
			thick alumin	um stiffening plat	e. A centrally located 3/16-	inch steel shell,	ou incries in
			diamotor <b>x</b>	129 inches kinn is	separated from the outer s	neii dy fire retar	Vant
				o foam. The culli	itier Scheid in the overback	DV JUDDEL SHOC	K ISUIALUIS.
			Eave mild a	taal brackats are i	nrovided on the body tor littl	na. Four, z-inci	1 DOILS are used
			in conjuncti	on with the ISO c	omer fittings for tie-down.	he maximum gi	oss weight of
			the packao	e is 40,000 pound	is.		
			- F3	· •			
		(3)	Drawings				
		<u>\-</u> /	-				<b>–</b>
			The Paduc	ah Tiger overoack	is constructed in accordance	ce with Martin M	larietta Energy
			Systems, Ir	nc., Drawing Nos.	M-1209-NRC-1, Rev. 0, M-1	209-NHG-2, RE	ev. 0, M-1209-
			NRC-3 Rev	. A. M-1209-NRC	C-4, Rev. 1, and M-1209-NR	C-5, Rev. 0.	
					108		

NRC FO	RM 616/			C	ONDITIO	ONS (continued	)	U.S. NUCLE	AR REG	ULATO	RYCO	MM IS8	ON
6-2000) D CFR 71												_	T
Certificat	te No.	6553	ł	<b>Revision No.</b>	17	Docket No.	07106553	Page	2	of	3	Pages	• [
(b)	Cont	ents											
	(1)	Type and fo											
		Solid uraniu H/U ratio of	um hexaflu i no more t	oride (UF _s han 0.088	;) at no -	ot more that	ים 4.5 w/o U-	235 isotop	e enri	chmer	nt, an	d an	
	(2)	Maximum q											
		The maxim content not	um weight to exceed	of UF _s not 640 poun	t to ex ds (29	ceed 21,03 10 kg).	0 pounds (9	),540 kg). `	The m	aximu	ım U-	235	
	(3)	Transport II		ŝ	ontrol	<b>S</b> S S S S S S S S S S S S S S S S S S	\$ e .						
		Minimum tra label for nu	clear critic	ality contro				÷					
6.		Model No. 48 rdance with A	moričen Na	ational Sta	indard	s Institute (.	ANSI) N14.	r-1990. Ir	е сул	naers	must	be 1 in	
	offee	ned and fabri t at the time o	<b>HitaBricatio</b>	R NO.	linder	s must be fa		accoroanc	e with	Secu	on vi	ц,	
	Divisi	ion I, of the A	nencan Sc ASME Co	ciety of M	echan d Éx	ice) Engine	ers (ASME) • 48X cvlin	Boijer and ders manul	factur	sure v ed by	esse	t	1
		Stewart Com	n voeg	ഹര്ദ്ദര്ഘ	áith A	NSI N14.3-	1971:atler/	ANSI4474.1	-1904	wasa	appro teste	oved ed	
	and r	re-certified in	aecordance	with ANS	<b>11</b> 4	1-1990	S. Mile						
7.	renai	dition to the re red, operated	and orepa	red for sh	pmed	Nin Bccorga	nce with Up	<b>ing ins</b>	structu	ons an	iu –	neđ,	
	Acce	ptance Tests lemented Dec	and Mainte	enance Pr	DOLULIO	in the appl	cation date	D-OCTODEL 1	28, 19	98, as	5		
9.	Use d	of Model No. 4	18A cylinde	is not a	uthori	zed.							
<b>9</b> .		of Model No. 4			8. Q		authorize						
10.	solde	Model 48X cyl er material, or Ire has a minir	a mixture o	of alloy 50	A or S	n50 with all	ed with AS ⁻ oy 40A or S	rM B32, ali n40A mate	oy 50 arial, p	A or S provide	n50 ed the	)	
11.	Syste	icah Tiger ove ems, Inc., Drav id M-1209-NR prized by this (	wing Nos. I	M-1209-NI A may be	RC-1, used	Rev. C; M- ⁻ until Septer	1209-NRC-2 nber 10, 19	2, Hev. A, N 99. For the	n-1203 B Over	packs	,- <b>3</b> , n		
	plane	e of the end of nce must be a	the cylind	er skirt mu	ist be	measured p	prior to each	shipment.	The	cleara	nce		



NRC FORM 618 (3-96) 10 CFR 71			CERT		TE OF CO	U.S MPLIANCE ALS PACKAGES	S. NUCLEAR REGUL	ATORY COMMISSIO
1. a. CERTIFICATE NU	MRED							
	MIDER			UMBER				e. TOTAL NUMBER PAG
6574			26		USA	(6574/B( )	1	3
a. This certificate Code of Feder	al Regula	itions, Part 71, "Pack	aging and Tran	sportation	of Radioactive N			
applicable regu	latory ag	encies, including the	government of	f any cour	try through or in	of the regulations of the U. o which the package will	be transported.	portation or other
a. ISSUED TO (Nan	ne and Add	lress)	A SAFETT ANA	b. TITL	E AND IDENTIFIC	KAGE DESIGN OR APPLIC ATION OF REPORT OR API	CATION PLICATION:	
ATG Nuclear Services, LLC 669 Emory Valley Road Oak Ridge, TN 37830						cology Group, In ember 27, 1990, a		d.
				c. DOCI	CET NUMBER	71-6574		
4. CONDITIONS This certificate is a	condition	al upon fulfilling the	requirements o	f 10 CFR	Part 71, as applic	able, and the conditions s	pecified below.	
s. (a)	Pac	kaging					<u> </u>	
	(1)	Model No.:	3-82B					
	(2)	Description						
		a right circul cask, closed by 74.5 inch 3-3/4 inches connecting t of insulating	ar cylinde l at one er es in heig of lead sl he two sh material a	r and f nd and ht. Th hieldin ells. T and ca	three differe a lid closur e cask wall g, one-inch he cask ou nned in 11-	steel annulus cas ent types of inner e at the other, is consists of a 3/8 outer steel shell, ter shell is surrou gauge steel.	containers. The 66.25 inches in -inch inner stee and a steel flar inded by a one-	e shielded diameter I shell, nge inch layer
		shield plug is gasket. Lifti	s located i ng and tie	in the o down	center of the devices are	is bolted to the c e cask lid and is s e attached to the absorbing foam, a	sealed by a silic cask body. Imp	one flat bact skirts,
	(3)	Drawings						
		•			a 4.			
		Group, Inc. [	e is fabrica Drawing N	ated in lo.: ST	accordanc ID-02-076,	e with the followir Sheets 1 through	ng Scientific Eco 3, Revision 7.	blogy
		Group, Inc. I	e is fabrica Drawing N	ated in lo.: ST	accordanc ID-02-076,	e with the followir Sheets 1 through	ng Scientific Eco 3, Revision 7.	blogy
		Group, Inc. I	e is fabrica Drawing N	ated in lo.: ST	accordanc ID-02-076,	e with the followir Sheets 1 through	ng Scientific Eco 3, Revision 7.	blogy
		Group, Inc. I	e is fabrica Drawing N	ated in lo.: ST	accordanc ID-02-076,	e with the followir Sheets 1 through	ng Scientific Eco 3, Revision 7.	blogy
		Group, Inc. I	e is fabrica Drawing N	ated in lo.: ST	accordanc ID-02-076,	e with the followir Sheets 1 through	ng Scientific Eco 3, Revision 7.	blogy

NRC FOR! (3-96)	vi 618A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
	e 2 - C	Certificate No. 6574 - Revision No. 26 - Docket No. 71-6574
-		
	(b)	Contents
		(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.
		(2) Maximum quantity of material per package
		Greater than Type A quantity of byproduct material, which may contain not more than a Type A quantity 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 drum size containers per pallet. Drums to be constructed of metal or high integrity plastic with a tightly fitted cover. A maximum decay heat load of 84 Btu/hr.
		(c) One pallet with three, 55-gallon drum size containers. Drums to be constructed of metal or high integrity plastic with tightly fitted covers. A maximum decay heat load of 116 Btu/hr.
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/ft ³ 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 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.
7.	The cont	total weight of the package must not exceed 50,000 pounds and the weight of the tents (including dunnage, etc.) must not exceed 8,195 pounds.

	<b>NRC</b> FOR (3-96)	M 618A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
	Pag	e 3 - (	Certificate No. 6574 - Revision No. 26 - Docket No. 71-6574
	8.	In a	ddition to the requirements of Subpart G of 10 CFR Part 71:
		(a)	The package shall be prepared for shipment and operated in accordance with Operating Procedure STD-P-02-024, Rev. 3, in the supplement dated March 7, 1996.
		(b)	The package shall be maintained in accordance with the maintenance program in the supplement dated March 13, 1991.
	9.	mini	ept for close fitting contents, sufficient dunnage, shoring, and/or bracing must be utilized to mize secondary impact of the contents within the cavity under accident conditions of sport.
	10.	oper	to each shipment, the seal on the main cover and the seal on the shield plug cover, if ned, or if the security seal is broken, must be inspected. The seals must be replaced if the ection shows any visible defects or every 12 months, whichever occurs first.
	11.	cont obje mate	ddition to the requirements of Subpart G of 10 CFR Part 71: The package shall be prepared for shipment and operated in accordance with Operating Procedure STD-P-02-024, Rev. 3, in the supplement dated March 7, 1996. The package shall be maintained in accordance with the maintenance program in the supplement dated March 13, 1991. The for close fitting contents, sufficient dunnage, shoring, and/or bracing must be utilized to mize secondary impact of the contents within the cavity under accident conditions of sport. To each shipment, the seal on the main cover and the seal on the shield plug cover, if ted, or if the security seal is broken, must be inspected. The seals must be replaced if the ection shows any visible defects or every 12 months, whichever occurs first. packaging must be leak tested in accordance with Section 8.2.2 of the application. For ents that meet the definition of low specific activity material or surface contaminated cts in 10 CFR §71.4, and also meet the exemption standard for low specific activity rial and surface contaminated objects in 10 CFR §71.10(b)(2), the pre-shipment leak test t required. package authorized by this certificate is hereby approved for use under the general
	12.	The prov	package authorized by this certificate is hereby approved for use under the general sions of 10 CFR §71.12.
	13.	Expi	ration date: May 31, 2001.
			REFERENCES
	Scier	ntific E	cology Group Incorporated application dated December 27, 1990.
	Supp	lemei	nts dated: March 13, 1991; March 7, 1996; and October 10, 1997.
	ATG	Nucle	ear Services, LLC, supplements dated: December 1, 1998; August 9 and 11, 1999.
			FOR THE U.S. NUCLEAR REGULATORY COMMISSION
			William from
			E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards
	Date:	: _'/	
			113
EQ.		(21(21)	21, 21, 21, 21, 21, 21, 21, 21, 21, 21,

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3-96) 0 CFR 71				ICATE OF COMPLIANCE		
	CERTIFICATE NUMBERb. REVISION NUMBERc. PACKAGE IDENTIFICATION NUMBERd. PAGE NUMBERe. TOTAL NUM658129USA/6581/AF14					
PREAM					,,	<u> </u>
Coo	de of Fed	eral Regulations, Part 71, "Pack	aging and Transpor	nts described in Item 5 below, meets the applic tation of Radioactive Material." with any requirement of the regulations of the		
app	licable re	gulatory agencies. including the	government of any	country through or into which the package will IS REPORT OF THE PACKAGE DESIGN OR APPI	ill be transported.	·
		iame and Address)	b.	TITLE AND IDENTIFICATION OF REPORT OR		
2101	Horn	ower Corporation Rapids Road VA 99352-0130		Advanced Nuclear Fuels ( dated October 15, 1990, a		
HICHI	ano, v	VA 99332-0130		71-6581		
			с.	DOCKET NUMBER		
CONDIT						
	ertificate i	is conditional upon fulfilling the	requirements of 10	CFR Part 71, as applicable, and the condition	s specified below.	
(a)	Pack	aging				
	(1)	Model No.: 51032-	1			
	(2)	Description				
		clamping assembly bolted between fuel approximately 8 inc	, shock mour assemblies. hes high and	el bundles, consisting of a stro nted to a steel outer container. The separator blocks are a m I 9 inches long, with a minimun	Steel separator ninimum 6 inches n nominal 3/8-inc	blocks are wide by h thick wall.
		The outer container weight of the packa	is approximage, including	ately 43 inches in diameter by contents, is 7,400 pounds.	216 inches long.	The maximum
	(3)	Drawings				
		The packaging is concerning the concerning of th		nd assembled in accordance w	ith the following	<u> </u>
						Siemens Power
		EMF-309,813,		ts 1 and 2		Siemens Power
		EMF-303,359,	Rev. 7	ts 1 and 2		Siemens Power
		EMF-303,359, EMF-303,360,	Rev. 7 Rev. 6	ts 1 and 2		Siemens Power
		EMF-303,359, EMF-303,360, EMF-303,898, EMF-300,607,	Rev. 7 Rev. 6 Rev. 5 Rev. 3	ts 1 and 2		Siemens Power
		EMF-303,359, EMF-303,360, EMF-303,898,	Rev. 7 Rev. 6 Rev. 5 Rev. 3	ts 1 and 2		Siemens Power
		EMF-303,359, EMF-303,360, EMF-303,898, EMF-300,607,	Rev. 7 Rev. 6 Rev. 5 Rev. 3	ts 1 and 2		Siemens Power
		EMF-303,359, EMF-303,360, EMF-303,898, EMF-300,607,	Rev. 7 Rev. 6 Rev. 5 Rev. 3	ts 1 and 2		Siemens Power
		EMF-303,359, EMF-303,360, EMF-303,898, EMF-300,607,	Rev. 7 Rev. 6 Rev. 5 Rev. 3	ts 1 and 2		Siemens Power
		EMF-303,359, EMF-303,360, EMF-303,898, EMF-300,607,	Rev. 7 Rev. 6 Rev. 5 Rev. 3	ts 1 and 2		Siemens Power
		EMF-303,359, EMF-303,360, EMF-303,898, EMF-300,607,	Rev. 7 Rev. 6 Rev. 5 Rev. 3	ts 1 and 2		Siemens Power
		EMF-303,359, EMF-303,360, EMF-303,898, EMF-300,607,	Rev. 7 Rev. 6 Rev. 5 Rev. 3	ts 1 and 2		Siemens Power
		EMF-303,359, EMF-303,360, EMF-303,898, EMF-300,607,	Rev. 7 Rev. 6 Rev. 5 Rev. 3	ts 1 and 2		Siemens Power
		EMF-303,359, EMF-303,360, EMF-303,898, EMF-300,607,	Rev. 7 Rev. 6 Rev. 5 Rev. 3	ts 1 and 2		Siemens Power
		EMF-303,359, EMF-303,360, EMF-303,898, EMF-300,607,	Rev. 7 Rev. 6 Rev. 5 Rev. 3	ts 1 and 2		Siemens Power

NRC FORM 618A (3-96) CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 6581 - Revision No. 29 - Docket No. 71-6581

# 5.(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 wt% in the U-235 isotope except for the T15X15 cruciform assemblies, which have a maximum enrichment of 2.8 wt% in the U-235 isotope. The sum of the cladding wall thickness and the pellet-clad radial gap must not be less than 0.023 inch, except for the T15X15 square array fuel assemblies. For the T15X15 square array fuel assemblies the sum of these two parameters must not be less than 0.016 inch. The maximum length of the active fuel region is 196 inches, except for the T15X15 cruciform assemblies, whose maximum active fuel region is 116 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 any number of edge rods missing) 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.
- (v) Fuel assemblies consisting of a maximum of 208 fuel rods in a 15 x 15 square array (with any number of edge rods missing) with a maximum nominal fuel rod pitch of 0.527 inch and a maximum assembly cross section of 7.91 inches square. The fuel rod cladding must have an OD not less than 0.364 inch and not greater than 0.400 inch. The fuel rod arrangement is as shown in Figure VII-1 of the application.
- (vi) Fuel assemblies consisting of a maximum of 28 fuel rods in a cruciform array with a maximum nominal fuel rod pitch of 0.556 inch and a 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. The fuel rod arrangement is as shown in Figure VII-3 of the application.

<b>IRC</b> FOR 3-96)	M 618A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
Page	3 - Cer	rtificate No. 6581 - Revision No. 29 - Docket No. 71-6581
5.(b)	Conter	nts (Continued)
	(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), 5(b)(1)(iii), 5(b)(1)(v) and 5(b)(1)(vi):
		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.
		(ii) For the contents described in 5(b)(1)(iv):
		Two rod containers.
(c)	Transp	port Index for Criticality Control
		Minimum transport index to be shown on label for nuclear criticality control: 0.4
6.	which folded	fuel assembly must be unsheathed or must be enclosed in an unsealed polyethylene sheath will not extend beyond the ends of the fuel assemblies. The ends of the sheaths must not be I or taped in any manner that would prevent the flow of liquids into or out of the sheathed fuel nblies.
7.	Hydrog	genous shims are not permitted within the fuel assemblies.
8.	Separa Tables	rator blocks, shock mounts, and fuel element clamp assemblies must be in accordance with s 2.2, 2.3, 2.4, 2.5, and VII-3 of the application.
9.	Each s in Dra	separator block must be attached to the strongback by one of the following methods, as shown awing No. EMF-309,813, Rev. 2, Sheet 2:
	(a)	Two, 5/8-11 UNC Grade 5 steel cap screws and nuts. A 5/8-11 UNC Grade 2 (or better) steel stud may be substituted for one of the cap screws.
	(b)	Two, 1-8 UNC Grade 8 steel cap screws and nuts. A 1-8 UNC Grade 8 steel stud may be substituted for one of the cap screws.
10.		uel assembly cross section is defined as the rod pitch times the number of rods on the edge of ssembly.
11.	Rods	containing gadolinia or other neutron poison are authorized but not required.
		116

NRC FORM 618A

**CONDITIONS** (continued)

Page 4 - Certificate No. 6581 - Revision No. 29 - Docket No. 71-6581

- 12. 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, and supplemental operating procedures dated July 1, 1997.
  - (b) Each packaging shall be maintained in accordance with the procedures in Section 3.4 of the application.
  - (c) Each packaging shall meet the acceptance tests in Chapter 4.0 of the application.
- 13. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 14. Expiration date: May 31, 2004.

# REFERENCES

Advanced Nuclear Fuels Corporation application dated October 15, 1990.

Siemens Nuclear Power Corporation supplements dated September 18, 1991; April 22, 1992; January 25, 1994; July 1, 1997; March 16, 18, 21, and 24, 1998; April 28, May 6, August 31 and October 6 and 12,1999; and July 7, 2000.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

William Trach

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: July 20, 2000

R. (#), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(, #), #(

	OR <b>M 618</b>	I	CERTIFICA FOR RADIOACT		MPLIANCE	NUCLEAR REGUL	ATORY COMMISSION			
. a. CEI	RTIFICATE	NUMBER	b. REVISION NUMBER	c. PACKAGE IDEN	NTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAC			
	6613		8	USA/66	13/B(U)	1	2			
a. 1 C b. T	Code of Fe	cate is issued to certify that the p deral Regulations, Part 71, "Pac cate does not relieve the consign	kaging and Transportatio or from compliance with	n of Radioactive M any requirement o	laterial." f the regulations of the U.S.	Department of Trans				
THIS	CERTIFICA	regulatory agencies, including th	A SAFETY ANALYSIS RE	PORT OF THE PAC	KAGE DESIGN OR APPLICAT	TION	·····			
Ame 40	ersham North A	Name and Address) Corporation Avenue , MA 01803	D. 1111	Amersham	ATION OF REPORT OR APPLI Corporation applie 27, 1991, as supp	cation dated				
			c. DOC	KET NUMBER	71-6613					
	DITIONS	is conditional upon fulfilling th	a requirements of 10 CE	P Boot 71 on opplie	able and the conditions sne	cified below				
1 1115	centificate	is conditional upon fulfilling th	e requirements of 10 Cri	C Paπ /1, as applic	able, and the conditions spec					
(a)	Pack	aging								
	(1)	Model No.: 702								
	(2)	Description								
	The cask system overall dimensions are $19" \times 21" \times 20"$ . The cask is a stainle weldment containing depleted uranium shielding. The cask has a central cavity 2.26 inches in diameter by 3.25 inches long. Closure is accomplished by a neo gasket, six, 3/8-inch bolts and a stainless steel stepped plug containing deplete shielding. The closure is equipped with an eye bolt and two drain and vent plug cask is mounted on a 19" x 21" rectangular steel skid with four, 1/2-inch bolts down system consisting of four, 1/2-inch diameter threaded rods which connec ring at the top of the cask to channel brackets welded to the skid. A protective constructed of 1-1/4-inch square steel tubing and perforated 18 gauge steel shi welded to the tubular frame surrounds the cask and is bolted to the skid by fou									
		2.26 inches in diar gasket, six, 3/8-ind shielding. The clos cask is mounted of down system cons ring at the top of t constructed of 1-1	neter by 3.25 in sure is equipped n a 19" x 21" ro sisting of four, 1 he cask to chan /4-inch square surrou	nium shieldir iches long. tainless stee with an eye ectangular s /2-inch dian onel brackets steel tubing unds the cas	ng. The cask has Closure is accomp a stepped plug con a bolt and two dra teel skid with four neter threaded rod s welded to the sk and perforated 18 sk and is bolted to	a central cav plished by a r ntaining deple in and vent p 7, 1/2-inch bo Is which conr id. A protect gauge steel	vity which is neoprene eted uranium blugs. The blts and a tie- nect a clamp tive cage sheets tack			
	(3)	2.26 inches in diar gasket, six, 3/8-ind shielding. The clos cask is mounted of down system cons ring at the top of t constructed of 1-1 welded to the tubu	neter by 3.25 in sure is equipped n a 19" x 21" ro sisting of four, 1 he cask to chan /4-inch square surrou	nium shieldir iches long. tainless stee with an eye ectangular s /2-inch dian onel brackets steel tubing unds the cas	ng. The cask has Closure is accomp a stepped plug con a bolt and two dra teel skid with four neter threaded rod s welded to the sk and perforated 18 sk and is bolted to	a central cav plished by a r ntaining deple in and vent p 7, 1/2-inch bo Is which conr id. A protect gauge steel	vity which is neoprene eted uranium blugs. The blts and a tie- nect a clamp tive cage sheets tack			
	(3)	2.26 inches in diar gasket, six, 3/8-ind shielding. The clos cask is mounted of down system cons ring at the top of t constructed of 1-1 welded to the tubu bolts. Maximum g	neter by 3.25 in ch bolts and a sis- sure is equipped in a 19" x 21" ro- sisting of four, 1 he cask to chan /4-inch square surrou ross weight of the ross weight of the ross weight of the	nium shieldir iches long. tainless stee with an eye ectangular si /2-inch dian onel brackets steel tubing unds the cas the packagir	ng. The cask has Closure is accomp a stepped plug con a bolt and two dra teel skid with four neter threaded rod s welded to the sk and perforated 18 sk and is bolted to ng is 410 pounds.	a central cav plished by a r ntaining deple in and vent p , 1/2-inch bo is which conr id. A protect gauge steel the skid by f	vity which is neoprene eted uranium olugs. The olts and a tie- nect a clamp tive cage sheets tack four, 1/2-inch			

NRC (3-96)	FORM 6	18A		<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISS
Pag	e 2 - (	Certific	ate No. 6613 - Revision	No. 8 - Docket No. 71-66	913
	(b)	Cont	tents		
		(1)	Type and form of mate	erial	
			Metallic iridium-192 so radioactive material.	purces which meet the req	uirements of special form
		(2)	Maximum quantity of	material per package	
			10,000 curies (output)		
					American National Standard N432- onstruction of Apparatus for Gamma
		(3)	Maximum decay heat	per package	
			100 watts.		
6.			plate must be fabricated intaining their legibility.	l of materials capable of re	esisting the fire test of 10 CFR Part
7.	In ac	ddition	to the requirements of	Subpart G of 10 CFR Part	71:
	(a)		package shall be opera e application, as supple		nent in accordance with Section 7.0
	(b)		package must meet the opplication, as suppleme		intenance Program, Section 8.0 of
8.			ge authorized by this ce of 10 CFR §71.12.	rtificate is hereby approved	d for use under the general license
9.	Expi	ration	date: June 30, 2003.	an a	
				<b>REFERENCES</b>	
Ame	rsham	Corpo	pration application dated	November 27, 1991.	
		nts dat . 1998		1, 1992; March 19 and 20	5, 1993; March 1, 1996; and
				FOR THE U.S. NUC	LEAR REGULATORY COMMISSION
				Cars R. Chapy	rell
				Cass R. Chappell, C Package Certificatio	hief
				Spent Fuel Project ( Office of Nuclear M	Office
Date	: ^J	une 2,	1998	and Safeguards	
		202020			

Q					10101	010101010101	
	NRC FORM 618		СЕДТІЕЙ		U.S. N	IUCLEAR REGUL	ATORY COMMISSION
	(3-96) 10 CFR 71		FOR RADIOA	CTIVE MATERIALS PACKAGE	s		
	1. a. CERTIFICATE N	UMBER	b. REVISION NUMBE	R c. PACKAGE IDENTIFICATION NUME	ER	d. PAGE NUMBER	e. TOTAL NUMBER PAGES
	6642		6	USA/6642/B( )		1	2
	2. PREAMBLE		L	USA DECISION AND ALL A			
È	a. This certifica	te is issued to certify that the pa	ackaging and contents	described in Item 5 below, meets the ap	plicable s	afety standards set f	orth in Title 10,
	Code of Fede	ral Regulations, Part 71, "Pack	aging and Transporta	ion of Radioactive Material.		D	
	b. This certificat applicable reg	gulatory agencies, including the	r from compliance w government of any c	ountry through or into which the package	will be t	transported.	portation or other
	3. THIS CERTIFICAT a. ISSUED TO (No	E IS ISSUED ON THE BASIS OF a time and Address)	A SAFETY ANALYSIS b. T.	REPORT OF THE PACKAGE DESIGN OR A TLE AND IDENTIFICATION OF REPORT (	PPLICAT	ION CATION:	
	U.S. Dep Washingt	artment of Energy on, DC 20585	,	Safety Analysis Report Ton Californium Shippi December 1974, Rev. 1, as supplemented.	- Pa ng Ca Marc	nckages SRL Nsk, DPSPU 7 Sh 1976,	4.5 74-124-6,
			c. D	OCKET NUMBER 71-6642			
JE AL	4. CONDITIONS This certificate is	conditional upon fulfilling the	requirements of 10 C	FR Part 71, as applicable, and the condi	ions spec	ified below.	
È	5.						
C	(a)	Packaging			e. Litera		
	/1>	Modol No · A	Top Cf				
	(1)					d ⁱ	
	(2)	Description				lege al ^{gale} r,	
	~	A shielded packa 3/4-inch thick, water extended p (9) fusible plug material. The o by 6-3/8 inches lead of 2 inches and top, respect outer container, to a 3/4-inch th container closun accomplished by 27-inch long, 4- and is gasketed 22-1/2-inch dian A hexagonal shar to the spherica provided around approximately 9	Ging for sp 61-1/2-inch oolyester (W is and a ven cylindrical high is cen is, 1.9 inche cively. The inck 22-1/2- re assembly. a flange pl- inch OD tub and bolted meter protec bed assembly i shell as a the upper h 500 pounds.	OD spherical steel sh EP) shielding. Outer t valve for relief of containment cavity app trally located in the s and 1.75 inches thic containment vessel is d by a 31-1/2-inch lor inch diameter top plat Closure of the conta ate and sleeve insert e filled with lead and to the top closure ass tive cover bolts to th , approximately 5 feet base. Four equally s emisphere. The cask of	ine ell f shell gases roxin spher kness an i g 4-1 e mou inmer assen l wate embly e clc pacec pross	filled with is fitted generated nately 4-inc e and surro integral pan l/2-inch OD inted to the ot vessel is ably. The er extended of the con osure assem oss the flat i lifting li weight is	borated with nine in the WEP ch diameter bunded by ttom, sides rt of the tube welded e outer s sleeve is a polyester ntainer. A bly sleeve. ts mounts, ugs are
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0					3232	222222222222	ALL ALL ALL ALL

NRC FORM 618 3-96)	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
Page 2 ·	- Certificate No. 6642 – Revision No. 6 – 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. O; 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.
(2)	Maximum quantity of material per package.
	46 curies (85 mg).
6. Prio 1/4-	r to each shipment, the WEP shielding space shall be vented, using the inch angle valve which is then closed.
7. Ina	ddition 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 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.
8. Use	of packaging fabricated after August 31, 1986, is not authorized.
9. The gene	package authorized by this certificate is hereby approved for use under the ral license provisions of 10 CFR §71.12.
10. Expi	ration date: February 28, 2002.
	REFERENCES
Safety A 74-124-6	REFERENCES malysis Report - Packages SRL 4.5-Ton Californium Shipping Cask, DPSPU , December 1974, Revision 1, March 1976. Ints dated: September 18, 1991; and July 17, 1996. FOR THE U.S. NUCLEAR REGULATORY COMMISSION Law R. Chappell Cass R. Chappell, Chief Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards 2/04/97 121
Suppleme	nts dated: September 18, 1991; and July 17, 1996.
	FOR THE U.S. NUCLEAR REGULATORY COMMISSION
	Cars R. Chappell
	Cass R. Chappell, Chief Package Certification Section
	Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards
Date: 0	2/04/97

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NRC FORM 6 (3-96) 10 CFR 71	18		CERT FOR RAD	IFICA IOAC7	TE OF COMPLIANCE TIVE MATERIALS PACKAGES c. PACKAGE IDENTIFICATION NUMBER USA\6717\B(U)	.S. NU	JCLEAR REGUI	.Atory	COMMISSIO
I. a. CERTIFICAT	TE NUMBEI	2	b. REVISION N	UMBER	c. PACKAGE IDENTIFICATION NUMBER	Í	d. PAGE NUMBER	e. TOT	AL NUMBER PAG
671	17		10		USA\6717\B(U)		1		4
Code of I b. This certi	Federal Reg ficate does	ulations, Part 71. "Pack not relieve the consigno	aging and Trans or from compliar	portation	escribed in Item 5 below, meets the applica n of Radioactive Material." any requirement of the regulations of the	U.S. D	epartment of Tran		
	CATE IS ISS	UED ON THE BASIS OF		YSIS RE	ntry through or into which the package wil PORT OF THE PACKAGE DESIGN OR APPL E AND IDENTIFICATION OF REPORT OR A	ICATIO			·····
40	North /	nology/QSA Inc Avenue , MA 01803	:.		Amersham Corporation ap October 10, 1990, as sup				
				c. DOC	KET NUMBER 71-6717				
. CONDITIONS			I			·			· · ·
This certifica	te is condit	ional upon fulfilling the	requirements of	f 10 CFF	R Part 71, as applicable, and the conditions	specif	fied below.		
•									
a) Pac	kaging								
u, , , uu									
(1)	Mod	el No.: 6717-E							
(2)	Des	cription							
	and 1 ind the t to e	outer container ch on the top a radiographic de xceed 100 pou							
		maximum gros urethane filler)		weight of the secondary packaging (device and molded ot to exceed:					
	i)	65 pounds fo Universal, Ce	r the Modentury SA I	el No: Unive	s.: Century, Century S, Ce rsal, C-10, 35, 35S and 35	entur 5SA;	ry SA, Cent	ury S	
	ii)	•			s.: 20V, 40V, 20VS, 40V			·	
	iii)	45 pounds fo Mariner; and	r the Mod	el No	s. Pipeliner Model 1, Pipelir	ner N	Model 201 a	and	
	iv	54.5 pounds	for the Mo	odel N	No. MX-IC-100.				
(3)									
	The Nos Rev	. 93590, Rev.	be constr C; 93690,	ucteo Rev.	d in accordance with Amer C; 93790, Rev. D; 93890	shan , Rev	n Corp. Dra v. B; and 9:	wing 3990,	
					122				

(3-96)	ORM 61	BA CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISS
Page	2 - Ce	ertificate No. 6717 - Revision No. 10 - Docket No. 71-6717
(a)	Pacl	(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, Sheets 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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	NRC FOI (3-96)			
	Page 3	- Cei	ificate No. 6717 - Revision No. 10 - Docket No. 71-6717	
	(b)	Cont	nts	
		(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, 35S 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.	AL AL
A NEW AND AND AN	6.	shipp asser envir the s asser	burce shall be secured in the shielded position of the radiographic device by the ong plug, source assembly, and locking device. The shipping plug and source ably used must be fabricated of materials capable of resisting a 1475°F fire onment for one-half hour and maintaining their positioning function. The ball stop of burce assembly must engage the locking device. The flexible cable of the source ably and shipping plug must be of sufficient length and diameter to provide positive burce of the source in the shielded position.	<u>A A A A A A A A A A A A A A A A A A A </u>
	7.	In ad	lition 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.	
	8.		ackaging authorized by this certificate is hereby approved for use under the general e provisions of 10 CFR §71.12.	
	9.	Expir	ation date: November 30, 2003.	
	<u>() ) () ) () ) () ) () ) () ) () () () (</u>	( )\$( )\$(	124 r pr	

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NRC FORM 618A (3-96)

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 4 - Certificate No. 6717 - Revision No. 10 - Docket No. 71-6717

## **REFERENCES**

Amersham Corporation application dated October 10, 1990.

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

AEA Technology/QSA Inc. supplement dated September 1, 1998.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Coss K. Cha

Cass R. Chappell, Chief Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: November 5, 1998

		<u>a na na na na na na na na na</u>							
NRC FORM 618	\$				U.	S. NUCLEAR REGUL	ATORY COMMISSIO		
(3-96) 10 CFR 71				CATE OF CO					
1. a. CERTIFICATE	NUMBER	.  t	. REVISION NUMB	ER c. PACKAGE IDE	NTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAC		
6786			6	USA/6	786/B( )F	1	2		
2. PREAMBLE						<b>.</b>	*		
Code of Fe	deral Regi	ulations, Part 71, "Packag	ckaging and contents described in Item 5 below, meets the applicable safety standards set forth in Title 10, ging and Transportation of Radioactive Material." from compliance with any requirement of the regulations of the U.S. Department of Transportation or other						
applicable r	egulatory	agencies, including the g	government of any	country through or int	o which the package will	be transported.	sportation or other		
a. ISSUED TO (.	Name and A	Address)	SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION:						
Departmer									
Detachm	•	ms Command		Aeroiet An	plication dated	February 18 1	971		
		airs Support Offi	ice	as supplen			571,		
PO Drawe									
		VA 23691-026	Ю с. Г	OCKET NUMBER	71-6786				
4. CONDITIONS			·····		5	•			
This certificate	is conditi	onal upon fulfilling the r	equirements of 10	CFR Part 71, as applic	able, and the conditions	specified below.			
5. (a)	Pack	aging							
	(1)	Model Nos.: U	IRIPS-84 an	d URIPS-8B					
	(1)								
	(2)	Description							
	• •	-							
		The packages,	thermoelec	tric generator	s, are 28.5 inch	es in overall hei	ght, with an		
		outer diameter	of 19.14 in	ches, and tot	al weight of app	rox. 1,600 pou	nds. The		
		components in	iclude a dep	leted uranium	shield (470 lbs.	), a steel housi	ng, cover bolts		
		(recessed and	caulked ove	r), an electric	al adaptor, cooli	ng fin system,	and cylindrical		
		fin guard, stiff	ened by eigh	nt ribs on the	inside surface.	The housings a	re equipped		
		with lifting and	tie down d	evices. I ne f	Model No. URIPS	5-88 differs from	n Model No.		
		URIPS-8A In tr		onverter syste	m. The thermo Drawing No. 11	138450 Boy A			
		secured in a si	who		Diawing No. 1	100400, Nev. F			
	(3)	Drawings							
	(0)								
		The package is	s constructe	d in accordan	ce with the follo	wing Aerojet C	ompany		
		Drawing Nos.:							
		1120444		0 VA/	att URIPS-8A As	seembly			
		1138441	• •		erator Housing	section			
		1138442, Rev 1138457			ing Fins				
		1139240, Rev	, Δ		Guard				
		1139245, Rev			ping Package Ul	RIPS-8			
		1139246			att URIPS Asser				
		1138459, Rev	/. A		ping Frame-URI	•			
		1138443, Rev			Cover				
		1138444			om Cover				
		1138436			Capsule				
		1138437, Rev	и. В		ld Uranium				
		1138435			Liner				
		1138440, Rev	/. A		Shield Plug				
				lnsu	· .•				
		1138453	-		ation				
		1138453 1138455, Rev	и. В		ation per Plug				
			и. В						
			и. В						
			и. В						
			и. В	Сор					

NRC FC (3-96)	DRM 61	BA		<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISS
Page	e 2 - (	Certifica	ate No. 6786 - Rev	vision No. 6 - Docket No. 71-6	786
					780
	(b)	Cont	ents		
		(1)	Type and form of	material	
			Strontium 90 tital form radioactive r	nate doubly encapsulated which material.	ch meets the requirements of special
		(2)	Maximum quantit	y of material per package	
			56,850 ci.		
6.	In ac	dition	to the requirement	s of Subpart G of 10 CFR Par	1 71.
	(a)	proce	dures specified in	the supplements dated April 1	ated in accordance with the operating 6 and August 6, 1998.
	(b)	The p in the	ackage must be m supplements date	aintained in accordance with ad April 16 and August 6, 199	the maintenance procedures specified 8.
7.	The prov	packag isions (	e authorized by th of 10 CFR §71.12.	is certificate is hereby approve	ed for use under the general license
8.	Expi	ration c	late: September 3	0. 2003.	
	•				
				<b>REFERENCES</b>	
Aero	iet Nu	clear S	Systems Company	application dated February 18	1071
Supp	lemer	ited by	Naval Nuclear Pov	wer Unit letter dated: Decemb	er 10, 1971, and Oak Ridge
Natio	onal La	aborato	ry dated: Decembe	er 28, 1972; and February 27	and March 27, 1973.
Depa	rtmen	t of th	e Navy application	dated: June 8, 1990.	
Supp Depa	lemen rtmen	ts: Dep t of the	partment of the Na e Navy letter 5104	vy letter 5104 Ser 455/1U59	April 16, 1998; and Department of
				FOR THE U.S. NUC	CLEAR REGULATORY COMMISSION
				PRP	uell.
				Cass R. Chappell,	Chief
				Package Certificati	on Section
				Spent Fuel Project Office of Nuclear N	Office Anterial Safety
				and Safeguards	
Date:		<u></u>			
				1.55	
				127	

-2000		618				_		ULATORY COMMISSIO
OCFR			-					
	• CE		the second s	DR HADIOACT	VE MATERIAL PACK		d. PAGE NUMBER	. TOTAL NUMBER PAGES
	8. UC		001	33	USA/9001/B	()F	1	6
	PRE	AMBLE						
		set forth in Til	tle 10, Code of Federal	Regulations, Part 71	aging and contents) describe , "Packaging and Transports	tion of Ha	dicactive Material."	
		Transportation transported.	n or other applicable re	gulatory agencies, in	liance with any requirement of a cluding the government of a	ny country	through of into whic	n the package will be
			TE IS ISSUED ON THE (Name and Address)	BASIS OF A SAFE	b. TITLE AND IDENTI	THE PAC FICATION	KAGE DESIGN OR	APPLICATION PPLICATION
		Chem-Nu	clear Systems, Ir	IC.	VECTRA Tech	nologie	es, Inc., applica	tion dated
			eridge Drive		March 30, 199			
			SC 29210			-		
							74 0004	
					C DOCKET NUMBER		71-9001	
		DITIONS		FAT	n neu(),		e conditions specifie	vi helow
	This	certificate is c	onditional upon fulfilling	the requirements of	10 CFR Part 71, as optical			
•	(a)	Packa	ging 🚬 🕈	$\sim$	·	る		
						Ĩ O		
		(1)	Model No.:	F-300			0	
			<u></u>		Ĺ	2	2	
		(2)	Description	232	la l	8	-	
						• • • • • • • • • •		- diadatia
			A stainless stee	i encesso dep	leteouranium an en	o cask	. The cask is t	yunancai in
				is in the second of the second s	and a maximula a	U-Inche	es long with ma	Eximum cavity
			dimensions of 3	1-1/2	dameter prise	inches	iono-Snielding	j is provided by
			4 inches of dep		2.1/8 inche Vie Stinl	SS SIE	el, <b>Ga</b> r a minim	ium of 4-1/2
			inches 350 gal	BODDB TO ADD		2	2	
			<b>O</b>					nacamblico
			I WO CIOSETTE NE	aussi a crowd	entre anomene entre angs and sid			asseniumes.
				SUATORIZHINASS SI	tank niskigs and no	plates	wench encase	ine onich mick
			depleted uteniu irradiated hards	m shieldi <b>ng.</b> E	Table and m	ay De V	Sed for packag	ing solia
						$\overline{\mathcal{A}}$		
			The closure hea	ada are secure	d to the cask body by	means	of 32, 1-3/4 in	ch studs and
			nuts. The cask	is sealed with	a metalliciring skel	-		
				· · · ·				<b></b>
					ent line at the top an			
					inless steel globe val			
			couplings. Stail	nless steel pipe	caps may be used i	n lieu of	t the quick-disc	onnect
					o equipped with a 35		sig rated ruptu	re disk. All
			valves are hous	ed in protected	boxes on the cask e	xterior.		
					128			
					128			

くべんべい	NRC FORM 618A (6-2000) 10 CFR 71 Certificate No. 9001 5.(a) Packaging (continued)	C	DNDITIO	NS (continued)		U.S. NUCLEA	R REG	ULATO	RY CO	MMISSIO	N N N
	Certificate No. 9001	Revision No.	33	Docket No.	71-9001	Page	2	of	6	Pages	Ĩ
XXX	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 stainless 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 tank which is provided with a pressure relief valve set at 200 psig.

The cask has three types of fuel baskets which can be interchanged to accommodate various fuels. The PWR basket holds seven assemblies, the unchanneled BWR basket holds eighteen assemblies, and the channeled BWR backet holds seventeen assemblies. The channeled and unchanged BWR fuel baskets may be provided with supplementary shielding (depleted unantum) near the cask closure.

The cask is shipped horizontally with the bottom supported in a tipping cradle between two pedestals and the upper end resting in a semi-circular saddle; the upper end is pinned to the saddle. The cask support are welded to the framine of a 37-1/2 teot long by 8-foot wide structural steps kid. The cask support are welded to the framine of a 37-1/2 teot long by 8-foot wide structural steps kid. The cask support are welded to the framine of a 37-1/2 teot long by 8-foot wide structural steps kid. The cask support are welded to the framine of a 37-1/2 teot long by 8-foot wide structural steps kid. The cash way also have installed an it an auxiliary cooling system, consisting of two diesel are as griving wo blowers which dischalge cooling air to the corrugated parface of the cash was common ducting the better installation nor operation of all or part of this auxiliary contract system to the test was proved.

The entire **cu**k and **cu**ling **cultural structure** is **cultural** retracted a luminum enclosure. Access to the enclosure is **cultural parels intro a line** and a long doo in one end. Although the Model No. IF-310 cases are proceeded on the enclosure by the parels intro a cultural parels in the second of the enclosure is the parels into a cultural parels in the second of the enclosure is the parels into a cultural parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the second of the enclosure is the parels in the parels in the enclosure is the parels in the enclosure is the parels in the enclosure is the parels in the parels in the enclosure is the parels in the enclosure is the parels in the enclosure is the parels in the parels in the enclosure is the parels in the enclosure is the parels in the pa

The gross weight of the cask is approximately 140,000 pounds. The skid and other external components weigh opproximately 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; and 420-11-3006, Sheet 1, Rev 1.

NRC FORM 61 (6-2000) 10 CFR 71											
Certificate No.	9001	Re	vision No.	33	Docket No.	71-9001	Pa	<b>je</b> 3	of	6	Pages
5.(a)(4)	Basic	Components									
	The b safety	basic components y are listed in Sect	of the Mation IX, T	odel N able I)	lo. IF-300 sh K-1.	ipping cas	sk that are	import	ant to	nucle	ear
(b) Cor	ntents										
(1)	Туре	and form of mate	rial								
	(i)	Irradiated PWR shipped with or which fuel pins displace an amo power of each f assembly must assembly must assemblies must Group I fuer ass	without c are missi bunt of w uel assen not ecc be no les have th	xontrol ing, <b>m</b> ater e mbiy n ad 35, ss thar	rods. Partia ust <u>not</u> be s qual to that o nust not exc 000 M/US/ n 120 days.	al fuel ass hipped un displaced aed 40 kW TTU, The Prior to in	emblies, ti nless dumi by the orig //kgU and minimum radiation, f	hat is, a my fuel ginal pir the bui cooling the BW	issemi pins a ns. Th mup o i time o	blies f are us e spe f eacl of eac	from ed to ecific h fuel ch
		S				CONTRACTOR OF	P		BWF	3	
		Fuertorm		1 4	Gladu	a sellets	ଜା	ad UO ₂	pellet	S	
		Cladding materi			mun )	ss	, ON	Z	r or SS	5	
		Mathum inn content/ass					MM/SS		198	3	
		Maximud initial enrichment, w		cep		4.0	S		4.(	כ	
		Maximum build section, in	e cross	<i>v</i>		€¢¢	<b>)</b>		5.75	5	
		Fuel pin array	*	*	★ ★14x	4/15x15			7x7	7	
		Fuel diameter, i	'n		0.3	80-0.460		0.500	)-0.60(	כ	
		Fuel pin pitch ra	ange, in		0.5	02-0.582		0.647	7-0.809	9	
		Maximum active length, in	e fuel			145	·		14(	6	
					130						

PRINTED ON RECYCLED PAPER

RC FORM 618 -2000)	A	COND	ITIONS (continued)		U.S. NUCLE	AR REC	ULATO	ay co	MMISS
ertificate No.	9001	Revision No. 3	3 Docket No.	71-9001	Page	٨	of	6	Page
(b) Conte				/1-3001	1 995	•	01	Ū	1 490
		Group II fuel assemblies							
				<u>PWR</u>			<u>BWR</u>		
		Fuel form	Clad UO2	pellets	Clad	UO2	pellets		
		Cladding material	z	r or SS		Zr	or SS		
		Maximum initial U content/assembly, kg		475			198		
			3 REC.						
		Maximum initial U-285 D enrichment, weight percen	REGU	4			4.0		
		Maximum burdle cross		(Ar	•				
		section		8.75	~		5.75		
		Fuel prearray	16x16		2		8x8		
		Fuel clameter, in	A 63	400	C d	).475	0.505		
		Fuel pin pitch range a	Kum )	507	<u> </u>	).630-	0.645		
		Matinum activituel			MMI		150		
	(ii)	Solid irradiated hardware, w fissile material does not exo limits of 10 000 71.53. As r when loading irradiated hard contents during accident cor provided: (1) its outside of dimensions, (2) constructed welds, (3) thickness of steel provided with a drain and ve	tware into the cas nditions of transf lensensitie appr of single thicknes plate does not ex	antity and ate consider the constant of the co	o limit mov of a steel l those of t plate with inch, and	ers m ers m remer iner is he ca: full p	d the m sust be it of the sautho sk cavi enetra	nass usec rizec ty ins tion	i i
(2)	Мах	imum quantity of material per	package						
	(i)	Maximum decay heat per pa Btu/hr/PWR assembly. Max				Maxin	num 5,	725	
	(ii)	Seven PWR fuel assemblies unchanneled BWR fuel asse		neled BV	R assemt	olies,	or eigh	teen	
	(iii)	Above fuel assemblies to be GE Drawing No. 159C5238 Sheets 1 through 9, Rev. 1.							

NRC FORM	618A						NS (continued		U.S. 1	NUCLEA	R REG	ULATO	RY CO	MMISSI
CFR 71	b. 900	1		Revision	No.	33	Docket No.	71-9001		Page	5	of	6	Pages
			nackage			nd ma	aximum qua	Intity of n	naterial					
5.	(0)												finai	
		Greater th and activa	an a Typ tion proc	e A qua lucts adl	hering	of res g to ir	sidual radio nterior cavit	y and fue	iterial co il baskel	surfa	ces.	mixeo	-11550	וזכ
	(d)	Transport	Index for	r Critical	ity Co	ontrol								
		Minimum t label for n					non		0.4					
6.	The e not ex	nd of life to ceed 0.50	otal calcu Ib moles	lated rest for con	sidua tent 5	al gas 5.(b).	that could	become	available	e from	the fu	uel pir	ns mu	st
7.	The m	naximum g	ross weig	ght of th	e cav		REG	t not exc	eed 21,0	0 <b>00</b> pc	ounds	•		
8.	prom	otly inerted	followine		al of t	the w	ies, the cas ater from th	e cavity	The ca	sk cav	rity m	ust be	e purg	ed
	greate argon	er than the , nitrogen,	casica or neliur	vity volui	me. / atm p	After press		rge, the o		ust be	prom	iptly fi	lied w	/itn
9.	holes	and hairlin	e eracks	are i	e th	prizé	(rods) and	ack ack	age. N	ö				
10.	conte maxin	nt of 439 k num asser	nograms	per ass annot 4 annot 4		anc U	a mining		e of 60		is may	y have	ea	
11.	Subs	to each shi ter in the c ection 10.1	of the a	pplicatio	n. <b>U</b>	4				ent, in	acco	roanc		1
12.	neutro	on dose rat	te plus 6.	3 times	the g	jamm	a dose rate	will no	exceed :	560 m	nspoi rem/h	rt, 62 ir at a	times dista	the nce
13.	The n ethyle	eutron shi ane glycol a	elding tai and wate	nks mus r during	t be f the n	filled nonth	with approx as of Octobe	imately a ar throug	. 50/50 v h May.	olume	perc	ent m	ixture	of
14.	Repla 8, mu	icement glo ist be teste	obe valve d as stat	es other ed in Su	than Ibsec	the v tion f	alve specifi 6.6.3.2 of th	ed on Dr e applica	awing N Ition.	o. 159	C523	8-She	eet 4,	Rev.
15.	applic provid	ation. Dur	ring inact e packag	ive perio	ods, t	he m	ordance with aintenance ull complian	and testi	ng frequ	iency i	may b	be disi	regar	ded
16.	The c range	ask cavity of 350-40	must be 0 psig (4	equippe 43°F) in	ed wit ncludi	h a ru ng al	upture disk I tolerances	device w	ith a bur	st pres	ssure	withir	n the	

(XXX	NRC FORM (6-2000)	618A				continued)		U.S. NUCLEA		-		
<b>ZXX</b>	10 CFR 71	o. 9001		Revision No.	33	Docket No.	71-9001	Page	6 ol	6	Page	s I
ANXAXX	17.	The uranium s thickness of 4 unchanneled l	-mils, excep	t that the s	tud bolts	s attaching	the shield	assemblies	to top o		copper	
XXXXX	18.	A shutoff valve expansion tan		e installed	betwee	n each neu	itron shield	I tank and it	s respec	tive ti	hermal	
XXXXXXXXX	19.	The cask may of the contents be greater tha The reinforced with 10 CFR 7	s does not e n 0.015 inch I plastic wra	exceed 1.5 nes thick or	KW. Th have a	e reinforce	d plastic u nductivity	sed to wrap less than 0.0	the cas	k mus 1/hr-ft	st not -°F.	
XXXXX	20.	The package a provisions of 1			cate is I	nereby app	proved for u	use under th	e gener	al lice	ense	
XXXXX	21.	Expiration date	e: Septemb	e <del>r</del> 30, 2005	5.		797	n. Mart				
AXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	VECTRA	Technologies, Technologies, r 25, 1997;		tion dated		0, 1995.	ugeust 18, 1	995;				
	.≀em-Nu	clear Systems :	supplement					000 TORY COM	IMISSIO	N	ļ	
				Spent F Office of	uel Pro	h, Director ject Office ar Material ds						
	Date <u>Aug</u> r	ust 28, 2000										
1111					1	33						

D

I-96) ) CFR 71			ATE OF COMPLIANCI	E	JCLEAR REGUL	ATORY COMMISSIO
a. CERTIFICATE N	NUMBER	b. REVISION NUMBER	c. PACKAGE IDENTIFICATION NU	MBER	d. PAGE NUMBER	e. TOTAL NUMBER PAC
9009		18	USA/9009/B( )F		1	4
Code of Fede	eral Regulations, Part 71, "Pack ate does not relieve the consigno	aging and Transportation or from compliance with	described in Item 5 below, meets the on of Radioactive Material." In any requirement of the regulations untry through or into which the pack	of the U.S. D	epartment of Trans	
THIS CERTIFICAT a. ISSUED TO (No			EPORT OF THE PACKAGE DESIGN O LE AND IDENTIFICATION OF REPOR			
	Fuel Services 337, MS 123 N 37650		General Electric Compa dated January 27, 1984			
CONDITIONS			CKET NUMBER         71-9009			
	is conditional upon fulfilling the	requirements of 10 CF	R Part 71, as applicable, and the cor	nditions speci	fied below.	<u></u>
(a) P	ackaging					
(1		<b>10-1</b>				
(2	2) Description			·		
(2	Two, 16-gauge 1/2 inches in d gauge bolt-lock 5/8-inch diame wood supports resistant phene pounds per cul relief holes sha	liameter. The o king ring with dr eter bolt and lock s, steel inner sle olic foam, forme bic foot for the r all be provided i	ns welded end to end, a uter drum closure shall op-forged lugs, one of w k nut. The pressure ves eve and nut ring to rece ed in place to an averag main body and 10 pound n the outer steel drum.	be accon which is t ssel supp live the c e finished ds per cu	nplished by a hreaded to re ort mechanis ontainment v d density of a ibic foot for th	at least a 12- eceive at least a sm consists of vessel, and fire at least 8 he cap. Gas
(2	Two, 16-gauge 1/2 inches in d gauge bolt-lock 5/8-inch diame wood supports resistant phene pounds per cul relief holes sha The containme 53-1/2 inches k 304L stainless 3/4-inch steel k pressure tap b pressure tap is stainless steel is sealed by a high section 5-	liameter. The o king ring with dr eter bolt and lock s, steel inner sle olic foam, forme bic foot for the r all be provided i ent vessel is a 3 long, with a 304 steel 300 poun bolts. The flang between the two s sealed with a p valve is screwe pipe cap (thread	uter drum closure shall op-forged lugs, one of w k nut. The pressure ves eve and nut ring to rece ed in place to an averag main body and 10 pound n the outer steel drum. 04L stainless steel 5-ind L stainless steel ½-inch d slip-on flange and blir ge closure is gasketed b O-ring grooves. During pipe plug with threads w ed into the blind flange of ds wrapped with Teflon 40 pipe welded to the to	be accon which is t ssel supp ive the c e finished ds per cu ch Sched h thick we hd flange by two fluc g shipmed in f the con tape) and	nplished by a hreaded to re- port mechanis ontainment v d density of a bic foot for the lule 40 pipe, alded bottom which is fast oroelastomer nt, the O-ring n teflon tape. atainment vest d is protected	at least a 12- eceive at least a sm consists of vessel, and fire at least 8 he cap. Gas approximately plate and a tened by eight, r O-rings with a g groove . A 1/4-inch ssel. The valve d by a 2-1/2 incl
	Two, 16-gauge 1/2 inches in d gauge bolt-lock 5/8-inch diame wood supports resistant phene pounds per cul relief holes sha The containme 53-1/2 inches k 304L stainless 3/4-inch steel k pressure tap b pressure tap b pressure tap is stainless steel is sealed by a high section 5- maximum gros	liameter. The o king ring with dr eter bolt and lock s, steel inner sle olic foam, forme bic foot for the r all be provided i ent vessel is a 3 long, with a 304 steel 300 poun bolts. The flang between the two s sealed with a p valve is screwe pipe cap (thread -inch Schedule ss weight of 515	uter drum closure shall rop-forged lugs, one of v k nut. The pressure ves eve and nut ring to rece ad in place to an averag main body and 10 pound n the outer steel drum. 04L stainless steel 5-ind L stainless steel ½-inch d slip-on flange and blir ge closure is gasketed b O-ring grooves. During bipe plug with threads w ad into the blind flange of ds wrapped with Teflon 40 pipe welded to the to 5 lbs.	be accon which is t ssel supp live the c e finished ds per cu ch Sched n thick we had flange by two flue g shipmed in f the con tape) and op of the f	nplished by a hreaded to re- port mechanis ontainment v d density of a bic foot for the lule 40 pipe, alded bottom which is fast oroelastomer nt, the O-ring n teflon tape. atainment ves d is protected flange. The p	at least a 12- ecceive at least a sm consists of vessel, and fire at least 8 he cap. Gas approximately plate and a tened by eight, r O-rings with a g groove . A 1/4-inch ssel. The valve d by a 2-1/2 inch packaging has a
	<ul> <li>Two, 16-gauge 1/2 inches in d gauge bolt-lock</li> <li>5/8-inch diame wood supports resistant phene pounds per cul relief holes sha</li> <li>The containme 53-1/2 inches k</li> <li>304L stainless</li> <li>3/4-inch steel k</li> <li>pressure tap b</li> <li>pressure tap is stainless steel is sealed by a</li> <li>high section 5- maximum gros</li> <li>3) Drawings</li> <li>The Model No</li> </ul>	liameter. The o king ring with dr eter bolt and lock s, steel inner sle olic foam, forme bic foot for the r all be provided i ent vessel is a 3 long, with a 304 steel 300 poun bolts. The flang between the two s sealed with a p valve is screwe pipe cap (thread -inch Schedule ss weight of 515	uter drum closure shall rop-forged lugs, one of w k nut. The pressure ves eve and nut ring to rece ad in place to an averag main body and 10 pound n the outer steel drum. 04L stainless steel 5-ind L stainless steel ½-inch d slip-on flange and blir ge closure is gasketed b O-ring grooves. During bipe plug with threads w ed into the blind flange of ds wrapped with Teflon 40 pipe welded to the to 5 lbs.	be accon which is t ssel supp live the c e finished ds per cu ch Sched n thick we had flange by two flue g shipmed in f the con tape) and op of the f	nplished by a hreaded to re- port mechanis ontainment v d density of a bic foot for the lule 40 pipe, alded bottom which is fast oroelastomer nt, the O-ring n teflon tape. atainment ves d is protected flange. The p	at least a 12- eceive at least a sm consists of vessel, and fire at least 8 he cap. Gas approximately plate and a tened by eight, r O-rings with a g groove . A 1/4-inch ssel. The valve d by a 2-1/2 inch packaging has a

RC FORM 96)	1618A		CONDI	TIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
Page	2 - Cer	tificate	No. 9009 - Revision No. 18 -	Docket No. 71-9	0009
(b)	Conte	ents			
	(1)	Туре	and form of material		
		(i)	Uranyl nitrate solutions en is not more than 1% of the		35 isotope, provided the U-233 content or
		(ii)	uranium-235 not exceeding	g 250 grams per ded the U-233 co	concentration of uranium-233 and liter and an H to fissile material atomic ontent is not greater than 20% of the
		(iii)	Uranyl sulfate solution (UC	2SO₄) containing	uranium-235; or
		(iv)	Dry compounds and mixtu	res of uranium-23	35; or
		(v)	Uranium oxide interspersed material; or	d with graphite or	r silicon carbide plus plastic packing
		(vi)	Uranyl nitrate solutions enr not to exceed 350 grams p		35 isotope having a U-235 concentration
	(2)	Maxi	mum quantity of material per	package	
		(i)	For the contents described	l in 5(b)(l)(i) and \$	5(b)(1)(ii):
			of solution.		ial, 21 watts decay heat, and 10.5 liters
		(ii)	For the contents described	in 5(b)(1)(iii):	
			Not to exceed 950 grams f	issile material an	d 18 watts decay heat.
		(iii)	For the contents described	in 5(b)(1)(iv):	
			Not to exceed 4.5 kilogram	s fissile material	and 30 watts decay heat.
		(iv)	For the contents described	in 5(b)(1)(v):	
			Not to exceed 300 grams f	issile material an	d 10 watts decay heat.
		(v)	For the contents described	in 5(b)(1)(vi):	
			Not to exceed 10.0 liters of	solution.	
(c)	Trans	port In	dex for Criticality Control		
	Minim label f	ium tra for nuc	For the contents described Not to exceed 950 grams f For the contents described Not to exceed 4.5 kilogram For the contents described Not to exceed 300 grams f For the contents described Not to exceed 10.0 liters of dex for Criticality Control nsport index to be shown on lear criticality control:	0.4	
					135 78(78(78(78(78(78(78(78(78(78(78(78(78(7

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NR (3-9	RC FORM	618A				CONDITIO	NS (continued)		U.S. NUCLEAR REGULATORY	COMMISSION
	Page	3 - Cert	ificate	No. 9009 -	Revision I	No. 18 - D	ocket No. 7	1-9009		
	6.		olution		f the packa	age shall l	pe containe	d within a	a bottle having one of the	following
		(a)	For c	ontents des	scribed in	5(b)(1)(i),	5(b)(1)(ii), a	and 5(b)( ⁻	1)(iii):	
	(i) Slit-vent polyethylene bot						per Drawing	g No. CAF	PE-1170-37,	
			(ii)		t polyethyl 3, Rev. 0,		per Gener	al Electric	: Company Drawing No.	
			(iii)		s steel bott FRO-140/		wn on Gene	eral Electi	ric Company Drawing No	s. FRO-
		(b)	For c	ontents des	scribed in	5(b)(1)(vi)				
			Slit-v Rev.	ent or duo- 2, and Dra	vent polye wing No. 5	thylene bo 5B-U-740,	ottle per Nu Rev. 2.	clear Fue	Services, Inc., Specifica	ation U-1,
	7.	stainle	ess ste	el or polvet	hvlene bo	ttle is clos	ed. After fi	lling with	ater than 365 days after solution, the minimum re st be at least 0.44 liters.	the maining
	8.	Jense	olyethy en Corr 26, 197	pany, Inc.,	s may be Drawing I	packaged Nos. 1092	within the I M-1, 1093	metal inno A-1, 1095	er container described by M-1 and 1096M-1, Issue	Chester- 1, dated
	9.	recon betwe to ass	nmend	ed in ARH- cap assen at the polye	1819 *Vibr nbly of the	ration Tes	ting of L-3 a ene bottle a	and L-10 and the cl	le restraining device (suc Shipping Containers") pla osure flange of the press equency as the pressure	aced ure vessel
	10.	Speci speci Illustr with A may I	fication fied on ation, a Article ( be con	n 2R contai General E all inner cor 6. Section \	ners and p lectric Illus ntainer we /, ASME 0 300 series	placed with stration AF lds shall b Code. Alte s stainless	hin an innei L 1105. Fo tested us rnatively, th steel pipe	Containe blowing t ing a liqu he inner c with an o	ealed metal cans or DOT er constructed and leak te he gas leak testing speci id penetrant method in a container shown in the Illu utside diameter of 4.500 inch.	ested as fied on the ccordance ustration
	11.	Appro the co	opriate onsign	steps shall ee, the pres	l be taken ssure in th	to assure le containr	that from tl nent vesse	ne time of I will not e	f sealing to the time of de exceed 40 psig.	livery to
	12.	the d of de	ouble ( tectina	D-ring shall a leak orea	be tested ater than 1	l at 100 ps 10 ⁻³ atm co	ig and leak /sec at sta	detection	active material, the space n performed by a method nperature and pressure. or transport.	capable
							136	است میں بن		
	<u>10,240,240,24</u>	<u>(</u> 28( 24( 2			0101010101	()_()_1()_1()_2()_2()		21, 221, 221, 221	<u>14, 18, 18, 18, 18, 18, 18, 18, 18, 18, 18</u>	

<b>NRC</b> FORN 3-96)	1 618A	<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISS
Page	4 - Certificate No. 9009	- Revision No. 18 - Docket No. 71-90	09
13.	containment vessel ar initially and once each detecting a leak greate chamber that fails to p	irements of Subpart G of 10 CFR 71, nd associated 1/4-inch stainless steel a year at 300 psig and the leak detecti er than $10^{-6}$ atm cc/sec at standard te bass the test shall be withdrawn from s nts of not more than a Type A quantit	valve (without its associated pipe cap on performed by a method capable of mperature and pressure. Any service and repaired to meet the test.
14.	The fire resistant pher Specification SP-9 or a	nolic foam shall be in accordance with as modified by ORGDP Reports K/TL	AEC Materials and Equipment -729 and K/P-6567S.
15.	Prior to release of the determination of surface	package for shipment, a radiation sur ce contamination, to assure complian	vey should be performed, including a ce with 10 CFR §§71.47 and 71.87.
16.	In addition to the cond Section 8.0 of the curr May 16, 1984.	itions in this certificate, each packagin ent Safety Analysis Report of January	ng must meet the Acceptance Test 27, 1984, as revised April 26 and
17.	operated in accordanc	itions in this certificate, the packaging e with the Operating Procedures of S juary 27, 1984, as revised April 26 an	ection 7.0 of the current Safety
18.	The package authorize provisions of 10 CFR §	ed by this certificate is hereby approve §71.12.	ed for use under the general license
19.	Expiration date: Septer	mber 30, 2004.	
		<b><u>REFERENCES</u></b>	
Gener	al Electric Company app	olication dated January 27, 1984.	
Supple	ements dated: April 26 a	and May 16, 1984; and February 8 an	d June 7, 1994.
Westi	nghouse Electric Corpor	ation supplement dated: May 15, 198	34.
Nuclea May 2	ar Fuel Services, Inc. su 8, 1999.	pplements dated: July 3 and October	23, 1996, November 6, 1997, and
			AR REGULATORY COMMISSION
		M. Wayne for	den
		E. William Brach, Direc	ctor
		Spent Fuel Project Offic Office of Nuclear Mater	ce de la constant de
		and Safeguards	ar carby
Date:	<u>Sept</u> ember 20, 1999	)	
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IRC FORM 618		<u>~</u>		U.S. I	NUCLEAR REGUL	ATORY COMMISSIO
3-96) 0 CFR 71				MPLIANCE ALS PACKAGES		
. a. CERTIFICATE NUM	1BER	b. REVISION NUMBER	c. PACKAGE IDE	NTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PA
	9010	39	US	∿9010/B( )F	1	9
PREAMBLE	<del></del>	d				1
Code of Federal	Regulations, Part 71, "Pack loes not relieve the consigne	aging and Transportation from compliance wit	on of Radioactive I h any requirement	below, meets the applicable Material." of the regulations of the U.S. to which the package will be	Department of Trans	
	S ISSUED ON THE BASIS OF	A SAFETY ANALYSIS R	EPORT OF THE PAG	KAGE DESIGN OR APPLICATION OF REPORT OR APPL	TION	
NAC Interna	ational, Inc. ering Drive, Suite 2	٢		rance Corporation		
		c. DO	CKET NUMBER	71-9010		
CONDITIONS						
This certificate is co	onditional upon fulfilling the	requirements of 10 CF	R Part 71, as appli	cable, and the conditions spe	cified below.	
(a) Packag	ing					
(1)	Model No.:	VLI-1/2				
(1)		n an The Art State			n Litter Arten	
(2)	Description					
				ping cask, encased		
lead A 7/4 of th also The	, and 5 inches of (I B-inch thick stainle e cask. The outer attached to the en inner cask cavity is	ss steel outer s shell of the cas d forgings. A v s formed by a 1	ethylene glyd hell is welde sk is surroun vater expans /2-inch thick	/4 inches of deplete col mixture. d to a solid stainles ded by a 1/4-inch t ion tank is welded , stainless steel cyl nd to a circular plat	s steel forging nick steel wate to the water ja indrical shell;	g at each end er jacket that is acket shell.
The	e are four separat	e configuration	s of the cask			
by 1 cont head bolts cavit ring.	78 inches inside le ainment vessel is d d, twelve, 1-inch di are used to secul ty is by a 1-1/2-incl	ngth by 1/4-inc closed and seal ameter bolts, a re the containm h thick steel clo contents are pos	h thick, locat ed by a 5-ind nd silver plat ent vessel to sure head, e sitioned and	ht circular stainless ed within the inner ch thick, composite ed, metallic O-ring. the upper cask for ight, 1-inch diamet supported within the port structure.	cask cavity. T steel and ura Eight of the tr ging. Closure er bolts, and e	The nium closure welve closure of the cask elastomer O-
			1	.38		

NRC FORM 618A (3-96)

CONDITIONS (continued)

**U.S. NUCLEAR REGULATORY COMMISSION** 

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5.(a) Packaging (continued)

(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 1-1/2-inch thick steel plate secured to the top of the upper cask forging by eight, 1-inch 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 aluminum 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 stainless 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 stainless steel structure as shown in NAC Drawing No. 347-291-F12, sheet 1, Rev. 2, and the cask must be enclosed in a closed shipping container.

The package, including impact limiters, 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-1/2 shipping cask is constructed in accordance with the following National Lead Company Drawing Nos.:

### <u>General</u>

70514F, Sheet 1, Rev. 8, Cask and Trailer General Arrangement 70514F, Sheet 2, Rev. 8, 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

Configuration (A)

70516F, Sheet 1, Rev. 8, Spent Fuel Cask General Assembly 70562F, Sheet 1, Rev. 11, Inner Container 70562F, Sheet 2, Rev. 7, Inner Container 70562F, Sheet 3, Rev. 0, Inner Container* 70562F, Sheet 4, Rev. 0, Inner Container*

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5.(a) l	Packaging (continued)								
	(3) Drawings (continued)								
	Configuration (B)								
	70888F, Sheet 1, Rev 70886F, Sheet 1, Rev 70884F, Sheet 1, Rev	. 2, Basket Concept							
	Configuration (C)								
	70888F, Sheet 1, Rev 460-052-F8, Sheet 1, 460-052-F9, Sheet 1, Cask, Assembly of*	Rev. 4, Rockwell Fue	I Basket-NLI-1/2 Ca	sk* Basket, NLI-1/2					
	Configuration (D)								
	70888F. Sheet 1. Rev	. 3, Spent Fuel Cask , Rev. 2, Liner - 3 Ele	General Assembly ment, NLI-1/2 Cask,	Fuel Movement Project*					
*Nucle	ear Assurance Corporat								
	ontents								
	(1) Type and form of	material							
	(i) Irradiated PWR of	BWR uranium oxide	fuel assemblies of 1	he following specifications:					
	(i) Irradiated PWR of	BWR uranium oxide <u>PWR</u>	fuel assemblies of 1 <u>BWR</u>	he following specifications: Consolidated <u>Fuel Rods</u>					
	(i) Irradiated PWR of Fuel form		BWR	Consolidated <u>Fuel Rods</u>					
		<u>PWR</u>	BWR	Consolidated <u>Fuel Rods</u>					
	Fuel form	<u>PWR</u> Clad UO₂ pell Zr or SS	<u>BWR</u> et Clad UO ₂ p	Consolidated <u>Fuel Rods</u> ellet Clad UO ₂ pellets					
	Fuel form Cladding material Maximum initial fuel pin pressure at 100°F	<u>PWR</u> Clad UO ₂ pell Zr or SS	<u>BWR</u> et Clad UO ₂ p Zr or SS	Consolidated <u>Fuel Rods</u> ellet Clad UO ₂ pellets Zr or SS					
	Fuel form Cladding material Maximum initial fuel pin pressure at 100°F psig Maximum initial U	PWR Clad UO ₂ pell Zr or SS 550 475 tial	BWR et Clad UO ₂ p Zr or SS 200	ellet Clad UO ₂ pellets Zr or SS					
	Fuel form Cladding material Maximum initial fuel pin pressure at 100°F psig Maximum initial U content/assembly, kg Maximum average ini	PWR Clad UO₂ pell Zr or SS , 550 475 tial o 3.70	BWR et Clad UO ₂ p Zr or SS 200 197	ellet Clad UO ₂ pellets Zr or SS 550 950					

FORM 618A		<b>CONDITIONS</b> (continued)	U.S. NUCLE	AR REGULATORY COMMISSIO
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5.(b)(1)(i) (continued)				
		PWR	<u>BWR</u>	Consolidated Fuel Rods
Maximum active fuel length, inches		144	145.25	144
Maximum specific por	wer, kW/kgU	40	27	40
Maximum average bu MWD/MTU	ırnup,	40,000**	34,000	40,000
Maximum decay heat	, kW	10.6	10.6	0.6
Minimum cooling time	e, days	150* 150* 1000 1000 1000 1000 1000 1000	120	4,380
- /		oling time of 120 days.		
PWR fuel assembly may hav poling time prior to shipment the borated fluid may be left (ii) Irradiated metallic Fuel form	ve a maximum is 450 days ar in the shielding fuels of the fo <u>F</u> U a	n average burnup of 56 nd the neutron shield fl g tanks during the ship ollowing specifications: <u>Fermi-1</u> Jranium-motybdenum Illoy pins	,000 MWD/MTU uid contains 1.0 v pment of other co <u>EBR-II Bla</u> Uranium r cylindrical	weight percent boron. ntents.) anket netal slugs
PWR fuel assembly may hav poling time prior to shipment he borated fluid may be left (ii) Irradiated metallic	ve a maximum is 450 days ar in the shielding fuels of the fo E U a Z	n average burnup of 56 nd the neutron shield fl g tanks during the ship ollowing specifications: <u>Fermi-1</u> Jranium-motybdenum Illoy pins	,000 MWD/MTU uid contains 1.0 v pment of other co <u>EBR-II Bla</u> Uranium r cylindrical	weight percent boron. ntents.) anket metal slugs i containers
PWR fuel assembly may hav poling time prior to shipment the borated fluid may be left (ii) Irradiated metallic Fuel form Cladding material Max. initial U	ve a maximum is 450 days ar in the shielding fuels of the fo E U a Z 1 3 2	n average burnup of 56 nd the neutron shield fl g tanks during the ship ollowing specifications: <u>Fermi-1</u> Jranium-molybdenum Illoy pins Ir 8.7/assy.	,000 MWD/MTU uid contains 1.0 v oment of other co <u>EBR-II Bla</u> Uranium r cylindrical Aluminum	weight percent boron. ntents.) anket metal slugs a containers iner
PWR fuel assembly may hav poling time prior to shipment the borated fluid may be left (ii) Irradiated metallic Fuel form Cladding material Max. initial U content/assembly, kg Max. avg. initial	ve a maximum is 450 days ar in the shielding fuels of the fo E U a Z 1 3 2	n average burnup of 56 nd the neutron shield fl g tanks during the ship ollowing specifications: <u>Fermi-1</u> Jranium-molybdenum illoy pins Ir 8.7/assy. 600/16 assy. cask load	,000 MWD/MTU uid contains 1.0 v pment of other co <u>EBR-II Bla</u> Uranium r cylindrical Aluminum 292/conta 0.21 (3.88	weight percent boron. ntents.) anket metal slugs a containers iner
PWR fuel assembly may hav poling time prior to shipment the borated fluid may be left (ii) Irradiated metallic Fuel form Cladding material Max. initial U content/assembly, kg Max. avg. initial U-235 enrichment, w/o Max. bundle cross	ve a maximum is 450 days ar in the shielding fuels of the fo E U a 2 3 2	n average burnup of 56 nd the neutron shield fi g tanks during the ship ollowing specifications: <u>Fermi-1</u> Jranium-molybdenum Illoy pins Ir 8.7/assy. 00/16 assy. cask load	5,000 MWD/MTU uid contains 1.0 v pment of other co <u>EBR-II Bla</u> Uranium r cylindrical Aluminum 292/conta 0.21 (3.88 Pu/caniste	weight percent boron. ntents.) anket metal slugs a containers iner
PWR fuel assembly may hav poling time prior to shipment the borated fluid may be left (ii) Irradiated metallic Fuel form Cladding material Max. initial U content/assembly, kg Max. avg. initial U-235 enrichment, w/o Max. bundle cross section, inches	ve a maximum is 450 days ar in the shielding fuels of the fo a 2 1 3 2 1 3 3	n average burnup of 56 nd the neutron shield fl g tanks during the ship ollowing specifications: <u>Fermi-1</u> Jranium-molybdenum Illoy pins Zr 8.7/assy. 900/16 assy. cask load 26.0	,000 MWD/MTU uid contains 1.0 v pment of other co <u>EBR-II Bla</u> Uranium r cylindrical Aluminum 292/conta 0.21 (3.88 Pu/caniste 4.875 dia	weight percent boron. ntents.) anket metal slugs a containers iner
PWR fuel assembly may hav poling time prior to shipment the borated fluid may be left (ii) Irradiated metallic Fuel form Cladding material Max. initial U content/assembly, kg Max. avg. initial U-235 enrichment, w/o Max. bundle cross section, inches Fuel rods per canister Max. active fuel	ve a maximum is 450 days ar in the shielding fuels of the fo a 2 1 3 2 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3	n average burnup of 56 nd the neutron shield fi g tanks during the ship ollowing specifications: <u>Fermi-1</u> Jranium-molybdenum Illoy pins Zr 8.7/assy. 200/16 assy. cask load 26.0 2.93 sq 40 0.5/assy	5,000 MWD/MTU uid contains 1.0 v pment of other co <u>EBR-II Bla</u> Uranium r cylindrical Aluminum 292/conta 0.21 (3.88 Pu/caniste 4.875 dia 41	weight percent boron. ntents.) anket metal slugs a containers iner

	Fen	<u>mi-1</u>	EBR-II Blanket	
Fuel form		<b>nium-moly</b> bdenun y pins	n Uranium metal cylindrical slugs	
Cladding material	Zr		Aluminum containers	;
Max. initial U content/assembly, kg		7/assy. /16 assy. cask loa	292/container ad	
Max. avg. initial U-235 enrichment, w/o	26.0	<b>)</b>	0.21 (3.88 kg Pu/canister)	
Max. bundle cross section, inches	2.90	3 sq	4.875 dia	
Fuel rods per canister	140		41	
Max. active fuel length, inches		ō/assy /cask	157	
Max. average burnup, MWD/MTU	2,84	40	2,400	
Max. decay heat, watts	20		300	
Min. cooling time, days	5,00	00	365	
<u>1, 21, 21, 21, 21, 21, 21, 21, 21, 21, 2</u>		ALAXA 141		

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Page	5 - Certificate No. 9010 - Revision	No. 39 - Docket No. 71	-9010
	(iii)	Res	search Reactor
	Fuel form		anium metal rods
	Cladding material	Alu	minum
	Maximum initial U content/assembly-kg	54.	5
	Maximum average initial U-235 enrichment	Nat	tural
	Maximum bundle cross-section inches	a de <u>de de ser</u> ação secondador a de sera da sera <b>1.3</b> secondada e sera da sera sera da sera da	6
	Intact fuel rods per canister, maximum	7	
	Canisters per cask		ntact fuel
	Max. active fuel length, inches	120	
	Maximum average burnup MWD/		
	Maximum decay heat, watts	750	略化 ""专力"的"公",要辩论 "一个理想我们","当时
	Minimum cooling time, days (iv) Irradiated PWR* or BWR ura		
	specifications:	PWR Rods	<u>BWR Rods</u>
			i se
	Fuel form	Clad UO ₂ pellets Zr or SS	Zr  or  SS
	Cladding material		210133
	Maximum initial fuel pin pressure at 100°F, psig	550	200
	Maximum initial U content, kg	58.2	75
	Maximum average initial U-235 enrichment, w/o	4.9	5.0
	Maximum bundle cross section, inches	8.75	5.75
	Maximum active fuel length, inches	150	150
	Maximum specific power, kW/kgU	44	60

NRC FORM 618A

CONDITIONS (continued)

**U.S. NUCLEAR REGULATORY COMMISSION** 

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(iv) (continued)

	PWR Rods	BWR Rods
Maximum average burnup, MWD/MTU	60,000	75,000
Maximum decay heat, kW	1.65	4.0
Minimum cooling time, days	150	150

* 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).

- (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 MARK 42 fuel assemblies consisting of three concentric fuel tubes with PuO₂-Al powder metallurgy cores clad with type 6063 aluminum, containing a total of 3.35 kg of plutonium. The plutonium was initially enriched to contain 78.28 w/o Pu-239, 2.27 w/o Pu-241 and 0.15 w/o Pu-238.
- (x) Irradiated MARK 22 fuel assemblies consisting of two concentric fuel tubes with uraniumaluminum cores clad with type 8001 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. 11, 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. 11.
  - (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.

NRC FORM 618/ (3-96)	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
· ·	Certificate No. 9010 - Revision No. 39 - Docket No. 71-9010
5.(b)(2) (co	ntinued)
<b>(</b> 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 a 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 canister. Plutonium content of the filters not to exceed 20 curies plutonium per package.
(iv)	Item 5(b)(1)(iv) above, the fuel rods will be shipped in Configuration (A) or (B). PWR fuel rods with burnup in excess of 45,000 MWD/MTU and BWR fuel rods with burnup in excess of 50,00 MWD/MTU will be shipped in Configuration (A) only. The maximum initial uranium content is limited to 58.2 kg per package for PWR rods and 75 kg per package for BWR rods; and
	(a) up to 25 PWR fuel rods or up to 25 BWR fuel rods per cask. Up to 2 of the 25 PWR roo may have a maximum burnup of 65,000 MWD/MTU; or
	(b) up to 18 PWR fuel rods, with a maximum specific power of 60 kW/kgU and a minimum cooling time of 300 days, per cask.
(v)	Item 5(b)(1)(v) above, weight not 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. 11, 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 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-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
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## NRC FORM 618A **CONDITIONS** (continued) **U.S. NUCLEAR REGULATORY COMMISSION** (3-96) Page 8 - Certificate No. 9010 - Revision No. 39 - Docket No. 71-9010 (5)(b)(2) (continued) 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. Item 5(b)(1)(x) above: Two MARK 22 fuel assemblies or one MARK 22 fuel assembly with the (ix)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, lss. B. (c) Transport Index for Criticality Control Minimum transport index to be shown on label for nuclear criticality control: 100 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). 10. 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. 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. 12. 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. 13. When the cask is shipped in a closed shipping container, the internal heat load must not exceed 750 watts. 145

	RM 618A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
Pag	je 9 - (	Certificate No. 9010 - Revision No. 39 - Docket No. 71-9010
14.	volur	neutron shielding tank must be filled with a mixture of water and ethylene glycol (52% by me). This mixture must not freeze or precipitate in a temperature range from -40°F to 330°F. neutron shield tank may be empty when the cask is in Configuration D.
15.		structures used to support the package on the transport vehicle must be as described in the ication.
16.	that a 310	system used for cooling down the package must be provided with a pressure relief device set so during the cool-down process, the maximum pressure in the containment vessel cannot exceed psig when the package is used in Configuration (A) or 365 psig when the package is used in figuration (B).
17.		eeded, appropriate component spacers must be used in the cask cavity nit movement of contents during shipment.
18.	Ship be s	ping cans used for sectioned MARK 42 irradiated fuel assemblies must eal welded and must be leak tested to 1x10 ⁻⁷ std cm ³ /sec.
19.	In ac	ddition 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.
	(c)	When the package is to be used for the transport of authorized contents having a decay heat load of greater than 4.0 kW, a 220 psig hydrostatic test of the containment cavity, and a 405 psig hydrostatic test of the water jacket and expansion tank shall be performed as part of the maintenance program as specified in Section XVI of the application.
20.	The prov	package authorized by this certificate is hereby approved for use under the general license visions of 10 CFR §71.12.
21.	Effe	ctive Date: April 1, 1996. Expiration date: April 30, 2001.
		REFERENCES
Nucl Marc	ear As ch 26,	ssurance Corporation application dated February 27, 1996, as supplemented 1996; June 9, 1998; March 29 and May 20, 1999.
		FOR THE U.S. NUCLEAR REGULATORY COMMISSION
		Guilliam Frach
		E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards
Date		5/25/49
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<b>NRC</b> FO <b>RM 618</b> 3-96) 0 CFR 71			U CATE OF COMPLIANCE CTIVE MATERIALS PACKAGES	.S. NUCLEAR REGU	LATORY COMMISSIO
. a. CERTIFICATE NUN	MBER <b>9015</b>	b. REVISION NUMB 19	ER C. PACKAGE IDENTIFICATION NUMBER USA/9015/B()F		e. TOTAL NUMBER PA
Code of Federal b. This certificate of applicable regul	l Regulations, Part 71, "Pa does not relieve the consig atory agencies, including t	ickaging and Transporta mor from compliance w the government of any o	s described in Item 5 below, meets the applica tion of Radioactive Material." ith any requirement of the regulations of the I country through or into which the package wil REPORT OF THE PACKAGE DESIGN OR APPL	J.S. Department of Tran l be transported.	
a ISSUED TO (Name Transnucle; Two Skyline Hawthorne,	ar, Inc.	۲ ۸ ٥	TTLE AND IDENTIFICATION OF REPORT OR A Transnuclear, Inc., appli larch 25, 1991, as supple 71-9015 оскет NUMBER	cation dated	
. CONDITIONS This certificate is co	onditional upon fulfilling t	he requirements of 10 C	FR Part 71, as applicable, and the conditions	specified below.	
(a) Packa	aging				
(1)	Model No.:	TN-8 AND TN-8	SL		
(2)	Description				
	shipping cas	ks. The cask	ad, steel and resin-shie s approximates a right c	ircular cylin	der 1,718 mm
	shipping cash in diameter a steel square stepped top with B4C + Cu main shieldin	ks. The cask and 5,516 mm pressure ves flange, separ u plates. Ea ng consists o	s approximates a right c long. The cavity consis sels welded to an end pl ated by a T-shaped coppe ich cavity is 230 x 230 m of 135 mm of lead, 26 mm	ircular cylin ts of three s ate and a cir r plate and s m and 4,280 m of steel and	der 1,718 mm tainless cular urrounded m long. The 150 mm of
	shipping cash in diameter a steel square stepped top with B4C + Cu main shieldin	ks. The cask and 5,516 mm pressure ves flange, separ u plates. Ea ng consists o	s approximates a right c long. The cavity consis sels welded to an end pl ated by a T-shaped coppe ich cavity is 230 x 230 m of 135 mm of lead, 26 mm	ircular cylin ts of three s ate and a cir r plate and s m and 4,280 m of steel and	der 1,718 mm tainless cular urrounded m long. The 150 mm of
	shipping cash in diameter a steel square stepped top with B4C + Cu main shieldin	ks. The cask and 5,516 mm pressure ves flange, separ u plates. Ea ng consists o	s approximates a right c long. The cavity consis sels welded to an end pl ated by a T-shaped coppe ich cavity is 230 x 230 m of 135 mm of lead, 26 mm	ircular cylin ts of three s ate and a cir r plate and s m and 4,280 m of steel and	der 1,718 mm tainless cular urrounded m long. The 150 mm of
	shipping cash in diameter a steel square stepped top with B4C + Cu main shieldin	ks. The cask and 5,516 mm pressure ves flange, separ u plates. Ea ng consists o	s approximates a right c long. The cavity consis sels welded to an end pl ated by a T-shaped coppe ich cavity is 230 x 230 m f 135 mm of lead, 26 mm r is located between the	ircular cylin ts of three s ate and a cir r plate and s m and 4,280 m of steel and	der 1,718 mm tainless cular urrounded m long. The 150 mm of

I <b>RC</b> FORM 3-96)				UCLEAR REGULATORY COMMISSIO
Page			cate No. 9015 - Revision No. 19 - Docket No. 71	-9015
	(3)	Drawi	ings	
		Trans const The m	Model No. TN-8 packaging is constructed in accor snuclear Drawing No. 9317.01, Rev. J. The Mode cructed in accordance with Transnuclear Drawing materials of construction and welds shall be in kes A, B, and C to Chapter II of the application	l No. TN-8L is No. 9317.138, Rev. A. accordance with
		The 1 Drawi 0.	id for Configuration X is constructed in according Nos. 9040-500-1, Rev. 1, 9040-500-2, Rev. 1	dance with Transnuclear and 9040-500-3, Rev.
(b)	Conte	ents		
	(1)	Туре	and form of material	
		(i)	Irradiated PWR uranium oxide fuel assemblies ( specifications:	of the following
			Fuel form Cladding material Maximum initial U content/assembly, kg Maximum average initial U-235 enrichment with Zr cladding, w/o Maximum average initial U-235 enrichment with SS cladding, w/o Maximum bundle cross section, in Maximum active fuel length, in Minimum cooling time, day Maximum weight/fuel assembly, kg Group I fuel assemblies Initial fuel pin pressure at 100°F, psig Maximum average burnup, MWD/MTU Group II fuel assemblies Maximum average burnup, MWD/MTU For the casks in Configuration X, the minimum the fuel assemblies shall be 1,460 days with installed and 2,190 days with the lid plate references	the lid plate
		(11)	Solid non-fissile irradiated hardware. As ne component spacers must be used when loading i the cask cavity to limit movement of the cont conditions of transport.	rradiated hardware into
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(iii)	Intact BWR and PWR fuel rods. The ro basket or grid structure; initial U-2 15.0 kg per rod bundle; cross section full length structural material shall inches; and the bundle cross section inches. Maximum weight per bundle sh Group I and Group II burnup limits of	35 content shall be less than al area of the rods, tubes, and not be less than 29.6 square shall not be greater than 8.5 all not exceed 733 kg. The
(2) Ma	ximum quantity of material per package	
(1	) For the contents described in Item 5. assemblies:	(b)(l)(i), Group I fuel
	Three PWR assemblies. The maximum de 35.5 kilowatts per package and 12 kilo Model No. TN-8 packaging and 23.7 kilo kilowatts per assembly for the Model I	owatts per assembly for the owatts per package and 7.9
(1	i) For the contents described in Item 5. assemblies:	(b)(l)(i), Group II fuel
	Th <b>ree PWR a</b> ssemblies. The maximum dee free gas volume are not to exceed the below:	cay heat load and the maximum limits listed in the table

Decay H Shipmen	eat per t. kw ^(a)	Maximum Free Gas for 3 ₃ Assemblies m ³ (NTP) ^(D)	Configuration X Maximum Free Gas for 3 Assemblies (NTP) (D)
3 9 15 21	.5 .0 .0 .0 .0 .0	0.558 0.543 0.483 0.441 0.408 0.384	0.601 0.585 0.520 0.475 0.439 0.413
Notes:	(a)	Decay heat load per ass exceed 7.9 kilowatts fo packaging.	embly must not or Model No. TN-8L
	(b)	NTP conditions are 25°	C and one (1) bar.
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NRC FORM (3-96) Page 5.(b)	/ 618 <b>A</b>		<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISSION
Page	4 - Certific	a <b>te No. 9015 -</b> Re	evision No. 19 - Do	ocket No. 71-9015
5.(b)	)(2) (Continu	led)		
	(iii)	For the contents	described in Item	n 5.(b)(1)(iii):
				ecay heat load and maximum free gas ts listed in Paragraph
(c)	Transport I	ndex for Critical	ity Control	
		nsport index to b uclear criticalit		100
(c) 6. 7. 8. 9.	and/or BWR of 5.(b)(1)	fuel rods that in	dividually meet al 5.(b)(l)(iii), an	Zr or SS clad, and bundles of PWR 11 the appropriate specifications nd 5.(b)(2)(iii) above may be
7.		ies may be shippe g, or control rod		without burnable poison rod,
8.		appropriate composition the fuel a		be used in the cask cavity to
9.			ntents (fuel assen nust not exceed 2,2	mblies, component spacers, inserts, 200 kg.
	transport. the methods contents 5.	Residual moistur described in Anr (b)(1)(i) and 5.(	e must be promptly nex I to Chapter VI	hen delivered to a carrier for y removed from the cask cavity by III of the application. For avity must be promptly backfilled s.
11.			lel assemblies (roo lairline cracks are	ds) and fuel cladding defects e not authorized.
12.	For content tests for c	cs 5.(b)(1)(ii), t containment assemb	the dryness verific bly verification ar	cation test is required but leakage re not required.
13.	transport,	e contents must be the total dose ra the package.	e so limited that united that unites must not exceed	under normal conditions of ed 17 mrem/hr at one meter from the
14.	relief devi	ice set so that th	down the package m ne maximum pressure the cool-down proc	must be provided with a pressure e in the containment vessel cannot cess.
11. 12. 13. 14. 15.	criteria sp and shieldi must be per shipment of verificatio on packagin	pecified in Chapte ing efficiency ver formed on each pa f contents listed on and shielding e ng during periods	er VIII of the appl rification tests in ackaging within the in 5(b)(l)(i) and efficiency verifica	must meet the periodic tests and lication. The K _{eff} verification n Chapter VIII of the application e two year period preceding any 5(b)(1)(iii). The K _{eff} ation tests need not be performed two years) when only irradiated ed.
			150	

# NRC FORM 618A **CONDITIONS** (continued) **U.S. NUCLEAR REGULATORY COMMISSION** (3-96) Page 5 - Certificate No. 9015 - Revision No. 19 - Docket No. 71-9015 16. In addition to the requirements of 10 CFR Part 71: The package must be prepared for shipment and operated in accordance with (a) 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. 17. 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. 18. In accordance with Annex L to Chapter VIII, 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 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. *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. 19. The Configuration X lid shall be operated and maintained in accordance with Annex N to Chapter 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. Effective date: June 1, 1996. Expiration date: May 31, 2001. REFERENCES Transnuclear, Inc., application dated March 25, 1991, and supplements dated April 22, 1991, and April 22, 1996. FOR THE U.S. NUCLEAR REGULATORY COMMISSION William D. Travers', Director Spent Fuel Project Office Office of Nuclear Material Safety and Safequards 1996 Date: Mav 151

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		M 618		CEDT	IFIC	TEOECOM		U.S. N	UCLEAR REGU	LATORY COMMISSION
Ž	(3-96) 10 CFR 71			FOR RAD	IC ICA IOACI	TIVE MATERIALS	PACKAG	ES		
- 12 2	1. a. CERTIFI	ICATE NUN	ABER	b. REVISION N	UMBER	c. PACKAGE IDENTIFI	ICATION NUN	IBER	d. PAGE NUMBE	e. TOTAL NUMBER PAGES
FL			9016	11		USA/9	016/B(	)F	1	4
	2. PREAMBL			l		L		-	1,,	
			is issued to certify that the pa					applicable s	afety standards set	forth in Title 10,
ŝ			Regulations, Part 71, "Pack	•••	•					
			loes not relieve the consigno atory agencies, including the							isportation or other
- 1	3. THIS CER	TIFICATE IS	S ISSUED ON THE BASIS OF	A SAFETY ANAL	YSIS RE	PORT OF THE PACKAG	E DESIGN OF	APPLICAT	ION	• • • • • • • • • • • • • • • • • • • •
	a. ISSUEI	D TO (Name	and Address)		b. TITL	E AND IDENTIFICATIO	N OF REPORT	r or applic	CATION:	
	Tranc	າມເວີດ	ar, Inc.		Tre	ansnuclear, I	inc ar	nlicat	ion dated	
Ĭ			e Drive			rch 25, 1991,				
			NY 10532-2120					•		
					c. DOC	KET NUMBER 71-	9016			
Ĭ	4. CONDITIC			I						
		ificate is co	onditional upon fulfilling the	requirements of	f 10 CFF	R Part 71, as applicable.	, and the cond	litions spec	ified below.	·····
	5. (a)	Dack	aging	an di Angelandi. Angelandi						
ž	(a)	racki	nA 111A							
		(1)	Model No.: T	N-9						
		(2)	Description							
		(2)								
			The TN-9 is a	lead, st	eel a	and resin shi	ielded i	irradia	ted fuel s	hipping
			casks. The cardiameter and !							
			stainless ste							
			stepped top f	lange, se	para	ted by thin c	opper f	lates.	The bays	are divided
			into a total ( The main shie	ot seven Iding con	squa	re compartmer s of 128 mm c	nts, 150 of lead	26 mm	n of steel	and 150 mm
			of resin. A	wet cemen	t la	yer is locate	d betwe	en the	lead and	the outer
				• • • • • • • • •	C			أمار تشديم كالانت	hall and a	avam tha
			surface of the	e cask be	twee	n each end dr	°um.			
Ĩ			The lid is a w	welded st	ainl	ess steel she	ell cont	aining	g lead and	resin
			shields. The	pressure	ves	sels are clos	sed and	sealed	by sixtee	en, 1-1/4-
X			inch diameter within recess	bolts an	id two	o silicone ru the top flar	ibber of	r Vitor	1 O-rings   tremity of	ocated the cask is
			surrounded by	circular	s on sta	inless steel	drums 1	reinfor	rced by rac	lial gusset
			plates and fi	lled with	ı bal	sa wood. A c	iisk sha	aped in	npact limit	er,
			constructed of	f carbon	stee	l and balsa w	vood, 19 Inain 19	s faste inos wł	ened to ead	h drum with
			inner cavity	are equip	bed v	with positive	e closu	res. 1	In addition	, all access
			ports are pro	tected by	the	impact limit	ters.	Frunnic	ons are use	ed for
			lifting and t	ie-down o	of the	e package. 1	lhe weig	ght of	the packag	je is
			approximately	30,000 K	y.					
		(3)	Drawings							
			The neckare f	+	<b>س</b> ه + مرا	in accordance	o with	Transr	uclean Dry	wing No
			Shell. Radia surface of the The lid is a within shields. The inch diameter within recesses surrounded by plates and fi constructed of four, 1-1/4-in inner cavity ports are pro lifting and t approximately Drawings The package i 9317.03, Rev. accordance wi	s constru J. The	mate	rials of cons	struction	on and	welds must	be in
<b>P</b> 1			accordance wi	th Annex	A, B	, and C to Ch	napter	II of t	the applica	ation.
							-			
						152				
CH.	201200	(21)	21 21 21 21 21 21 21 21 21	25 25 25 25	2020	A A A A A A A A A A A A A A A A A A A		222		14(24)24(24)24(24)24(24)24

IRC FOR	M 618A		<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
Page	2 - Co	ertific	cate No. 9016 - Revision No. 11 - Docket	No. 71-9016
5.(b	) Conte	ents		
	(1)	Туре	and form of material	
		(i)	Irradiated BWR uranium oxide fuel asse	mblies of the following
		(•)	specifications:	indites of the forlowing
			Fuel form	Clad UO2 Pellets
			Cladding material	Zr or SS
			Initial fuel pin pressure at	000
			100°F, psig	200
			Maximum initial U content/	
			assembly, kg	201
			Maximum average initial U-235	
			enrichment, w/o	2.65
			Maximum bundle cross section, in	5.52
			Maximum active fuel length, in	144
			Average burnup, MWD/MTD	36,500
			Minimum cooling time, day	150
			Maximum weight/fuel assembly, kg	300
		(ii)	Solid non-fissile irradiated hardware. component spacers must be used when loa the cask cavity to limit movement of th conditions of transport.	ading irradiated hardware into
	(2)	Maxim	num quantity of material per package	
		(i)	Seven BWR assemblies. The maximum deca not to exceed 24.4 kilowatts and 3.5 ki needed, appropriate component spacers m to properly position the fuel assemblie	ilowatts per assembly. As nay be used in the cask cavity
		(11)	The maximum weight of the contents (fue spacers, inserts, irradiated hardware, 2,110 kg.	
(c)	Trans	port I	ndex for Criticality Control	
			nsport index to be shown on	100
			uclear criticality control:	100
6.	trans the m conte	port. ethods nts 5.	vity must be dry (no free water) when de Residual moisture must be promptly remo described in Annex I to Chapter VIII of (b)(1)(i), the cavity must be promptly b rogen, or argon gas.	oved from the cask cavity by f the application. For
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NRC FORM	Structure         Structure <t< th=""></t<>
³⁻⁹⁶⁾ Page 3	3 - Certificate No. 9016 - Revision No. 11 - 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.
9.	For contents 5.(b)(1)(ii), the dryness verification 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 VIII 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 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.
14.	In accordance with Annex L to Chapter VIII, 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 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 lower heat load.
	<ul> <li>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.</li> </ul>
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<b>IRC</b> FORM 3-96)	618A	CON	DITIONS (continued)	U.S. NUCLEAR REGULATORY COMMIS
Page 4	4 - Certificate	No. 9016 - Revisi	on No. 11 - Docke	et No. 71-9016
15.	The package aut general license	horized by this c provisions of 10	ertificate is hen CFR §71.12.	reby approved for use under th
16.	Effective date:	June 1, 1996	Expiration date	e: May 31, 2001.
			REFERENCES	
Transı 1991,	nuclear, Inc., a and April 22, 1	pplication dated 996.	March 25, 1991, a	and supplements dated April 22
·	• •			
		Wi Sp Of	R THE U.S. NUCLEA Milliam D. Travers, ent Fuel Project fice of Nuclear M and Safeguards	Office
Date:	May <u>4</u> , 1996			

<b>NRC</b> FORM 618 (3-96) 10 CFR 71			ATE OF COMPLIANCE	U.S. NUCLEAR REGU	LATORY COMMISSION
1. a. CERTIFICATE	NUMBER	b. REVISION NUMBER	c. PACKAGE IDENTIFICATION NUMBER	R d. PAGE NUMBEI	R e. TOTAL NUMBER PAGES 4
·					
	ate is issued to certify that the paterial Regulations, Part 71, "Pack		escribed in Item 5 below, meets the appli n of Radioactive Material."	cable safety standards set	forth in Title 10,
b. This certific	ate does not relieve the consigno	r from compliance with	any requirement of the regulations of the negative of the nega		nsportation or other
	TE IS ISSUED ON THE BASIS OF a Jame and Address)		PORT OF THE PACKAGE DESIGN OR APP E AND IDENTIFICATION OF REPORT OR		
NAC Inte	rnational, Inc.		lear Assurance Corporatio		
	neering Drive	date	d November 18, 1991, as	s supplemented.	
Norcross	, GA 30092				
ŧ 		c. DOC	KET NUMBER 71-9023		
4. CONDITIONS	ic conditional upon fulfilling the	requirements of 10 CET	Port 71 as applicable and the condition	ns specified below	
5.	is conditional upon furning the	requirements of HUCF	R Part 71, as applicable, and the condition	us specifica ociów.	
	ickaging				
(1	) Model No.: NLI	10/24			
(2	) Description				
	encased in stain railcar which is conditions of tr principal shieldi uranium plates High temperatu	nless steel, equ considered to l ansport. The c ng consists of are encased in re polymer she	m and high temperature p ipped with balsa impact li be an integral part of the p ask body is 204.5 inches 6 inches of lead and 9 inc the bottom end forging an et is encased in the botto ads at the top end.	miters, and mou packaging for no long by 96 inch hes of water. D nd cask inner clo	nted to a rmal es in OD. The epleted sure head.
	stainless steel ( water jacket sh	outer shell. The ell. The three ter expansion t	veen 0.75-inch stainless s e outer shell is surrounded shells are welded to stain anks are mounted to the r al hose.	by a 0.75-inch less steel forging	stainless steel is at both
	closure head. closure head is Secondary con a Viton or silico cavity and the the space betw through the cas	t is 179.5 inch held in place b tainment is pro- one O-ring seal. ambient. The t reen the inner a sk body connec b-inch quick-dis	el is comprised of the 0.7 es long and has a 45-inch y sixteen bolts and is seal vided by the outer closure There is no direct penetr two penetrations into the and outer closure heads, w sting it with the ambient. connect valves and metal	inside diameter led with a metall head which is b ration between t containment cav which has a singl The two lid pend	ic O-ring. bolted and has he containment rity are from e penetration etrations are
	poisoned alumi basket cavities	num baskets ar	oositioned within the contained internal support structures neutron absorber sleeves	ires. The PWR a	and BWR fuel

NRC FOR (3-96)	M 618A		<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISS
Page	2 - Cer	tificate No. 9023 - Rev	rision No. 8 - Docket No. 71-9023	}
5.(a)	(2)	Description (continue	d)	
			system, mounted to the railcar, is as to facilitate handling and coold	
			, excluding the railcar, is approxin gross weight of the cavity conten etc.).	
	(3)	Drawings		
		Industries, Inc., and N	D/24 shipping cask is constructed National Lead Company Drawing N (VIII-2, Rev. 8, in Section XVIII of	los. as specified on page XVIII-
5.(b)	Conte	ents		
	(1)	Type and form of mat	terial	
		Irradiated PWR and B	WR uranium oxide fuel assemblies <u>PWR</u>	of the following specifications:
	Fuel f	orm	Clad UO ₂ pellets	Clad UO ₂ pellets
	Claddi	ing material	Zr or SS	Zr or SS
		num initial U ent/assembly, kg	475	200
		num average initial 35 enrichment, w/o	<b></b>	2.8
		num initial U-235 ent/assembly, kg	16.6	5.6
		num bundle cross		0.0
	-	on, inches	9.00	5.75
		in array size, ber of pins	14x14/15x15 16x16/17x17	7x7/8x8
		num active fuel h, inches	144	144
	Maxim kw/k	num specific power, gU	40	27
		num average burnup, D/MTU	35,500	29,700
	Minim days	um cooling time,	150	150
	The PV	NR type assemblies ma	ay be shipped either with or witho	ut control rods

I <b>RC</b> FORM 3-96)	M 618A CONDITIONS (continued) U.S. NUCLEAR 1	REGULATORY COMMISSIO
Page 3	3 - Certificate No. 9023 - Revision No. 8 - Docket No. 71-9023	
5.(b)(2	2) Maximum quantity of material per package	
	The maximum decay heat load per package not to exceed 70 kilowatts, and	:
	Ten PWR fuel assemblies or twenty-four BWR fuel assemblies.	
	Above assemblies must be contained in their respective fuel baskets as show Industries, Inc., and National Lead Company Drawing Nos.:	wn on NL
	70652F, Sheet 1, Rev. 7 PWR Fuel Basket, Sheet 2, Rev. 5 10/24 Rail Cask	
	70653F, Sheet 1, Rev. 7 BWR Fuel Basket, Sheet 2, Rev. 5 10/24 Rail Cask	
5.(c)	Transport Index for Criticality Control	
	Minimum transport index to be shown on label for nuclear criticality control: 100	
6.	The maximum gross weight of the cavity contents must not exceed 34,100 spacers, basket, etc.).	pounds (fuel,
7.	The containment vessel must be dry (no free water) when delivered to a car Residual moisture must be promptly removed from the containment vessel b described in Section XVI of the application. The containment vessel must b with helium to 1.0 atm pressure.	by the methods
8.	Known or suspected failed fuel assemblies (rods) and fuel with cladding def pin holes and hairline cracks are not authorized.	ects greater than
9.	The cask contents must be so limited under normal conditions of transport t measured dose rates be satisfied:	that the following
	<ul> <li>at one meter from the external radial midplane surface of the packag neutron dose rate plus 2.5 times the gamma dose rate will not excee per hour; and</li> </ul>	e: 625 times the d 1,000 millirems
	<ul> <li>b) at one meter from the external surface of the bottom of the package neutron dose rate plus 2.0 times the gamma dose rate will not excee per hour.</li> </ul>	e: 115 times the ed 1,000 millirems
10.	The neutron shielding system and auxiliary cooling system must be filled wi water and ethylene glycol (53% to 58% by weight ethylene glycol).	th a mixture of
11.	The neutron shielding system must be equipped with two pressure relief val cask and one on an expansion tank) set at 220 psig.	lves (one on the
12.	Any system used for cooling down the package must be provided with a pr device set so that the maximum pressure in the containment vessel cannot during the cooldown process.	essure relief exceed 233 psig
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# NRC FORM 618A **CONDITIONS** (continued) U.S. NUCLEAR REGULATORY COMMISSION (3-96)Page 4 - Certificate No. 9023 - Revision No. 8 - Docket No. 71-9023 The systems and components of each packaging must meet the criteria for the periodic tests 13. specified in Section XVII of the application. 14. 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 (i) 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. 15. Prior to first use, each packaging shall meet the criteria for the acceptance tests specified in Sections XIV and XV of the application, except that the prototype railcar test, meeting the stated design criteria, need be performed only once. 16. Packaging is authorized for rail mode of transport only. 17. Expiration date: July 31, 2003. REFERENCES Nuclear Assurance Corporation application dated November 18, 1991. Supplements dated: February 7, 1992; and February 28 and November 25, 1997. FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cass R. Chappell, Chief Package Certification Section **Spent Fuel Project Office** Office of Nuclear Material Safety and Safeguards

Date _July 9, 1998

<ul> <li>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."</li> <li>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 country through or into which the package will be transported.</li> <li>THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION         <ul> <li>a. ISSUED TO (Name and Address)</li> <li>b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION:</li> <li>AEA Technology/QSA, Inc.</li> <li>AEA Techno</li></ul></li></ul>			NR MA					A.			
PREAMBLE         a. This certificate is issued to certify that the packaging and contents described in term 5 below, mets the applicable safety standards ast forth in Tute 10. Code of Foreiral Regulations. JPM 71, "Packaging and Transportation of Madoactive Maternal."         b. This certificate does not televe the consigner from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulations gaterics. Including the previnteer of any county through or into which the maximum.         NUIL CERTINCATE IS ISSUED OF THE BASIS OF A SAFETY ANALYSIS BEDONT OF THE PACKAGE DESIGN OF APPLICATION IN ALL ADDRESS of the CHART CONTING.         AEA Technology/QSA, Inc.       AEA Technology/QSA, Inc.         40 North Avenue       Distribution of the fore of the PACKAGE DESIGN OF APPLICATION IN EXERCISED         CONDITIONS       This subplicable as evaluation of the requirements of 10 CFR Par 71. as applicable, and the conditions specified below.         (a) Packaging       (1) Model No: 741-OP         (2) Description       The protective container is of welded steel construction and is approximately 32 inches long, 10 inches wide, and 18.5 inches high. Polyurethane foam and wood insets locate the Model No. 741 series projectors in the center of the container and provide impact protection.         The 741 series projectors include the Model Nos. 741, 741E, 741A, 741AE, 741B and 741BE. The primary components of the projector consist of an outer steel shell, internal bracing, polyurethane foam, depleted uranium shield, and an 'S' tube by a source cable locking device and shipping plug. A 1/4-thick steel shipping plate is bobled over the source locking mechanism for at	NRC FORM 618 3-96) 0 CFR 71	CERT FOR RAD	IFICA IOACT	TE OF COMPLIANO	U.S. N CE IGES	IUCLEAR REGUL		N			
<ul> <li>The centrace is issued to centry that the packaging and contents decribed in the 16 below, mees the applicable safety standards set forth in Title 10. Cold of Federal Regulations, Part 71, Packaging and Transportation of Valued Contents of the U.S. Department of Transportation of Valued Contents of the U.S. Department of Transportation of Valued Contents of the U.S. Department of Transportation of Valued Contents of the U.S. Department of Transportation of Valued Contents of the U.S. Department of Transportation of Valued Contents of Valued Cont</li></ul>	a CERTIFICATE NUMBER 9027	b. REVISION N 15	UMBER	C. PACKAGE IDENTIFICATION N USA/9027/	UMBER B(U)-85	d. PAGE NUMBER 1	e. TOTAL NUMBER PA 2	GĘ			
Code Federal Regulations, Part 11. "Packagers and Transportation of Radiacative Material."         b This criticade so on their be consigner from compliance with any programment of regulations of the U.S. Department of Transportation or other applicable regulatory species, including the government of any country through or sino which the package will be transported.         ITHIS CENTROATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION:         AEA Technology/OSA, Inc. 40 North Avenue         Burlington, MA 01803         ITHIS CENTROATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION:         AEA Technology/OSA, Inc. 40 North Avenue         Burlington, MA 01803         ITHIS CENTROATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OF APPLICATION:         AEA Technology/OSA, Inc. 40 North Avenue         Burlington, MA 01803         ITHIS CENTROATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN ON APPLICATION:         AEA Technology/OSA, Inc. 40 North Avenue         Burlington, MA 01803         Ithis centroate is conditional upon fulfilling the requirements of 10 CER Part 71. as applicable, and the conditions specified below.         (a) Packaging         (1) Model No.: 741-OP         (2) Description         The Model No. 741-OP consists of gamma ray projector within a protective carbon steel container. The protective container is of welded steel construction and is approximately 32 inches lon	PREAMBLE	L				<u></u>	. <b>-</b>				
This CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OF APPLICATION ISSUED TO I/Name and Adversity        In THE A NO DEPTIFICATION OF REPORT OF APPLICATION ITTLE AND DEPTIFICATION OF REPORT OF APPLICATION          AEA Technology/QSA, Inc. 40 North Avenue Burlington, MA 01803       Internet And Deptification Of APPLICATION Its certificate is conditional upon fulfilling the requirements of 10 CFR Par 71. as applicable, and the conditions specified below         (a) Packaging <ul> <li>(1) Model No.: 741-OP</li> <li>(2) Description</li> <li>The Model No. 741-OP consists of gamma ray projector within a protective carbon steel container. The protective container is of welded steel construction and is approximately 32 inches long, 10 inches wide, and 18.5 inches high. Polyurethane foam and wood inserts locate the Model No. 741 series projectors in the center of the container and provide impact protective container is of welded Nos. 741, 741E, 741A, 741AE, 741B and 741BE. The primary components of the projector consist of an outer steel shell, internal bracing, polyurethane foam, depleted uranium shield, and an "S" tube. The radioactive contents are securely positioned in the "S" tube by a source cable locking device and shipping plug. A 1/4-thick steel shipping plate is bolted over the source locking mechanism for additional protection during transport. Tamper-prof seals are provided on the outer steel container. The dimensions of the projector are approximately 19 1/8 inches long, 13 7/8 inches wide, and 9 15/16 inches in height. The maximum weight of the package is 515 pounds and the maximum weight of the projector is 360 pounds.<td>Code of Federal Regulations, Part</td><th>71, "Packaging and Trans consignor from complia</th><td>sportation nce with</td><td>n of Radioactive Material." any requirement of the regulation</td><td>is of the U.S. 1</td><td>Department of Tran</td><td></td><td></td></li></ul>	Code of Federal Regulations, Part	71, "Packaging and Trans consignor from complia	sportation nce with	n of Radioactive Material." any requirement of the regulation	is of the U.S. 1	Department of Tran					
40 North Avenue       February 15, 1999, as supplemented.         Burlington, MA 01803       71-9027         c. DOCKET NUMBER       71-9027         c. OCKET NUMBER       71-9027         c. OCKET NUMBER       71-9027         (a) Packaging       (1) Model No.: 741-OP         (2) Description       The Model No. 741-OP consists of gamma ray projector within a protective carbon steel container. The protective container is of welded steel construction and is approximately 32 inches long, 10 inches wide, and 18.5 inches high. Polyurethane foam and wood inserts locate the Model No. 741 series projectors in the center of the container and provide impact protection.         The 741 series projectors include the Model Nos. 741, 741E, 741A, 741AE, 741B and 741BE. The primary components of the projector consist of an outer steel shell, internal bracing, polyurethane foam, depleted uranium shield, and an "S" tube. The radioactive contents are securely positioned in the "S" tube by a source cable locking mechanism for additional protection during transport. Tamper-proof seals are provided on the outer steel container. The dimensions of the projector are approximately 19 1/8 inches wide, and 9 15/16 inches in height. The maximum weight of the package is 515 pounds and the maximum weight of the projector is 360 pounds.         (3) Drawings       The package is constructed in accordance with AEA Technology/QSA, Inc. Drawing Nos. R74190, Rev. A, Sheets 1-5, R741NP Rev. A, R85790 Rev. A Sheets 1-3, R97011, Rev. C and R97012 Rev. D. Sheets 1-5.         5.       (b) Contents         (1) Type and form of material       Cohabit 60 or infilim: 192 as sealed sour	THIS CERTIFICATE IS ISSUED ON THE I		LYSIS RE	PORT OF THE PACKAGE DESIGN	OR APPLICAT	ION					
<ul> <li>CONDITIONS         This certificate is conditional upon fulfilling the requirements of 10 CPR Part 71, as applicable, and the conditions specified below.         <ul> <li>(a) Packaging</li> <li>(1) Model No.: 741-OP</li> <li>(2) Description             The Model No. 741-OP consists of gamma ray projector within a protective carbon steel container. The protective container is of welded steel construction and is approximately 32 inches long, 10 inches wide, and 18.5 inches high. Polyurethane foam and wood inserts locate the Model No. 741 series projectors in the center of the container and provide impact protection.         The 741 series projectors include the Model Nos. 741, 741E, 741A, 741AE, 741B and 741BE. The primary components of the projector consist of an outer steel shell, internal bracing, polyurethane foam, depleted uranium shield, and an "S" tube. The radioactive contents are securely positioned in the "S" tube by a source cable locking device and shipping plug. A 1/4-thick steel shipping plate is bolted over the source locking mechanism for additional protection during transport. Tamper-proof seals are provided on the outer steel container. The dimensions of the projector are approximately 19 1/8 inches long, 13 7/8 inches wide, and 9 15/16 inches in height. The maximum weight of the package is 515 pounds and the maximum weight of the projector is 360 pounds.         </li> <li>(3) Drawings         <ul> <li>The package is constructed in accordance with AEA Technology/QSA, Inc. Drawing Nos. R74190, Rev. D, Sheets 1-2, R741NP Rev. A, R85790 Rev. A Sheets 1-2, R85791, Rev. A Sheets 1-2, R67691 Rev. A, R67692 Rev. A, R97010 Rev. E, Sheets 1-3, R97011, Rev. C and R97012 Rev. D, Sheets 1-2.</li> </ul> </li> <li>(b) Contents         <ul> <li>(1) Type and form of material Coublet-60 or induity as sealed sources which meet the requirements</li> <li>(2) Type and form of material</li></ul></li></ul></li></ul>	40 North Avenue	c.	AEA Febr	uary 15, 1999, as sup	plemente	ion dated					
<ul> <li>This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.</li> <li>(a) Packaging <ol> <li>Model No.: 741-OP</li> <li>Description</li> </ol> </li> <li>The Model No. 741-OP consists of gamma ray projector within a protective carbon steel container. The protective container is of welded steel construction and is approximately 32 inches long, 10 inches wide, and 18.5 inches high. Polyurethane foam and wood inserts locate the Model No. 741 series projectors in the center of the container and provide impact protection.</li> <li>The 741 series projectors include the Model Nos. 741, 741E, 741A, 741AE, 741B and 741BE. The primary components of the projector consist of an outer steel shell, internal bracing, polyurethane foam, depleted uranium shield, and an "5" tube. The radioactive contents are securely positioned in the "5" tube by a source cable locking device and shipping plug. A 1/4-thick steel shipping plate is bolted over the source locking mechanism for additional protection during transport. Tamper-proof seals are provided on the outer steel container. The dimensions of the projector are approximately 19 1/8 inches long, 13 7/8 inches wide, and 9 15/16 inches in height. The maximum weight of the package is 515 pounds and the maximum weight of the projector is 360 pounds.</li> <li>(3) Drawings The package is constructed in accordance with AEA Technology/QSA, Inc. Drawing Nos. R74190, Rev. D Sheets 1-5, R741NP Rev. A, R85790 Rev. A Sheets 1-2, R85791, Rev. A Sheets 1-2, R67691 Rev. A, R67692 Rev. A, R97010 Rev. E, Sheets 1-3, R97011, Rev. C and R97012 Rev. D, Sheets 1-2. 5. (b) Contents <ol> <li>Type and form of material</li> </ol> </li> </ul>	-		c. DOC								
<ul> <li>(a) Packaging <ol> <li>Model No.: 741-OP</li> <li>Description</li> </ol> </li> <li>The Model No. 741-OP consists of gamma ray projector within a protective carbon steel container. The protective container is of welded steel construction and is approximately 32 inches long, 10 inches wide, and 18.5 inches high. Polyurethane foam and wood inserts locate the Model No. 741 series projectors in the center of the container and provide impact protection.</li> <li>The 741 series projectors include the Model Nos. 741, 741E, 741A, 741AE, 741B and 741BE. The primary components of the projector consist of an outer steel shell, internal bracing, polyurethane foam, depleted uranium shield, and an "S" tube. The radioactive contents are securely positioned in the "S" tube by a source cable locking device and shipping plug. A 1/4-thick steel shipping plate is bolted over the source locking mechanism for additional protection during transport. Tamper-proof seals are provided on the outer steel container. The dimensions of the projector are approximately 19 1/8 inches long, 13 7/8 inches wide, and 9 15/16 inches in height. The maximum weight of the package is 515 pounds and the maximum weight of the projector is 360 pounds.</li>  (3) Drawings The package is constructed in accordance with AEA Technology/QSA, Inc. Drawing Nos. R74190, Rev. D Sheets 1-5, R741NP Rev. A, R85790 Rev. A Sheets 1-2, R85791, Rev. A Sheets 1-2, R67691 Rev. A, R67692 Rev. A, R97010 Rev. E, Sheets 1-3, R97011, Rev. C and R97012 Rev. D, Sheets 1-2.  <li>(b) Contents <ol> <li>(1) Type and form of material Container</li> </ol></li></ul>	CONDITIONS	filling the requirements of	of 10 CE	R Part 71, as applicable, and the o	onditions spec	cified below.		•			
<ol> <li>Model No.: 741-OP</li> <li>Description         The Model No. 741-OP consists of gamma ray projector within a protective carbon steel container. The protective container is of welded steel construction and is approximately 32 inches long, 10 inches wide, and 18.5 inches high. Polyurethane foam and wood inserts locate the Model No. 741 series projectors in the center of the container and provide impact protection.     </li> <li>The 741 series projectors include the Model Nos. 741, 741E, 741A, 741AE, 741B and 741BE. The primary components of the projector consist of an outer steel shell, internal bracing, polyurethane foam, depleted uranium shield, and an "S" tube. The radioactive contents are securely positioned in the "S" tube by a source cable locking device and shipping plug. A 1/4-thick steel shipping plate is bolted over the source locking mechanism for additional protection during transport. Tamper-proof seals are provided on the outer steel container. The dimensions of the projector approximately 19 1/8 inches long, 13 7/8 inches wide, and 9 15/16 inches in height. The maximum weight of the package is 515 pounds and the maximum weight of the projector is 360 pounds.     <li>Drawings         <ul> <li>The package is constructed in accordance with AEA Technology/QSA, Inc. Drawing Nos. R74190, Rev. D Sheets 1-5, R741NP Rev. A, R85790 Rev. A Sheets 1-2, R85791, Rev. A Sheets 1-2, R67691 Rev. A, R67692 Rev. A, R97010 Rev. E, Sheets 1-3, R97011, Rev. C and R97012 Rev. D, Sheets 1-2.</li> <li>Contents</li></ul></li></li></ol>	inis centricate is conditional upon fur	Initing the requirements of									
<ul> <li>(2) Description</li> <li>The Model No. 741-OP consists of gamma ray projector within a protective carbon steel container. The protective container is of welded steel construction and is approximately 32 inches long, 10 inches wide, and 18.5 inches high. Polyurethane foam and wood inserts locate the Model No. 741 series projectors in the center of the container and provide impact protection.</li> <li>The 741 series projectors include the Model Nos. 741, 741E, 741A, 741AE, 741B and 741BE. The primary components of the projector consist of an outer steel shell, internal bracing, polyurethane foam, depleted uranium shield, and an "S" tube. The radioactive contents are securely positioned in the "S" tube by a source cable locking device and shipping plug. A 1/4-thick steel shipping plate is bolted over the source locking mechanism for additional protection during transport. Tamper-proof seals are provided on the outer steel container. The dimensions of the projector are approximately 19 1/8 inches long, 13 7/8 inches wide, and 9 15/16 inches in height. The maximum weight of the package is 515 pounds and the maximum weight of the projector is 360 pounds.</li> <li>(3) Drawings</li> <li>The package is constructed in accordance with AEA Technology/QSA, Inc. Drawing Nos. R74190, Rev. D Sheets 1-5, R741NP Rev. A, R85790 Rev. A Sheets 1-2, R85791, Rev. A Sheets 1-2, R67691 Rev. A, R67692 Rev. A, R97010 Rev. E, Sheets 1-3, R97011, Rev. C and R97012 Rev. D, Sheets 1-2.</li> <li>5. (b) Contents</li> <li>(1) Type and form of material Cohert for a direction sheet the requirements</li> </ul>	(a) Packaging										
<ul> <li>The Model No. 741-OP consists of gamma ray projector within a protective carbon steel container. The protective container is of welded steel construction and is approximately 32 inches long, 10 inches wide, and 18.5 inches high. Polyurethane foam and wood inserts locate the Model No. 741 series projectors in the center of the container and provide impact protection.</li> <li>The 741 series projectors include the Model Nos. 741, 741E, 741A, 741AE, 741B and 741BE. The primary components of the projector consist of an outer steel shell, internal bracing, polyurethane foam, depleted uranium shield, and an "S" tube. The radioactive contents are securely positioned in the "S" tube by a source cable locking device and shipping plug. A 1/4-thick steel shipping plate is bolted over the source locking mechanism for additional protection during transport. Tamper-proof seals are provided on the outer steel container. The dimensions of the projector are approximately 19 1/8 inches long, 13 7/8 inches wide, and 9 15/16 inches in height. The maximum weight of the package is 515 pounds and the maximum weight of the projector is 360 pounds.</li> <li>(3) Drawings         <ul> <li>The package is constructed in accordance with AEA Technology/QSA, Inc. Drawing Nos. R74190, Rev. D Sheets 1-5, R741NP Rev. A, R85790 Rev. A Sheets 1-2, R85791, Rev. A Sheets 1-2, R67691 Rev. A, R67692 Rev. A, R97010 Rev. E, Sheets 1-3, R97011, Rev. C and R97012 Rev. D, Sheets 1-2.</li> <li>(b) Contents</li></ul></li></ul>	(1) Model No.: 74	41-OP									
<ul> <li>container. The protective container is of welded steel construction and is approximately 32 inches long, 10 inches wide, and 18.5 inches high. Polyurethane foam and wood inserts locate the Model No. 741 series projectors in the center of the container and provide impact protection.</li> <li>The 741 series projectors include the Model Nos. 741, 741E, 741A, 741AE, 741B and 741BE. The primary components of the projector consist of an outer steel shell, internal bracing, polyurethane foam, depleted uranium shield, and an "S" tube. The radioactive contents are securely positioned in the "S" tube by a source cable locking device and shipping plug. A 1/4-thick steel shipping plate is bolted over the source locking mechanism for additional protection during transport. Tamper-proof seals are provided on the outer steel container. The dimensions of the projector are approximately 19 1/8 inches long, 13 7/8 inches wide, and 9 15/16 inches in height. The maximum weight of the package is 515 pounds and the maximum weight of the projector is 360 pounds.</li> <li>(3) Drawings</li> <li>The package is constructed in accordance with AEA Technology/QSA, Inc. Drawing Nos. R74190, Rev. D Sheets 1-5, R741NP Rev. A, R85790 Rev. A Sheets 1-2, R85791, Rev. A Sheets 1-2, R67691 Rev. A, R67692 Rev. A, R97010 Rev. E, Sheets 1-3, R97011, Rev. C and R97012 Rev. D, Sheets 1-2.</li> <li>5. (b) Contents     <ul> <li>(1) Type and form of material</li> <li>Cohett-60 or iridium-192 as sealed sources which meet the requirements</li> </ul> </li> </ul>	(2) Description	Description									
<ul> <li>maximum weight of the projector is 360 pounds.</li> <li>(3) Drawings <ul> <li>The package is constructed in accordance with AEA Technology/QSA, Inc. Drawing Nos. R74190, Rev. D Sheets 1-5, R741NP Rev. A, R85790 Rev. A Sheets 1-2, R85791, Rev. A Sheets 1-2, R67691 Rev. A, R67692 Rev. A, R97010 Rev. E, Sheets 1-3, R97011, Rev. C and R97012 Rev. D, Sheets 1-2.</li> </ul> </li> <li>5. (b) Contents <ul> <li>(1) Type and form of material</li> <li>Cobalt-60 or iridium-192 as sealed sources which meet the requirements</li> </ul> </li> </ul>	32 inches lon locate the Mo protection. The 741 serie and 741BE. shell, interna tube. The ra cable locking over the sou Tamper-proo	ig, 10 inches wid odel No. 741 seri es projectors inc The primary con I bracing, polyure dioactive conten device and ship rce locking mech of seals are provi- are approximate	le, and ies pro lude ti npone ethane its are oping p nanism ided o alv 19	d 18.5 inches high. P ojectors in the center of the Model Nos. 741, 74 onts of the projector co e foam, depleted uran securely positioned in olug. A 1/4-thick stee n for additional protect n the outer steel conta 1/8 inches long, 13 7/	olyurethal of the con 41E, 741/ onsist of a ium shiek n the "S" 1 I shipping tion during ainer. The 8 inches	A, 741AE, 74 an outer and pr A, 741AE, 74 an outer steel d, and an "S" tube by a sou plate is bolte g transport. e dimensions wide, and 9 1	1B ICCE ICCE ICCE ICCE ICCE ICCE ICCE ICC				
<ul> <li>The package is constructed in accordance with AEA Technology/QSA, Inc. Drawing Nos. R74190, Rev. D Sheets 1-5, R741NP Rev. A, R85790 Rev. A Sheets 1-2, R85791, Rev. A Sheets 1-2, R67691 Rev. A, R67692 Rev. A, R97010 Rev. E, Sheets 1-3, R97011, Rev. C and R97012 Rev. D, Sheets 1-2.</li> <li>5. (b) Contents <ul> <li>(1) Type and form of material</li> <li>Cobalt-60 or iridium-192 as sealed sources which meet the requirements</li> </ul> </li> </ul>	maximum we	ght. The maximu eight of the proje	im we	360 pounds.	515 pou						
(1) Type and form of material	The package R74190, Re Sheets 1-2,	v. D Sheets 1-5, R67691 Rev. A,	R741 R676	NP Rev. A. 885790 H	ev. A She	eets 1-2. Hoo	191, Rev. A	F			
Cobalt-60 or iridium-192 as sealed sources which meet the requirements	5. (b) Contents										
Cobalt-60 or iridium-192 as sealed sources which meet the requirements of special form radioactive material.	(1) Type a	and form of mate	erial								
160	Cobal of spe	t-60 or iridium-19 icial form radioad	92 as a trive n	sealed sources which naterial.	meet the	requirement	S				
				160							

Q	( ) ) ) )	$M \cap M \cap$					
	NRC FOF (3-96)	RM 618A	N		CON	DITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
	Page	e 2 - C	ertifica	ate No. 9027 - Revision	No. 15	- Docket No. 71-9027	U.S. NUCLEAR REGULATORY COMMISSION
	5.	<b>(</b> b)	(2)	Maximum quantity of r	material	l per package.	
				33 curies of cobalt-60; 240 curies of iridium-1		put).	
				Output curies are dete 1980, "Radiological Sa Radiography."	ermined afety foi	in accordance with A r the Design and Cons	merican National Standard N432- struction of Apparatus for Gamma
EN DEN DEN DEN DEN DEN DEN DEN DEN DEN D	6.	lock musi main locki	cap ar t be fal ntaining ng dev	nd safety plug assembly bricated of materials ca g their positioning functi vice. The flexible cable	r. The spable of on. The spable of on. The of the space of the spac	source assembly lock, f resisting a 1475°F fir e locking ball of the so source assembly and s	caging by the source assembly lock, lock cap and safety plug assembly re environment for one half hour and burce assembly must engage the shipping plug must be of sufficient e in the shielded position.
	7.			plates shall be fabricate aining their legibility.	d of ma	terials capable of resident	sting the fire test of 10 CFR Part 71
	8.	In ac	dition	to the requirements of	Subpart	t G of 10 CFR Part 71	
		(a)	The Proc	package shall be prepa edures in Section 7 of t	red for he appl	shipment and operate lication; and	d in accordance with the Operating
		(b)	The appli	package must meet the ication.	Accept	tance Test and Mainte	enance Program of Section 8.0 of the
	<b>9</b> .	The prov	packa isions	ge authorized by this ce of 10 CFR §71.12.	ertificate	e is hereby approved f	or use under the general license
	10.	Expi	ration	date: February 28, 200	1.		
					<u>F</u>	REFERENCES	
	AEA	Tech	nology	/QSA, Inc. application c	lated Fe	ebruary 23, 1999.	
	Sup	oleme	nts dat	ted: April 20, June 7, an	id Septe	ember 16 and 21, 199	9; and June 9, 2000.
						FOR THE U.S. NUC	LEAR REGULATORY COMMISSION
						E. William Brach, Di Spent Fuel Project C Office of Nuclear Ma and Safeguards	Office
	Date	e:	July 2	<u>25, 20</u> 00			
ALL	·					161	
E	<b>.</b>	28(28)	75( 75( 75)				AN A

	FORM							ULATORY COMMISSIO
	10) 1771	,		CERTI	FICATE			
						E MATERIAL PACKAGES	4. PAGE NUMBER	. TOTAL NUMBER PAGES
	a. CEF	RTIFICATE NUMBER		b. REVISION		USA/9030/B()	1	2
-		90	30	<u> </u>	,	0077000078(7	<u> </u>	
	PRE	AMBLE			- (inclusion	g and contents) described in Item 5 bel	ow meets the applic	able safety standards set
	a	This certificate i	s issued to certify the Code of Federal Br	hat the package equiations. Par	ə (pacıkagını 171. "Packa	aging and Transportation of Radioactive	Material."	
						in a subservent of the regulation	s of the US Depar	tment of Transportation o
	THIS		IS ISSUED ON TH	HE BASIS OF	A SAFETY	ANALYSIS REPORT OF THE PAUN	AGE DESIGN ON A	
	a	ISSUED TO (N	ame and Address)			D. TITLE AND IDENTIFICATION		
		Departmor	t of the Navy	v		Teledyne Energy Sys	tems applicat	ion
		Neval Sea	Systems Cor	mmand		dated November 12	, 1990, as su	pplemented
			tachment					
			al Affairs Sup	oport Offic	ce			
		PO Drawe				C. DOCKET NUMBER	71-9030	
		NWS York	town, VA 23	8691-026	<u>م</u>			
	CON	IDITIONS	ditional unon fulfilli	ing the require		CFR Part 71, as applicable, and the co	nditions specified b	ałow.
_				And the restaund				
	(a)	Packaging	ł	a the second sec		Ĩ.A.		
			odel Nos.: 💐	2000	and Sen	tinel-8	)	
		(1) MC	) dei Nos.: Hv	<b>W</b> -3000 (			<u></u> .	
		(2)	Deserie		ða.	and the second	As.	
		(2)	Description				and the second s	
			The r	ackanes (	are ther	moelectric generators. Th	e major comp	onents include:
			× the m	and haiten	ກິດໃຫ້ ທີ່ ທີ່	sten shield, bousing tlang	e, aque electric	al connectors.
			Line a	nonxima	te dime	nsions and weights for the	Model Nos.	are as follows:
					577 - C.			•
			Mode	No		<u>Dimension (in</u>	<u>ich)</u>	Weight (lb)
			<u>~</u>		2 48		All A.	2 700
			MW	3000	Ser Stand	24 OD × 23	Ç.	2,700
			Senti	nel-8		24 DD x 25	<b>9</b>	3,200
			Υ,	and star				
		(3)	Drawings	a Calana				
				ALC HAT	n.k		with the follow	ing Drawing
					s are co	nstructed in accordance v		ang bratting
			Nos.:	:		3% <i>\$</i> ^		
						Desuise Nos		
			Mode	<u>el No.</u>		Drawing Nos.		
				2000		Martin Co. Drawing No. 4	71A100000	)
				3000		Isotopes, Inc. Drawing No. 4	J-30856-00	3-10000
			Sent	inel-8		isotopos, nio. Browing the		
						•		
	,	0	<b>^*</b> ^					
	(Ь)	) Conte	nts					
	(b)			orm of ma	terial			
	(b)	) Conte	Type and fo					
	(b)		Type and fo Strontium 9	0 titanate	e doubly	encapsulated in Hastelloy	fuel capsule	which
	(b)		Type and fo Strontium 9	0 titanate	e doubly	encapsulated in Hastelloy ecial form radioactive mate	fuel capsule	which

NRC FOI (6-2000) 10 CFR 71	RM 618A		·····› C		IS (continued)		U.S. NUCI	EAR RI	GULATO	RY CO	MMISSI
Certificate	e No. 9030		Revision No.	9	Docket No.	71-9030	Pag	<b>e</b> 2	of	2	Pages
	(2)	The maxim	um quantity	of mat	erial per pa	ackage					
		1	Model No.		Quant	tity					
			MW-3000		25,0	00 Curies					
		:	Sentinel-8	•	40,0	00 Curies					
-	e-bolts shall vices of pac	be removed ( kages.	or covered d	uring tr	ansportatio	in to preve	nt their (	lse as	tie-do	wn	
ste	eel shield at	and Sentinel all times exce removal of the	ept when ma	intenan	ce operatio						
8. Fa	brication of a	additional unit	ts is not auth	norized.	* < * * * *	X					
9. in	addition to t	he requireme	nts of Subpa	rt G of	10 CFR Pa	rt 71:					
(a)		e shall be pre in the supple					rdance v	vith th	ie oper	ating	
	supplement	je shall be ma dated Februa	ary 1, 1991.			Ê ,/ +					
pro	ovisions of 1	authotized by 0 CFR §71.1	2	nte are	hereby app	roved for a	use unde	r the :	genera	llicen	ise
	PIRATION DATE	: October 31,	, 2009. 	- AM	<i>()))</i> 4	ř "					1
Teledy	ne Energy Sy	ystems applic	ation dated !	Novemi	per 12, 19	ąo.					
Teledy	ne suppleme	nt dated: Fel	bruary 1, 19	91.		~~~					
•	ment of the l and April 27	Navy supplen , 2000.	nent dated:	Februai	y 7, 1994	, and Septe	ember 20	), 199	15, Apr	il 16,	ł
			FOR 1	THE U.S	S. NUCLEA	R REGULA	TORY C	OMM	SSION		
			-	thang							
			Spent Office	Fuel P of Nuc	ach, Direct roject Offic clear Mater	e					
Date:	July 28, 2	2000	а	ind Safi	eguards						

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	NRC FORM 618 (3-96) 10 CFR 71						MPLIANCE IALS PACKAGES	U.S. N	UCLEAR REGUL	ATORY COMMISSION
	1. a. CERTIFICATE	NUMBER		b. REVISION N	UMBER	c. PACKAGE ID	ENTIFICATION NUMBE	R	d. PAGE NUMBER	e. TOTAL NUMBER PAGES
NA	9034			11			USA/9034/AF		1	2
	2. PREAMBLE			1				<u></u>	l	L
	Code of Fed b. This certifica	eral Regu ate does n	lations, Part 71, "Pack ot relieve the consigne	kaging and Tran or from complia	sportation	n of Radioactive any requirement	of the regulations of th	e U.S. I	Department of Trans	
		E IS ISSU	ED ON THE BASIS OF		LYSIS RE	PORT OF THE PA	nto which the package v CKAGE DESIGN OR API CATION OF REPORT OR	PLICATI	ION	·····
<u>, a dec dec dec dec dec dec dec dec dec dec</u>	General A P.O. Box	tomic 85608	S		0. 1112	General	Atomic Compa tober 4, 199	ny aj	pplication	ited.
					c. DOC	KET NUMBER	71-9034			
		s conditio	onal upon fulfilling the	e requirements (	of 10 CFF	t Part 71, as app	icable, and the conditio	ns speci	ified below.	
	5.									
	(a)	Pack	aging							
		(1)	Model No.:	TRIGA-I						
		(2)	Description					-1 11		
			drum, appro inner vesse the inner v thick wall a threaded The inner v by eight, 3 between the vermiculite	oximately el is a 5 vessel ar and a 5- pipe cap vessel is 3/8-inch e inner v e tamped	22.5 i-inch inch and cent diame vessel to a	inches Schedule roximate inside d the bott ered and ter brace and the minimum	iner. The o in diameter b 40 carbon s y 31 inches iameter. The supported wi ed, support s outer packag lensity of 4. roximately 23	y 39 teel in h top d 1/ thin pace ing 5 lb	-1/4 inches pipe. Dir eight with of the in 4-inch this the outer r rods. The is filled way	s high. The mensions of a 1/4-inch mer vessel is ck flat disc. packaging me void with
		(3)	Drawing			an a				
			The packag Drawing No	ing is co . TOS3960	onstru 2160,	Rev. G.	accordance wi	th G	eneral Ato	nic Company
						164				المساريف ريف مون بيف ريف
<u> </u>	242442424		21/21/21/21/21/2	12121212		25,25,25,25,2		(21(22		

(3-96)	ORM 61	BA		<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
Page	2 -	Cert	ificate No. 9034	4 - Revision No. 11 - Docket	No. 71-9034
5.	(b)	Cont	tents		
		(1)	Type and form	of material	
			erbium-uranium erbium content application, a enriched to a	c) as described in Table A.1 and clad with stainless stee	inal fuel composition (excluding -1 of the October 4, 1995 1, aluminum or incoloy. Uranium 35 isotope. The H to Zr atomic
		(2)	Maximum quanti	ty of material per package	
			1.5-inch diame fuel elements, as described i	with nominal fuel composit n Table A.1-2 (Rev. 1) of th s greater than 5 weight perc	ained in a maximum of 7 imum of 25 0.5-inch diameter ion (excluding erbium content) he October 4, 1995, application. cent U-235, uranium content not
	(c)	Tran	sport Index for	Criticality Control	
				ndex to be shown on riticality control:	0.4
6.	In a	dditi	on to the requi	rements of Subpart G of 10 (	CFR Part 71:
	(a)	The the	package shall b Operating Proce	e prepared for shipment and dures of Chapter 8 of the ap	operated in accordance with plication.
	(b)	The Chap	packaging must ter 9 of the ap	meet the Acceptance Tests ar plication.	nd Maintenance Program of
7.	The gene	packa ral l	ge authorized b icense provisio	y this certificate is hereby ns of 10 CFR §71.12.	approved for use under the
8.	Expi	ratio	n date: December	r 31, 2000.	
				<b>REFERENCES</b>	
Gener	ral A	tomic	Company applica	ation dated October 4, 1995.	
Suppl	emen	t dat	ed: December 5,	1995.	
				FOR THE U.S. NUCL	EAR REGULATORY COMMISSION
				William	Inans
		,	1	William D. Traver Spent Fuel Projec Office of Nuclear and Safeguards	tOffice
Date:	3	25	s lak		
		-		165	

3-96)	RM 618				U.S	NUCLEAR REGUL	ATORY COMMISSION
				CATE OF CO	MPLIANCE		
CFR 71					ALS PACKAGES	d. PAGE NUMBER	e. TOTAL NUMBER PAG
a. CERT	TIFICATE		b. REVISION NUMB	-	ENTIFICATION NUMBER	d. PAGE NUMBER	2
	9035	>	17	05/	4/9035/B(U)-85	·	£
PREAM		ate is issued to certify that the		a decoribed in Item S	below meets the applicabl	e cafety standards set i	forth in Title 10.
a. In: Co	is certific ide of Fed	leral Regulations, Part 71, "Pac	kaging and Transporta	tion of Radioactive I	Material."		
b. Thi	is certific:	ate does not relieve the consign	or from compliance w	ith any requirement	of the regulations of the U.	S. Department of Trans	sportation or other
		gulatory agencies, including th					
		TE IS ISSUED ON THE BASIS OF	F A SAFETY ANALYSIS i b. T	REPORT OF THE PAC ITLE AND IDENTIFIC	CKAGE DESIGN OR APPLIC CATION OF REPORT OR APP	ATION LICATION:	
	Tech	nology/QSA, inc.	AF	A Technolog	y/QSA, Inc. applic	ation dated	
	Iorth A				99, as supplemen		
Burli	ngton,	MA 01803					
				OCKET NUR (DED	71-9035		
CONDIT				OCKET NUMBER			
		is conditional upon fulfilling th	e requirements of 10 C	CFR Part 71, as appli	cable, and the conditions sp	ecified below.	
(a)	Pack	aging					
			<b>D</b>			34	
	(1)	Model No.: 680-O					
	(2)	Description					
		The Model No. 68		f o commo r	av projector within	a protective ca	arbon steel
		32 inches long, 10	inches wide, a	nd 18 ½ inch	d steel constructions high Polyuret	hane toam and	wood inserts
		locate the Model 6 protection. The 680 series pro and 680BE. The p shell, internal brac tube. The radioac cable locking devi bolted over the so Tamper-proof sea the projector are a	inches wide, a 80 series proje ojectors include primary compo- ting, polyuretha tive contents a ce and shipping urce locking m ls are provided approximately 2	the Model N the Model N nents of the p ine foam, dep re securely p g plug. A 1/4 echanism for on the outer 1 inches long	es high Polyureti enter of the contai os. 680, <b>68</b> 0E, 68 rojector consist of leted uranium shi ositioned in the "S -inch thick steel sh additional protecti steel container. T 1, 14 5/8 inches wi	Anne toam and iner and provid 0A, 680AE, 680 an outer steel and, and an "S" tube by a sou hipping plate is on during trans he dimensions ide, and 10 7/1	wood inserts e impact 0B urce sport. of 6
	(3)	locate the Model 6 protection. The 680 series pro and 680BE. The p shell, internal brac tube. The radioac cable locking devi bolted over the so Tamper-proof sea	inches wide, a 80 series proje bjectors include primary compo- ting, polyuretha tive contents a ce and shipping urce locking m ils are provided approximately 2 maximum weig	the Model N entry of the p ine foam, dep re securely p g plug. A 1/4 echanism for on the outer 1 inches long ht of the pack	es high Polyureti enter of the contai os. 680, <b>68</b> 0E, 68 rojector consist of leted uranium shi ositioned in the "S -inch thick steel sh additional protecti steel container. T 1, 14 5/8 inches wi	Anne toam and iner and provid 0A, 680AE, 680 an outer steel and, and an "S" tube by a sou hipping plate is on during trans he dimensions ide, and 10 7/1	wood inserts e impact 0B urce sport. of 6
	(3)	locate the Model 6 protection. The 680 series pro and 680BE. The p shell, internal brac tube. The radioac cable locking devi bolted over the so Tamper-proof sea the projector are a inches high. The r weight of the proje	inches wide, a 80 series proje ojectors include orimary compo- ing, polyuretha tive contents a ce and shipping urce locking m ls are provided approximately 2 maximum weigle ector is 465 pol onstructed in ac Sheets 1-5, R6	the Model N entry of the p ine foam, dep re securely po g plug. A 1/4- echanism for on the outer 1 inches long ht of the pack unds.	es high Polyureti enter of the contai os. 680, 680E, 68 rojector consist of leted uranium ship sitioned in the "S -inch thick steel sh additional protecti steel container. The 14 5/8 inches wi age is 615 pounds h AEA Technolog , R85791 Rev. A,	Ane toam and iner and provid 0A, 680AE, 680 an outer steel eld, and an "S" tube by a sou hipping plate is on during trans he dimensions de, and 10 7/1 s and the maxin y/QSA, Inc. Dr Sheets 1-2, R	awing Nos. 67691, Rev. A,
(b)		locate the Model 6 protection. The 680 series pro and 680BE. The p shell, internal brac tube. The radioac cable locking devi- bolted over the so Tamper-proof sea the projector are a inches high. The p weight of the proje Drawings The package is co R68090, Rev. D, R67692, Rev. A,	inches wide, a 80 series proje ojectors include orimary compo- ing, polyuretha tive contents a ce and shipping urce locking m ls are provided approximately 2 maximum weigle ector is 465 pol onstructed in ac Sheets 1-5, R6	the Model N entry of the p ine foam, dep re securely po g plug. A 1/4- echanism for on the outer 1 inches long ht of the pack unds.	es high Polyureti enter of the contai os. 680, 680E, 68 rojector consist of leted uranium ship sitioned in the "S -inch thick steel sh additional protecti steel container. The 14 5/8 inches wi age is 615 pounds h AEA Technolog , R85791 Rev. A,	Ane toam and iner and provid 0A, 680AE, 680 an outer steel eld, and an "S" tube by a sou hipping plate is on during trans he dimensions de, and 10 7/1 s and the maxin y/QSA, Inc. Dr Sheets 1-2, R	awing Nos. 67691, Rev. A,
(b)		locate the Model 6 protection. The 680 series pro and 680BE. The p shell, internal brac tube. The radioac cable locking devi bolted over the so Tamper-proof sea the projector are a inches high. The r weight of the proje Drawings The package is co R68090, Rev. D, R67692, Rev. A, Sheets 1-2.	o inches wide, a 80 series proje opiectors include primary compo- ting, polyuretha tive contents a ce and shipping urce locking m ls are provided approximately 2 maximum weigle ector is 465 pol onstructed in ac Sheets 1-5, R6 R97011, Rev. (	the Model N entry of the p ine foam, dep re securely po g plug. A 1/4- echanism for on the outer 1 inches long ht of the pack unds.	es high Polyureti enter of the contai os. 680, 680E, 68 rojector consist of leted uranium ship sitioned in the "S -inch thick steel sh additional protecti steel container. The 14 5/8 inches wi age is 615 pounds h AEA Technolog , R85791 Rev. A,	Ane toam and iner and provid 0A, 680AE, 680 an outer steel eld, and an "S" tube by a sou hipping plate is on during trans he dimensions de, and 10 7/1 s and the maxin y/QSA, Inc. Dr Sheets 1-2, R	awing Nos. 67691, Rev. A,
(b)	Cor	locate the Model 6 protection. The 680 series pro and 680BE. The p shell, internal brac tube. The radioad cable locking devi bolted over the so Tamper-proof sea the projector are a inches high. The r weight of the proje Drawings The package is co R68090, Rev. D, R67692, Rev. A, Sheets 1-2.	inches wide, a 80 series proje ojectors include primary compo- ing, polyuretha tive contents a ce and shipping urce locking m ls are provided approximately 2 maximum weigle ector is 465 poi onstructed in ac Sheets 1-5, R6 R97011, Rev. (	the Model N entry of the p ine foam, dep re securely po g plug. A 1/4- echanism for on the outer 1 inches long ht of the pack unds.	es high Polyureti enter of the contai os. 680, 680E, 68 rojector consist of leted uranium ship sitioned in the "S additional protecti steel container. The 14 5/8 inches wi age is 615 pounds h AEA Technolog A, R85791 Rev. A, ev. E, Sheets 1-3,	Ane toam and iner and provid 0A, 680AE, 680 an outer steel eld, and an "S" tube by a sou hipping plate is on during trans he dimensions de, and 10 7/1 s and the maxin y/QSA, Inc. Dr Sheets 1-2, R and R97013, I	awing Nos. 67691, Rev. A, Rev. F,

NRC FORM 618A

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

# Page 2 - Certificate No. 9035 - Revision No. 17 - Docket No. 71-9035

- 5.(b) Contents (continued)
  - (2) Maximum quantity of material per package:

110 curies (output)

Output curies are determined in accordance with American National Standard N432-1980, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography."

- 6. The source shall be secured in the shielded position of the packaging by the source assembly lock, lock cap and safety plug assembly. The source assembly lock, lock cap and safety plug assembly 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 be of sufficient 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 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) The package must meet the Acceptance Tests and Maintenance Program of Section 8 of the application; and
  - (b) Each package shall be operated and prepared for shipment in accordance with Section 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.
- 10. Expiration date: May 31, 2005.

# REFERENCES

AEA Technology QSA, Inc. application dated February 15, 1999.

Supplements dated: April 20, June 7, and September 16 and 21, 1999; and January 18 and June 9, 2000.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: July 25, 2000

			o` /o` /o` /o` /o` /o` /o` /o` /o` /o			TORY COMMISSION
(8-95) 10 CFR 7	<b>DRM 618</b> 71			OF COMPLIANCE MATERIALS PACKAGES		
1.a.CEF	TIFICATE NUMB	ER	b. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAGES
r <u>-</u>		9036		USA/9036/B(U)	1 1	2
h a. 1	MBLE This certificate is	issued to certify that the pa	ckaging and contents describ	ed in Item 5 below, meets the applicable saf	ety standards set for	th in Title 10, Code
			and Transportation of Radios	Ictive Material. requirement of the regulations of the U.S. (	Department of Trans	sportation or other
. 8	applicable regula	atory agencies, including th	e government of any country	through or into which the package will b	e transported.	
	CERTIFICATE IS		SAFETY ANALYSIS REPORT OF b. TITLE AND	THE PACKAGE DESIGN OR APPLICATION	DN:	
		ction & Equipme	ent Co.	Source Production & Equ application dated Novem		
	Teal Str Rose, LA	70087-9691		Supplemented.	Der 15, 15	09, as
			C. DOCKET N			
4. CON	DITIONS			71-9036 t 71, as applicable, and the conditions spe	aified helew	
	certificate is co	inditional upon fulfilling the	requirements of 10 CFR Par	τ /1, as applicable, and the conditions spe		
5.				here's		
(a)	Pack	aging			۲	
	(1)	Model No.: C-	1 2 7		ć m.	
	(2)	Description				
	(-)					
		The packaging	consists of an a	outer overpack and a un The source changer con	nium shiel Mouration	ded is that of
		a rectangular	box approximate	y 9" toigh x 175" wide 🤊	č 7.5" deep	. A11
				The inner receptate		
		shield equippe	ed with two close	ed bottom Zircallo "J"	tubes, eac	h of which 🛛
		may house one	"pigtail type"	special form source. Th	ne overpack	is a 12-
		of the source	changer is 51 to	drum partially filed wi o 70 lbs. The weight of	f the overp	ack is 19
		to 22 lbs. U	o to 8a∰abs <u>…</u> ∉ofau	ncillary@equipment may b	be included	within the
		overpack. The	e maximum greossa	eight of the package is	S 100 IDS.	
	(3)	Drawings				
		The package is	s constructed in	accordance with Source	Production	&
		Equipment Com	bany Inc. Drawing	g Nos. 11489-1, Rev (4);		
		and 61090, Rev	/. (0).			
(b)	Cont	ents				
		Type and form	of material			
	(1)					
		Iridium-192 a: radioactive m		that meet the requireme	ents of spe	cial form
<b>.</b>	(2)	Maximum quant	ity of material	per package		
		Two sealed so	urces with a com	bined activity not to ex	kceed 240 c	uries.
				168		
					785 286 785 285 785 Tex	

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NRC FORM 618A **U.S. NUCLEAR REGULATORY COMMISSION CONDITIONS** (continued) (6-83) Page 2 - Certificate No. 9036 - Revision No. 8 - Docket No. 71-9036 ô. Tungsten shield pads, with dimensions up to approximately 2-inches diameter and 1/2-inch thick, may be welded to the inside surface of the source changer housing. 7. The nameplate shall be fabricated of materials capable of resisting the fire test 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 Reputatoe Gats and Maintenance Program of b. Section 8.0 of the application dated November , 1989, as supplemented June 19, and September 24, 1990. 9. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12. Expiration date. October 10. 2000. REFEREN Source Production B-Equipment Company pplicat €ed Nøvember⁴ 【3, 1989, and JECENERAL CECENER CECENER July 13, 1990. (D Supplements dated: June 19≝ <u>آ</u> 1990 November 29, and listober December 6, 1993; and July GULATORY COMMISSION chappell, Section Leader R Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards SEP 1 5 1995 Date: 169 

ための一般で見たまた。

	1051057			TATA			
NRC FORM 618 (3-96) 10 CFR 71					U.S. I ATE OF COMPLIANCE TIVE MATERIALS PACKAGES	NUCLEAR REGU	ATORY COMMISSION
1. a. CERTIFICATE N	UMBER		b. REVISION NU	MBER	c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAGES
9037			11		USA/9037/AF	1	2
2. PREAMBLE					L	<u> </u>	
a. This certifica Code of Fede	ral Regu	lations, Part 71, "Pack	aging and Transp	ortatio	escribed in Item 5 below, meets the applicable n of Radioactive Material."		
b. This certifica applicable reg	gulatory a	igencies, including the	government of a	any cou	any requirement of the regulations of the U.S. ntry through or into which the package will be	transported.	sportation or other
3. THIS CERTIFICAT a. ISSUED TO (Na			A SAFETY ANAL'		PORT OF THE PACKAGE DESIGN OR APPLICA LE AND IDENTIFICATION OF REPORT OR APPL	ICATION:	
General A P.O. Box & San Diego	35608				General Atomic Company a dated October 4, 1995, a	application as supplement	nted.
S				c. DOC	KET NUMBER 71-9037		
4. CONDITIONS This certificate is	s conditio	nal upon fulfilling the	requirements of	10 CFI	R Part 71, as applicable, and the conditions spe	cified below.	
5.							
	Deek	aaina					
(a)	PACK	aging	e en				
	(1)	Model No.:	TRIGA-II				ŧ
	(2)	Description					
	(-)	1 - C.				ing se 1985 - Karatara	te e eteol
NRC FORM 618 (3-96) 10 CFR 71 1. a. CERTIFICATE N 9037 2. PREAMBLE a. This certifica Code of Fede b. This certificat applicable reg 3. THIS CERTIFICAT a. ISSUED TO ( <i>Na</i> General Af P.O. Box 5 San Diego 4. CONDITIONS This certificate is 5. (a)		drum, appro inner vesse the inner v thick wall a threaded The inner v by eight, 3 between the vermiculite	ximately l is a 5- essel are and a 5- pipe cap essel is b/8-inch co inner ve tamped to tamped tampe	22. incle app inch and cent ii amo esse to a	bing container. The outer inches in diameter by 5 Schedule 40 carbon stee proximately 50 inches in inside diameter. The to the bottom is a welded 1 tered and supported within eter braced, support space 1 and the outer packaging minimum density of 4.5 1 ts is approximately 330 p	7.5 inches l pipe. Di height with p of the in /4-inch thi n the outer er rods. T is filled bs/ft ³ . Ma	high. The mensions of a 1/4-inch ner vessel is ck flat disc. packaging he void with
	(3)	Drawing					
		The packagi Drawing No.	ng is cor TOS396C1	nstru 161,	ucted in accordance with Rev. F.	General Ato	ximum gross mic Company
	1 2 1 2 1	28, 29, 28, 28, 28, 28, 28,		201 201	170 	AZAZAZAZ	

NRC F( (3-96)	ORM 61	BA	<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISS
Page	2 -	Certificate No. 9037 -	Revision No. 11 - Docket	No. 71-9037
5.	(b)	Contents		
		(1) Type and form of	material	
		or erbium-uranium compositions (exc October 4, 1995, incoloy. Uranium	-zirconium-hydride whose ept erbium content) as de application, and clad wit	scribed in Table A.1-1 of the h stainless steel, aluminum or .5 w/o in the U-235 isotope.
		(2) Maximum quantity (	of material per package	
		1.5-inch diameter fuel elements, who content) as descr application. For	ose fuel portion has nomi	mum of 25 0.5-inch diameter nal compositions (except erbium 1) of the October 4, 1995, 5 weight percent U-235,
	(c)	Transport Index for Cr	iticality Control	
		Minimum transport index label for nuclear crit		0.4
5.	In a	ddition to the requirem	ents of Subpart G of 10 C	FR Part 71:
	(a)		repared for shipment and e es of Chapter 8 of the ap	operated in accordance with plication.
	(b)	The packaging must meet Chapter 9 of the applic	t the Acceptance Tests and cation.	d Maintenance Program of
7.		package authorized by th ral license provisions o		approved for use under the
8.	Expi	ration date: December 31	1, 2000.	
			REFERENCES	
Gene	ral A	tomic Company applicatio	on dated October 4, 1995.	
		t dated: December 5, 199	-	
				EAR REGULATORY COMMISSION
			William D. Travers Spent Fuel Project Office of Nuclear	s, Director t Office
			and Safeguards	
Date		3 125 96	171	
	100 100 1		<u>, 28, 28, 28, 28, 28, 28, 28, 28, 28, 28</u>	

NRC FORM 518 (8-55)	CERTIFICATE			FORY COMMISSION
10 CFR 71	b. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9039/B(U)	d. PAGE NUMBER	. TOTAL NUMBER PAGES
1.a. CERTIFICATE NUMBER 9039	9	USA/9039/B(U)	1	5
PREAMBLE a. This certificate is issued to certify that the pa of Federal Regulations, Part 71, "Packaging	and Transportation of Radioa	ctive Material.		
<ul> <li>b. This certificate does not relieve the consign applicable regulatory agencies, including the</li> </ul>	or from compliance with any n ne government of any country	equirement of the regulations of the U.S. Do through or into which the package will be	apartment of Trans transported.	portation or other
3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A a. ISSUED TO (Neme and Address)	SAFETY ANALYSIS REPORT OF T b. TITLE AND	HE PACKAGE DESIGN OR APPLICATION IDENTIFICATION OF REPORT OR APPLICATION	N:	
Amersham Corporation 40 North Avenue Burlington, MA 01803	- 3.5	Amersham Corporation a dated May 11, 1995, as DEC G1-9039		
	C. DOCKET NI	JMBER		
4. CONDITIONS This certificate is conditional upon fulfilling the	requirements of 10 CFR Part	t 71, as applicable, and the conditions spec	ified below.	
an MS-27683- by a bolt; insulation; dimensions 24-inch hiğl (3) Drawings The radiogra the overpac	-2, 18 gauge spec 1.5 inches of MA and a molded yub f the overpack a Maximum weigh aphic devices, as	14 gauge clamp 1 2781 of Mil-2819 rig berized for Mil-2819 rig berized for Mil-2819 rig terized for Mil-2819 rig teri	e overpack closure rin h temperat erial. Ove nch diamet 105 pound thorized f	ure erall er by s. or use in
<u>Mode</u> Over 533	<u>] No.</u> pack	<u>Drawing Nos.</u> R715, Rev. B R53390, Rev. A		
616 644 713		R61690, Rev. A R64490, Rev. A R71390, Rev. A		

NRC FORM 618A U.S. NUCLEAR REGULATORY COMMISSION **CONDITIONS** (continued) (6-83) Page 2 - Certificate No. 9039 - Revision No. 9 - 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 (output) contained in the Model No. 533, Model No. 644 or Model No. 713 radiographic device. (ii) 240 (output) grie Contained in the Model No. 616 radiograph Output curies are determined in accordance with American National Standard N432-1980, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography." Source assembles for use in this packaging are limited to those assemblies as identified in Technical Operations, Inc. Drawing to. C42400, Rev. F, Sheet 2, and Sheet 3 of 3, and Drawing Nos 42401, Rev. 5 42409, Let. B. 6. medel type adiographic device Separate molded fillers 7. 1 be used for 1464 to ensure a snug fit, withe if resting the fire test 8. Nameplates shall be of 10 CFR Part 71 and In addition to 9. 0 CFR F**60**t 71: The package shall be prepared stiphen and operated in accordance (a) with Section 1 of the application, as supplemented. Each package must be tested and maintained in accordance with the (b)

- (b) Each package must be tested and maintained in accordance with the acceptance tests and printenance program in section 8 of the application, as supplemented.
- 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: December 31, 2000.

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NRC FORM 618A ______

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**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 3 - Certificate No. 9039 - Revision No. 9 - Docket No. 71-9039

### REFERENCE

Amersham corporation application dated May 11, 1995.

Supplement dated: November 29, 1995.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION



NRC FORM 618 (8-86) 10 CFR 71		OF COMPLIANCE MATERIALS PACKAGES		CHONONONONONONON
1.a. CERTIFICATE NUMBER 9049	b. REVISION NUMBER	C. PACKAGE IDENTIFICATION NUMBER USA/9094/B()	d. PAGE NUMBER	e. TOTAL NUMBER PAGES
<ol> <li>2. PREAMBLE         <ul> <li>a. This certificate is issued to certify that the pace of Federal Regulations, Part 71, "Packaging a</li> <li>b. This certificate does not relieve the consigno applicable regulatory agencies, including the</li> </ul> </li> </ol>	and Transportation of Radios r from compliance with any is government of any country	active Material." requirement of the regulations of the U.S. I through or into which the package will	Department of Trans	th in Title 10, Code
3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A S a. ISSUED TO (Norme and Address) Advanced Medical Systems, 1020 London Road Cleveland, OH 44110	Inc.	Advanced Medical Sys dated September 28,	tem, Inc. a	pplication pplemented.
4. CONDITIONS This certificate is conditional upon fulfilling the	requirements of 10 CFR Part	71, as applicable, and the conditions sp	ecified below.	
cylinder pr bolted to plug fitted cavity drain (melting poin Cask fin Cask fin Cavity b Cavity d Lead shid Protectiv Protectiv	stective jacket steel pallet with a stricome time is closed at 500 F). The pht, in neter, in		ng transport a lead-fille ted closure. steel or fus	t. It is ed flanged The sible plug S:
(3) Drawings The packaging Electric Comp 212E246, Rev. 106D3870, Rev. 706E790, Rev.	Dany Drawing Nos 7 1 7.11 1	in accordance with the .: 06D3855, Rev. 4 29D4690, Rev. 0	e following	General
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	NRC FOR (6-83)	M 618A	-		CONDITIO	ONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION	
								1
	Page	2 -	Certi	ficate No. 9049	- Revision No	o. 8 – Docket No	. 71-9049	
	5.	(b)	Cont	ents				
	J.	(0)			C			
			(1)	Type and form				
				Byproduct mate material.	rial meeting	the requirements	of special form radioactive	
			(2)	Maximum quanti	ty of materia	l per package		
				Radioactive de		to exceed 780 wa	tts.	
	6.	Shor	ina m	ust be provided		- 07	ents during accident	
	0.	cond	lition	s of transport		7		
				ontents muss be			D P.	
	8.	Pric	or to	each shoment	he silicone r	ubber lid gasket	must inspected. This its or every 12 months, whicheve	r
		0000	irc fi	rst JCATENTY dr			appropriate sealant applied to	
		thre	eads o	f pipe plug, or	massive perm	anently charge a	ind seal	
	9.	In a	additi	on to the requi	remente of st		R Part 7 the package must be	
-1		prep Char	oared oter 7	for surpment an .0, and must be	o operation in Gina in Gazgeli	n do transe with	the Mastenance program of	
Ĩ				.2 of the app				
	10.			on of additiona	Will A	alson alson fred.	S	
	11.	The gene	packa eral l	ge authorized b icense provisio	by this certifing of 10 CFR	tata Tis fieleby	approved for use under the	
	12			<b>V</b>	31, 2000.			
		•				FRENCE		
	Advai	nced	Medic	al System, Inc.	. application	dated September	28, 1990.	
			nt da1					
					FC	OR THE U.S. NUCLE	EAR REGULATORY COMMISSION	
						Nellion 1/	rais	
					. Vi	illiam D. Travers	s, Director	
					Sr	ent Fuel Project ffice of Nuclear	t Office	
			1	1	01	and Safeguards	nucei iui Sulety	
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	Date	•		<u></u>				
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NRC FORM 618 (3-96)		CERTI	FICATE	E OF COMP	U. LIANCE	S. NUCLEAR F	REGUL	ATORY COMMISSIO
10 CFR 71				E MATERIALS				
1. a. CERTIFICATE N	UMBER	b. REVISION NU	MBER c. P	ACKAGE IDENTIFI	CATION NUMBER	d. PAGE NI	MBER	e. TOTAL NUMBER PAG
	9056	11		USA	/9056/B(U)		1	2
2. PREAMBLE	· · · · ··	ł						1
	e is issued to certify that the p ral Regulations, Part 71, "Pack					ble safety standa	rds set :	forth in Title 10,
	e does not relieve the consigno ulatory agencies, including the						of Tran	sportation or other
3. THIS CERTIFICATE a. ISSUED TO (Nat	IS ISSUED ON THE BASIS OF				E DESIGN OR APPLI			
Source Pro	•				luction and E		Comp	any Inc.,
	t Company, Inc.				lated March 2			
113 Teal St								
St. Rose, L	A 70087			71_	9056			
	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	c. DOCKET	NUMBER / I-				
4. CONDITIONS This certificate is	conditional upon fulfilling the	requirements of 1	10 CFR Par	t 71, as applicable	and the conditions	specified below		
5. (a) Packag				-,				
(/ · ••••••••								
(1)	Model No.: SPEC	2-T			N des			
	Description				ika: 			
- <b>(2)</b>	<b>Description</b>							
	A steel encased, u	uranium shie	elded G	amma Rav F	Projector. Pri	imarv comp	oner	nts consist of
	an outer steel she							
	contents are secu	rely position	ned in th	e Zircalloy	S" tube by a	source cab	le Íoc	cking device
	and shipping plug.							
	11/16" high by 4-3							0,
				11 11 12 12		10,44 (1)		
(3)	Drawings					the spectrum		
	The packaging is a	constructed	in acco	rdance with	Source Prod	uction and	Faui	oment
	Company, Inc. Dra							
					10 July 10			
	The packaging ma Drawing No. 1000							
	The overpack is a	12 gallon o	pen hea	ad 20 or 22 c	auge Nation	al Motor Fre	eight	Classification
	100-H, or succeed	ling issues,	Item 26	0 steel drum	constructed	in accorda	nce	
	Production and Ec	upment UC	mpany,	, inc. Drawin	y INU. 33189	-2, nev. (2)	•	
(b) Conten	its							
(1)	Type and form of I	material						
	Iridium 192 as sea material.	led sources	s which	meet the req	uirements of	special for	m ra	dioactive
(2)	Maximum quantity	of material	per pac	kage				
	225 curies							
				177				

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NRC FORM 618A (3-96)	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9056 - Revision No. 11 - Docket No. 71-9056

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 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 of 10 CFR Part 71 and maintaining their legibility.

8. For transportation of more than 45 curies per package in private carriage the shipment must be in accordance with 49 CFR 173.441(b).

9. For transportation of more than 45 curies per package by a common carrier, the package must be within a protective overpack as described and constructed in accordance with 5(a)(3).

10. 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 Test and Maintenance Program of Section 8.0 of the application, as supplemented.

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: April 30, 2005.

# REFERENCES

Source Production and Equipment Company, Inc. application dated March 24, 2000.

Supplement dated: March 30, 2000.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

allum Brach

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: Apr. 1 10, 2000

	CATE NUME	BER		· · · · · · · ·	ALS PACKAGES	d. PAGE NUMBER	e. TOTAL NUMBER P.
9057			8		USA/9057/AF	1	2
Code o	ertificate is of Federal F	issued to certify that the p legulations, Part 71, "Pack es not relieve the consigno	aging and Transportation	on of Radioactive N	faterial."		
applica 3. THIS CERTI	able regulate	ory agencies, including the SSUED ON THE BASIS OF	a safety analysis R	untry through or int	o which the package wil	l be transported.	
P.O.	ral Ato Box 85 Diego,				& Environmen t 3, 1973, as		
			c. DOC	CKET NUMBER	71-9057		
<ol> <li>CONDITION This certifi</li> </ol>		litional upon fulfilling the	requirements of 10 CF	R Part 71, as applic	able, and the conditions	specified below	
5.							
(a)	Packa	ging				: 	
	(1)	Model No.: F	FPD-100				
	(2)	Description			17、11月4日(1月) 17、1日日日(11) 11日日(11日日)		
		defects, with sheet and 18-	n minim <mark>um thi</mark> -gauge r <b>emova</b>	ckness 18- ble head s	steel drum, f gauge body she heet with one outer drum clo	eet, 18-gauge or more corru	bottom head ugations in
		defects, with sheet and 18- the cover nea accomplished lugs, one of	n minimum thi gauge remova ar the periph by at least which is thr	ckness 18- ble head si ery. The c a 12-gauge eaded to ro	gauge body she	eet, 18-gauge or more corru osure shall bo ring with dro st 5/8-inch d	bottom head ugations in e op-forged
(b)	Conte	defects, with sheet and 18- the cover nea accomplished lugs, one of and lock nut.	n minimum thi gauge remova ar the periph by at least which is thr	ckness 18- ble head si ery. The c a 12-gauge eaded to ro	gauge body she heet with one outer drum clo bolt-locking eceive at leas	eet, 18-gauge or more corru osure shall bo ring with dro st 5/8-inch d	bottom head ugations in e op-forged
(b)	Conte	defects, with sheet and 18- the cover nea accomplished lugs, one of and lock nut.	n minimum thi gauge remova ar the periph by at least which is thr Gross weig	ckness 18- ble head si ery. The c a 12-gauge eaded to ro	gauge body she heet with one outer drum clo bolt-locking eceive at leas	eet, 18-gauge or more corru osure shall bo ring with dro st 5/8-inch d	bottom head ugations in e op-forged
(b)	Conte (1)	defects, with sheet and 18- the cover nea accomplished lugs, one of and lock nut. nts Type and form	n minimum thi gauge remova ar the periph by at least which is thr Gross weig n of material	ckness 18- ble head s ery. The c a 12-gauge eaded to ro ht not to c	gauge body she heet with one buter drum clo bolt-locking eceive at leas exceed 260 pou	eet, 18-gauge or more corru osure shall be ring with dro st 5/8-inch d unds.	bottom head ugations in e op-forged iameter bolt
(b)		defects, with sheet and 18- the cover nea accomplished lugs, one of and lock nut. nts Type and form	n minimum thi gauge remova ar the periph by at least which is thr Gross weig n of material bearing material	ckness 18- ble head s ery. The c a 12-gauge eaded to ro ht not to c	gauge body she heet with one outer drum clo bolt-locking eceive at leas	eet, 18-gauge or more corru osure shall be ring with dro st 5/8-inch d unds.	bottom head ugations in e op-forged iameter bolt
(b)		defects, with sheet and 18- the cover nea accomplished lugs, one of and lock nut. nts Type and form Solid uranium	n minimum thi gauge remova ar the periph by at least which is thr Gross weig n of material bearing material	ckness 18- ble head s ery. The c a 12-gauge eaded to ro ht not to c	gauge body she heet with one buter drum clo bolt-locking eceive at leas exceed 260 pou	eet, 18-gauge or more corru osure shall be ring with dro st 5/8-inch d unds.	bottom head ugations in e op-forged iameter bolt
(b)		defects, with sheet and 18- the cover nea accomplished lugs, one of and lock nut. nts Type and form Solid uranium	n minimum thi gauge remova ar the periph by at least which is thr Gross weig n of material bearing material	ckness 18- ble head s ery. The c a 12-gauge eaded to ro ht not to c	gauge body she heet with one buter drum clo bolt-locking eceive at leas exceed 260 pou	eet, 18-gauge or more corru osure shall be ring with dro st 5/8-inch d unds.	bottom head ugations in e op-forged iameter bolt
(b)		defects, with sheet and 18- the cover nea accomplished lugs, one of and lock nut. nts Type and form Solid uranium	n minimum thi gauge remova ar the periph by at least which is thr Gross weig n of material bearing material	ckness 18- ble head s ery. The c a 12-gauge eaded to ro ht not to c	gauge body she heet with one buter drum clo bolt-locking eceive at leas exceed 260 pou	eet, 18-gauge or more corru osure shall be ring with dro st 5/8-inch d unds.	bottom head ugations in e op-forged iameter bolt

	NRC FORM 618A (3-96)	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
	Page 2 – Ce	ertificate No. 9057 - Revision No. 8 - Docket No. 71-9057
	5.(b) Conte	ents (continued)
	(2)	Maximum quantity of material per package
<b>HARARATE</b>		Total contents not to exceed 200 pounds. Fissile material not to exceed 350 grams U-235. Total quantity of radioactive material within a package may not exceed a Type A quantity.
	(c) Trans	sport Index for Criticality Control
		num transport index to be shown on for nuclear criticality control: 2.5
	jars, steel ruptu	ents (continued) Maximum quantity of material per package Total contents not to exceed 200 pounds. Fissile material not to exceed 350 grams U-235. Total quantity of radioactive material within a package may not exceed a Type A quantity. sport Index for Criticality Control num transport index to be shown on for nuclear criticality control: 2.5 ial nuclear material shall be contained in secondary plastic bottles or , metal cans or jars or heavy plastic bags securely tied closed within the drum. Metal secondary containers must be capable of venting to avoid are of the package in the event the package is exposed to the thermal test, R §71.73(c)(3). ments are restricted to transport between the licensee's Sorrento Valley Manufacturing Facility and other on-site facilities. dition to the requirements of Subpart G of 10 CFR Part 71: The package shall be prepared for shipment and operated in accordance with the Operating Procedures in the application dated August 16, 1990. The packaging must be maintained in accordance with the Maintenance Program in the application dated August 16, 1990. "ration date: September 30, 2000.
		ments are restricted to transport between the licensee's Sorrento Valley Manufacturing Facility and other on-site facilities.
	8. In ac	dition 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 dated August 16, 1990.
	(b)	The packaging must be maintained in accordance with the Maintenance Program in the application dated August 16, 1990.
	9. Expir	ration date: September 30, 2000.
		<u>REFERENCES</u>
ALL ALL	Gulf Energy	& Environmental Systems application dated August 3, 1973.
	General Ato	omics supplement dated August 16, 1990.
		FOR THE U.S. NUCLEAR REGULATORY COMMISSION
		William Trans
	_	A Environmental Systems application dated August 3, 1973. Somics supplement dated August 16, 1990. FOR THE U.S. NUCLEAR REGULATORY COMMISSION William D. Travers, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards 180
TAL AND	Date: <u>3</u>	62-196
		180
B	R( )B( )B( )B( )B( )B( )B( )B( )B( )B( )B	( )#( )#( )#( )#( )#( )#( )#( )#( )#( )#

		CERTIFIC FOR RADIOAC	CATE OF COMPLIANCE	U.S. NUCLEAR REGULA	ATORY COMMISSI
1. a. CERTIFICATI 906		b. REVISION NUMBER	<pre>c. PACKAGE IDENTIFICATION NUMBER USA/9067/B()F</pre>	d. PAGE NUMBER	e. TOTAL NUMBER P/ 3
Code of Fe	ederal Regulations, Part 71, "Pack	aging and Transportati	described in Item 5 below, meets the appli on of Radioactive Material." h any requirement of the regulations of the		
applicable	regulatory agencies, including the	e government of any co	untry through or into which the package w EPORT OF THE PACKAGE DESIGN OR APP	ill be transported.	
a. ISSUED TO	Name and Address) artment of Energy	b. TIT	U.S. Department of En	APPLICATION:	n .
	on, DC 20585		dated November 7, 199		
		c. DO	71–9067 CKET NUMBER		
CONDITIONS This certificate	is conditional upon fulfilling the	requirements of 10 CF	R Part 71, as applicable, and the condition	s specified below.	
5.				,	·
(a) Pacl	kaging				
(1)	Model No.: BCL-3	3			
(2)	Descripti <b>on</b>				
	a recessed. plug-	-type lid and	shipping package. The a gasketed, bolted cl	packagingʻis p osure: lifting	rovided wit and tie-dow
	a recessed, plug- devices; and a di provided by an in packaging dimens Exterior he Exterior dia Cavity heigh Cavity diame Lead shield	-type lid and rain line per nner can asso ions, weight ight, in. ameter, in. ht, in. eter, in. ing, in.	d a gasketed, bolted cl netration. Containment embly or by material in , and shielding are as 26.4 19.0 10.5 4.5 6.0	osure; lifting for the conten special form. follows:	and tie-dow ts is
(3)	a recessed, plug devices; and a du provided by an in packaging dimens Exterior he Exterior dia Cavity heigh Cavity diame Lead shield Loaded weigh	-type lid and rain line per nner can asso ions, weight ight, in. ameter, in. ht, in. eter, in. ing, in.	d a gasketed, bolted cl netration. Containment embly or by material in , and shielding are as 26.4 19.0 10.5 4.5 6.0	osure; lifting for the conten special form.	and tie-dow ts is
(3)	a recessed, plug- devices; and a di provided by an in packaging dimens Exterior he Exterior dia Cavity heigh Cavity diame Lead shield Loaded weigh	-type lid and rain line per nner can asse ions, weight ight, in. ameter, in. ht, in. eter, in. ing, in. ht, lb. constructed	d a gasketed, bolted cl netration. Containment embly or by material in , and shielding are as 26.4 19.0 10.5 4.5 6.0 2,800 (Incl in accordance with Bat	osure; lifting for the conten special form. follows: 110-1b. skid)	and tie-dow ts is The
(3)	a recessed, plug- devices; and a di provided by an in packaging dimens Exterior he Exterior dia Cavity heigh Cavity diame Lead shield Loaded weigh Drawings The packaging is Drawing No. BCL3-	-type lid and rain line per nner can asso ions, weight ight, in. ameter, in. ht, in. eter, in. ing, in. ht, lb. constructed -01, Sheets 1 sembly is cor	d a gasketed, bolted cl netration. Containment embly or by material in , and shielding are as 26.4 19.0 10.5 4.5 6.0 2,800 (Incl in accordance with Bat 1 & 2, Rev. C.	osure; lifting for the conten special form. follows: 110-1b. skid) telle Memorial	and tie-dow ts is The Institute
(3)	a recessed, plug- devices; and a di provided by an in packaging dimens Exterior he Exterior dia Cavity heigh Cavity diame Lead shield Loaded weigh Drawings The packaging is Drawing No. BCL3- The inner can ass	-type lid and rain line per nner can asso ions, weight ight, in. ameter, in. ht, in. eter, in. ing, in. ht, lb. constructed -01, Sheets 1 sembly is cor	d a gasketed, bolted cl netration. Containment embly or by material in , and shielding are as 26.4 19.0 10.5 4.5 6.0 2,800 (Incl in accordance with Bat 1 & 2, Rev. C.	osure; lifting for the conten special form. follows: 110-1b. skid) telle Memorial	and tie-down ts is The Institute
(3)	a recessed, plug- devices; and a di provided by an in packaging dimens Exterior he Exterior dia Cavity heigh Cavity diame Lead shield Loaded weigh Drawings The packaging is Drawing No. BCL3- The inner can ass	-type lid and rain line per nner can asso ions, weight ight, in. ameter, in. ht, in. eter, in. ing, in. ht, lb. constructed -01, Sheets 1 sembly is cor	d a gasketed, bolted cl netration. Containment embly or by material in , and shielding are as 26.4 19.0 10.5 4.5 6.0 2,800 (Incl in accordance with Bat 1 & 2, Rev. C.	osure; lifting for the conten special form. follows: 110-1b. skid) telle Memorial	and tie-down ts is The Institute

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	NRC FOF (3-96)				CONDITIONS (continued)		U.S. NUCLEAR REGULATORY COMMISSION
	Page	2 -	Certi	ficate No. 9067	- Revision No. 6 - Doo	cket No.	71-9067
~! ~1							
	5.	(b)	Cont	ents			
			(1)	Type and form o	f material.		
				solid metal or assembly specif	oxide form, which is p	backaged	cial nuclear material in within the inner can meets the requirements of
			(2)	Maximum quantit	y of material per pacl	kage	
				Not to exceed 3	00 watts decay heat, a	and	
				(i) Fissile ma	terial not to exceed	100 gram	s U-235 equivalent mass.
				(ii) Fissile ma	terial not to exceed a	2,000 gra	ams U-235 equivalent mass.
		(c)	Tran	sport Index for	Criticality Control		
					dex to be shown on iticality control:		
				contents describ limited in 5(b)(			0.4
				contents describ limited in 5(b)(			100
	6.	The	U-235	equivalent mass	must be determined b	y the fo	llowing method:
			1 60	5 equivalent mas ) times Pu mass.	s equals U-235 mass p	lus 1.75	times U-233 mass plus
	7.	Plut allo	tonium by, or	n in excess of 20 reactor fuel el	) curies per package m ements.	ust be i	n the form of metal, metal
	7. 8. 9. 10.	At f pack deco X af 10 r	the ti kage c ompose tomic nillir	contents must be e up to a tempera ratio less than	(1) dry (contents of ture of 750°F) and th 2) and (2) so limited	inner ca e fissil that th	rier for transport, the n assembly must not e material unmoderated (H to e dose rate will not exceed al surface of the package.
	9.	The can	maxin assen	num gross weight nbly, radioactive	of the cavity content e material, etc.).	s must n	ot exceed 40 pounds (inner
	10.	In a	additi	ion to the requir	rements of Subpart G o	f 10 CFR	Part 71:
		(a)	Each app1	n package shall t lication, as supp		dance wi	th Section 8.0 of the
		(b)	Each Sect	n package shall b tion 7.0 of the a	pe operated and prepar application, as supple	ed for s mented.	hipment in accordance with
					182		
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NRC FORM 618A **CONDITIONS** (continued) U.S. NUCLEAR REGULATORY COMMISSION (3-96) Page 3 - Certificate No. 9067 - Revision No. 6 - Docket No. 71-9067 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, 2002. REFERENCES U.S. Department of Energy application dated November 7, 1991. Supplement dated: April 10, 1992; and January 27 and August 18, 1997. FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cass R. Choppell

Cass R. Chappell, Chief Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: _September 23, 1997

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	18		ADD	IEIO		ADT LANCE	U.S. N	UCLEAR REG	ULATORY	COMMISSIC
-96) CFR 71					ATE OF COM	VIPLIANCE ALS PACKAGE	s			
a. CERTIFICAT	TE NUMBI	ER	b. REVISION N	UMBER	c. PACKAGE IDEN	TIFICATION NUME	ER	d. PAGE NUMBI	ER e. TOT	L NUMBER PA
90	68			6	l I	JSA/9068/B(	)F	1		3
PREAMBLE					L		<u>-</u> -	1	l	
a. This certi Code of J	ificate is i Federal Re	ssued to certify that the p egulations, Part 71, "Pacl	backaging and co kaging and Trans	ontents de sportation	escribed in Item 5 n of Radioactive M	below, meets the ap laterial."	plicable s	afety standards so	et forth in ?	fitle 10,
		s not relieve the consign ry agencies, including th							ansportatio	n or oth <del>e</del> r
THIS CERTIFIC a. ISSUED TO		SUED ON THE BASIS OF d Address)	A SAFETY ANAL		E AND IDENTIFIC	ATION OF REPORT (	OR APPLIC	CATION:		
		ent of Energy DC 20585			U.S. Depa dated Nov	artment of vember 7, 1	Energ 991,	y applica as supple	tion mented	l.
				c. DOC	KET NUMBER	71-9068				
CONDITIONS This certifica		itional upon fulfilling the	e requirements o	f 10 CFF	R Part 71, as applic	able, and the condition	ions speci	ified below.		
			F.							
(a) Pa	ackagi	ng								
(1	l) Mo	del No.: BCL	-2		100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100			an g		
(2	2) De	aguintion								
	•	scription						an a		
	A wi ti	steel encased th a recessed e-down device ntents is pro rm. The pack	, plug-ty s; and a vided by	vpe 1 drai an i	id and gas n line pen nner can a	keted, boll etration. ssembly or	ced cl Conta by ma	osure; li inment fo terial in	fting or the spec	and ial
	A wi ti co fo Ex	steel encased th a recessed e-down device ntents is pro rm. The pack terior height	, plug-ty s; and a vided by aging has , in.	vpe 1 drai an i	id and gas n line pen nner can a	keted, boll etration. ssembly or eight, and 18.2	ced cl Conta by ma	osure; li inment fo terial in	fting or the spec	and ial
	A wi ti co fo Ex Ex	steel encased th a recessed e-down device ntents is pro rm. The pack terior height terior diamet	, plug-ty s; and a vided by aging has , in. er, in.	vpe 1 drai an i	id and gas n line pen nner can a	keted, boll etration. ssembly or eight, and	ced cl Conta by ma	osure; li inment fo terial in	fting or the spec	and ial
	A wi ti co fo Ex Ex Ca Le	steel encased th a recessed e-down device ntents is pro rm. The pack terior height terior diamet vity height, ad shielding,	, plug-ty s; and a vided by aging has , in. er, in. in. in.	vpe 1 drai an i	id and gas n line pen nner can a	keted, boll etration. ssembly or eight, and 18.2 15.5 5.25 4.5	ced cl Conta by ma shiel	osure; li imment fo terial in ding as f	fting or the spec ollows	and ial
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(3	A wi ti co fo Ex Ca Le	steel encased th a recessed e-down device ntents is pro rm. The pack terior height terior diamet vity height, ad shielding,	, plug-ty s; and a vided by aging has , in. er, in. in. in.	vpe 1 drai an i	id and gas n line pen nner can a	keted, boll etration. ssembly or eight, and 18.2 15.5 5.25 4.5	ced cl Conta by ma shiel	osure; li imment fo terial in ding as f	fting or the spec ollows	and ial
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(3	A wi ti co fo Ex Ex Ca Le Lo 3) Dr Th Dr	steel encased th a recessed e-down device ntents is pro rm. The pack terior height terior diamet vity height, ad shielding, aded weight, awings e packaging i awing No. BCL ne inner can a	, plug-ty s; and a vided by aging has , in. er, in. in. in. lb. s constru .2-01, She assembly	vpel drai an i dim dim ets is co	id and gas n line pen nner can a ensions, w 1 and 2, R nstructed	keted, boll etration. ssembly or eight, and 18.2 15.5 5.25 4.5 1,360 (ind ance with l ev. D.	ed cl Conta by ma shiel	osure; li dinment fo terial in ding as f -lb. skic le Memori	fting or the spector follows	and ial s: stitute
(3	A wi ti co fo Ex Ex Ca Le Lo 3) Dr Th Dr	steel encased th a recessed e-down device ntents is pro rm. The pack terior height terior diamet vity height, ad shielding, aded weight, awings e packaging i awing No. BCL ne inner can a	, plug-ty s; and a vided by aging has , in. er, in. in. in. lb. s constru .2-01, She assembly	vpel drai an i dim dim ets is co	id and gas n line pen nner can a ensions, w 1 and 2, R nstructed	keted, boll etration. ssembly or eight, and 18.2 15.5 5.25 4.5 1,360 (ind ance with l ev. D.	ed cl Conta by ma shiel	osure; li dinment fo terial in ding as f -lb. skic le Memori	fting or the spector follows	and ial s: stitute
(3	A wi ti co fo Ex Ex Ca Le Lo 3) Dr Th Dr	steel encased th a recessed e-down device ntents is pro rm. The pack terior height terior diamet vity height, ad shielding, aded weight, awings e packaging i awing No. BCL ne inner can a	, plug-ty s; and a vided by aging has , in. er, in. in. in. lb. s constru .2-01, She assembly	vpel drai an i dim dim ets is co	id and gas n line pen nner can a ensions, w 1 and 2, R nstructed	keted, boll etration. ssembly or eight, and 18.2 15.5 5.25 4.5 1,360 (ind ance with l ev. D.	ed cl Conta by ma shiel	osure; li dinment fo terial in ding as f -lb. skic le Memori	fting or the spector follows	and ial s: stitute
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;)	A wi ti co fo Ex Ex Ca Le Lo 3) Dr Th Dr	steel encased th a recessed e-down device ntents is pro rm. The pack terior height terior diamet vity height, ad shielding, aded weight, awings e packaging i awing No. BCL ne inner can a	, plug-ty s; and a vided by aging has , in. er, in. in. in. lb. s constru .2-01, She assembly	vpel drai an i dim dim ets is co	id and gas n line pen nner can a ensions, w 1 and 2, R nstructed 7, Rev. B.	keted, boll etration. ssembly or eight, and 18.2 15.5 5.25 4.5 1,360 (ind ance with l ev. D.	ed cl Conta by ma shiel	osure; li dinment fo terial in ding as f -lb. skic le Memori	fting or the spector follows	and ial s: stitute

NRC FO (3-96)	RM 618	BA			CONDITIONS	(continued)	U.S. NUCLEAR REGU	LATORY COMMISSIO
Page	2 -	Certi	ficate No.	9068 – Revi	sion No.	6 – Docket	t No. 71-9068	
5.	(b)	Cont	ents					
		(1)	Type and	form of mate	rial			
			solid met assembly	al or oxide [·]	form, whi Item 5(a	ch is packa )(3), or wh	special nuclear ma aged within the inno nich meets the requ	er can
		(2)	Maximum q	uantity of ma	aterial p	er package		
			Not to ex	ceed 200 wat	ts decay	heat, and		
			(i) Fiss	ile material	not to e	xceed 50 gr	rams U-235 equivale	nt mass.
			(ii) Fiss	ile material	not to e	xceed 2,000	) grams U-235 equiva	alent mass.
	(c)	Tran	sport Inde	x for Critica	ality Con	trol		
				ort index to ear critical				
				escrib <mark>ed in</mark> ! 5(b)(2)(i):	5(b)(1)		0.4	
				escribed in 5 5(b)(2)(ii):			100	
6.	Plut allo	onium y or 1	in excess reactor fu	of 20 curies el elements.	s per pac	kage must b	be in the form of me	etal, metal
	The	U-235	equivalen	t mass must b	oe determ	ined by the	e following method:	
		U-235 times	5 equivale s Pu mass.	nt mass equal	s U-235 r	mass plus l	75 times U-233 mas	s plus 1.60
	pack deco X at	age co mpose omic r	ontents mu: up to a to ratio less	st be (1) dry emperature of than 2) and	(conten 750 F) (2) so 1	ts of inner and the fis imited that	carrier for transport can assembly must ssile material unmoo the dose rate will surface of the pac	not lerated (H to not exceed
9.	The i can a	maximu assemb	um gross wo oly, radio	eight of the active materi	cavity co al, etc.)	ontents mus )	t not exceed 20 pou	ınds (inner
10.	In a	dditic	on to the i	requirements	of Subpai	rt G of 10	CFR Part 71:	
	(i)	Each appli	package sl ication, a	nall be maint s supplemente	ained in d.	accordance	with Section 8.0 o	f the
	(ii)	The p Secti	backage sha ion 7.0 of	all be prepar the applicat	ed for sl ion, as s	nipment and supplemente	operated in accord d.	ance with

NRC FORM 618A U.S. NUCLEAR REGULATORY COMMISSION **CONDITIONS** (continued) (3-96) Page 3 - Certificate No. 9068 - Revision No. 6 - Docket No. 71-9068 The package authorized by this certificate is hereby approved for use under the 11. general license provisions of 10 CFR §71.12. 12. Expiration date: May 31, 2002. REFERENCE U.S. Department of Energy application dated November 7, 1991. Supplements dated: April 10, 1992; and January 27, 1997. FOR THE U.S. NUCLEAR REGULATORY COMMISSION Cars K. Ch Ø Cass R. Chappell, Chief Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards May 21, 1997 Date: 186 

(3-96) 10 CFR 71	1 618		CERTIFIC FOR RADIOAC	CATE OF COMPLIANCE	U.S. NUCLEAR REGU	LATORY COMMISSIC
1. a. CERTIFI	CATE NUMI	BER	b. REVISION NUMBER	R C. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PA
9069	I		11	USA/9069/B()F	1	3
b. This ce	ertificate is of Federal I ertificate do	Regulations, Part 71, "Pac es not relieve the consign	kaging and Transportati	described in Item 5 below, meets the appli on of Radioactive Material." h any requirement of the regulations of the untry through or into which the package w	U.S. Department of Tran	
Depa	rtment	issued on the basis of and Address) of Energy , DC 20585	6. TT	REPORT OF THE PACKAGE DESIGN OR APP THE AND IDENTIFICATION OF REPORT OR Westinghouse Electric C	application: orporation	
nasn	ngcon	, DC 20303	i	application dated Octob as supplemented.	er 30, 1981,	
			c. DO	CKET NUMBER 71-9069		
4. CONDITION This certifi	-	ditional upon fulfilling th	e requirements of 10 CF	R Part 71, as applicable, and the condition	s specified below.	
5.						
(a)	Pack	aging				
	(1)	Model No.:	<b>M</b> O-1		· .	
	(2)	Description				
		latch pins. a strongback absorber pla equipped wit	The fuel ass and adjustab tes are locat h lifting, ti	by 12 ratchet binders emblies are held in pl le clamping assembly ( ed between the fuel as e-down and pressure re 8,600 pounds.	ace within the shock mounted) semblies. The	overpack by . Neutron package is
	(3)	Drawings				
		Corporation container is	Drawing No. 1 constructed	ted in accordance with 581F50, Sheets 1 and 2 in accordance with West 5650D55, Rev. 1.	. Rev. I. Fue	l rod
				187		

NRC FORM (3-96)	1618A CONDITION	ONS (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
Pa	age 2 - Certificate No. 9069 - Revisi	on No. 11 – Docket	No. 71-9069
5.(b)	Contents		
	(1) Type and form of material		
	Uranium dioxide as stainless s the following specifications:	steel or aluminum c	lad unirradiated rods of
		<u>SST Clad</u>	<u>AL Clad</u>
	Pellet diameter (max), in Rod diameter (nom), in Fuel length (max), in ²³⁵ U enrichment (max), w/o	0.446 0.476 70.0 4.02	0.406 0.475 61.0 2.5
	(2) Maximum quantity of material p	oer package	
	Two inner containers as descri total of 70 kilograms U-235.	ibed in 5(a)(3) con	taining not more than a
(c)	Transport Index for Criticality Cont	trol	
	Minimum transport index to be shown on label for nuclear criticality cor	ntrol:	1.6
6.	Two (2) neutron absorber plates cons stainless steel containing 1.3 perce must be installed between the active	ent minimum boron o	r 0.19" thick OFHC copper
7.	Fuel rods must be closely packed in equivalent metal-to-metal square lat must be fitted with a minimum of the noncombustible portion of the blocks must assure that the rods are mainta to-metal square lattice within the	ttice. Partially 1 ree, equally spaced s and the method by ained on no more th	oaded fuel rod containers blocks, of which the which they are secured an an equivalent metal-
8.	Each fuel assembly must be unsheather polyethylene sheath which will not of The ends of the sheath must not be prevent the flow of liquids into or Alternatively, the fuel assembly may sheath along its full length. At the will be cut off or folded back to as lower end of the assembly is unobstr portion of the sheath that is folded end to hold it in place, and the len loaded in the packaging, the folded two grid locations. The top end of closed. However, the top end then w will run perpendicular to the axis distance between the top nozzle pad percent of the length of each side) that formed by the top of the pads	extend beyond the e folded or taped in out of the sheathe y be enclosed in an he bottom end of th ssure that the enti ructed. When the f d back will be cinc ngth will be such t sheath will be cinc the bag may be gat ill be slit on all of the assembly and s and spring clamps . The slits will b	nds of the fuel assembly. any manner that would d fuel assembly. elongated plastic bag or e fuel assembly, the bag re cross section of the olding is used, the hed with tape near its hat when the assembly is mped in place in at least hered together and taped four sides. The slits will extend the inner s (approximately 60
		188	

NRC FOR (3-96)	M 618A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
	Page 3	- Certificate No. 9069 - Revision No. 11 - Docket No. 71-9069
9.	In ac	dition to the requirements of Subpart G of 10 CFR Part 71:
	(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.
10.	The p gener	package authorized by this certificate is hereby approved for use under the ral license provisions of 10 CFR §71.12.
11.	Expir	ration date: December 31, 2002.
		REFERENCES
West	inghous	se Electric Corporation application dated October 30, 1981.
West	inghous	se supplements dated January 24, 1992 and December 31, 1996.
Depa and	rtment Novembe	of Energy supplements dated: April 2 and June 14, 1984; December 24, 1996; er 7 and December 10, 1997.
		FOR THE U.S. NUCLEAR REGULATORY COMMISSION
		Lass R. Chappell
		Cass R. Chappell, Chief
		Package Certification Section Spent Fuel Project Office
		Office of Nuclear Material Safety and Safeguards
Date	: Dec	ember 16, 1997
		189
		109

<u>)</u> @(				05051				MACHANIA MANA
	NRC FORM 618 (3-96) 10 CFR 71				ATE OF COMP	LIANCE	UCLEAR REGUL	ATORY COMMISSION
¥ -	I. a. CERTIFICATE NUMBE				c. PACKAGE IDENTIFI		d. PAGE NUMBER	e. TOTAL NUMBER PAGES
Ĭ,								
•	<u>9070</u>		14		USA/9070/B	(U)	1	3
	<ol> <li>PREAMBLE         <ol> <li>This certificate is issued to certify that the packaging and cc Code of Federal Regulations, Part 71, "Packaging and Tran</li> <li>This certificate does not relieve the consignor from complia</li> </ol> </li> </ol>				n of Radioactive Materi	al."		forth in Title 10,
	applicable regulator	y agencies, including the	government o	f any cou	ntry through or into wh	ch the package will be	ransported.	
	3. THIS CERTIFICATE IS IS a. ISSUED TO (Name and		A SAFEI Y ANA	b. TITI	LE AND IDENTIFICATIO	N OF REPORT OR APPLICAT	CATION:	
	Packaging Te 4507-D Pacifi Tacoma, WA	c Highway East				chnologies, Inc. 4, as suppleme	nted.	lated
	1			c. DOC	KET NUMBER	71	-9070	
	4. CONDITIONS This certificate is cond	itional upon fulfilling the	requirements	of 10 CF	R Part 71, as applicable,	and the conditions spec	ified below.	
	5.							
ŝ	(a) Packa	aina	en i sei 1986 -					
	(a) Facha	ignig						
	(1)	Model No.: N-5	55 m					
	(2)	Description						
<b>CECECECECECECECE</b>		high by 32 inch or 20-gauge ga polyurethane fo lower (lid and b neoprene gask provided for lift gauge lid and a	es diame loam. The ody) sect et at the s ing. The gasket. lugs and	ter wit steel s inner ions o steppe steel c Closu a 5/8	n. The overpac h a 34-1/2-inch hell is filled with shell is molded f the overpack is d joint between frum is minimun re of the drum is -inch diameter b bunds.	high by 24-inch 3-pound per cu fiberglass. Closes provided by fo the two section 18-gauge stees by way of a 12	diameter cav ubic foot rigid sure of the up our toggle clar s. Four lugs al with a minir 2-gauge lockin	rity. The 18 oper and nps, and a are num 14-
	(2)	Drawing						
	(3)	The packaging	is constru	ucted i	in accordance w C, or X-60-200I	rith Nuclear Pac	kaging, Incor	porated
	•							ge gross
			7 187 187 187 1	() Die Ser	190	कर ग्रहर अग्र स्वर भाव स्वय प्र	אור זער זער זער אין און ז	( 25) 25) 25) 25) 25) 25) 25) 25)

NRC FORM 618A (3-96)

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9070 - Revision No. 14 - Docket No. 71-9070

- (b) Contents
  - (1) Type and form of material
    - (a) Radioactive material in the form of dewatered, solid or solidified materials meeting the requirements of low specific activity material, contained in steel drums.
    - (b) Radioactive material meeting the requirements of special form radioactive material, contained in steel drums.
    - (c) Radioactive material in the form of solid metal pieces or activated solid metal components, contained in steel drums.
  - (2) Maximum quantity of material per package

Greater than Type A quantities of radioactive material. Fissile material contents not to exceed the generally licensed mass limits as specified in 10 CFR §§71.18 and 71.22. Plutonium in excess of 20 curies per package must be in the form of metal, metal alloy or reactor fuel elements, or must meet the requirements of special form radioactive material. Internal decay heat not to exceed 3 watts.

- 6. The maximum weight of contents, including drum, not to exceed 550 pounds.
- 7. The steel drum must be in accordance with Appendix 1.3.2 of the supplement dated October 20, 1994.
- 8. The drum must be securely positioned in the overpack.
- 9. Contents must be securely positioned so that protrusions will not puncture the drum under normal or accident conditions.
- 10. The lifting lugs must be rendered inoperable for tie-down during transport.
- 11. 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 Chapter 8.0 of the application; and
  - (b) The package shall be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7.0 of the application.
- 12. The packaging authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.12.

13. Expiration date: January 31, 2005.

NRC FORM 618A (3-96)

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 3 - Certificate No. 9070 - Revision No. 14 - Docket No. 71-9070

## REFERENCES

VECTRA Technologies, Incorporated, application dated July 21, 1994.

Supplements dated: August 22 and October 20, 1994; and February 6, 1998.

Transnuclear, Inc., supplement dated February 5, 1998, and December 3, 1999.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

February 4,2000 Date:

10 CFR 71			CATE OF COL		JE –	NUCLEAR REGU	JLATORY COMMISS
1. a. CERTIFICATE	NUMBER		ER c. PACKAGE IDE			4 0.001	
9071		6		/9071/B(		d. PAGE NUMBE	R e. TOTAL NUMBER
∠. PREAMBLE					/		5
Code of Fed	ate is issued to certify that the eral Regulations, Part 71, "Pac ate does not relieve the consign	ckaging and Transporta	tion of Radioactive M	laterial."			
	gulatory agencies, including th	he government of any c	country through or into	o which the pac	kage will be	transported.	nsportation or other
a. ISSUED TO (N	TE IS ISSUED ON THE BASIS OF ame and Address)	F A SAFETY ANALYSIS	REPORT OF THE PACE TTLE AND IDENTIFIC	KAGE DESIGN ATION OF REPO	OR APPLICA	TION ICATION:	
ANEFCO,	Incorporated		ANEFCO appl	ication 1	receive	d June 14,	1976,
P.O. Box			with report,	, "Safety	/ Analy	sis Report	Cask
moodus,	CT 06469		AP-101," as	suppleme	ented.		
		c. D	OCKET NUMBER	<b>71-9071</b>			
4. CONDITIONS This certificate i	s conditional upon fulfilling th	e requirements of 10 C	EP Bart 71 as applied	able and the se		-16. 41.1	
5.			A A L 41 / 1, 45 applie				
(a) Pack	aging						
(1)	Model No.: AP-	101					
(2)	Description						
	long. The cask shells. The in	consists of ner shell is	two concent 5/8-inch th	ric stai ick bv 2	s in d nless : 8-inch	ID: the ou	drical ter
	long. The cask shells. The in stainless steel poured lead shi by a 0.140-inch 0.125-inch thic diameter by 167 construction wi steel and lead a gask-o-seal c vessel for drain The cask is equ end. The overa 84 inches in dia trunnions, two for tie-down of approximately 62	consists of ner shell is shell is 1- eld fills the thick stain k stainless inches long th 3 inches Closure is losure seal. n lines which ipped with re ameter by 230 redundant pa the cask for	two concent 5/8-inch thi e space betw less steel t steel spacer . The base of poured le provided by There are h are plugge emovable, ca s of the cas 6 inches lon irs for lift r shipment.	ric stai ick by 2 ck by 39 ween. Th hermal s wire. is a wel ad. The twenty, two pene d and ga nned bal k with i g. The ing. Th	s in d nless s 8-inch -1/4-in e outen hield s The cav ded sta flange 1-1/2-i tration sketed sa impa mpact l cask ha ree of	iameter by steel cylin ID; the ou shell is separated by vity is 28 ainless ste d lid is o inch diamet is into the with a neo act limiter imiters in as four lif the trunni	drical ter a 3-1/2-inch surrounded y a inches in el f stainless er bolts and containment prene seal. s at each place are ting ons are used
	long. The cask shells. The in stainless steel poured lead shi by a 0.140-inch 0.125-inch thic diameter by 167 construction wi steel and lead. a gask-o-seal c vessel for drain The cask is equ end. The overa 84 inches in dia trunnions, two for tie-down of	consists of ner shell is shell is 1- eld fills the thick stain k stainless inches long th 3 inches Closure is losure seal. n lines which ipped with re ameter by 230 redundant pa the cask for	two concent 5/8-inch thi e space betw less steel t steel spacer . The base of poured le provided by There are h are plugge emovable, ca s of the cas 6 inches lon irs for lift r shipment.	ric stai ick by 2 ck by 39 ween. Th hermal s wire. is a wel ad. The twenty, two pene d and ga nned bal k with i g. The ing. Th	s in d nless s 8-inch -1/4-in e outen hield s The cav ded sta flange 1-1/2-i tration sketed sa impa mpact l cask ha ree of	iameter by steel cylin ID; the ou shell is separated by vity is 28 ainless ste d lid is o inch diamet is into the with a neo act limiter imiters in as four lif the trunni	drical ter a 3-1/2-inch surrounded y a inches in el f stainless er bolts and containment prene seal. s at each place are ting ons are used

(3-96)	RM 618	A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSION
Page	e 2 -	Cert	ificate No. 9071 – Revision No. 6 – Docket No. 71-9071
5.	(a)	Packa	aging (Continued)
		(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)	Conte	ents
		(1)	Type and form of material
			Greater than Type A quantity of byproduct material in the form of dry, solid, metallic waste material 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.	must cavi temp vapo be v	be di ty pre eratur r pres acuum	ge must be shipped dry. In preparation for shipment, the cask cavity rained of all excess water. A vacuum pump must be used to reduce the essure below the vapor pressure corresponding to the measured re of the drained water. The cavity pressure must be held below the ssure determined for at least 90 minutes. A dry loaded package need not dried provided the "empty" cask cavity and drain lines are verified not n liquid prior to each loading.
7.			r close fitting contents, appropriate shoring must be used in the cask limit movement of the contents during accident conditions of transport.
8.	In a	dditio	on to the requirements of Subpart G of 10 CFR Part 71:
	a.		package must be operated and maintained in accordance with procedures in lement dated December 12, 1991.
	b.	gask- with	r to each shipment the gask-o-seal closure seal must be inspected. The -o-seal closure seal and the cavity drain O-ring seals must be replaced new seals within the 12-month period prior to shipment, or earlier if ection shows any defect.
	c.	The popera	package must be leak tested prior to each shipment in accordance with ating procedures in supplement dated December 12, 1991.
9.	The gene	packaq ral l	ge authorized by this certificate is hereby approved for use under the icense provisions of 10 CFR §71.12.
10	Expi	ratio	n date: January 31, 2002.
10.			
10.			

NRC FORM 618A (3-96)

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 3 - Certificate No. 9071 - Revision No. 6 - Docket No. 71-9071

#### **REFERENCES**

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

Supplements dated: July 21, August 6, and October 21, 1976; April 2 and September 12, 1986; September 26 and December 12, 1991; and November 25, 1996.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

ass.

Cass R. Chappell, Chief Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: 01/17/97

NRC FORM 618 (3-96)								
. ,		CEDTIEIC		S. NUCLEAR REGUL	ATORY COMMISSION			
10 CFR 71			ATE OF COMPLIANCE TIVE MATERIALS PACKAGES					
I. a. CERTIFICATE N		b. REVISION NUMBER	c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAG			
9081		12	USA/9081/B()	1	3			
2. PREAMBLE	····							
Code of Fede	eral Regulations, Part 71, "Pack	aging and Transportation						
applicable re	gulatory agencies, including the	e government of any cou	from compliance with any requirement of the regulations of the U.S. Department of Transportation or other government of any country through or into which the package will be transported. SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION					
a. ISSUED TO (N		b. ТТТ 	LE AND IDENTIFICATION OF REPORT OR AP	PLICATION:				
140 Stone	clear Systems, LLC ridge Drive SC 29210		em-Nuciear Systems, Inc. apj ed November 24, 1987, as su					
		c. DOC	CKET NUMBER 71-9081					
4. CONDITIONS This certificate is	s conditional upon fulfilling the	requirements of 10 CE	R Part 71, as applicable, and the conditions s	pecified below				
5.								
(a) Pac	kaging		an Leta					
(1)	Model No.: CNS	1-13C						
(2)	Description							
			ug-type, lead-filled lid is attac	hed with twelve	, 1-1/4" bolts;			
	diameter wires. bolted-on steel lu line is closed with	sket. Outer stee The lead shieldin gs are for lifting a plug. The ca	ng is 5" in the sides, 6" in the only. The lid has a steel U-b isk is 39" in diameter and 68- ackage weight is about 26,000	the cask walls v base and 5-3/4 par for lifting. Th 1/2" long. The	with small " in the lid. Two ne cavity drain			
(3)	diameter wires. bolted-on steel lu line is closed with	sket. Outer stee The lead shieldin gs are for lifting a plug. The ca	el sheets are separated from ng is 5" in the sides, 6" in the only. The lid has a steel U-b isk is 39" in diameter and 68-	the cask walls v base and 5-3/4 par for lifting. Th 1/2" long. The	with small " in the lid. Two ne cavity drain			
(3)	diameter wires. bolted-on steel lu line is closed with in diameter and 5 Drawings The packaging is	sket. Outer stee The lead shieldin gs are for lifting a plug. The ca 4" long. The pa constructed in	el sheets are separated from ng is 5" in the sides, 6" in the only. The lid has a steel U-b isk is 39" in diameter and 68-	the cask walls v base and 5-3/4 bar for lifting. The 1/2" long. The 0 pounds. ear Systems, Inc	with small " in the lid. Two ne cavity drain cavity is 26-1/2"			
(3) (b) Con	diameter wires. bolted-on steel lu line is closed with in diameter and 5 Drawings The packaging is C-110-E-0005, S	sket. Outer stee The lead shieldin gs are for lifting a plug. The ca 4" long. The pa constructed in	el sheets are separated from ng is 5" in the sides, 6" in the only. The lid has a steel U-b ask is 39" in diameter and 68- ackage weight is about 26,000 accordance with Chem-Nucle	the cask walls v base and 5-3/4 bar for lifting. The 1/2" long. The 0 pounds. ear Systems, Inc	with small " in the lid. Two ne cavity drain cavity is 26-1/2"			
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(b) Con Typ	diameter wires. bolted-on steel lu line is closed with in diameter and 5 Drawings The packaging is C-110-E-0005, S tents e, form, and maximu Greater than Typ	sket. Outer stee The lead shieldings are for lifting a plug. The ca 4" long. The pa constructed in the heets 1, 2, and m quantity of m e A quantity of I	el sheets are separated from ng is 5" in the sides, 6" in the only. The lid has a steel U-b ask is 39" in diameter and 68- ackage weight is about 26,000 accordance with Chem-Nucle 3, Rev. 7; and C-112-B-0006, aterial per package oyproduct material as solid m	the cask walls v base and 5-3/4 bar for lifting. The 1/2" long. The 0 pounds. ear Systems, Inc , Rev. A.	with small " in the lid. Two ne cavity drain cavity is 26-1/2" c., Drawing Nos.			
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(b) Con Typ (i)	diameter wires. bolted-on steel lu line is closed with in diameter and 5 Drawings The packaging is C-110-E-0005, S tents e, form, and maximu Greater than Typ 600 watts; or Decay heat not to Process solids, e the requirements	sket. Outer stee The lead shieldin gs are for lifting a plug. The ca 4" long. The pa constructed in heets 1, 2, and m quantity of m e A quantity of m o exceed 5 watts ither dewatered for low specific	el sheets are separated from ng is 5" in the sides, 6" in the only. The lid has a steel U-b ask is 39" in diameter and 68- ackage weight is about 26,000 accordance with Chem-Nucle 3, Rev. 7; and C-112-B-0006, aterial per package oyproduct material as solid m s, and: , solid, or solidified in a secor activity material; or Solid read	the cask walls v base and 5-3/4 bar for lifting. The 1/2" long. The 0 pounds. ear Systems, Inc , Rev. A. etal. Decay hear ndary sealed cor ctor components	with small " in the lid. Two ne cavity drain cavity is 26-1/2" c., Drawing Nos. at not to exceed ntainer meeting s in secondary			

NRC FC (3-96)	ORM 618A		CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
	Page	2 - Certificate No. 90	81 - Revision No. 12 - Docket No. 7	71-9081
6.	(a)	generate combustiti analysis of a repres		tances which could radiolytically ade by tests and measurements or by owing criteria are met over a period of
		5% by volume	(or equivalent limits for other inflam	ar quantity that would be no more than nmable gases) of the secondary than 0.063 g-moles/ft ³ at 14.7 psia and
		oxygen must b	container and cask cavity must be e limited to 5% by volume in those greater than 5%.	inerted with a diluent to assure that portions of the package which could
		prepared for shipme	gins when the package is prepared	e secondary container must be termination for gas generation is made (sealed) and must be completed withir
(	b)	low specific activity venting of drums or	material, and shipped within 10 day	concentration not exceeding that for vs of preparation, or within 10 days after termination in (a) above need not be ply.
7.	Shorin	ng must be provided t	o minimize movement of contents o	during accident conditions of transport.
8.	Maxim	num gross weight of t	ne contents, secondary container, a	and shoring is limited to 5,000 pounds.
9.			shall be secured by twelve, SA-354 $10\%$ (lubricated) or 420 ft-lbs $\pm$ 10	, Type BD, 1-1/4"-7 UNC x 2-1/4" long % (dry).
10.		ask shall be delivered It applied to threads c		n line shall be sealed with appropriate
11.	Prior to No pao Section	ckage is to be deliver	leak test described in Section 8.2 c ed to a carrier for transport with a d	of the application must be performed. letectable leak using the method of
12.			nall be made to determine that the c ce of a dry loaded cask.	dose rate does not exceed 30 mrem/hr
13.	Prior to	o each shipment, the	lift lugs must be removed from the	packaging.
			197	

NRC FORM 618A (3-96)

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 3 - Certificate No. 9081 - Revision No. 12 - Docket No. 71-9081

- 14. The contents described in 5(b)(ii) shall 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.
- 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 8 of the application.
- 16. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
- 17. Expiration date: January 31, 2003.

### REFERENCES

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

Supplements dated: November 24, 1992, October 31, 1997, July 28, 1999, and January 5, 2000.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

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Date: February 4,2000

9 packaging and contents of ckaging and Transportation from compliance with the government of any cou FA SAFETY ANALYSIS RI b. TITT c. DOC	c. PACKAGE IDENTIFICATION NUMBER USA/9098/B() described in Item 5 below, meets the appli- on of Radioactive Material." In any requirement of the regulations of the untry through or into which the package w EPORT OF THE PACKAGE DESIGN OR APP LE AND IDENTIFICATION OF REPORT OR Department of Energy a March 31, 1998, as supplicable, and the condition CKET NUMBER 71-9098 R Part 71, as applicable, and the condition	1 icable safety standards set f e U.S. Department of Trans will be transported. PLICATION APPLICATION: APPLICATION: APPLICATION:	
c. DOC	on of Radioactive Material." In any requirement of the regulations of the untry through or into which the package w EPORT OF THE PACKAGE DESIGN OR APP LE AND IDENTIFICATION OF REPORT OR Department of Energy a March 31, 1998, as support CKET NUMBER 71-9098 R Part 71, as applicable, and the condition	e U.S. Department of Trans vill be transported. PLICATION APPLICATION: application dated plemented.	
F A SAFETY ANALYSIS RI b. TITI c. DOC	EPORT OF THE PACKAGE DESIGN OR APP LE AND IDENTIFICATION OF REPORT OR Department of Energy a March 31, 1998, as sup CKET NUMBER 71-9098 R Part 71, as applicable, and the condition	PLICATION APPLICATION: Ipplication dated plemented.	
e requirements of 10 CFF	March 31, 1998, as sup CKET NUMBER 71-9098 R Part 71, as applicable, and the condition	plemented.	
e requirements of 10 CFF	R Part 71, as applicable, and the condition	ns specified below.	
		ns specified below.	
CI-20WC-2 and	CI-20WC-2A		
CI-20WC-2 and	CI-20WC-2A		
CI-20WC-2 and	CI-20WC-2A		
psulated in steel 4" long bolts. Th el, gasketed and	with a gasketed and bolted the inner containment vessel	l flange closure wi l is a 2.73" OD x 5	th six, 3/8"-16 5.56" long 416
unus.			
	<u>CI-20WC-2</u>	<u>CI-20WC-2</u>	<u>2A</u>
ckets in	24-1/4x22x28-3/4	24-1/4x18x20	6-1/4
ss, in	2	1.8	
in	3.1x6H	3.1x6	Н
	199		
	ment vessel. Th ich are glued tog d within an 18-ga psulated in steel 4" long bolts. Th el, gasketed and bunds. ckets in ss, in	ment vessel. The protective jackets are cor ich are glued together and reinforced with st d within an 18-gauge steel drum. The shield psulated in steel with a gasketed and bolted 4" long bolts. The inner containment vessel el, gasketed and threaded container. The gi bunds. <u>CI-20WC-2</u> ckets in 24-1/4x22x28-3/4 ss, in 2 in 3.1x6H	CI-20WC-2       CI-20WC-2         ckets       24-1/4x22x28-3/4       24-1/4x18x20         ss, in       2       1.8         in       3.1x6H       3.1x6

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	NRC FORM 61 (3-96)	8 <b>A</b>			<b>CONDITIONS</b> (continued)	U	.S. NUCLEAR REGULATORY COMMISSION
	Page 2 - (	Certificat	te No. 90	98 - Revision N	o. 9 - Docket No. 71-90	098	
		(3)	Drawing	js			
			The pac	kagings are con	structed in accordance	e with Cintic	hem Inc. Drawing Nos.:
				<u>lo. CI-20WC-2</u> , Rev. D and 100	0964, Rev. H		
				<u>lo. CI-20WC-2A</u> , Rev. G and 10 ⁻			
				ontainment Vess , Rev. C	sel		
	(b)	Con	tents				
		(1)	Туре а	and form of mate	erial		
			(i)	Mo-99/Tc-99 i	n normal form as solid	s or liquids.	
			(ii)	I-131 in norma	al form as liquids.		
		(2)	Maxir	num quantity of	material per package		
			(i) • • •	For contents c 1,000 curies	lescribed in 5(b)(1)(i):		
			<b>(</b> ii)	200 curies	described in 5(b)(1)(ii):		
	6. Cor	ntents m	ust be ca	ontained within t	he inner containment v	vessel speci	ified in 5(a)(3).
	7. In a	addition	to the rea	quirements of Su	ubpart G of 10 CFR Pa	rt 71:	
	а.	The proc	package ædures (	e must be prepar PO-05, PO-06 a	red for shipment and o and PO-08) of the appli	perated in a ication.	accordance with the operating
	b.	The the	package application	e must be mainta on.	ained in accordance wi	th the main	tenance procedures (PO-06) of
	<b>C</b> .	The	inner co	ntainment vesse	el neoprene O-ring sea	l must be re	eplaced prior to each shipment.
	d.	Prio test	r to each ed to a s	n shipment, the le ensitivity of at le	oaded inner containme ast 1x10⁵ std-cm³/sec.	ent vessel m	nust show no leakage when
IN AN AN AN AN AN	<b>e</b> .	The with show	inner co the leak w no leal	ntainment vesse test procedure kage greater tha	el must be leak tested v (PO-07) of the applicat n 1x10 ⁻⁷ std-cm³/sec.	within 12 m lion. The in	ified in 5(a)(3). accordance with the operating tenance procedures (PO-06) of eplaced prior to each shipment. nust show no leakage when onths prior to use in accordance ner containment vessel must
					200		
ĕ.							

NRC FORM 618A (3-96)

**CONDITIONS** (continued)

**U.S. NUCLEAR REGULATORY COMMISSION** 

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Page 3 - Certificate No. 9098 - Revision No. 8 - Docket No. 71-9098

- 8. 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.
- 9. The packages authorized by this certificate are hereby approved for use under the general license provisions of 10 CFR §71.12.
- 10. Expiration date: May 31, 2004.

### **REFERENCES**

Department of Energy application dated March 31, 1998.

Supplements dated: November 4, 1998, and April 19, 1999.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

William have

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date:

10 CFR 71			LEKI	IIIICA	TC OL CUI	MPLIANCE				imis
	<u> </u>	·				ALS PACKAGES				
I. a. CERT	IFICATE NUN	aber	<b>b. REVISION N</b>	NUMBER	c. PACKAGE IDE	TIFICATION NUMBE	R	4. PAGE NUMBER	E. TOTAL NUM	MBER
909			9	l	USA/	9099/B(U)F-85		1	2	
<ol> <li>PREAMBLE</li> <li>This certificate is issued to certify that the packaging a Code of Federal Regulations, Part 71, "Packaging and</li> <li>This certificate does not relieve the consignor from con applicable regulatory agencies, including the government</li> </ol>			kaging and Tran for from complia	aportation (	of Radioactive M Av requirement o	laterial." f the regulations of th	e U.S. De	nartment of Trans		
3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY AN a. ISSUED TO (Name and Address) U.S. Department of Energy Washington, DC 20585				LYSIS REPO	ORT OF THE PACI	KAGE DESIGN OR AP	LICATIO	N		
				ATR Fresh Fuel Shipping Container Safety Analysis Report, INEL-94/0275, January 27, 1999, as supplemented 71-9099						
CONDITI	ions			c. DOCKE	ET NUMBER					
		ditional upon fulfilling the	e requirements of	f 10 CPR P	art 71, as applied	ble, and the condition	s specifie	d below.		
<b>(a)</b>	Packa	aging				· .				
	(1)	Model No.: AT	3			υ ₄ .	• 18:			
	(2)	Description	angeningen in der sonen ander Sie Seine State in der sonen ander Mehr State in der sonen ander			م <del>مع</del> د من	المحقة الحق			
		The inner containing inches, construct are lined with his spacers covered separation for to and two wire set	cted of 3/4- gh density j d with spon pur fuel ase	inch ply polyeth ge rubl emblie	wood, covid viene foam ber and with sPositive	and with 16-g and with a 0.0 a 0.020-inch plosure is prov	auge s )20-inc thick c	iteel. The tech cadmium admium pla	op and bot plate. Wo	itor ood
	(3)	inches, construct are lined with his spacers covered separation for to and two wire sea The inner contail 3/16 inches, con with 18-gauge st overpack. Positi secured in place approximately 85 Drawings	ted of 3/4 gh density d with spon our fuel ase aled hinge ner & enck structed of teel. Alumi ve closure using 1/16 53 pounds.	inch ply polyeth ge rubb emblie pins pro osed wi 1-inch inum, h of the 5-inch d	wood, cov ylene foam ber and with s. Positive wide acces wide acces thin an ove plywood, fr onevcomb overpack is iameter cot	and with 16-g and with a 0.0 a 0.020-inch closure is prov s rpack, 73-15/1 aned by stee impact limiters provided by fo ter pins. The	auge s D20-ind thick c rided 1 6 inch angle are fib our hin packa	teel. The to ch cadmium admium pla by a continu es x 31-3/4 members a ked to the e ge pins whi ge weight is	op and bot a plate. We ate provide ous hinge, inches x 1 and covere ands of the ich are	i 1-
	(3)	inches, construct are lined with hig spacers covered separation for to and two wire sea The inner contail 3/16 inches, con with 18-gauge st overpack. Positi secured in place approximately 85	ted of 3/4- gh density d with spon our fuel ass aled hinge ner is enck structed of teel. Alumi ve closure using 1/16 53 pounds.	inch ply polyeth ge rubb emplies pins pro osed wi 1-inch inum, h of the 5-inch d	wood, cover ylene foam ber and with s. Rositive ovide acces thin an over plywood, fr oneycomb overpack is lameter cot	and with 16-g and with a 0.0 a 0.020-inch closure is prov s. mack 73-15/1 aned by stee impact limiters provided by 10 ter pins. The	auge s 20-ind thick c ided 1 6 inch angle are fit bur hin packa	teel. The to ch cadmium admium pla by a continu es x 31-3/4 members a ked to the e ge pins whi ge weight is Drawing Na	op and bot plate. We ate provide ous hinge, inches x 1 and covere ends of the ch are c. 445721.	11- 11-
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(b)	Conter (1)	inches, construct are lined with hig spacers covered separation for for and two wire sea The inner contail 3/16 inches, con with 18-gauge st overpack. Positi secured in place approximately 85 Drawings The packaging is Sheets 1, 2, and	ted of 3/4- gh density i d with spon our fuel ase and hinge i ner 18 enck structed of teel. Alumi ve closure using 1/16 53 pounds. fabricated 3; and EGA material fuel eleme Each elem	inch ply polyeth ge rubb emplies plus pro- osed wi 1-inch of the of the of the S-inch d	wood, cov ylene foam ber and with s. Positive avide acces thun an ove plywood, fr oneycomb overpack is lameter cot ordance with ho, Inc., Dra ach elemen ntains a ma	and with 16-g and with a 0.0 a 0.020-inch closure is provise pack, 73-15/1 aned by stee inpact limiters provided by li- ter pins. The h EG&G Idahe awing No. 445	auge s 20-fac thick c ided 1 angle are fi bur hin packa o, Inc., 722, S	teel. The to ch cadmium admium pla by a continu es x 31-3/4 members a ked to the e ge pins whi ge weight is Drawing Na sheets 1 and	op and bot plate. We ate provide ous hinge, inches x 1 and covere rnds of the ch are ch are ch are ch are ch are	
(b)	Conter (1)	inches, construct are lined with hig spacers covered separation for to and two wire sea The inner contail 3/16 inches, con with 18-gauge st overpack. Positi secured in place approximately 85 Drawings The packaging is Sheets 1, 2, and its Type and form of Unirradiated ATR Aluminum 6061.	ted of 3/4 gh density i d with spon bur fuel ase aled hinge ner is enck structed of teel. Alumi ve closure using 1/16 53 pounds. fabricated 3; and EGA material fuel eleme Each elem o a maximu	inch ply polyeth ge rubb emplies plus pro- osed wi 1-inch inum h of the 0 5-inch d 1 in acco & d in ac	wood, cover viene foam ber and with s. Positive ovide access thin an ove plywood, fr onevcomb overpack is iameter cot ordance with ho, Inc., Dra ach elemen ntains a mai 4 wt% in the	and with 16-g and with a 0.0 a 0.020-inch closure is provise pack, 73-15/1 aned by stee inpact limiters provided by li- ter pins. The h EG&G Idahe awing No. 445	auge s 20-fac thick c ided 1 angle are fi bur hin packa o, Inc., 722, S	teel. The to ch cadmium admium pla by a continu es x 31-3/4 members a ked to the e ge pins whi ge weight is Drawing Na sheets 1 and	op and bot plate. We ate provide ous hinge, inches x 1 and covere rnds of the ch are ch are ch are ch are ch are	ttorr ood

,			CON	DITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISS
	Page 2	2 - Certificate No. 9	099 - Revision N	io. 9 - Docket No.	71-9099
(c)	Tran	sport Index for Cri	ticality Control		
	Minir label	num transport inde	ex to be shown o lity control:	n 4.2	
6.	oom	contents must be r bletely within the re mplish this.	naintained within igion of the cadm	its compartment nium covered space	and the active fuel length must be cers. Wood spacers may be used to
7.	In ad	dition to the require	ements of Subpa	rt G of 10 CFR Pa	art 71:
	(a)	The package mu Operating Proce	ust be prepared f dures in Chapte	or shipment and c 7 of the applicati	operated in accordance with the
	(b)	Each packaging Acceptance Test	nust be accepta is and Maintenar	nce tested and m ice Program in Ch	ainitained in accordance with the lapter 8 of the application.
8.	The provis	ackage authorized	by this certificat	e is hereby approv	ved for use under the general license
9.	Expira	tion date: January	/ 31. 2004.		
ATRI	Fresh Fu	iel Shipping Conta		FERENCES	
		el Shipping Conta dated: February 1	iner Salety Analy 1999 and April FOR E. W Spen	THE U.S. NUCLI	CB
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	NRC FORM 618 (3-96) 10 CFR 71			U.S. NUCLEAR REGULATORY COMMISSION CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIALS PACKAGES						
Ĭ	1. a. CERTIFICATE N	IMBED		b. REVISION		c. PACKAGE IDENTIFICATION NUMBER		e. TOTAL NUMBER PAGES		
		102		0. KE VISION I	8	USA/9102/B()	a. PAGE NUMBER	e. TOTAL NUMBER PAGES		
	<u>.</u>	102					•			
	a. This certifica	<ul> <li>PREAMBLE</li> <li>a. This certificate is issued to certify that the packaging and Code of Federal Regulations, Part 71, "Packaging and Tr</li> </ul>					le safety standards set	forth in Title 10,		
	applicable reg				npliance 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.					
	3. THIS CERTIFICATI a. ISSUED TO (Na			A SAFETY ANA		PORT OF THE PACKAGE DESIGN OR APPLIC E AND IDENTIFICATION OF REPORT OR APP				
	2230	Neutron Products, Inc. 22301 Mt. Ephraim Road Dickerson, MD 20842				Neutron Products, Inc., ap dated August 31, 1977, a	-	ed.		
					- DOC	KET NUMBER 71-9102				
	4. CONDITIONS				e. DOC					
	This certificate is	condition	al upon fulfilling the	requirements	of 10 CFF	t Part 71, as applicable, and the conditions sp	ecified below.			
	5. (a)	Pack	aging					ŝ		
								ļ		
		(1)	Model No.:	NPI-20W	C-6					
		(2)	Description							
		(2)	is 24 inches formed by a shielded cas overpack is inches in he reinforced b lid is accom and held tog gross weigh	in diame n 8-1/4-ii k is acco a 48-inch ight made y 16 stee plished by jether wit	iter wi nch ID mplist diam e of 3/ el tie ro y 3 eq th a 3/	ed cask contained within a within a 3//8-inch thick steel sph by 3/8-inch thick steel tube ned by bolted end covers at a eter, 12 gauge steel body w /4-inch thick plywood sheets ods and 32 lug screws. Posi- ually spaced bracket assemt /8-inch by 4-inch welded ring nds.	nerical shell an . Positive close each end of the ith a wooden s glued togethe itive clsoure o blies with attac	d a cavity sure of the le cavity. The shell 38-1/4 er and f the overpack ched chains um packge		
		(3)	Drawings							
			Products, In	c. Drawir with Neu	ng No. Itron P	packaging is constructed in 240010, Rev. C. The over roducts Inc. Drawing Nos. 2 . A.	pack is constru	ucted in		
	(b)	Cont	tents							
		(1)	Type and fo	rm of ma	terial					
			Cobalt 60, a radioactive i		source	es which meet the requireme	ents of special	form		
		(2)	Maximum q	uantity of	f mate	rial per package				
					•	t not exceed 9,500 curies. thermal watts.	The maximum	internal decay		
L						204				

NRC FORM 618A

**CONDITIONS** (continued)

LULALLALALALALALALALALALALALALALALAL

Page 2 - Certificate No. 9102 - Revision No. 8 - Docket No. 71-9102

- 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.
- 7. 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 G of 10 CFR Part 71:
  - (a) The package must 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 Test and Maintenance program in the supplement dated September 21, 1993.
- 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, 2003.

#### REFERENCES

Neutron Products, Inc., application dated August 31, 1977.

Supplements dated: February 6, 1978; July 31, 1985; August 2 and September 7, 1988; September 21, 1993; and September 23, 1998.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cass R. Choppell

Cass R. Chappell, Chief Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: <u>October 16, 1998</u>

		DRM 618		<u>)77)77)77)77</u> 77077				
	(3-96) 10 CFR 71			CERTIFICA FOR RADIOACT		MPLIANCE		
	1. a. CER	TIFICATE !	NUMBER	b. REVISION NUMBER	c. PACKAGE IDE	NTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAGES
		9107		6	USA/S	9107/B(U)	1	2
		his certific	ate is issued to certify that the pa eral Regulations, Part 71, "Pack				safety standards set f	orth in Title 10,
			ate does not relieve the consigno gulatory agencies, including the					portation or other
			TE IS ISSUED ON THE BASIS OF a ame and Address)			KAGE DESIGN OR APPLICAT ATION OF REPORT OR APPL		
	40 1	North A	Corporation Avenue MA 01803			Operations, Inc. a ember 30, 1982,		nted.
				c. DOC	KET NUMBER	71-9107		
	4. CONDI This c		s conditional upon fulfilling the	requirements of 10 CFJ	R Part 71, as appli	cable, and the conditions spe	cified below.	
- 	5.							
Į	(a)	Pack	aging					
		(1)	Model No.: 771					
		(2)	Description	法 "年"的。 "我没要"表示				
			The Model No. 77 container and Type container is 110 cu mounted radiograp special form. The wide and 20 inches Titanium "S" tube. material. The depl space between the rigid polyurethane	B Shipping Co uries of cobalt ( hic sources wh Model No. 771 s high. The rac The "S" tube eted uranium s depleted urani	ontainer for 60. The con ich have be Source Cha dioactive so is surround hield assem ium shield a	radiographic source ntainer will accept en deemed to mee anger measures 23 urce assembly is h ed by depleted ura bly is encased in a ssembly and the in	es. The cap certain Tech at the required inches long, noused in a Zi anium metal a steel housin nner containe	acity of the /Ops wire ments of 24 inches rcalloy or s shielding g. The void
	5.	(3)	Drawings					
			The packaging is c No. 77190, Sheets	onstructed in a 3 1 through 6, 1	ccordance v Rev. O.	with the Technical	Operations,	nc. Drawing
	(b)	Cont	tents					
		(I)	Type and form of I					
			Cobalt 60 as seale material.	d sources that	meet the re	quirements of spe	cial form radi	oactive
		(2)	Maximum quantity	of material per	r package			
			110 curies					
					206			

# NRC FORM 618A **CONDITIONS** (continued) **U.S. NUCLEAR REGULATORY COMMISSION** ARACTER E CORRECTED A CORRECTE (3-96) Page 2 - Certificate No. 9107 - Revision No. 6 - Docket No. 71-9107 ·6. Source assemblies for use in this packaging are limited to those assemblies as identified in Section 1-3 of Technical Operations, Inc. application dated December 30, 1982. 7. Nameplates shall be fabricated of materials capable of resisting the fire test of 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 supplement dated April 29, 1998; and, (2)Each package must be maintained and acceptance tested in accordance with the Acceptance Tests and Maintenance Program in the supplement dated April 29, 1998. The packaging authorized by this certificate is hereby approved for use under the general license 9. provisions of 10 CFR §71.12. 10. Expiration date: June 30, 2003. **REFERENCES** Technical Operations, Inc., application dated December 30, 1982. Supplements dated February 16, April 13, and April 28, 1993; and April 29, 1998. FOR THE U.S. NUCLEAR REGULATORY COMMISSION lous K nell_ Cass R. Chappell, Chief **Package Certification Section** Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: June 18, 1998

3737

IRC FORM 618		CERT	FICATE OF	COMPLIANCE	U.S. N	IUCLEAR REGUL	ATORY COMMISSION
) CFR 71				FERIALS PACKAGES	5		
. a. CERTIFICATE NU	MBER	b. REVISION N	UMBER c. PACKAC	E IDENTIFICATION NUMB	ER	d. PAGE NUMBER	e. TOTAL NUMBER PAG
	9132	13		USA/9132/B(M)	F	1	5
PREAMBLE		······					I
a. This certificate	is issued to certify that th	he packaging and co	ntents described in	item 5 below, meets the app	licable s	safety standards set f	orth in Title 10,
	l Regulations, Part 71, "H						
applicable regu	latory agencies, including	g the government of	any country through	ment of the regulations of t or into which the package	will be	transported.	portation or other
. THIS CERTIFICATE a. ISSUED TO (Nam		OF A SAFETY ANAL		IE PACKAGE DESIGN OR A NTIFICATION OF REPORT C			
U.S. Department of Energy Washington, DC 20585			Nuclear Packaging, Inc. application dated April 22, 1985, as supplemented				
			c. DOCKET NUMB	71-9132 _{ER}			
CONDITIONS This certificate is c	onditional upon fulfilling	g the requirements of	f 10 CFR Part 71, a	applicable, and the condit	ions spec	cified below.	
			· · · · · · · · · · · · · · · · · · ·				
(a) Pack	aging				8.a. 1. Ku		
(1)	Model No.:	T-3					
(2)	Description					te tud og	
inch meas	es in length sures 177.2 in	and 2 inche ches in len	gth and 26	imiters. The o ter. The cask .44 inches in d	iame	ter.	act Hanters
over a O.	laved with a	10 gauge st	ainless st	1-inch thick s eel cover. Bet ing an air gap	ween	these two	materials is
Sche thio	dule 40 pipe kness of 0.32	having an c 2 inch. Th	utside dia Ne annular	s a standard se meter of 8.625 space between t of approximate	inch he i	es with a n nner and ou	ominal wall
nlat	es with conic	al surfaces	s to assist	lded at each er in positioning in length by 7	l and	sealing. T	he
sta ves: 0-r 1/2 plu	inless steel p sel is sealed ing seals. Th '-13UNC x 2-1/	olug with tw with a 11.6 he bottom pl '4-inch ASTM n place ut	vo Viton O- 525-inch th lug is reta 1 A320. Gra	e bottom end wi ring seals. The ick stainless s ined by a closu de L7 socket he 1/2"-13UNC x 1	e top steel ire p ead c	end of the plug with late secure ap screws.	containment two Viton d by eight, The top

**.** .

NRC FORM 618A

**CONDITIONS** (continued)

Page 2 - Certificate No. 9132 - Revision No. 13 - Docket No. 71-9132

## 5.(a)(2)(continued)

No drain or vents penetrate directly into the containment vessel. A drain/vent line opens directly into the area between the two 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 six trunions, four 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.

#### (3) Drawings

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. O, 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. O, and H-4-66535, Revision No. O, and Los Alamos Drawing No. 54Y-110854, Sheets 1 and 2, Revision No. B.

## 5.(b) Contents

Type, form, and maximum quantity of material per package

Irradiated, (a) mixed oxide (MOX) fuel pins and assemblies; (b) reactor fuel comprised of U-235 and/or Pu-239 oxides, carbides, nitrides, or metallic alloys; and (c) structural components. The minimum cooling time of each assembly and rod must be 90 days, and the cask may contain 1,400 thermal watts. Prior to irradiation, the fuel and structural components must have the following specifications:

			Maximum Fissile	
Туре	Fuel <u>Description*</u>	Array Description	Package Loading	Pin <u>Dimensions</u>
217-Pin DFA assembly	31% PuO ₂ - 69% UO 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 ₆ + 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. 36" active fuel length

CFORM 618A ⁶⁶⁾ Page 3 - Certific	condit ate No. 9132 - Revision			REGULATORY COMMISSI
raye 5 - certific	ate No. 3152 - Nevision	NO. 15 DUCKEU NO.	,1 ,192	
Туре	Fuel Description*	Array	Maximum Fissile Package <u>Loading</u>	Pin <u>Dimensions</u>
109-Pin MOX fuel pins	35% PuO ₂ -65% UO 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
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
37-Pin MOX fuel pins	35% PuO ₂ -65% UO ₂ (86% U-235)	Circular array individual pins contained in 0.75" dia. tubes	8.9 kg	0.23"-0.29" dia. 36" active fuel length
42-Pin MOX	35% PuO ₂ -65% UO ₂ (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
40-Pin MOX fuel pins	35% PuO ₂ -65% VO ₂ (86% V-235)	Circular array individual pins contained in 0.625 dia. tubes	9.6 <b>k</b> g	0.23"-0.29" dia. 36" active fuel length
19-Pin MOX fuel pins	35% PuO ₂ -65% UO ₂ (86% U-235)	Circular array individual pins contained in 0.88" dia. tubes	4.6 kg	0.23"-0.29" dia. 36" active fuel length
PU compound fuel pins (spent fuel containers)	X=C,N, or 0 (94% U-235)	Unrestricted array individual pins contained in SS 5-inch Schedule 40 pipe	[,] 8.0 kg	Container cavity 5.047" dia. by 38.9" length
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 kg ;"	0.425" dia. 38" active fuel length
	<u>. 285, 285, 285, 285, 285, 285, 285, 285,</u>	210		

NRC FORM 61			ORCORCORCORCORCORCORCORCORCORCORCORCORCO		GULATORY COMMISSION
(3-96) Page 4	- Certificate No	. 9132 - Revision	No. 13 – Docket No	. 71-9132	
Ī	ype	Fuel Description*	Array Description	Maximum Fissile Package Loading	Pin <u>Dimensions</u>
С (	tructural omponents incl. control ssemblies)	Dosimetry foils		1.0 kg	
P C	<b>4</b> max. ins. U-Pu arbide fuel ins	85-94%(Pu-U)C -6 to 15% (Pu-U ₂ )C ₃ . Max 23% Pu, uranium is not enriched	Circular array; individual pins contained in 0.625-in. dia. tubes within 5-in. Schedule 40 pipe	3.0 kg	Pin Dimensions  0.37" outer dia. 36" active fuel length 0.30" outer dia. 36" active fuel length 0.30" outer dia. 36" active fuel length
P be	8 max. ins. Sodium onded (fuel- o-clad)	10% Zr-20% Pu max. Remainder U (U enriched to 40% max. (U-235)	Circular array; individual pins contained in 0.625 in. diam. tubes within 5-in. Schedule 40 pipe	1.9 kg 5-	0.30" outer dia. 36" active fuel length
*/ ty	All plutonium in ype (9) has no li	the fuel types (1) mit for PU-240; ty	thru (8) contains pe (10) contains a	at least 10 It least 6% F	0% Pu-240; fuel 20-240.
5.(c) Tr	ransport Index fo	or Criticality Cont	rol		
		index to be shown criticality contro			

6. Content 5.(b)(1) shown in AEC Drawing No. H-4-21500, Rev. 9, and ERDA Drawing No. H-4-66230, Sheet 5, Rev. 0.

Contents 5.(b)(2), (3), (4), and (5) must be contained within inner container Ident 69 described by ERDA Drawing Nos. H-4-66160, Sheet 1, Rev. 0, and H-4-66230, Sheets 5 and 6, Rev. 0.

Contents 5.(b)(6), (7), (8), (12) and (13) must be contained within inner container Ident 1578 described by ERDA Drawing Nos. H-4-66160, Sheet 2, Rev. 0, and H-4-66230, Sheets 5 and 6, Rev. 0.

Contents 5.(b)(9) and (10) shown in DOE Drawing No. H-3-47474, Sheets 1 and 2, Revision No. O, and Los Alamos Drawing No. 54Y-110854, Sheets 1 and 2, Revision No. B must be contained within the Ident 69 Liner shown in ERDA Drawing No. H-4-66230, Sheets 5 and 6, Revision No. O, and DOE Drawing No. H-4-66535, Revision No. O.

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NRC FORM 3-96)	1 618A	<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISSION
	5 - Certificate No.	9132 – Revision No. 13 – Docke	t No. 71-9132
7.	sodium wetted fuel	ipped dry (no water coolant in rods (external) is authorized onal requirements of Section 7	for up to 200 g of sodium
8.	In addition to the	requirements of Subpart G of 1	0 CFR Part 71:
	Chapter 8 of ANSI N 14.5 a must be a tes standard temp	erature and pressure leaking t	ed. The leak test to satisfy
		shall be operated and prepared ating Procedures of Chapter 7 (	
9.	Any repair to the t be authorized by NR	runnions because of out-of-rou C prior to returning the packa	ndness or weld failure must ge to service.
10.	The containment clo Sheet 1, Revision N	sure bolts (as specified by No o. 0) must be torqued to 70 $\pm$	te 9, Drawing No. H-4-66230, 10 ft-1b.
11.		by this certificate is hereby visions of 10 CFR §71.12.	approved for use under the
12.	Effective Date: Ap	ril 1, 1996. Expiration Date:	April 1, 2001.
		<u>REFERENCES</u>	
Nucle	ear Packaging, Inc.,	application dated April 22, 19	85.
Supp1 May 2	ements dated: Octob 24, 1988; September 1	er 8 and 31, 1985; February 4, 1, 1990; March 22, 1991; and F	1986; March 21, 1986; ebruary 21, 1996.
			D DECULATORY COMMISSION
		FOR THE U.S. NUCLEA	R REGULATORY COMMISSION
		William D. Travers, Spent Fuel Project Office of Nuclear M and Safeguards	Office
Date:	324/92		
		212	

3-96) 0 CFR 71	)RM 618	1	CERTIFI FOR RADIO	CATE OF CO	MPLIANCE	. NUCLEAR REGUL	ATORY COMMISS
l.a.CER	TIFICATE	NUMBER	b. REVISION NUME	BER c. PACKAGE IDE	NTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER
	9148 5			USA/	′9148/B(U)	1	2
b. Th	his certific ode of Fe	cate is issued to certify that th deral Regulations, Part 71, "P cate does not relieve the consi	ackaging and Transport gnor from compliance v	ation of Radioactive N with any requirement o	laterial." f the regulations of the U.S	S. Department of Trans	
THIS C	ERTIFICA	egulatory agencies, including	OF A SAFETY ANALYSIS	REPORT OF THE PAC	KAGE DESIGN OR APPLIC	ATION	
Amer 40 N	rsham lorth	Name and Address) Corporation Avenue on, MA 01803	b.7	Technica]	ATION OF REPORT OR APP Operations, I 1981, as supp	nc. applicat	ion dated
			c. I	OCKET NUMBER	71-9148		
CONDI This c		is conditional upon fulfilling	the requirements of 10	CFR Part 71, as applic	able, and the conditions sp	ecified below.	
(a)	Pack	aging					·
	(1)	Model No.: 77	<b>)</b>				
	(2)	Description			an di Antonio di Antonio di A		
		inches wide, an Zircalloy or t uranium metal s steel containen and the inner of weight of the o	itanium "S" t shield. The rs. The void container is	ube. The "S depleted ura space betwe filled with	" tube is surr nium shield as en the deplete	ounded by dep sembly is end d uranium sh	pleted cased in tw ield assemb
	(3)	Drawing The packaging i Drawing No. 770	s constructe	d in accorda 1 through 6	nce with Techn Rev 3	ical Operatio	ons, Inc.
(b)	Cont	-					
	(1)	Type and form o	of material				
		Cobalt 60 as se radioactive mat	aled sources erial.	that meet r	equirements of	special form	n
	(2)	Maximum quantit	y of materia	i per packag	9		
		550 curies					
				213			

NRC FOI	RM 618A	<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISSION
Page	2 - Certificate No. 9148	- Revision No. 5 - Docket No.	. 71-9148
	shipping plug, source ass assembly used must be fab environment for one-half ball stop of the source a cable of the source assem	d in the shielded position of embly, and locking device. ricated of materials capable hour and maintaining their po ssembly must engage the lock bly and shipping plug must be ive positioning of the source	The shipping plug, source of resisting a 1475'F fire ositioning function. The ing device. The flexible e of sufficient length and
7.	Name plates must be fabri 10 CFR Part 71 and mainta	cated of materials capable o ining their legibility.	f resisting the fire test of
8.	The lifting eye bolts (2) to prevent their use as a	must be removed prior to sh tie-down device during tran	ipment and the holes covered sport.
9.	In addition to the requir	ements of Subpart G of 10 CFI	5
	(a) The package shall be operating procedures	prepared for shipment and op in the application; and	perated in accordance with the
10. 11. Tech Supp Sept	(b) The package shall be in the application.	maintained in accordance wi	th the maintenance program in
10.	The packaging authorized general license provision	by this certificate is hereb of 10 CFR §71.12.	perated in accordance with the th the maintenance program in y approved for use under the 1. 25, and April 16, 1992;
11.	Expiration date: March 3	1, 2002.	
		-REFERENCES	
Tech	nical Operations, Inc. app	lication dated March 24, 198	1
	lements dated: January 18 ember 20, 1996.	3, and May 10, 1982; February	
		FOR THE U.S. NU	CLEAR REGULATORY COMMISSION
		Cass R. Chappel Cass R. Chappel Package Certifi Spent Fuel Proj Office of Nucle and Safeguard	cation Section lect Office ear Material Safety
	e: <u>March 19, 199</u> 7		
	<u>1, 784, 284, 284, 284, 284, 284, 284, 284, 2</u>	214	E E 254, 255, 255, 255, 255, 255, 256, 257, 257, 255, 255, 255, 255, 255, 257, 257

NRC FORM 618 (3-96) 10 CFR 71		<b>FIFICATE OF CO</b> <b>DIOACTIVE MATERI</b>	MPLIANCE	NUCLEAR REGUL	ATORY COMMISS
1. a. CERTIFICATE NUMBER 9150	b. REVISION	NUMBER C. PACKAGE IDE	NTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER
Code of Federal Regub. This certificate does n	ned to certify that the packaging and alations, Part 71, "Packaging and Tra not relieve the consignor from compli- agencies, including the government of	nsportation of Radioactive N iance with any requirement of	faterial." of the regulations of the U.S.	. Department of Trans	
3. THIS CERTIFICATE IS ISSL a. ISSUED TO (Name and A	JED ON THE BASIS OF A SAFETY AN.	ALYSIS REPORT OF THE PAC	KAGE DESIGN OR APPLICA ATION OF REPORT OR APPL	TION	· ·
	ent of Energy	PAT-2 (P1 Safety An	utonium Air-Tra alysis Report, , as supplement	ansportable   SAND81-0001	
		c. DOCKET NUMBER	71 0150		
CONDITIONS	anal upon fulfilling the maximum	of 10 CEP P== 71 "	71_9150		
This certificate is conditio	onal upon fulfilling the requirements	OF IU CFR Part 71, as applic	able, and the conditions spe	cified below.	
(a) Pack	aging				
(1)	Model No.: PAT-2				
(2)	Description				
	A superalloy primar overpack (AQ-2). 1 within a capsule (C	he contents whi	ch may be in ca	irrounded by inisters are	a protectiv contained
	The AQ-2 overpack in inches) high and 38 attached to the cyl walled stainless st bottom and bolted a protective case how spreader which is f protective case.	Il mm (15 inches inder outer wal eel structure w it the top. An uses the TB-2; i	) in diameter w ls. The outer ith rounded end inner grain ori t is surrounded	vith protrudi shell is a c l caps, rivel ented maple l by a titani	ing handles louble ced on the wood ium load
	The TB-2 containmen sections, bolted to diameter sphere. A on the matting hemi	gether with (20 copper gasket	) bolts, formin held between kn	g an 88 mm ( ife-edge sea	(3.46 inch) ling beads
	The C-1 capsule is inch) diameter and lid which is sealed	a nominal 70 mm	(2.76 inch) le	h a nominal ngth; it has	44 mm (1.80 a screw to
	Brass or aluminum c various radioactive liners.				
	The package gross w	eight is approx	imately 73 poun	ds (33 kg).	

NRC FORM 61 3-96)	8 <b>A</b>		<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISSION		
	Page 2	- Certificate No	o. 9150 - Revision No. 5	- Docket No. 71-9150		
	(3)	Drawing and Spec	cifications			
		drawings, as lis Data LD-T67000-0	sted by document number,	ice with specifications and issue, and title in the List of page 2, issue D (Chapter 9 of nted July 1981).		
(1	) Cont	ents				
	(1)	Type and form of	f material			
		Plutonium, urani compositions in	ium, or mixtures of pluto solid form as:	onium-uranium in various isotopic		
		(i) oxide powde	er, sintered oxide pellet	s, and metal;		
		(ii) plutonium s dihydrate,	sulfate tetrahydrate, Pu( Pu(NO ₃ ) ₄ 2H ₂ 0.	(SO ₄ ) ₂ 4H ₂ O and plutonium nitrate		
	(2)	Maximum quantity	y of material per package			
		(i) For the con	ntents described in 5(b)	(1)(i):		
		Not to exce decay heat	eed 15 grams fissile mate , or 0.5 gram water.	erial, 120 grams mass, 2 watts		
		(ii) For the co	ntents described in 5(b)	(1)(ii):		
		Not to exc of hydratio		water in addition to the water		
gr pa	ams of ckaging	brace and 16 ar	ams of aluminum may be us p to 0.3 gram of polytet	s of quartz (SiO ₂ ) or glass, 50 sed within the C-1 capsule for ra-fluoroethylene (PTFE) tape may		
7. Th do	e C-1 ( es not	capsule need not exceed 20 ci per	be leak tested when the a package.	activity of plutonium contents		
8. A TB	maximu -2 to :	n of 2.0 grams of avoid relative mo	aluminum foil may be use vement between the two.	ed to shim the C-1 within the		
sp	Up to 9 grams of polyvinylchloride (PVC), 18 grams of quartz (SiO ₂ ) or glass, 50 grams of brass, and 16 grams of aluminum may be used within the C-1 capsule for packaging of contents. Up to 0.3 gram of polytetra-fluoroethylene (PTFE) tape may be used to seal the C-1 capsule. The C-1 capsule need not be leak tested when the activity of plutonium contents does not exceed 20 ci per package. A maximum of 2.0 grams of aluminum foil may be used to shim the C-1 within the TB-2 to avoid relative movement between the two. Prior to first use, each package must meet the criteria for the acceptance tests specified in section 8.1 of Chapter 8 of the Safety Analysis Report (SAND81-0001, printed July 1981). Prior to each shipment, the package must meet the criteria for inspections and tests specified in section 8.2 of Chapter 8 of the Safety Analysis Report (SAND81-0001, printed July 1981).					
te	sts sp	each shipment, t ecified in sectio 0001, printed Jul	n 8.2 of Chapter 8 of th	criteria for inspections and e Safety Analysis Report		
			216			

NRC FC (3-96)	ORM 618A         CONDITIONS (continued)         U.S. NUCLEAR REGULATORY COMMISSION
	Page 3 - Certificate No. 9150 - Revision No. 5 - 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 PAT-2 package(s).
14.	The package authorized for use by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.
15.	The package authorized by this certificate is hereby approved for transportation or plutonium by air.
16.	Expiration date: July 31, 2001.
	REFERENCES
	2 (Plutonium Air-Transportable Model 2) Safety Analysis Report, SANDIA Report No. 81-0001, July 1981.
	application dated April 19, 1983. Supplements dated August 3, 1983, July 15, 1986, 16, 1991 and May 29, 1996.
	FOR THE U.S. NUCLEAR REGULATORY COMMISSION
	Welliam Trans
	William D. Travers, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards
Date	= -7/19/96
	217

3-96) 0 CFR 71			FICATE OF CON DACTIVE MATERL	MPLIANCE	NUCLEAR REGUL	ATORY COMMISSIO
I. a. CERTIFICATE !	NUMBER	b. REVISION NU	MBER c. PACKAGE IDE	NTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PA
9152		1:	3 US/	A/9152/B( )F	1	4
Code of Fed b. This certifica	leral Regulations, Part 7 ate does not relieve the	<ol> <li>"Packaging and Transp consignor from complianc</li> </ol>	ortation of Radioactive M with any requirement o	below, meets the applicable faterial." f the regulations of the U.S. o which the package will be	Department of Trans	
THIS CERTIFICAT a. ISSUED TO (N	TE IS ISSUED ON THE B lame and Address)	ASIS OF A SAFETY ANALY	SIS REPORT OF THE PAC b. TITLE AND IDENTIFIC.	KAGE DESIGN OR APPLICA ATION OF REPORT OR APPL	TION ICATION:	
.S. Departm /ashington, l	ent of Energy DC 20585		-	tment of Energy a uary 26, 1988, as	• •	<b>i</b> .
			c. DOCKET NUMBER	71-9152		
CONDITIONS This certificate i	is conditional upon fulfi	lling the requirements of 1	10 CFR Part 71, as applic	able, and the conditions spe	cified below.	
,						
(a)	Packaging					
(a)	rackaging					
	(1) Model	No.: CNS 1-13C	11			
	:					
	(2) Descri					
	A ship steel c	oing cask for r <b>adi</b> ircular cylind <b>er s</b> e	parated by 16-ga	he packaging cons auge wires, 39-1/8 /2* in diameter and	" in diameter a	and 68-1/2"
	A ship steel c high w approx steel, p provide 3/8" te cover. gasket 16.5 lb the cas	ping cask for radii ircular cylinder se ith a central steel timately 5" of lead olug type, lead fille ed by a flat silicon st port between th The cask is equi , a steel lifting how /ft ³ rigid polyureth sk by six (6), 1" ra	parated by 16-ga lined cavity 26-1 I surrounds the c ed cover secured in gaskets. App pped with a cavit ok for the cover, nane foam clad ir atchet binders. T	auge wires, 39-1/8	" in diameter a d 45-1/6" high sure is accomp 1/4" bolts and ber O-ring with ad are in the b l with a 3/8" ca m impact limite t limiters are a ions with impa	and 68-1/2" , blished by a l seal n a sealed base and ap screw and ers filled with attached to act limiters is
	A ship steel c high w approx steel, p provide 3/8" te cover. gasket 16.5 lb the cas 60" in c	ping cask for radii ircular cylinder se ith a central steel timately 5" of lead olug type, lead fille ed by a flat silicon st port between th The cask is equi , a steel lifting ho /ft ³ rigid polyureth sk by six (6), 1" ra diameter and 99-	parated by 16-ga lined cavity 26-1 I surrounds the c ed cover secured in gaskets. App pped with a cavit ok for the cover, nane foam clad ir atchet binders. T	auge wires, 39-1/8 /2" in diameter and entral cavity. Close I by twelve (12), 1- and a silicone rub roximately 6" of lea ty drain line sealed and top and bottom of steel. The impact the overall dimension	" in diameter a d 45-1/6" high sure is accomp 1/4" bolts and ber O-ring with ad are in the b l with a 3/8" ca m impact limite t limiters are a ions with impa	and 68-1/2" , blished by a l seal n a sealed base and ap screw and ers filled with attached to act limiters is
	A ship steel c high wi approx steel, p provide 3/8" te cover. gasket 16.5 lb the cas 60" in o lbs. (3) Drawin The pa	ping cask for radii ircular cylinder se ith a central steel timately 5" of lead olug type, lead fille ed by a flat silicon st port between th The cask is equi , a steel lifting how /ft ³ rigid polyureth sk by six (6), 1" ra diameter and 99-	parated by 16-ga lined cavity 26-1 I surrounds the c ed cover secured he gaskets. App pped with a cavit ok for the cover, hane foam clad ir atchet binders. T 5/8" high. The paratecer succed in accorda	auge wires, 39-1/8 /2" in diameter and entral cavity. Close I by twelve (12), 1- and a silicone rubl roximately 6" of lea by drain line sealed and top and bottom is steel. The impact the overall dimension ackage gross weig	" in diameter a d 45-1/6" high sure is accomp 1/4" bolts and ber O-ring with ad are in the b l with a 3/8" ca m impact limiters t limiters are a ions with impa th is approxim	and 68-1/2" , olished by a l seal n a sealed pase and ap screw and ers filled with attached to act limiters is nately 27,000
	A ship steel c high wi approx steel, p provide 3/8" te cover. gasket 16.5 lb the cas 60" in o lbs. (3) Drawin The pa	ping cask for radii ircular cylinder se ith a central steel imately 5" of lead olug type, lead fille ed by a flat silicon st port between th The cask is equi , a steel lifting hou /ft ³ rigid polyureth sk by six (6), 1" ra diameter and 99-5	parated by 16-ga lined cavity 26-1 I surrounds the c ed cover secured he gaskets. App pped with a cavit ok for the cover, hane foam clad ir atchet binders. T 5/8" high. The paratecer succed in accorda	auge wires, 39-1/8 /2" in diameter and entral cavity. Close I by twelve (12), 1- and a silicone rubl roximately 6" of lea by drain line sealed and top and bottom is steel. The impact the overall dimension ackage gross weig	" in diameter a d 45-1/6" high sure is accomp 1/4" bolts and ber O-ring with ad are in the b l with a 3/8" ca m impact limiters t limiters are a ions with impa th is approxim	and 68-1/2" , olished by a l seal n a sealed pase and ap screw and ers filled with attached to act limiters is nately 27,000

NRC (3-96)	FORM 618	BA			<b>CONDITIONS</b> (continued)		U.S. NUCLEAR REG	ULATORY COMMISSI
2200	2 - 6	rtificate	No. 91	52 - Revision No. 13	Dockot No. 71 9	150		
aye	- 2 - 06	lincale	110. 91	52 - Revision 140, 15	- DOCKEL NO. 71-9	JJZ		
5.	(b)	Cont	ents					
		(1)	Tune	and form of motoria				
		(1)	rype	e and form of materia	1			
			(i)		e A quantity of nonfi s solids (resins) wit			
			(ii)	Greater than Type sealed secondary	A quantity of irrad container.	iated solid	l reactor compon	ents within a
			(iii)		A quantity of irrad			
		(2)	Maxi	mum quantity of mat	erial per package			
			For t	he contents describe	d in 5(b)(1)(i), (ii), a	and (iii):		
•				o exceed a decay he nt of the contents an			nd 3,000 pounds	including
			For t	ne contents describe	d in 5(b)(1)(i):			
				lual water in the sec -1 of the <b>app</b> lication.		ot to excee	ed the activity sta	ated in Table
			For ti	ne contents describe	d in 5(b)(1)( <del>ii</del> i):			
			3 w/o and r	naximum U-235 enri The average burn nust be cooled for at 5 prior to irradiation.	up of the fuel mater	ial must n	ot exceed 3,165	MWD/MTU
	(c)	Trans	port Ind	dex for Criticality Cor	itrol			
				nsport index to be sh ear criticality control:				
		For co	ontents	described in 5(b)(1)	(iii):	100	ט	
	As neo	eded, a secono	ppropri lary coi	ate shoring must be ntainer during accide	used in the cask can nt condition of trans	avity to lim sport.	it movement	
	The ca to 270	ask cov ft-lbs ±	er mus ⊧ 10% (	t be secured by 12, s lubricated) or 360 ft-	SA-354, Type BD, 1 bs ± 10% (dry).	-1/4"-7UN	NC x 2-1/4" long	bolts torqued
					219			

NRC F( (3-96) Page 3 8.	ORM 618/	4	<u>( )\$( )\$( )\$( )\$( )\$( )\$( )\$( )\$( )\$( )\$</u>	DITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
Page 3	3 - Certi	ficate No. 9152	- Revision No. 13 - Do	cket No. 71-9152	
8.	perform	ned. No packag	, the leak test describe le is to be delivered to l the method of Appen	a carrier for trans	of the application must be port with
9.	(a)	generate comb analysis of a re	ustible gases, determi	nation must be ma such that the follo	ances which could radiolytically ade by tests and measurements or by wing criteria are met over a period of
		than 5% seconda	by volume (or equiva	lent limits for othe	molar quantity that would be no more r inflammable gases) of the (i.e., no more than 0.063 g-moles/ft ³
		that oxy		5% by volume in	be inerted with a diluent to assure those portions of the package which
		prepared for sh made. Shipme	ipment in the same ma	anner in which de the package is pi	e secondary container must be termination for gas generation is repared (sealed) and must be
	(b)	low specific act days after vent	ivity material, and ship	ped within 10 econdary contain	concentration not exceeding that for ers, the determination in (a) above does not apply.
10.	In addi	tion to the requi	rements of Subpart G	of 10 CFR Part 7	r and the second
	(i)	• •	must meet the accepta rogram of Section 8 of		maintained in accordance with the
		accordance wit with the Depart	h EG&G Idaho, Inc. le	Iter dated Deceml	the application may be performed in per 20, 1982 which was submitted a dated February 26, 1988. he packaging owner.
10.	(ii)				The flat lid gasket must be replaced blaced before each loaded shipment.
				220	

NRC FORM 618A (3-96)

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**CONDITIONS** (continued)

**U.S. NUCLEAR REGULATORY COMMISSION** 

Page 4 - Certificate No. 9152 - Revision No. 13 - Docket No. 71-9152

11. 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, 2004.

## **REFERENCES**

Department of Energy consolidated application dated: February 26, 1988.

Department of Energy supplements dated: May 12, 1989; April 11, 1994 and March 24, 1999.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Low R. Chopper

Cass R. Chappell, Chief Licensing Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Jate: May 21, 1999

NRC FORM 6 ⁻ 3-96) 0 CFR 71	18			IFICATE OF COM	PLIANCE	NUCLEAR REGUL	ATORY COMMISSIC
. a. CERTIFICAT	TE NUMBI	 ER	b. REVISION N			d. PAGE NUMBER	e. TOTAL NUMBER PA
9157			8		57/B(U)-85	1	2
PREAMBLE				I			L
				ontents described in Item 5 be sportation of Radioactive Mat		e safety standards set f	orth in Title 10,
applicable	e regulato	y agencies, including	the government of	nce with any requirement of t f any country through or into v	which the package will b	e transported.	portation or other
a. ISSUED TO			JF A SAFET I ANA	LYSIS REPORT OF THE PACKA b. TITLE AND IDENTIFICAT			
		luclear Compa	ny		lear Company A		
• • • • •		ks Blvd. ro, CA 94577		dated June 8,	1999, as supple	emented.	
Can	Leand			c. DOCKET NUMBER	71-91	157	
CONDITIONS		·····	<u>_</u>				
This certifica	te is cond	itional upon fulfilling	he requirements of	of 10 CFR Part 71, as applicab	le, and the conditions sp	ecified below.	
							· · · · · · · · · · · · · · · · · · ·
(a)	Pack	aging					
	(1)	Model No.: 1	R-100				
	• •						
	(2)	Description					
		The space be filled with a ri	etween the ugid polyuret	hield assembly is er uranium shield asse hane foam. The ma the maximum shield	mbly <b>and the sta</b> iximum weight o	ainless steel ca of the IR-100 ex	sing is
	(3)	Drawings	an The The states of				
		The packagir Drawing Nos	ng is constru .: IR 100-1A	icted in accordance , Rev. 3 and IR 100	with Industrial N -1B, Rev.2.	luclear Compa	ny
	(b)	Contents					
		• •	e and form o				
				ealed sources that r	neet the require	ments of speci	al farma
		Taan	pactive mate				aironn
			pactive mate				arionn
			pactive mate				arionn
			pactive mate				ariorm
			pactive mate				ariorm
			pactive mate				ariorm

NRC FORM 61 (3-96)	On O
Pag	e 2 - Certificate No. 9157 - Revision No. 8 - Docket No. 71-9157
	(2) Maximum quantity of material per package
	120 (output) curies
	Output curies are determined in accordance with American National Standard N432-1980, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography."
6.	The source must be secured in the shielded position of the packaging by the shipping plug, source assembly lock, and lock cap. The shipping plug, source assembly lock, and lock cap 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 lock 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 the exposure device must 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 must meet the Acceptance Tests and Maintenance Program of Section 8 of the application; and
	(b), Each package shall be operated and prepared for shipment in accordance with the operating procedures in accordance with Section 7 of the application.
<b>9</b> .	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, 2004.
	REFERENCES
Indu	strial Nuclear Company application dated June 8, 1999.
Supp	plements dated: June 9, August 6 and September 9, 1999.
	FOR THE U.S. NUCLEAR REGULATORY COMMISSION
	Ger Mean frach
	E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards
Date	<u>9/16/99</u>
	223

	AS 76576	T TAT TAT TAT TAT TAT TAT TAT TAT				STATTATATAT	
NRC FOF (3-96) 10 CFR 71	RM 618		CERTIFICA FOR RADIOACT	ATE OF COM	PLIANCE	JCLEAR REGUL	ATORY COMMISSION
I. a. CERT	IFICATE	NUMBER	b. REVISION NUMBER	c. PACKAGE IDENT			e. TOTAL NUMBER PAGE
	916	5	4		USA/9165/B(U)	1	2
Coo b. This	is certific de of Fed s certifica	ate is issued to certify that the p eral Regulations, Part 71, "Pacl ate does not relieve the consign gulatory agencies, including the	caging and Transportation or from compliance with	n of Radioactive Mat any requirement of t	erial." he regulations of the U.S. D	epartment of Trans	
		TE IS ISSUED ON THE BASIS OF Jame and Address)			GE DESIGN OR APPLICATION OF REPORT OR APPLIC		
AEA 40 N	Tech Iorth /	nology/QSA Inc. Avenue , MA 01803		Amersham ( August 4, 1	Corporation applic 995, as suppleme	ation dated	
			c. DOC	KET NUMBER 71	9165		
4. CONDIT This ce		s conditional upon fulfilling the	e requirements of 10 CFI	R Part 71, as applicab	le, and the conditions speci	fied below.	
5.			a a a a a a a a a a a a a a a a a a a				
(a)	Dack	aging			land a start 2015 - Alina 1015 - Alina Start		
(a)	Fack	ayiny sa ata			i, sta		
	(1)	Model No.: 855	and a second		مرین المنظمی المحالی المحالی		
	(2)	Description				01	
		A steel encased, u outer carbon steel "J" tubes, source with eight, 3/8"-1	shell, rigid poly stop, top and b 6 UNC x 5/8" lo	urethane pot ottom suppor ong hex head	ing material, uran t plates and a gas bolts. The conte	ium shield, ( sketed lid wh nts are secu	eight Titanium nich is secured red and
		positioned within thas an outside dia 14.75 inches which approximately 195	meter of approx ch includes the l	imately 11.2	5 inches and outs	ide height o	f approximately
	(3)	Drawing		*** ~******			
		The packaging is a R85590, Rev. B, \$			th Amersham Col	rporation Dra	awing No.
(b)	Con	tents					
	(1)	Type and form of	material				
		Iridium-192 source	es which meet t	he requireme	nts of special form	n radioactive	e material.
	(2)	Maximum quantity	y of material per	r package			
		1,000 curies (out	out) with no mo	re than 240 c	uries in a single s	source.	
	Ou "Ra	tput curies are dete diological Safety for	rmined in accord The Design and	dance with A d Construction	merican National and of Apparatus fo	Standard N4 r Gamma Ra	-32-1980, diography."
				224			

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NRC FO	PRM 618A		CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
	2 - Certif	icate No. 9165 - I	Revision No. 4 - Docket No. 71-9	9165
6.	The cover	bolts shall be pro	wided with tamperproof seal in a	ccordance with 10 CFR §71.43(b).
7.			eter vent holes in the side of the c plugs to preclude the entry of ra	packaging shall be provided with ain water into the packaging.
8.		plate shall be fab aining its legibility	-	sisting the fire test of 10 CFR Part 71
9.	In addition	ı to the requireme	ents of Subpart G of 10 CFR Part	71:
	(a)		must meet the Acceptance Test application, as supplemented.	s and Maintenance Program in
	(b)	• •	all be prepared for shipment and edures in Section 7 of the applica	operated in accordance with the tion, as supplemented.
10.		ge authorized by of 10 CFR §71.1		d for use under the general license
11.	Expiration	date: December	31, 2003.	an ta bha ann an Airtean Airtean Airtean Airt
			<u>REFERENCES</u>	
Amer	sham Corp	oration application	n dated August 4, 1995.	
Supp	lements da	ted: September 2	21, September 28, and November	er 29, 1995; November 24, 1998.
			FOR THE U.S. NUC	CLEAR REGULATORY COMMISSION
			Lous R. Cho	Luck
			Cass R. Chappell,	Chief
			Package Certification	
			Spent Fuel Project Office of Nuclear M	
			and Safeguards	naterial Safety
			Ū.	
Date:	December	<u>16,</u> 1998		
			225	

NRC FORM 618 U.S. NUCLEAR REGULATORY COMMISSION U.S. NUCLEAR REG										
1. a. CERTIF	CATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES			
	9168	10	71-9168	USA/9168/B(U)	1	OF	3			

2. PREAMBLE

- a. This certificate is issued to certify that the package (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 country through or into which the package will be transported.
- 3. 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

Chem-Nuclear Systems, LLC 140 Stoneridge Drive Columbia, SC 29210

Chem-Nuclear Systems, Inc. application dated February 26, 1990, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

- s. (a) Packaging
  - (1) Model No:: CNS 8-120B
  - (2) Description

The packaging is a carbon steel encased, lead shielded 74-inch OD by 88-inch high cask for radioactive waste materials. The cask is a right circular cylinder with a 62-inch ID by 75-inch high cavity. The walls of the cask contain a lead thickness of 3.35 inches encased in 0.75-inch thick inner steel shell and 1-1/2-inch thick outer steel shell. The exposed sides of the package are provided with a thermal barrier consisting of a 5/32-inch diameter wire wrap on 12-inch centers and covered with a 3/16-inch thick steel jacket. The bottom weldment is made of two, 3-1/4-inch thick carbon steel plates. The primary lid is sealed with a double silicone O-ring and 20 equally spaced 2-inch diameter bolts. The 29-inch diameter centered secondary lid is sealed with a double silicone O-ring and twelve equally spaced 2-inch diameter cap screw and a silicone O-ring. The lid sealing surfaces are stainless steel and the space between the double O-ring seals is provided with a test port for leak testing.

The top and bottom of the cask are provided with steel encased, rigid polyurethane foam impact limiters. The impact limiters are secured to each other about the cask with eight 1-inch diameter ratchet binders. The impact limiters are 102 inches in diameter and the overall height of the package with the impact limiters attached is 132 inches.

The package is provided with four tie-down and two removable lifting devices. Each lid is provided with three lifting lugs. The gross weight of the packaging and contents is approximately 74,000 pounds.

NRC FORM 618 (8-2000) 10 CFR 71

# CERTIFICATE OF COMPLIANCE

U.S. NUCLEAR REGULATORY COMMISSION

	FOR RADIOACTIVE MATERIAL PACKAGES									
1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	C. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES				
9168	10	71-9168	USA/9168/B(U)	2	OF	3				

- (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. 9.

## (b) Contents

- (1) Type and form of material
  - (i) Byproduct material in the form of dewatered restins, solids, or solidified waste contained within secondary containers; or
  - (ii) Radioactive material in the form of activated reactor components.
- (2) Maximum quantity 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 of 10 CFR 71.53 are not exceeded.

- 6. Except for close fitting contents, wood shoring must be placed between the secondary containers, or activated components, and the cask cavity to prevent movement during accident conditions of transport.
- 7. The cask primary lid must be secured by twenty and the secondary lid by twelve,  $2^{+}-8UNC-2A \times 4^{+}$  long hex cap screws with a flat washer torqued to 500 ft-lbs ± 50 ft-lbs (lubricated).
- 8. Prior to each shipment, the package must be leak tested in accordance with Section 8.2.2.2 of the application. For contents that meet the definition of low specific activity material or surface contaminated objects in 10 CFR 71.4, and also meet the exemption standard for low specific activity material and surface contaminated objects in 10 CFR 71.10(b)(2), the pre-shipment leak test is not required.
- 9. In addition to the requirements of Subpart G of 10 CFR Part 71:
  - (i) 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,
  - (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.

NRC FORM 618 (8-2000) 10 CFR 71		CERTIFICA FOR BADIOACT	TE OF COMPLI		ULATORY	COMMI	
I. A. CERTIFICATE	NUMBER 9168	b. REVISION NUMBER	c. DOCKET NUMBER 71-9168	d. PACKAGE IDENTIFICATION NUMBER USA/9168/B(U)	PAGE 3	OF	PAGE:
10. (a)	combustible gas of a representat that is twice the (i) The hyd than 5% seconda at 14.7 p	ses, determination is tive package such to expected shipmen rogen generated m by volume (or equ any container gas vo osia and 70°F); or	must be made by that the following it time: nust be limited to a ivalent limits for c bid if present at S	inces which could radiolytic tests and measurements criteria are met over a per a molar quantity that would other inflammable gases) of TP (i.e., no more than 0.0	d be no of the 63 g-mo	more oles/ft ³	
	that oxy could ha	gen must be limited ave hydrogen great	d to 5% by volume er than 5%.	the soordary container	раскаус		ł
	prepared for sh made. Shipme	inment in the same	e manner in which hen the package	, the secondary container n determination for gas ge is prepared (sealed) and r	neration	113	

- (b) For any package containing materials with a 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.
- 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, 2005.

## REFERENCES

Chem-Nuclear Systems, Inc., application dated February 26, 1990.

Supplements dated: February 22, 1994; September 1, 1998; May 25 and June 1, 1999; and May 26, and August 23 and 30, 2000.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Allhom from

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: September 28, 2000

(3-96) 10 CFR 71			CERTIFICA FOR RADIOACT	U.S ATE OF COMPLIANCE TIVE MATERIALS PACKAGES	. NUCLEAR REGUL	ATORY COMMISS
1. a. CERTIFIC	CATE NUM	BER	b. REVISION NUMBER	c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER
. PREAMBLE		9183	13	USA/9183/B( )F	1	4
b. This ce applica 3. THIS CERTI	ertificate do able regulat	ves not relieve the consign ory agencies, including the ISSUED ON THE BASIS OF	or from compliance with e government of any cour A SAFETY ANALYSIS RE	escribed in Item 5 below, meets the applicable n of Radioactive Material." any requirement of the regulations of the U.S ntry through or into which the package will b PORT OF THE PACKAGE DESIGN OR APPLIC/	5. Department of Trans e transported.	
NAC 655 E Suite Norcr	Interna Enginee 200 ross, G	ational, Inc. ering Drive eorgia 30092		E AND IDENTIFICATION OF REPORT OR APPI NAC Internation May 26, 1989, a KET NUMBER 71-9183	al, Inc. applicat	tion dated d
		ditional upon fulfilling the	requirements of 10 CFR	Part 71, as applicable, and the conditions spe	ecified below.	
5.						
(a)		aging				
	(1)	Model No.:	NAC-1			
		A steel and lea and lower steel	d shielded shipp encased balsa i	ing cask. The cask is a right	circular cylinde	r with upper 214 inches in
		and lower steel length and 50 in pounds. The in the inner shell i stainless steel s The annulus be inches maximum The stainless st cavity flange by provided by two of the upper or valves located i and rupture dise	l encased balsa i nches in diamete oner cavity is 178 is 5/16 inch, and shells are welded etween the inner m, 5 inches mini- teel lid is a frustu v six, ASTM-A320 polytetrafluoroe lower impact lim n the bottom shi c - pressure relie	impact limiters. The overall di er. The gross weight of the ca inches long and 13.5 inches the thickness of the outer she to a 2-inch thick stainless st and outer shells is filled with I	imensions are a ask is approxim in diameter. T ell is 1-1/4 inche eel shield disc ead (lead thick The lid is secu- teter bolts. The ons, two located features inclu- sure gasket lea cavity flange. 1	214 inches in lately 49,000 The thickness es. The two at the bottom. ness: 6-5/8 ured to the e seal is d on either sid de two drain k check valve For transport.
		and lower steel length and 50 in pounds. The in the inner shell i stainless steel s The annulus be inches maximum The stainless st cavity flange by provided by two of the upper or valves located i and rupture disc	l encased balsa i nches in diamete oner cavity is 178 is 5/16 inch, and shells are welded etween the inner m, 5 inches mini- teel lid is a frustu v six, ASTM-A320 polytetrafluoroe lower impact lim n the bottom shi c - pressure relie	impact limiters. The overall di er. The gross weight of the ca 3 inches long and 13.5 inches the thickness of the outer she d to a 2-inch thick stainless sta and outer shells is filled with I mum). um of a cone 7.5 inches thick. 0, Grade L43, 1-1/4-inch diam ethylene O-rings. Four trunnic iter, are provided. Other cask eld disc, vent valve, head clos of valve system located in the	imensions are a ask is approxim in diameter. T ell is 1-1/4 inche eel shield disc ead (lead thick The lid is secu- teter bolts. The ons, two located features inclu- sure gasket lea cavity flange. 1	214 inches in lately 49,000 The thickness es. The two at the bottom. ness: 6-5/8 ured to the e seal is d on either sid de two drain k check valve For transport.

RC FORM ⊦96)	618A	CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMIS	SION
Page	2 - Cerl	icate No. 9183 - Revision No. 13 - Docket No. 71-9183	
5.(a)	(Continu	d)	
	(3)	Drawings	
		The Model No. NAC-1 shipping cask is constructed in accordance with Nuclear Fuel Services, Inc., Drawing No. E 10080, Sheets 1 through 4, Rev. 22.	
(b)	Conte	ts	
	(1)	Type and form of material	
		(i) Clad, irradiated, metallic natural uranium fuel rods.	
		(ii) Solid, non-fissile, irradiated hardware.	
	(2)	Maximum quantity of material per package	
		The cavity content must not exceed a thermal decay heat load of 750 watts and a weigh of 3,700 lbs., 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 a follows:	
		(i) 21 intact rods or 6 encapsulated (defective) rods. Each defective rod will be encapsulated in either a 2.75-inch I.D. failed fuel rod can, as shown on Nuclear Assurance Corporation Drawing No. 340-108-D2, Rev. 9, or a 4.00-inch I.D. faile fuel rod can, as shown on Nuclear Assurance Corporation Drawing No. 340-108- D1, Rev. 9. Defective rods encapsulated in the 2.75-inch I.D. failed fuel rod cans will be shipped in a six rod capacity liner, as shown on Nuclear Assurance Corporation Drawing No. 491-001, Rev. 0., and defective rods encapsulated in th 4.00-inch I.D. failed fuel rod cans will be shipped in a three rod capacity liner, as shown on Nuclear Assurance Corporation Drawing No. 347-211-F19, Rev. 5.	S Ne
		(ii) 1,600 MWD/MTU average burn-up.	
		(iii) Minimum 365-day cooling time after irradiation.	
(C)	Trans	ort Index for Criticality Control	
		m transport index to be shown on r nuclear criticality control: 0.4	
		230	

NRC FORM (3-96)	1618A	<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISSI
Page	3 - Certificate No. 9183 - Revi	ision No. 13 - Docket No. 71-9 [.]	183
6.		(no free water) when delivered	
7.			-
7.	rods) must be used in the ca transport.	sk cavity to limit movement of	nd axial spacers for shipment of fuel contents during accident conditions of
8.	cask tie-down and support sy	ystem, and the transport vehicl ient of Transportation. Tie-dov	ovided that the closed container, the e (trailer) meet the applicable vn devices which are a structural part
9.	When the cask is shipped in cask, closed shipping contair	a closed shipping container, th ner, and trailer must not exceed	e center of gravity of the combined d 75 inches.
10.	When the cask is shipped in 750 watts.	a closed shipping container, th	e internal heat load must not exceed
11.	and testing of O-rings, drain a indicated in the table given be	and vent ball valves, relief valvel elow. During inactive periods.	e must perform periodic maintenance es, and rupture discs of the cask as the maintenance and testing brought into full compliance prior to
	Cask Component	<u>Period</u>	Test/Action
	Ball Valve Ball Valve	Each Shipment Annually	Hydro test to 30 psig Replace seats and seals
	O-rings O-rings	Each Shipment Annually	Test to 30 psig Test to 100 psig
	Inner Containment Vessel	Annually	Test to 100 psig
	Cavity Relief Valve	Annually	Test at set point
	Cavity Rupture Disc	Annually	Replace
	Neutron Shield Tank Rupture Disc	Annually	Replace
	Impact Limiters	Annually	Test to 5 psig
	test during a 10-minute test pr	eriod. Otherwise, corrective ac e component meets the specifi	essure drop for the component under ption must be taken and the test red tests. (Test to pressures equal to
		231	

# U.S. NUCLEAR REGULATORY COMMISSION NRC FORM 618A **CONDITIONS** (continued) (3-96)

Page 4 - Certificate No. 9183 - Revision No. 13 - Docket No. 71-9183

- The package shall be prepared for shipment and operated in accordance with the operating 12. procedures in Chapter 7 of the application, as supplemented.
- Each package must be maintained in accordance with the maintenance program in Chapter 8 of 13. the application.
- The package authorized by this certificate is hereby approved for use under the general license 14. provisions of 10 CFR §71.12.
- 15. Expiration date: September 30, 2004.

## REFERENCES

NAC International, Inc. application dated May 26, 1989.

Supplements dated January 29 and March 20, 1990; August 4, 1994; and August 31, 1999.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Thanking

E. William Brach, Director **Spent Fuel Project Office** Office of Nuclear Material Safety and Safeguards

Date: September 24, 1999

	M 618		U.S. ATE OF COMPLIANCE TIVE MATERIALS PACKAGES	NUCLEAR REGULATORY COMMISS
1. a. CERTIF	TCATE NUMBER		c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER e. TOTAL NUMBER
918	4	5	USA/9184/B(U)	1 2
b. This	certificate is issued to certify that th e of Federal Regulations, Part 71, "P certificate does not relieve the consi	ackaging and Transportation gnor from compliance with	described in Item 5 below, meets the applicable on of Radioactive Material." In any requirement of the regulations of the U.S untry through or into which the package will b	Department of Transportation or other
3. THIS CER a. ISSUE	TIFICATE IS ISSUED ON THE BASIS D TO (Name and Address)	OF A SAFETY ANALYSIS RI b. TIT	EPORT OF THE PACKAGE DESIGN OR APPLICA LE AND IDENTIFICATION OF REPORT OR APPI	ATION LICATION:
450	kaging Technology, Inc 7 D Pacific Highway Ea oma, WA 98424-2633	st	Nuclear Packaging, Inc. c dated March 31, 1989, as	
4. CONDITIO	<u>)</u>	c. DOC	CKET NUMBER 71-9184	
		the requirements of 10 CF	R Part 71, as applicable, and the conditions spe	ecified below.
5.				
(a)	Packaging			
/1\	Model No.: PAS-1			
(1)				
(2)	Description			
	sample is contained with	thin a undefined s	tion shield (32.5" OD x 39.0" C ample cask. Additionally, four	iodine collection cartridges
	sample is contained wir and four offgas vials ar	thin a undefined s e maintained insid	tion shield (32.5" OD x 39.0" C ample cask. Additionally, four de the foam shoring above the e sample cask to absorb the w ndary containment vessel and x 66.0" OH) which provides im s constructed of 304 stainless	DH). The 15 milliliter water iodine collection cartridges sample cask. Loose vater sample should leakage radiation shield is a foam pact and thermal protection. steel varying in thickness
	sample is contained wir and four offgas vials ar	thin a undefined s e maintained insid	tion shield (32.5" OD x 39.0" C ample cask. Additionally, four de the foam shoring above the e sample cask to absorb the w ndary containment vessel and x 66.0" OH) which provides im s constructed of 304 stainless e Viton O-ring seals and a sea ecured with eight, 3/8"-16 UNC	OH). The 15 milliliter water iodine collection cartridges sample cask. Loose vater sample should leakage radiation shield is a foam pact and thermal protection. steel varying in thickness led test port between the 2 x 8" long screws.
	sample is contained wir and four offgas vials ar	thin a undefined s e maintained insid	tion shield (32.5" OD x 39.0" C ample cask. Additionally, four de the foam shoring above the e sample cask to absorb the w ndary containment vessel and x 66.0" OH) which provides im s constructed of 304 stainless e Viton O-ring seals and a sea	OH). The 15 milliliter water iodine collection cartridges sample cask. Loose vater sample should leakage radiation shield is a foam pact and thermal protection. steel varying in thickness led test port between the C x 8" long screws. thick steel and 5.1" thick lea ding on the bottom, and 3.5" vith eight, 1.0"-8 UNC x 3.0
	sample is contained wir and four offgas vials ar	thin a undefined s e maintained insid	tion shield (32.5" OD x 39.0" C ample cask. Additionally, four de the foam shoring above the e sample cask to absorb the w ndary containment vessel and x 66.0" OH) which provides im s constructed of 304 stainless e Viton O-ring seals and a sea ecured with eight, 3/8"-16 UNC radiation shield provides 0.75" c steel and 5.1" thick lead shiel n the top. The lid is secured w	2H). The 15 milliliter water iodine collection cartridges sample cask. Loose vater sample should leakage radiation shield is a foam pact and thermal protection. steel varying in thickness led test port between the 2 x 8" long screws. thick steel and 5.1" thick lea ding on the bottom, and 3.5' vith eight, 1.0"-8 UNC x 3.0 ort between the seals for lea
	sample is contained wir and four offgas vials ar vermiculite surrounds to occur. Completely sum filled steel encased over The primary containme from 3/4" to 1.25", is pr seals for leak testing. T The secondary contain shielding in the radial d thick steel and 4.8" thic long bolts. The lid is set testing. The overpack provides The two halves of the o Neoprene gasket prevent	thin a undefined s e maintained insid	tion shield (32.5" OD x 39.0" C ample cask. Additionally, four de the foam shoring above the e sample cask to absorb the w indary containment vessel and x 66.0" OH) which provides im is constructed of 304 stainless e Viton O-ring seals and a sea ecured with eight, 3/8"-16 UNC adiation shield provides 0.75" is steel and 5.1" thick lead shiel in the top. The lid is secured w on O-rings with a sealed test per foam on the sides and about 1 together by eight, 3/4"-10 UNC	DH). The 15 milliliter water iodine collection cartridges sample cask. Loose vater sample should leakage radiation shield is a foam pact and thermal protection. steel varying in thickness led test port between the x 8" long screws. thick steel and 5.1" thick lead ding on the bottom, and 3.5" with eight, 1.0"-8 UNC x 3.0 ort between the seals for lead 13" on the top and bottom. 2 x 1.5" long bolts. A

NRC FORM 618A

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9184 - Revision No. 5 - 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) Contents

LULURUR DE LE LEVER DE LEVER D

- (1) Type and form of material
  - (i) Radioactive material in form of liquid or gaseous samples in sample casks, cartridges and vials.
  - (ii) Byproduct and activation materials as solids and process solids or resins, either dewatered, solid, or solidified in secondary containers.
- (2) Maximum quantity of material per package

50 Ci of mixed fission and activation products, 15 milliliters of liquid, one sample cask or secondary container and four cartridges and four vials.

- 6. In addition to the requirements of Subpart G of 10 CFR Part 71, each package prior to first use must meet the acceptance tests and criteria specified in Section 8.1, must be maintained in accordance with Section 8.2, and must be prepared for shipment in accordance with Chapter 7.0 of the application, and the supplement dated July 8, 1994.
- 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: July 31, 2004.

## REFERENCES

Nuclear Packaging, Inc., consolidated application dated March 31, 1989.

Supplement dated: April 7, 1989.

VECTRA Technologies, Inc., supplements dated: July 8, 1994 and January 30, 1998.

Transnuclear, Inc., supplement dated January 30, 1998.

Packaging Technology, Inc., Supplement dated: April 30,1999.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Minntra

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: 7/21/44

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CERTIFICATE OF COMPLIANCE     Can not been in the second of the sec					$\Delta \Delta \alpha$				
9185         5         USA/9185/B(U)-85         1         2           2 FRAME         1         2         2         1         2         1         2         1         2         1         2         1         2         1         2         1         2         1         2         1         2         1         2         1         2         1         2         1         2         1         2         1         2         1         2         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1 <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>UCLEAR REGUL</th> <th>ATORY COMMISSION</th>								UCLEAR REGUL	ATORY COMMISSION
<ul> <li>PRE-VANUE</li> <li>The conflicate is issued to certify that the perhaging and contents described in hem 5 below, meets the applicable safety standards set forh in Title 10, Cells of Federal Regulations, Par 71, "Packaging and Transportation of Radioactive Material".</li> <li>The certificate desis to relieve the consigner from compliance with any requirement of the regulations of the U.S. Department of Transportation at other periader regulations at a stransportation at a stransportation of the periader periader stransport in the BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION.</li> <li>THIS CERTIFICATE IS ISSUED ON the BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION.</li> <li>Industrial Nuclear Company 14320 Wicks Bhd. San Leandro, CA 94577</li> <li>CONDITIONS</li> <li>The conflicate is conditional upon fulfilling the requirements of 10 CER Pin 71, as applicable, and the conditions specified below.</li> <li>CONDITIONS</li> <li>The Model No. OP-100</li> <li>Description</li> <li>The Model No. OP-100 package consists of either an IR-50 source changer, or an IR-100 exposure device, which is positioned within a 10 galion drum. The drum is made of 20 gauge esteel, and is closed with a 12 gauge closure ring and a 5/8 inch diameter steel bott. Plywood members are used to position and support either the IR-50 or IR-100 within the the steel drum.</li> <li>The IR-50 source changer and the IR-100 exposure device are approximately 8.87 inches long, 4.5 inches wide, and 8.5 inches steel inclus.</li> <li>The IR-50 source changer and the IR-100 exposure device are approximately 8.87 inches long 4.5 inches wide, and 8.5 inches steel inclus.</li> <li>The IR-50 source changer and the IR-100 exposure device are approximately 8.87 inches long 4.5 inches wide, and 8.5 inches steel inclus.</li> <li>The IR-50 source changer and the IR-100 exposure device are approximately 8.87 inches steel inclusing. The space between the variation of training "St use within the IR-50 or IR-100. T</li></ul>	1. a. CERTIFICATE 1	UMBER		<b>b. REVISION N</b>	UMBER	c. PACKAGE IDENTIFICATION NUN	1BER	d. PAGE NUMBER	e. TOTAL NUMBER PAGE
The certificate is used to certify that the peckaging and categories the despitable address the applicable address that into 10, Core of Foreiral Regulations, Part 11, "Packaging and Transportation of Reducence Material."     This certificate does not elicite the consigner from compliance with any requirement of the regulations of the U.S. Department of Transportation or other epidate regulators guides to many decompliance with any requirement of the regulators of the U.S. Department of Transportation or other epidate regulators and with the peckage will be transport.     Industrial Nuclear Company 14320 Wicks Bhd. SAAFEY NAAVSS REPORT OF THE PACKAGE DESION APPLICATION     Industrial Nuclear Company 14320 Wicks Bhd.     San Leandro, CA 34577     Leandro,	918	5		5		USA/9185/B(U)-85		1	2
<ul> <li>(a) Packaging <ol> <li>Model No.: OP-100</li> <li>Description</li> <li>The Model No. OP-100 package consists of either an IR-50 source changer, or an IR-100 exposure device, which is positioned within a 10 gallon drum. The drum is made of 20 gauge steel, and is closed with a 12 gauge closure ring and a 5/8 inch diameter steel bolt. Plywood members are used to position and support either the IR-50 or IR-100 within the steel drum.</li> <li>The IR-50 source changer and the IR-100 exposure device are approximately 8.87 inches long, 4.5 inches wide, and 8.5 inches high. The radioactive material contents consist of indium-192 in source assemblies that meet the requirements for special form material. The source assemblies are positioned within a sizticalloy or titanium "5' tube within the IR-50 or IR-100. The "5' tube is surrounded by a shield assembly made of depleted uranium. The uranium shield assembly as the stainless steel housing. The space between the uranium shield assembly and the IR-100 exposure device is 50 pounds, and the maximum weight of the IR-50 source changer is 53 pounds.</li> </ol> </li> <li>(3) Drawings The packaging is constructed in accordance with Industrial Nuclear Company Drawing Nos.: OP 100-1, Rev. 3, IR 50-1A, Rev. 2, IR 50-1B, Rev. 1, IR 100-1A, Rev. 3, and IR 100-1B, Rev. 2. (b) Contents <ol> <li>(1) Type and form of material</li> <li>Iridium-192 as sealed sources that meet the requirements of special form radioactive material.</li> </ol></li></ul>	<ul> <li>a. This certific Code of Fed</li> <li>b. This certification applicable re</li> </ul>	eral Regulations, l ite does not relieve gulatory agencies,	Part 71, "Packa e the consignor including the	aging and Trans r from complia government of	sportation nce with a any coun	of Radioactive Material." any requirement of the regulations of try through or into which the packa	of the U.S. D ge will be tr	Department of Trans ansported.	
<ul> <li>(a) Packaging <ol> <li>Model No.: OP-100</li> <li>Description</li> <li>The Model No. OP-100 package consists of either an IR-50 source changer, or an IR-100 exposure device, which is positioned within a 10 gallon drum. The drum is made of 20 gauge steel, and is closed with a 12 gauge closure ring and a 5/8 inch diameter steel bolt. Plywood members are used to position and support either the IR-50 or IR-100 within the steel drum.</li> <li>The IR-50 source changer and the IR-100 exposure device are approximately 8.87 inches long, 4.5 inches wide, and 8.5 inches high. The radioactive material contents consist of indium-192 in source assemblies that meet the requirements for special form material. The source assemblies are positioned within a sizticalloy or titanium "5' tube within the IR-50 or IR-100. The "5' tube is surrounded by a shield assembly made of depleted uranium. The uranium shield assembly as the stainless steel housing. The space between the uranium shield assembly and the IR-100 exposure device is 50 pounds, and the maximum weight of the IR-50 source changer is 53 pounds.</li> </ol> </li> <li>(3) Drawings The packaging is constructed in accordance with Industrial Nuclear Company Drawing Nos.: OP 100-1, Rev. 3, IR 50-1A, Rev. 2, IR 50-1B, Rev. 1, IR 100-1A, Rev. 3, and IR 100-1B, Rev. 2. (b) Contents <ol> <li>(1) Type and form of material</li> <li>Iridium-192 as sealed sources that meet the requirements of special form radioactive material.</li> </ol></li></ul>	a. ISSUED TO (N	ame and Address)		A SAFETY ANA		E AND IDENTIFICATION OF REPORT	OR APPLIC	ATION:	
<ul> <li>(a) Packaging <ol> <li>Model No.: OP-100</li> <li>Description</li> <li>The Model No. OP-100 package consists of either an IR-50 source changer, or an IR-100 exposure device, which is positioned within a 10 gallon drum. The drum is made of 20 gauge steel, and is closed with a 12 gauge closure ring and a 5/8 inch diameter steel bolt. Plywood members are used to position and support either the IR-50 or IR-100 within the steel drum.</li> <li>The IR-50 source changer and the IR-100 exposure device are approximately 8.87 inches long, 4.5 inches wide, and 8.5 inches high. The radioactive material contents consist of indium-192 in source assemblies that meet the requirements for special form material. The source assemblies are positioned within a sizticalloy or titanium "5' tube within the IR-50 or IR-100. The "5' tube is surrounded by a shield assembly made of depleted uranium. The uranium shield assembly as the stainless steel housing. The space between the uranium shield assembly and the IR-100 exposure device is 50 pounds, and the maximum weight of the IR-50 source changer is 53 pounds.</li> </ol> </li> <li>(3) Drawings The packaging is constructed in accordance with Industrial Nuclear Company Drawing Nos.: OP 100-1, Rev. 3, IR 50-1A, Rev. 2, IR 50-1B, Rev. 1, IR 100-1A, Rev. 3, and IR 100-1B, Rev. 2. (b) Contents <ol> <li>(1) Type and form of material</li> <li>Iridium-192 as sealed sources that meet the requirements of special form radioactive material.</li> </ol></li></ul>	14320 Wi	cks Blvd.			c DOCK	dated July 1, 1999, a	s supple	emented.	
<ul> <li>(a) Packaging <ol> <li>Model No.: OP-100</li> <li>Description</li> <li>The Model No. OP-100 package consists of either an IR-50 source changer, or an IR-100 exposure device, which is positioned within a 10 gallon drum. The drum is made of 20 gauge steel, and is closed with a 12 gauge closure ring and a 5/8 inch diameter steel bolt. Plywood members are used to position and support either the IR-50 or IR-100 within the steel drum.</li> <li>The IR-50 source changer and the IR-100 exposure device are approximately 8.87 inches long, 4.5 inches wide, and 8.5 inches high. The radioactive material contents consist of indium-192 in source assemblies that meet the requirements for special form material. The source assemblies are positioned within a sizticalloy or titanium "5' tube within the IR-50 or IR-100. The "5' tube is surrounded by a shield assembly made of depleted uranium. The uranium shield assembly as the stainless steel housing. The space between the uranium shield assembly and the IR-100 exposure device is 50 pounds, and the maximum weight of the IR-50 source changer is 53 pounds.</li> </ol> </li> <li>(3) Drawings The packaging is constructed in accordance with Industrial Nuclear Company Drawing Nos.: OP 100-1, Rev. 3, IR 50-1A, Rev. 2, IR 50-1B, Rev. 1, IR 100-1A, Rev. 3, and IR 100-1B, Rev. 2. (b) Contents <ol> <li>(1) Type and form of material</li> <li>Iridium-192 as sealed sources that meet the requirements of special form radioactive material.</li> </ol></li></ul>		s conditional upon	fulfilling the	requirements o			···		·····
<ul> <li>(2) Description</li> <li>The Model No. OP-100 package consists of either an IR-50 source changer, or an IR-100 exposure device, which is positioned within a 10 galoe drum. The drum is made of 20 gauge steel, and is closed with a 12 gauge closure ring and a 5/8 inch diameter steel bolt. Plywood members are used to position and support either the IR-50 or IR-100 within the steel drum.</li> <li>The IR-50 source changer and the IR-100 exposure device are approximately 8.87 inches long, 4.5 inches wide, and 8.5 inches high. The radioactive material contents consist of iridium-192 in source assemblies that meet the requirements for special form material. The source assemblies are positioned within a zircalloy or titanium "S" tube within the IR-50 or IR-100. The "S' tube is surrounded by a shield assembly made of depleted uranium. The uranium shield assembly is encased in a stainless steel housing. The space between the uranium shield assembly and the stainless steel casing is filled with a rigid polyurethane foam. The maximum weight of the IR-50 source changer is 53 pounds, the maximum weight of the IR-100 exposure device is 50 pounds, and the maximum gross weight of the Model No. OP-100 package is 75 pounds.</li> <li>(3) Drawings</li> <li>The packaging is constructed in accordance with Industrial Nuclear Company Drawing Nos.: OP 100-1, Rev. 3, IR 50-1A, Rev. 2, IR 50-1B, Rev. 1, IR 100-1A, Rev. 3, and IR 100-1B, Rev. 2.</li> <li>(b) Contents</li> <li>(1) Type and form of material</li> <li>Iridium-192 as sealed sources that meet the requirements of special form radioactive material.</li> </ul>		Packagin	9 a ^m			4	: :		· · · · · · · · · · · · · · · · · · ·
<ul> <li>The Model No. OP-100 package consists of either an IR-50 source changer, or an IR-100 exposure device, which is positioned within a 10 gallon drum. The drum is made of 20 gauge steel, and is closed with a 12 gauge closure ring and a 5/8 inch diameter steel bot. Plywood members are used to position and support either the IR-50 or IR-100 within the steel drum.</li> <li>The IR-50 source changer and the IR-100 exposure device are approximately 8.87 inches long, 4.5 inches wide, and 8.5 inches high. The radioactive material contents consist of iridium-192 in source assemblies that meet the requirements for special form material. The source assemblies are positioned within a zircalloy or titanium "S" tube within the IR-50 or IR-100. The "S" tube is surrounded by a shield assembly made of depleted uranium. The uranium shield assembly is encased in a stainless steel housing. The space between the uranium shield assembly and the stainless steel casing is filled with a rigid polyurethane foam. The maximum weight of the IR-50 source changer is 53 pounds, the maximum gross weight of the IR-100 exposure device is 50 pounds, and the maximum gross weight of the Model No. OP-100 package is 75 pounds.</li> <li>(3) Drawings</li> <li>The packaging is constructed in accordance with Industrial Nuclear Company Drawing Nos.: OP 100-1, Rev. 3, IR 50-1A, Rev. 2, IR 50-1B, Rev. 1, IR 100-1A, Rev. 3, and IR 100-1B, Rev. 2.</li> <li>(b) Contents</li> <li>(1) Type and form of material Iridium-192 as sealed sources that meet the requirements of special form radioactive material.</li> </ul>		(1) N	Aodel No.	: OP-100	I	a second			
<ul> <li>an IR-100 exposure device, which is positioned within a 10 gallon drum. The drum is made of 20 gauge steel, and is closed with a 12 gauge closure ring and a 5/8 inch diameter steel bot. Plywood members are used to position and support either the IR-50 or IR-100 within the steel drum.</li> <li>The IR-50 source changer and the IR-100 exposure device are approximately 8.87 inches long, 4.5 inches wide, and 8.5 inches high. The radioactive material contents consist of iridium-192 in source assemblies are positioned within a zircalloy or titanium "S" tube within the IR-50 or IR-100. The "S" tube is surrounded by a shield assembly made of depleted uranium. The uranium shield assembly is encased in a stainless steel cosing is filled with a rigid polyurethane foam. The maximum weight of the IR-50 source changer is 53 pounds, the maximum weight of the IR-100 exposure device is 50 pounds, and the maximum gross weight of the Model No. OP-100 package is 75 pounds.</li> <li>(3) Drawings</li> <li>The packaging is constructed in accordance with Industrial Nuclear Company Drawing Nos.: OP 100-1, Rev. 3, IR 50-1A, Rev. 2, IR 50-1B, Rev. 1, IR 100-1A, Rev. 3, and IR 100-1B, Rev. 2.</li> <li>(b) Contents</li> <li>(1) Type and form of material Indium-192 as sealed sources that meet the requirements of special form radioactive material.</li> </ul>		(2) C	Description	n	•				
The packaging is constructed in accordance with Industrial Nuclear Company Drawing Nos.: OP 100-1, Rev. 3, IR 50-1A, Rev. 2, IR 50-1B, Rev. 1, IR 100-1A, Rev. 3, and IR 100-1B, Rev. 2. (b) Contents (1) Type and form of material Iridium-192 as sealed sources that meet the requirements of special form radioactive material.		a s T 8 c f c z s a u p t t	5/8 inch upport eit he IR-50 .87 inche ontents co special ircalloy or urrounded ssembly i ranium sh olyuretha ounds, th ne maximu	diameters ther the IR source ch s long, 4.5 onsist of in form mate titanium ' d by a shie s encased nield asset ne foam. e maximu	steel b 1-50 or 5 inche ridium- erial. "S" tub eld ass d in a s mbly a The m m weig	olt. Plywood members IR-100 within the steel and the IR-100 exposu s wide, and 8.5 inches 192 in source assemblies within the IR-50 or IR sembly made of deplete stainless steel housing. Ind the stainless steel c haximum weight of the I ght of the IR-100 expos	are use drum. re devic high. T es that are pos -100. T d uraniu The sp asing is R-50 so ure devi	d to position e are approx he radioactiv meet the req itioned withir he "S" tube i im. The uran ace between filled with a r urce change ce is 50 pour	and kimately ve material uirements a s nium shield the rigid r is 53 nds, and
Drawing Nos.: OP 100-1, Rev. 3, IR 50-1A, Rev. 2, IR 50-1B, Rev. 1, IR 100-1A, Rev. 3, and IR 100-1B, Rev. 2. (b) Contents (1) Type and form of material Iridium-192 as sealed sources that meet the requirements of special form radioactive material.			-	aina ia aa		and in accordance with t			
<ul> <li>Type and form of material</li> <li>Iridium-192 as sealed sources that meet the requirements of special form radioactive material.</li> </ul>		D	rawing No	os.: OP 10	00-1, F	Rev. 3, IR 50-1A, Rev. 2	industria 2, IR 50-	1B, Rev. 1, I	R 100-1A,
Iridium-192 as sealed sources that meet the requirements of special form radioactive material.	(b)	Contents							
radioactive material.									
225					d sour	ces that meet the requir	rements	of special fo	rm
				_		235			

PAGE OF MININ PAGE 2 - Certificate No. 9185 - Revision No. 5 - Docket No. 71-9185 Page 2 - Certificate No. 9185 - Revision No. 5 - Docket No. 71-9185 () Contents (continued) (2 Maximum quantity of material per package 120 (output curies are determined in accordance with American National Standard Mais 1960, Rediological Safety for the Design and Construction of Apparatus tor Gamma Radiography. (3 The source shall be secured in the shielded position of the packaging by the source assembly dock, lock cap, and the shipping plug (IR-100 only). The source assembly lock, lock cap, and the shipping plug (IR-100 only). The source assembly lock, lock cap, and the shipping plug (IR-100 only). The source assembly lock, lock cap, and the shipping plug (IR-100 only). The source assembly lock, lock cap, and the source assembly must engage the source assembly lock. The flaxible 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. (3 The name plate on the overpack must be fabricated of materials capable of resisting a 1475°F tire environment for one-half hour and maintain its leightilty. The two vert house in the side of the overpack must be covered with tape or rubber (plastic) plugs to prevent entry of rain water. (a) In addition to the requirements of Subpart G of 10 CFR Part 71: (a) The package authorized by this certificate is hareby approved for use under the general license provisions of 10 CFR §71.12. (b) Each package authorized by this certificate is hareby approved for use under the general license provisions of 10 CFR §71.12. (c) Expiration date: November 30, 2003. (c) Each package authorized by this certificate is hareby approved for use under the general license provisions of 10 CFR §71.12. (c) Expiration date: November 30, 2003. (c) Each package the proper date of the application (c) The application dated July 1, 1989. (c) The US. NUCLEAR REGULATORY COMMISSION (c) The Spert Final Proper Office (c) The pack			177 JUL 197 JUL			
<ul> <li>(c) Contents (content)</li> <li>(2) Maximum quantity of material per package <ul> <li>120 (output) curies</li> <li>Output curies are determined in accordance with American National Standard N432-1980, "Padiological Safety for the Design and Construction of Apparatus for Gamma Radiography."</li> </ul> </li> <li>6. The source shall be secured in the shielded position of the packaging by the source assembly lock, lock cap, and the shipping plug (IR-100 only). The source assembly with and the shipping plug (IR-100 only), 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 and shipping plug must be of sufficient length and diameter to provide positive positioning of the source is the source assembly is determined in accordance with the source intervent entry of rain water.</li> <li>7. The name plate on the overpack must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintain 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.</li> <li>8. In addition to the requirements of Subpart G of 10 CFR Part 71:     <ul> <li>(a) The package shall be prepared for shipment in accordance with the Operating Procedures of Chapter 7 of the application and</li> <li>(b) Each package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application.</li> </ul> </li> <li>9. The package autorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.</li> <li>10. Expiration date: November 30, 2003.</li> <li>REFERENCES</li> <li>Industrial Nuclear Company application dated July 1, 1999.</li> <li>Supplements dated: September 14 and December 29, 1999.</li> </ul> <li>FOR THE U.S. NUCLEAR REGULATORY COMMISSION</li> <li> <i>William Brach</i>, Director Spent Fuel Project Office Office on Nuclear Mater</li>		61 <b>8A</b>			CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
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<ul> <li>(b) Each package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application.</li> <li>9. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.</li> <li>10. Expiration date: November 30, 2003.</li> <li>REFERENCES</li> <li>Industrial Nuclear Company application dated July 1, 1999.</li> <li>Supplements dated: September 14 and December 29, 1999.</li> <li>FOR THE U.S. NUCLEAR REGULATORY COMMISSION</li> <li><i>Multiam Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards</i></li> </ul>		(b)	Content	s (continued)		
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<ul> <li>(b) Each package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application.</li> <li>9. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.</li> <li>10. Expiration date: November 30, 2003.</li> <li>REFERENCES</li> <li>Industrial Nuclear Company application dated July 1, 1999.</li> <li>Supplements dated: September 14 and December 29, 1999.</li> <li>FOR THE U.S. NUCLEAR REGULATORY COMMISSION</li> <li><i>Multiam Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards</i></li> </ul>	7.	fire e	environme	nt for one-half hour ar	nd maintain its legibility. T	The two vent holes in the side of
<ul> <li>(b) Each package must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application.</li> <li>9. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12.</li> <li>10. Expiration date: November 30, 2003.</li> <li>REFERENCES</li> <li>Industrial Nuclear Company application dated July 1, 1999.</li> <li>Supplements dated: September 14 and December 29, 1999.</li> <li>FOR THE U.S. NUCLEAR REGULATORY COMMISSION</li> <li><i>Multiam Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards</i></li> </ul>	8.	In ad	ldition to t	he requirements of Su	ubpart G of 10 CFR Part 7	11: 1998 (1
of the application. 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: November 30, 2003. REFERENCES Industrial Nuclear Company application dated July 1, 1999. Supplements dated: September 14 and December 29, 1999. FOR THE U.S. NUCLEAR REGULATORY COMMISSION E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards		(a)				nce with the Operating
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10. Expiration date: November 30, 2003. REFERENCES Industrial Nuclear Company application dated July 1, 1999. Supplements dated: September 14 and December 29, 1999. FOR THE U.S. NUCLEAR REGULATORY COMMISSION <i>William June</i> E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards	9.				ificate is hereby approved	for use under the general license
and Safeguards	10.	Expi	ration date	e: November 30, 2003		
and Safeguards				े के दिन के दिन के समय है। यह भाषा के समय है। संसर्व के समय है।		
and Safeguards					1 - A - A - A - A - A - A - A - A - A -	
and Safeguards	Supp	lemer	nts dated:	September 14 and D	ecember 29, 1999.	1
and Safeguards					FOR THE U.S. NUCLEA	R REGULATORY COMMISSION
and Safeguards					Wolliam Grow	
Date: 2/26/00 236					Spent Fuel Project Office Office of Nuclear Materia and Safeguards	a Al Safety
236	Date:		2/26/	00		
					236	

NRC FORM			OFDE			S. NUCLEAR REGU			
(3-96) 10 CFR 71				CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIALS PACKAGES					
1. a. CERTIFI	CATE NUM	IBER	b. REVISION N	UMBER d	d. PAGE NUMBER	d. PAGE NUMBER e. TOTAL NUMBER			
<u> </u>			12		USA/9186/B(U)F	1	5		
b. This c	certificate i of Federal ertificate d	Regulations, Part 71, "I oes not relieve the cons	ackaging and Tran	sportation of ince with ar	cribed in Item 5 below, meets the applica of Radioactive Material." ny requirement of the regulations of the U ry through or into which the package wil	J.S. Department of Tran			
3. THIS CERT a. ISSUEL U.S. Divis	Depart ion of l		OF A SAFETY ANA	LYSIS REPO b. TITLE Saf the Jur Ana	ORT OF THE PACKAGE DESIGN OR APPLI AND IDENTIFICATION OF REPORT OR AL fety Analysis for Shipping S-6213 Container, Rev. The 16, 1975, as suppleme alysis for Shipment of S6 its in the Model 2 S-6213 ET NUMBER 71-9186	CATION PPLICATION: S8G Power Un 7, dated nted; and Safet N Shipboard Po	ty ower		
		nditional upon fulfilling	the requirements of	f 10 CFR P	Part 71, as applicable, and the conditions	specified below.			
5.						<u> </u>	·····		
(a)	Pack	aging							
	(1)	Model Nos:	Modei 1, S	6213	Power Unit Shipping Cont	tainer			
			Model 2, S	-6213	Power Unit Shipping Cont	tainer			
	(2)	Description							
	(=/	Decemption							
					· (PUSC) for shipment of a ve mechanisms installed.	power unit co	mplete with		
		9-1/4 feet in impact limite and cover ha except that t in the PUSC clamped betw diameter high cantilever int longest contr adapter is ins prototype po	outside dian rs, with 10-3 lves. The M he primary of by a central veen the cer a strength st o the barrel ol rod drive talled in the wer unit and er, and a low	neter b 3/4-foo lodel 2 containe ly locat ntral ma cuds. T and cov mechar barrel l the Sé ver supp	sists of a carbon steel cyling y 39-1/2 feet long, include t outside diameter central S-6213 PUSC is of the sate er material is HY-80 steel, and thick circular steel plat ating flanges of the PUSC the upper and lower extrem ver halves without addition nisms (S8G Power Unit Ty- end of the container durin SW shipboard power unit, port adapter are installed in power unit.	ing hemispheric flanges joining ame design as t A power unit e (PU head) wh and fastened b mities of the po nal support exc /pe B only). A l g shipment of A shipping/lift	al steel end the barrel he Model 1, is supported ich is by 94, 2-inch ower unit cept for the ower support the S6W ing ring, a		
		a specially bu	ilt flatbed ra	ail car.	zontal position on a suppo The PUSC, including fram for shipments of Type A a	ne and contents	, weighs		
					237				

NRC FORM 618A (3-96)		CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
Page 2	- Certif	icate No. 9186 - Revision No. 12 - Docket No. 71-9186
5.(a) Packag	ging (Co	ontinued)
(2)	Desc	ription (Continued)
		weight of the PUSC, including frame and contents is approximately
	438,9 poune	900 pounds for shipment of the S6W prototype power unit, 429,900 ds for shipment of the S6W shipboard power unit, and 329,000 pounds hipment of the S9G shipboard power unit.
(3)	Draw	vings
	The N	Model 1 and Model 2 S-6213 PUSC are constructed in accordance with the
		rings included in the applications (see references, below).
(b) Conten	ts	
(1)	Туре	and form of material
	(i)	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 core 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 isotope.
	(iv)	Unirradiated S9G shipboard power unit, as described in Chapter 6 of "S9G Shipboard Power Unit in S-6213 Power Unit Shipping Container Safety Analysis Report For Packaging," Revision 2, and containing uranium enriched in the U-235 isotope.
(2)	Maxi	mum quantity of material per package
	For tl	he Model 1 S-6213 PUSC:
	One	Type A S8G Power Unit, or Type B S8G Power Unit, or S6W Advanced Fleet Reactor Prototype Power Unit, or
	One : One :	Sow Advanced Fleet Reactor Frototype Fower Unit, or S6W Advanced Fleet Reactor Shipboard Power Unit, or S6W High Performance Fleet Core Shipboard Power Unit, or S9G Shipboard Power Unit.
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<b>NRC</b> FOR 3-96)	M 618A		<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISS
F	Page 3 - Ce	rtificate No. 9186 - F	Revision No. 12 - Docket N	No. 71-9186
5.(b)	Contents (C	Continued)		
	Fo	r the Model 2 S-621	3 PUSC:	
	On		eet Reactor Shipboard Pow nance Fleet Core Shipboard wer Unit.	
(c)	Transport	Index for Criticality	Control	
		transport index to be nuclear criticality cont		
6.	The Mode packaging	el 1 S-6213 PUSC shi I fabricated after Aug	all be designated as B( )F. gust 31, 1986, is not auth	Use of Model 1 S-6213 PUSC orized.
7.	All control latches.	l rods shall be restrai	ined in the power unit fuel	cells by the control rod holddown
8.	71, a dete	odel 1 S-6213 PUSC ermination shall be m has been subjected	ade, for each shipment, of	ments of Subpart G of 10 CFR Part the "g" forces that the package or
	(a) A r the	nondestructive exami four tie-down suppo	ination of the entire length ort bracket-to-container wa	of both inner and outer surfaces of all butt welds shall be conducted:
	(1)		in any direction through th	has been subjected to "g" forces in e center of gravity of the package
	(2)	following the fou	urth shipment [*] , and	
	(3)	after every secor	nd shipment [*] following the	e fourth shipment.
*			be construed to require an ordance with (8(a)(1)) above	n inspection if previous shipment ve.
			239	

NRC FORM 3-96)	1618A	618A CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMM				J.S. NUCLEAR REGULATORY COMMISSIO
Pa	age 4 -	Certifi	cate N	o. 9186 - Revision No. 12 - Docl	ket No. 71-91	186
	(b)		ondest either:	• ructive examination in accordance	ce with a writ	tten procedure may
		(1)	The I	quid penetrant method in accord	lance with:	
			(i)	Article 6, Section V, ASME Co	ode, or	
			(ii)	MIL-STD-271E, "Nondestructiv Section 5, October 31, 1973,		quirements for Metals,"
			(iii)	NAVSHIPS 250-1500-1, "Weig	ding Standard	l," Section 12.5
		(2)	or th	e magnetic particle method in ac	cordance wit	h:
			(i)	Article 7, Section V, ASME Co Method; direct or rectified curr		chnique; Dry Particle
			(ii) -	MIL-STD-271E, Section 4; spe (coatings), 4.3.3 (Dry Powder) (Procedure) as excepted by us (Yoke Technique), 4.3.2.5 (see (smoothness), or	), 4.3.3.3.6 (( ing direct or r	Continuous), and 4.3.3.3 rectified current, 4.3.3.3.3
			(iii)	NAVSHIPS 250-1500-1, Secti powder), 12.4.3.3.2.1 (Yoke 7	ion 12.4, 12.4 Technique) us	4.1 (General), 12.4.3 (Dry sing direct or rectified current.
8.(c)	lf any	, indica	tions, a	as defined in accordance with eit	her:	
	(1)	-		A-93(a), Appendix VIII, Division	1, Section VI	III, ASME Code (with
	(2)	Section VIII, ASME Code (with				
	(3)	Acce	ptance	eptance criteria of NAVSEA 090 Standards for Metal," with Chai bove), or	0-LP-003-800 nge 2, July 1,	00, "Surface Inspection , 1974 (with 7(b)(1)(ii) or
	(4)	NAV: noted		250-1500-1, Section 10.3.2 (wi	th 7(b)(1)(iii)	or 7(b)(2)(iii), above), as
	inspe	etected cted pr 10 CFF	ior to e	ackaging shall be repaired and re each shipment thereafter. Any d 95.	einspected pri lefects shall b	ior to use and shall be be reported in accordance
9.	Expir	ation d	ate: N	ay 31, 2002		
					240	
L L L L		0.20.20				

NRC FORM 618A (3-96)

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 5 - Certificate No. 9186 - Revision No. 12 - Docket No. 71-9186

## **REFERENCES**

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 October 2, 1992; Naval Reactors letter G#97-03425, dated February 7, 1997; and Naval Reactors letter G#C97-03614, dated September 29, 1997.

For the Model 2 S-6213 PUSC:

U.S. Naval Reactors application G#C91-11165, dated December 19, 1991.

Supplements dated: Naval Reactors letter G#92-03563, dated June 17, 1992; and Naval Reactors letter G#C92-03714, dated October 2, 1992; Naval Reactors letter G#97-03425, dated February 7, 1997; and Naval Reactors letter G#C97-03614, dated September 29, 1997.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cass R. Chappell, Chief Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: AUG. 21, 1998

					OMPLIANCE UALS PACKAGE			ATORY COMMISS
1. a. CERTIFI 918	cate number 8 <b>7</b>	b. REVISION	NUMBER		ENTIFICATION NUM 9187/B(U)	BER	d. PAGE NUMBER	e. TOTAL NUMBER
Code b. This c	ertificate is issued to certify of Federal Regulations, Par ertificate does not relieve th	t 71, "Packaging and Tra ne consignor from compl	insportation	n of Radioactive any requiremen	Material." t of the regulations of	the U.S. L	Department of Trans	
	able regulatory agencies, in IFICATE IS ISSUED ON THE						-	
a. ISSUEE	TO (Name and Address)		b. TITL	E AND IDENTIF	plication date	OR APPLIC	ATION:	102
	th Avenue			suppleme	-	Dece		<i></i> ,
Burling	ton, MA 01803							
			c. DOCI	KET NUMBER	71-9187			
4. CONDITIO		Ifilling the requirements	of 10 CEP	Part 71 ac and	inchia and the condi		God below	
5.	ficate is conditional upon fu	anning the requirements	JI IUCFR		INCAURC, AUU UIC COUDI	ions speci		
(a) Pac	kaging							
(1)	Model No.: 865							
(2)	Description					19 ¹		
:	shaped legs. Prin uranium shield, ar source holder ass on the packaging	nd a source tub embly and actu and a 0.12-incl	0 x 9.2 ts cons e. The ator an h thick	5" long ha ist of an o contents d locking steel oute	ndle and two outer steel she are securely p assembly. Ta r cover is bolt	1.38" II, inter osition mper-i ed ove	rnal bracing, and in the so ndicating sea r the source	triangular depleted urce tube by als are provid actuator and
	shaped legs. Prin uranium shield, ar source holder ass	nary component and a source tub embly and actu and a 0.12-inch for additional p	0 x 9.2 ts cons e. The ator an h thick	5" long ha ist of an o contents d locking steel oute	ndle and two outer steel she are securely p assembly. Ta r cover is bolt	1.38" II, inter osition mper-i ed ove	x 5.5" long rnal bracing, red in the so ndicating sea r the source	triangular depleted urce tube by als are provid actuator and
(3)	shaped legs. Prin uranium shield, ar source holder ass on the packaging locking assembly approximately 59 Drawings	nary component and a source tube embly and actu and a 0.12-inch for additional p pounds.	D x 9.2 ts cons e. The ator an h thick rotectik	5" long ha ist of an o contents d locking steel oute on during t	ndle and two outer steel she are securely p assembly. Ta r cover is bolt rransport. The	1.38" II, inter osition mper-i ed ove e total	x 5.5" long rnal bracing, ad in the so ndicating sea r the source weight of th	triangular depleted urce tube by als are provid actuator and he package is
(3)	shaped legs. Prin uranium shield, ar source holder ass on the packaging locking assembly approximately 59	nary component and a source tube embly and actu and a 0.12-inch for additional p pounds.	D x 9.2 ts cons e. The ator an h thick rotectik accorda	5" long ha ist of an o contents d locking steel oute on during t ance with	indle and two outer steel she are securely p assembly. Ta r cover is bolt transport. The the following	1.38" II, inter osition mper-li ed ove total	x 5.5" long rnal bracing, red in the so ndicating sea r the source weight of th Ops Drawing	triangular depleted urce tube by als are provid actuator and he package is Nos.: 8659
(3)	shaped legs. Prin uranium shield, ar source holder ass on the packaging locking assembly approximately 59 Drawings The packaging is Sheets 1 through R86591, Rev. A.	nary component and a source tube embly and actu and a 0.12-inch for additional p pounds.	D x 9.2 ts cons e. The ator an h thick rotectik accorda	5" long ha ist of an o contents d locking steel oute on during t ance with	indle and two outer steel she are securely p assembly. Ta r cover is bolt transport. The the following	1.38" II, inter osition mper-li ed ove total	x 5.5" long rnal bracing, red in the so ndicating sea r the source weight of th Ops Drawing	triangular depleted urce tube by als are provid actuator and he package is Nos.: 8659
(3) (b) Con	shaped legs. Prin uranium shield, ar source holder ass on the packaging locking assembly approximately 59 Drawings The packaging is Sheets 1 through R86591, Rev. A.	nary component and a source tube embly and actu and a 0.12-incl for additional p pounds. constructed in a 5, Rev. 1; 865	D x 9.2 ts cons e. The ator an h thick rotectik accorda	5" long ha ist of an o contents d locking steel oute on during t ance with	indle and two outer steel she are securely p assembly. Ta r cover is bolt transport. The the following	1.38" II, inter osition mper-li ed ove total	x 5.5" long rnal bracing, red in the so ndicating sea r the source weight of th Ops Drawing	triangular depleted urce tube by als are provid actuator and he package is Nos.: 8659
(3) (b) Con (1)	shaped legs. Prin uranium shield, ar source holder ass on the packaging locking assembly approximately 59 Drawings The packaging is Sheets 1 through R86591, Rev. A.	nary component and a source tube embly and actu and a 0.12-incl for additional p pounds. constructed in a 5, Rev. 1; 865 material	D x 9.2 ts cons e. The ator an h thick rotectik accorda 00-10,	5" long ha ist of an o contents d locking steel oute on during t ance with Rev. 0; an	indle and two outer steel she are securely p assembly. Ta r cover is bolt transport. The the following and Amersham	1.38" II, inter osition mper-i ed ove total	x 5.5" long rnal bracing, and in the so ndicating sea r the source weight of th Ops Drawing ration Drawi	triangular depleted urce tube by als are provid actuator and be package is Nos.: 8659 ng No.
(3) (b) Con (1)	shaped legs. Prin uranium shield, ar source holder ass on the packaging locking assembly approximately 59 Drawings The packaging is Sheets 1 through R86591, Rev. A. Intents	nary component and a source tube embly and actu and a 0.12-incl for additional p pounds. constructed in a 5, Rev. 1; 865 material aled source mus	D x 9.2 ts cons e. The ator an h thick rotectic accorda 00-10,	5" long ha ist of an o contents d locking steel oute on during t ance with Rev. 0; ar	indle and two outer steel she are securely p assembly. Ta r cover is bolt transport. The the following and Amersham	1.38" II, inter osition mper-i ed ove total	x 5.5" long rnal bracing, and in the so ndicating sea r the source weight of th Ops Drawing ration Drawi	triangular depleted urce tube by als are provid actuator and be package is Nos.: 8659 ng No.
(3) (b) Con (1)	shaped legs. Prin uranium shield, ar source holder ass on the packaging locking assembly approximately 59 Drawings The packaging is Sheets 1 through R86591, Rev. A. Itents Type and form of Iridium-192 as se	nary component and a source tube embly and actu and a 0.12-incl for additional p pounds. constructed in a 5, Rev. 1; 865 material aled source mus y of material pe	D x 9.2 ts cons e. The ator an h thick rotectic accorda 00-10,	5" long ha ist of an o contents d locking steel oute on during t ance with Rev. 0; ar	indle and two outer steel she are securely p assembly. Ta r cover is bolt transport. The the following and Amersham	1.38" II, inter osition mper-i ed ove total	x 5.5" long rnal bracing, and in the so ndicating sea r the source weight of th Ops Drawing ration Drawi	triangular depleted urce tube by als are provid actuator and be package is Nos.: 8659 ng No.
(3) (b) Con (1)	shaped legs. Prin uranium shield, ar source holder ass on the packaging locking assembly approximately 59 Drawings The packaging is Sheets 1 through R86591, Rev. A. Itents Type and form of Iridium-192 as se Maximum quantit	mary component and a source tube embly and actu and a 0.12-incl for additional pr pounds. constructed in a 5, Rev. 1; 865 material aled source mus y of material pe at) determined in a	D x 9.2 ts cons e. The ator an h thick rotectic accorda 00-10, st meet er packa	5" long ha ist of an o contents d locking steel oute on during t ance with Rev. 0; ar t the requir age	American Nat	1.38" II, inter osition mper-i ed ove total Tech/C Corpo ecial fo	x 5.5" long mal bracing, and in the so ndicating sea r the source weight of th Ops Drawing ration Drawi	triangular depleted urce tube by als are provid actuator and he package is Nos.: 8659 ng No.
(3) (b) Con (1)	shaped legs. Prin uranium shield, ar source holder ass on the packaging locking assembly approximately 59 Drawings The packaging is Sheets 1 through R86591, Rev. A. Itents Type and form of Iridium-192 as se Maximum quantit 240 curies (outpu Output curies are	mary component and a source tube embly and actu and a 0.12-incl for additional pr pounds. constructed in a 5, Rev. 1; 865 material aled source mus y of material pe at) determined in a	D x 9.2 ts cons e. The ator an h thick rotectic accorda 00-10, st meet er packa	5" long ha ist of an o contents d locking steel oute on during t ance with Rev. 0; ar t the requir age	American Nati	1.38" II, inter osition mper-i ed ove total Tech/C Corpo ecial fo	x 5.5" long mal bracing, and in the so ndicating sea r the source weight of th Ops Drawing ration Drawi	triangular depleted urce tube by als are provid actuator and he package is Nos.: 8659 ng No.

NRC FORM 618A (3-96)

**CONDITIONS** (continued)

<u>TTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTT</u>

Page 2 - Certificate No. 9187 - Revision No. 4 - Docket No. 71-9187

- . 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 November 24, 1998, 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, 2003.

## REFERENCES

Tech/Ops application dated December 27, 1983.

Amersham Corporation supplements dated: March 15, 1984, November 8, 1988, and August 16, and October 29, 1993, and November 20, 1995.

AEA Technology Supplement dated November 24, 1998.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cass R. Chappell, Chief Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: December 7, 1998

NRC FORM 3-96) 0 CFR 71	618				U.S. MPLIANCE IALS PACKAGES	NUCLEAR REGUL	ATORY COMMISSIO
I. a. CERTIFIC	CATE NUM	BER	b. REVISION NUMBER		ENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PA
91	96		16	USA/S	196/AF-85	1	3
PREAMBLI	ε			L			
Code of b. This co	of Federal I ertificate do	Regulations, Part 71, "Pac bes not relieve the consign	kaging and Transportation from compliance with	on of Radioactive n any requirement	5 below, meets the applicable Material." of the regulations of the U.S ato which the package will be	. Department of Trans	
		ISSUED ON THE BASIS OF and Address)			CKAGE DESIGN OR APPLICA CATION OF REPORT OR APPL		
140 S	Stonerid	ar Systems, Inc. Ige Drive C 29210	C	dated Febru	ar Systems, Inc. a ary 17, 1999.	pplication	
			c. DOC	CKET NUMBER	71-9196	<u></u>	
CONDITION This certif	-	ditional upon fulfilling th	e requirements of 10 CF	R Part 71, as appl	cable, and the conditions spo	ecified below.	
			<u>an an a</u>			<u></u> ,.	
		- 					
(a)	Pack	aging					
	(1)	Model No.:	UX-30				
	(1)		07-30	وروب فالحبر مر			
	(2)	Description					
		shells filled with permits the top are secured wi	h 6-inch thick for half of the over th ten indexed, o	am (7.8 - 9.1 pack to be r cross-lockin	ainless steel shells PCF). A stepped emoved from the b g "ball lock" pins. 1 s weight of the pacl	and gasketed ase. The pack The overpack is	horizontal joint (age "halves" s 43.5" in
						<b>.</b>	
	(3)	Drawing					
					ted in accordance v eets 1 through 3, F		clear Systems
5.(b)	Conte	ents					
	(1)	Type and form	of material				
		UF ₆ enriched in	n the U-235 isoto	ope.			
	(2)	Maximum qua	ntity of material p	ber package			
					nds UF _s enriched t atomic ratio for the		n 5 w/o in the
			sotope. The ma				

NRC FORM (3-96)	1618A     CONDITIONS (continued)     U.S. NUCLEAR REGULATORY COMMISSION
P	age 2 - Certificate No. 9196 - Revision No. 16 - Docket No. 71-9196
5.(c)	Transport Index for Criticality Control
	Minimum transport index to be shown on label for nuclear criticality control: 5.0
6.	The 30-inch diameter UF ₆ cylinder must be fabricated, inspected, tested and maintained in accordance with American National Standard N14.1-1995 or an earlier version of ANSI N14.1 in effect at the time of fabrication. Cylinders 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.
7.	When the optional 4 lid lifting clips are used instead of the top lugs, the top lid (cover) must be lifted with a spreader bar (saddle).
8.	In addition to the requirements of Subpart G of 10 CFR Part 71:
	(a) Prior to each shipment, the overpack gaskets must be inspected. These gaskets must be replaced if inspection shows any defects or every 12 months, whichever occurs first.
	(b) Each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application, as supplemented.
	(c) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application, as supplemented.
	(d) Prior to each shipment, the stainless steel components of the packaging must be visually inspected. Packagings in which stainless steel components show pitting, corrosion, cracking, or pinholes are not authorized for transport.
9.	The 30-inch diameter UF _e cylinder valve stem and plug may be tinned with ASTM B32, alloy 50A or Sn50 solder material, or a mixture of alloy 50A or Sn50 with alloy 40A or Sn40A material, provided the mixture has a minimum tin content of 45 percent.
10.	The foam and installation of the foam must be in accordance with Chem-Nuclear Systems, Inc. Specification No. ES-M-170, Rev. 0. The foam and installation for packages fabricated before January 1, 1996 must be in accordance with Vectra Specification No. NPI.F12 (Density: 8-9.5).
11.	Packages may be marked with Package Identification Number USA/9196/AF until March 31, 2000.
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: February 28, 2001.
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**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 3 - Certificate No. 9196 - Revision No. 16 - Docket No. 71-9196

### **REFERENCES**

Chem-Nuclear Systems Inc. application dated February 17, 1999.

United States Enrichment Corporation supplement dated April 14, 1997.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cass R. Chappell, Chief Licensing Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: March 30, 1999

(3-96) 10 CFR 71	M 618		CERTIFIC. FOR RADIOAC	ATE OF COMPLIANCE TIVE MATERIALS PACKAGES	J.S. NUCLEAR REGUL	ATORY COMMISSI
1. a. CERTH	FICATE NUI			c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER P
		9200	9	USA/9200/B(M)F	1	5
b. This	certificate e of Federa certificate of	loes not relieve the consig	ackaging and Transportatio	escribed in Item 5 below, meets the applic n of Radioactive Material." any requirement of the regulations of the ntry through or into which the package wi	U.S. Department of Trans	
Depa	rtment	s ISSUED ON THE BASIS ( and Address) of Energy , DC 20585	Nu	PORT OF THE PACKAGE DESIGN OR APPL E AND IDENTIFICATION OF REPORT OR A clear Packaging, Inc., ril 6, 1991, as supplem	application d	ated
				кет NUMBER 71-9200	enteu.	
4. CONDITIC This cert 5.	-	nditional upon fulfilling t	he requirements of 10 CFF	Part 71, as applicable, and the conditions	specified below.	
J.						
(a)	Packa	aina				
	(1)	Model No.:	125-B			
	(2)	Description				
		diameter by diameter by shell, 3.88- outer shell, up the cask l the cask oute pitch spacing with a 300 ps secured by 32 the 0-rings. the outer cas down trunnior impact limite limiters are inch thick st Each impact l down to 1 inc The overall d	207.5-inch leng 192.5-inch leng inch thick lead and 7.50-inch body. A ten ga er shell with s g. The outer l sig rupture dis 2, 1-1/2-6 UNC The lid is al sk external cyl is, 1 shear blo er attachment l 120 inches in cainless steel imiter is secu ch. Plastic pi limensions of t	sk is a right circular oth. The cavity dimens oth. A 1.0-inch thick annulus and 2.0-inch thick welded stainless suge stainless steel the standoff provided by a id is 7.50-inch thick ic. The seal is provided closure bolts. A test so provided with a ven- indrical surface inclu- ck for fitting to the ugs (8 at each end of diameter by 75 inches and filled with closed- ired to the cask by 8, pe plugs are provided he cask with upper and by 279.5-inch length.	ions are 51.25 stainless stee thick stainles steel bottom ermal shield s wire wrap on a stainless stee ed by 2 Neopre port is provi t port. Protr de 2 lifting a shipping skid, the cask). Th long fabricate -cell polyuret 1-1/4-7 UNC bo in each impact	i-inch inner s steel plate make urrounds 3.3-inch equipped ne O-rings ded between usions from nd 4 tie- and 16 e impact d from 1/4- hane foam. lts necked limiter.

NRC FORM 618A (3-96)	<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISSION
Page 2 - Certificate No. 920	0 - Revision No. 9 - Docket	t No. 71-9200
5.(a)(2) Description (con	tinued)	
cask cavity. Th wall pipes with provides a 151-i positioned withi 2.0-inch thick w shell contain st moderator and ab thick stainless steel equipped w Neoprene O-rings closure bolts. also provided wi	e inner vessel consists of a welded bottom plate and f nch long cavity for the car n a 50.25-inch OD by 1.0-in elded bottom plate. The sp ainless steel structural me sorber. The top of each to steel plug. The inner lid ith 2, 300 psig rupture dis and is secured to the inner A test port is provided bet th a vent port.	ket) is positioned within the 7, 14.5-inch ID by 0.38-inch top end fixture plate which nisters. The pipe assembly is nch thick steel shell with a pace between the pipes and steel embers and solid neutron ube is shielded by a 10-inch is 5.0-inch thick stainless scs in series. The lid has 2 er vessel by 24, 3/4-10 UNC tween the 0-rings. The lid is
with canister im shield plug. Ea inch wall and co	pact limiters and a top 10 ch canister is 14.0-inch OI ntains Boral sheets or $B_2C$	.0-inch thick stainless steel D by 150.0-inch long by 0.25- rods. Canister containment is ed or bolted plate with 2 or 4

The weight of the cask (100,500 pounds), impact limiters (11,700 pounds each), inner vessel (37,000 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. 1; 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 (3-96)	1618A			CONDITIONS	(continued)	U.S. NUCLEAR F	REGULATORY COMMISSIO
. ,	3 -	Certific	ate No. 9200	- Revision No.	. 9 - Dock	et No. 71-9200	
-							
5.(b)	(1)	(continu	ied)				
		(ii)	Irradiated c equipment, a	core structural and filter-aid	componen materials	ts, contaminated .	defueling
			the shipping of the conte	, cask cavity s	sufficient lary conta	dunnage must be p to prevent signi iners relative to	ficant movement
		(iii)	contaminatio	on inside the i he limits for	nner vess	ial in the form o el. Internal con fic activity mater	tamination shall
	(2)	Maxim	um quantity o	of material per	package		
		withi 100 w	n the inner v	essel. The ra canister. The	dioactive	or any combinatio decay heat load r ight of each cani:	nust not exceed
(c)	Tra	nsport I	ndex for Crit	icality Contro	n (1		
				to be shown on ality control:		100	
6.	tra the The the cove	nsport, caniste caniste applica er gas.	except for fr rs for a mini rs must be lo tion which in The cask cav	ee water which mum of 2 minut aded and dewat cludes approxi	may be p es after ered in a mately 2 vessel mu	en delivered to a resent following o removal from the s ccordance with Sec atm of argon, nith st be filled with	Irip drying of storage pool. stion 7.1.1 of rogen, or helium
7.	Ina	addition	to the requi	rements of Sub	part G of	10 CFR Part 71:	
	(a)	Prior The s	to each ship eals must be	ment, the inne	r and out new seals	er lid seals must if inspection sho	be inspected. ws any defects
	(b)			meet the Accep application.	tance Tes	ts and Maintenance	e Program of
	(c)			e prepared for application.	shipment	and operated in a	ccordance with
8.	lyt meas	ically g surement	enerate combu: s or by analy:	stible gases, sis of a repre	a determi sentative	c substances which nation must be mac canister that the twice the expected	le by tests and following
				24	9		

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NRC FORM 3-96)	618A CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
	4 - Certificate No. 9200 - Revision No. 9 - Docket No. 71-9200
8.	(continued)
	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 ³ 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.
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 long bolts torqued to 780-945 ft-lbs (lubricated).
	The inner vessel lid must be secured by 24, ASTM A320, Grade L43 (Cadmium plated), $3/4-10$ UNC-2A x 2.25 long bolts torqued to 130-158 ft-lbs (lubricated).
	The upper and lower overpack limiters must each be secured by 8, ASTM A320, Grade L43 (Cadmium plated), $1-1/4-7$ UNC-2A x 41.75 long bolts torqued to 225-270 ft-lbs (lubricated).
10.	Except for the contents specified in 5.(b)(1)(iii), prior to each shipment, the licensee must confirm that the cask and inner vessel are properly sealed by tests as specified in Appendix 7.4 or Section 8.2.2 of the application. The test is satisfied if no leakage is detected using a test with a minimum sensitivity of $1 \times 10^{-3}$ atm-cm ³ /s.
11.	The neoprene O-ring seals used in the containment vessel closure must be fabri- cated from neoprene material specified as Cascade Gaskets compound number CG 100-111-60.
12.	The licensee may use a tarpaulin 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.	Effective date: April 1, 1996. Expiration date: April 1, 2001.
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# YYYYYYYYYYYYYYYYYYY NRC FORM 618A **CONDITIONS** (continued) **U.S. NUCLEAR REGULATORY COMMISSION** (3-96) Page 5 - Certificate No. 9200 - Revision No. 9 - Docket No. 71-9200 REFERENCES Nuclear Packaging, Inc. application dated April 6, 1991. Supplements dated: April 9 and 15, 1991; and February 21, 1996.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

William D. Travers, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date 3/21/96

			CERT FOR RAD	TFICATE O DIOACTIVE M	F COMPLIANC	E	UCLEAR REGUL	ATORY COMMISS
1. a. CERTIFIC	ATE NUMI		b. REVISION N	UMBER c. PACK	AGE IDENTIFICATION NU		1	e. TOTAL NUMBER
2. PRÉAMBLE		9202	6	Us	SA/9202/B(U)F		1	4
Code of b. This cer applicat	f Federal F rtificate do ble regulate FICATE IS I	Regulations, Part 71, "Pa es not relieve the consig ory agencies, including ISSUED ON THE BASIS (	ckaging and Tran mor from complia the government of	sportation of Radio ance with any requi f any country throu LYSIS REPORT OF	irement of the regulations ugh or into which the pack THE PACKAGE DESIGN C	of the U.S. I age will be the second	Department of Trans ransported.	
	tment o	of Energy DC 20585		Transnu	iclear, Inc. applic anuary 19, 1989,	ation		
				c. DOCKET NUM	(BER 71-9202			
CONDITION: This certific		ditional upon fulfilling t	he requirements o	of 10 CFR Part 71,	as applicable, and the cor	ditions speci	fied below.	
. · ·								
			n dia Ny INSEE dia N					
(a)	Packa	aging						
	(1)	Model No.:	TN-BRP	4				
	(2)	Description						
	(2)	Description			김 씨는 것 같은 물란 바람이다.			
		spent fuel ass This includes	em <mark>blie</mark> s. Th the <b>payl</b> oad	ne total weig capacity of	ical cask designe ht of the package 41,250 pounds.	e is appro The over	oximately 215 all dimension	5,000 pounds. ns of the
		spent fuel ass This includes package, with body is 190.5 cavity which is approximately The containme LF3) cylindrica 9.75-inch thick the cask with bolts. The case underside of the	emblies. The payload impact limit inches long 185 cubic f ent vessel c al shell, with steel (ASM forty-eight, - sk is sealed he lid. The	he total weig capacity of ters, are 244 by 83.25 ind s long and 64 reet. consists of a bottom plat ME SA-350, ( 1-5/8-inch di with a viton containment	ht of the package	e is appro The over 131 incl The cas ter. The orged ste ottom pla 74.75-in ME SA 5 in a groo ed with a	oximately 215 all dimension hes diameter sk has a cylin volume of th el (ASME SA te and lid are ich diameter 40 Grade B2 ve machined ccess and ve	5,000 pounds. Ins of the The cask adrical payload the cavity is A-350; Grade e made from lid is bolted to 24, Class 1) l in the ent ports in the
		spent fuel ass This includes package, with body is 190.5 cavity which is approximately The containme LF3) cylindrica 9.75-inch thick the cask with bolts. The cas underside of the lid, and two gas The spent fue Each compart During transpor-	emblies. The payload impact limit inches long 171 inches 185 cubic f ent vessel c al shell, with steel (ASM forty-eight, f sk is sealed he lid. The as sampling I assemblies ment can ac ort, one-half steel inserts	he total weig capacity of lers, are 244 by 83.25 ind long and 6 eet. consists of a bottom plat IE SA-350, 0 1-5/8-inch di with a viton containment ports and a s are housed ccommodate the compar	ht of the package 41,250 pounds. 1.5 inches long by ches in diameter. 4 inches in diame 9.62-inch thick for e and lid. The bo Grade LF3). The ameter steel (AS O-ring mounted t vessel is provide	e is appro The over 131 incl The case ter. The orged ste ottom pla 74.75-in ME SA 5 in a groo ed with a sentation esigned 4 ssemblies d with sp d from an	oximately 215 all dimension hes diameter sk has a cylin volume of the el (ASME SA te and lid are the diameter 40 Grade B2 ve machined ccess and ve port in the ca 4 compartme s stacked end went fuel and	5,000 pounds. Ins of the C. The cask adrical payload the cavity is A-350; Grade e made from lid is bolted to 24, Class 1) l in the ent ports in the ask body. ent fuel baske d-to-end. the remaining

NRC FORM 618A (3-96) Page 2 - Certificate No. 9202 - Revision No. 6 - Docket No. 71-9202

**U.S. NUCLEAR REGULATORY COMMISSION** 

5.(a) Packaging (continued)

(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 1.50inch 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
  - (i) The packaging is constructed in accordance with the following Transnuclear, Inc. Drawings:

3024-150-1, Rev. 2	Longitudinal Section	
3024-150-2, Rev. 4	Transverse Section	
3024-150-3, Rev. 2	Shell and Bottom	
3024-150-4, Rev. 2	Lid	
3024-150-5, Rev. 3	Trunnion	
3024-150-6, Rev. 4	Front Impact Limiter	
3024-150-7, Rev. 3	Rear Impact Limiter	
	Packaging Penetrations	
3024-150-12, Rev. 3	Lid Bolt	
3024-150-13, Rev. 2	Parts List	
3024-150-14, Rev. 2	Trunnion Shoulder Bolt	
3024-150-16, Rev. 0	Impact Limiter Spacers	
3024-150-19, Rev. 0	Tierods & Tierod Brackets	
3024-150-26, Rev. 0	Front Impact Limiter & Tierod E Assembly	Bracket
3024-150-27, Rev. 0	Rear Impact Limiter & Tierod B Assembly	racket
3024-150-31, Rev. 0	· · · · · · · · · · · · · · · · · · ·	
3024-150-32, Rev. 0	Disc Spring	

(ii) The fuel assembly basket is constructed in accordance with the following Transnuclear, Inc. Drawings:

3024-150-8, Rev. 1Basket General Arrangement3024-150-9, Rev. 0Basket Cross Section3024-150-10, Rev. 1Basket Plane View3024-150-15, Rev. 0Type A and B Spacers3024-150-17, Rev. 2Basket Peripheral Inserts3042-150-18, Rev. 2Fuel Replacement Inserts

NRC FORM 618A

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

³⁻⁹⁶ Page 3 - Certificate No. 9202 - Revision No. 6 - Docket No. 71-9202

5.(b) Contents

- (1) Type and form of material
  - (i) Irradiated BWR uranium oxide fuel assemblies as described in the application and including the following specifications:

Assembly Type	Array 	Pellet <u>dia. (in.)</u>	Clad <u>Thickness</u>	Rod <u>OD (in.)</u>	Pitch Mass <u>(in) (U) Kg</u>
В	11x11	0.275/0.373	0.034	0.344/0.449	0.577 132
С	11x11	0.275/0.373	0.034	0.344/0.449	0.577 121
D	7x7	0.620	0.040	0.700	0.921 133
D	8x8	0.500	0.035	0.570	0.807 113
E	9x9	0.471	0.040	0.562	0.707 141
F	9x9	0.471	0.040	0.562	0.707 137
D(EG)	9x9	0.471	0.040	0.562	0.707 136
EP	9x9	0.471	0.040	0.562	0.707 118

The BWR fuel assemblies have a maximum burnup of 25,000 MWD/MTU. The minimum cooling time for any assembly is fourteen years.

- (2) Maximum quantity of material per package
  - (i) Forty-four BWR assemblies.
  - (ii) Maximum decay heat per package not to exceed 3.1 kilowatts. Maximum 103 watts per BWR assembly.
  - (iii) Above fuel assemblies to be positioned in the fuel baskets as shown in the drawings referenced in 5(a)(3)(ii).
- (c) Transport Index for Criticality Control

Minimum transport index to be shown on label for nuclear criticality control: 100

- 6. Shipments must be completed between April 1 and October 31.
- 7. In addition to the requirements of Subpart G of 10 CFR Part 71:
  - a. The packaging must be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application.
  - b. The packaging must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application.
  - c. The packaging must be loaded in accordance with Section 7.1.2.19 and Chapter 1 of the application.

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NRC FORM 618A (3-96)

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

THE PROPERTY OF

Page 4 - Certificate No. 9202 - Revision No. 6 - Docket No. 71-9202

- 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: June 30, 2004.

### REFERENCES

Transnuclear Inc. application dated January 19, 1989.

Supplements dated: March 22, 1989; December 19, 1990; March 4 and October 3, 1991; April 21 and November 7, 1994, and April 27, 1999.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Thellem Trach

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date _ 6/18/59

NRC FORM 618					ATORY COMMISSION		
(3-96) 10 CFR 71			ATE OF COMPLIANCE TIVE MATERIALS PACKAGES				
1. 2. CERTIFICATE NUMBER	b. REVISION	NUMBER	c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAGES		
9203	1	0	USA/9203/AF	1	4		
2. PREAMBLE a. This certificate is issued to certificate of Federal Regulations, Particular Statement (Code of Federal Regulations, Particular Statement)	that the packaging and t 71, "Packaging and Tr	contents de	escribed in Item 5 below, meets the applicat n of Radioactive Material."	ole safety standards set f	forth in Title 10,		
applicable regulatory agencies, in	cluding the government	of any cou	any requirement of the regulations of the U ntry through or into which the package will	be transported.			
3. THIS CERTIFICATE IS ISSUED ON THI a. ISSUED TO (Name and Address)		ь. пп	EPORT OF THE PACKAGE DESIGN OR APPLI LE AND IDENTIFICATION OF REPORT OR AI	PLICATION			
3. THIS CERTIFICATE IS ISSUED ON THE a. ISSUED TO (Name and Address) Framatome Cogema I P.O. Box 11646 Lynchburg, VA 24506 4. CONDITIONS This certificate is conditional upon f 5. (a) Packaging (1) Model I (2) Descrip The pa		d	Framatome Cogema Fuels an lated May 31, 1996, as supp	emented.			
4. CONDITIONS This certificate is conditional upon f 5.	alfilling the requirement	1	R Part 71, as applicable, and the conditions	specified below.			
(a) Packaging	·						
(1) Model I	No.: DHTF						
(2) Descrip							
9.5 INC	nes by 17.5 inch is steel welded l	es high	4-gauge stainless steel conta , with a bolted and gasketed plate. The containment vess ane fiberboard of $16.5 \pm 2$ lbs	top flange closi sel is centered a	ure and		
1/8-inc bolts au 22 5 in	n thick silicone r nd nuts. The 16 shes in diameter	ubber g -gauge r. The (	ssel is maintained by a 3/8-ir pasket secured with eight, 3/8 steel outer drum is approxin drum closure is a 16-gauge l ugs, one of which is threaded	3-16NC by 1-1/2 nately 34 inches id with a 12-gau	long hex high and ge bolt		
The gr	oss weight of the	e packa	iging and contents is 490 poi	unds.			
(3) Drawin							
Fuels [ 12156	Drawing Nos. 12 DD, Rev. 6; exc	:49874E :ept tha	and assembled in accordance E, Rev. 3; 1259100C, Rev. 0; t the torque for the drum clos . 10 of this certificate.	1259101C, Rev	v. 0; and		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			256 28(28(28(28(28(28(28(28(28(28(28(28(28(2				

RC FORM	618A			CONDITIONS (continue	ed)	U.S. NUCLEAR REGULATORY COMMISSIO			
	- Cert	ificate N	lo. 9203 - Revision No	. 10 - Docket N	lo. 71-9203				
5.(b)	Cont	ents							
	(1)	Туре	and form of material						
		Dry u bagg	ranium oxide solid pel ed, as shown in Fram	llets, annular pel atome Cogema	llets, or scrap, Fuels 1215600	packaged either on trays or D, Rev. 6.			
		(i)	Solid pellets on stai and the maximum p	nless steel trays ellet diameter is	. The minimur 0.4075 inch.	n pellet diameter is 0.315 inch			
		<b>(</b> ii)	Bagged solid pellets diameter is 0.4075 i		y combination.	The maximum pellet			
		(iii)	Bagged solid pellets diameter is 0.375 in		y combination.	The maximum pellet			
		(iv)	Bagged annular pel maximum pellet dia in diameter.	lets. The minim meter is 0.304 ir	num pellet diam nch, with an an	eter is 0.291 inch and the nulus from 0.045 to 0.065 inch			
	(2)	(2) Maximum quantity of material per package							
		The is 27	maximum weight of co 5 lbs. The maximum of	ntents and all pa quantity of polye	ackaging mate thylene is 149	rials within the inner container grams per pellet box.			
		(i)	For the contents de are limited as follow		5(b)(1)(i), enric	hment and fissile quantities			
			Max. Enrichment (wt % U-235)	Max. UO ₂ mass (kg)	Max. U-235 <u>mass (kg)</u>	Max. Number <u>Pellet Boxes</u>			
			5.0	112	4.83				
		(ii)	For the contents de are limited as follow		5(b)(1)(ii), enric	chment and fissile quantities			
			Max. Enrichment (wt % U-235)	Max. UO₂ <u>mass (kg)</u>	Max. U-235 <u>mass (kg)</u>	Max. Number <u>Pellet Boxes</u>			
			5.0	84	3.62	3			
		<b>(</b> iii)	For the contents de are limited as follow		5(b)(1)(iii), enri	chment and fissile quantities			
			Max. Enrichment (wt % U-235)	Max. UO₂ <u>mass (kg)</u>	Max. U-235 <u>mass (kg)</u>	Max. Number <u>Pellet Boxes</u>			
			3.85	112	3.72	4			
				257					
		28(28(28))				T( 20, 20, 20, 20, 20, 20, 20, 20, 20, 20,			

RC FORM 6 96)	518A		CONDITIONS (continu	ied)	U.S. NUCLEAR REGULATORY COMMISSIO
Page 3	- Certificate	No. 9203 - Revision No	o. 10 - Docket	No. 71-9203	
5.(b)	(2) Max	imum quantity of mate	rial per package	e (Continued)	
	(iv)	For the contents de are limited as follow	escribed in Item vs:	5(b)(1)(iv), enri	chment and fissile quantities
		Max. Enrichment (wt % U-235)	Max. UO₂ <u>mass (kg)</u>	Max. U-235 <u>mass (kg)</u>	Max. Number <u>Pellet Boxes</u>
		5.0 3.75	84 112	3.55 3.55	3 4
(c)	Transport In	ndex for Criticality Con	trol		
	Mini labe	mum transport index tell for nuclear criticality	o be shown on control:		1.2
6.	Each packa shown on F	age must have a stainl Framatome Cogema Fi	ess steel plate ( Jels Drawing No	spacer) position b. 1249874E, R	ned between pellet boxes, as ev. 3.
7.	For packag shown on F all missing	Framatome Cogema Fi	an four loaded uels Drawing No	bellet boxes, so b. 1259100C, R	lid aluminum spacer blocks, as ev. 0, must be substituted for
8.	he position	ts described in Item 5( ed between each layer rays must be inserted	of pellets, and	on the top and	2)(i), stainless steel trays must bottom of the pellet stack. provide a snug fit.
9.	In addition	to the requirements of	Subpart G of 1	0 CFR Part 71:	
	(a) Pric mus	or to each shipment the st be replaced if the ins	e containment v spection shows	essel gasket mi any defects or s	ust be inspected. The gasket signs of degradation.
	(b) The Ope	e package must be pre erating Procedures of (	pared for shipm Chapter 7 of the	ent and operate application.	ed in accordance with the
	(c) Eac Cha	ch packaging must me apter 8 of the application	et the Acceptan	ce Tests and M ented October 2	aintenance Program of 9, 1999.
10.	inch closur	re ring bolt and lock nu ng of a package, the c	t must be torau	ed to 70 ft-lbs $\pm$	35 ft-lbs $\pm$ 10% and the 5/8- 10%. Immediately following assure it is fully seated
11.	The packa general lice	ge authorized by this c ense provisions of 10 (	ertificate is here CFR §71.12.	eby approved fo	or use under the
12.	Expiration	date: January 31, 200	1.		
			258		
				ar the same the the same same so	

**CONDITIONS** (continued)

**U.S. NUCLEAR REGULATORY COMMISSION** 

Page 4 - Certificate No. 9203 - Revision No. 10 - Docket No. 71-9203

### **REFERENCES**

Framatome Cogema Fuels application dated May 31, 1996.

Supplements dated: August 15, and September 9 and 10, 1996; September 26 and October 9, 1997; March 5, April 28, and May 8, 1998; and October 29, 1999.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

William pos Λ

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: November 5, 1959

Code of Fede b. This certificat applicable reg THIS CERTIFICAT a. ISSUED TO (No Chem-Nucl 140 Stoner	UMBER te is issued to certify that the pr ral Regulations, Part 71, "Pack te does not relieve the consigno rulatory agencies, including the E IS ISSUED ON THE BASIS OF	r from compliance with government of any co	c. PACKAGE IDEN USA/92 described in Item 5 b on of Radioactive Ma	TIFICATION NUMBER	1	e. TOTAL NUMBER PAGE
9204 PREAMBLE a. This certifica Code of Fede b. This certificat applicable reg THIS CERTIFICAT a. ISSUED TO (Mo Chem-Nucl 140 Stoner	te is issued to certify that the paral Regulations, Part 71, "Pack te does not relieve the consigno pulatory agencies, including the	ackaging and contents of aging and Transportation r from compliance with government of any contents	iescribed in Item 5 b on of Radioactive Mi	elow, meets the applicable	safety standards set 1	4
PREAMBLE a. This certifica Code of Fede b. This certificat applicable reg THIS CERTIFICAT a. ISSUED TO (Mo Chem-Nucl 140 Stoner	ral Regulations, Part 71, "Pack te does not relieve the consigno rulatory agencies, including the	ackaging and contents of aging and Transportation r from compliance with government of any contents	iescribed in Item 5 b on of Radioactive Mi	elow, meets the applicable	safety standards set f	
a. This certificat Code of Fede b. This certificat applicable reg THIS CERTIFICAT a. ISSUED TO (Mo Chem-Nucl 140 Stoner	ral Regulations, Part 71, "Pack te does not relieve the consigno rulatory agencies, including the	r from compliance with government of any co	any movimment of	elow, meets the applicable sterial."	sately standards set i	and in Title 10
applicable reg THIS CERTIFICAT a. ISSUED TO (Mo Chem-Nucl 140 Stoner	rulatory agencies, including the	government of any co		the regulations of the U.S.	Department of Trans	
LISSUED TO INC Chem-Nucl 140 Stoner		A SAFETY ANALYSIS R	EPOPT OF THE PACE		TION	
140 Stoner	ume and Address)	ь. 111		lear Systems, LL		dated
Columbia,	ear Systems, LLC idge Drive SC 29210		March 22,	2000.	o, approc.com	
		c. D0	CKET NUMBER	71-9204		
CONDITIONS	· · · · · · · · · · · · · · · · · · ·		alter de la composition de la		· · · · · · · · · · · · · · · · · · ·	
This certificate i	s conditional upon fulfilling the	requirements of 10 Cl	R Part 71, as applic	able, and the conditions sp	ecified below.	
(a) Pack	aging					
(4) . 40.						
(1)	Model No.: CNS 1	0-160B			- 1.	
(2)	Description					
	cask height Cask outer of	age has approx liameter	imate dimens	88 incho 78-1/2 i	es nches	
	Cask cavity	height		68 inch	55 85	
	Cask cavity	glameter age beight wit	h impact limite	ers 130 inch	BS	
	Overall pack	agé diameter,	with impact lir	niters 102 inch	es	
	Lead shieldi	ng thickness	jerova selo	1-7/8 inc	hes	
	(packaging Maximum to	and contents) tal weight of co	ntents,	72,000 lk	)S	
	optional sh	ield insert		14,500 lt	)S	
	Cask cavity Cask cavity Overall pack Overall pack Lead shieldii Gross weigh (packaging Maximum to shoring, se optional sh The cask body cou shell, a 1-7/8-inch (ASME SA516). The stainless steel the impact limiters. The stainless steel the impact limiters. The ratchet binders.	nsists of a 1-1/8 thick lead gam he inner and o cask cavity ha rmal shield sur he impact limite	B-inch thick ca ma shield, an uter shells are s an optional rounds the ca ers are secure	rbon steel (ASME d a 2-inch thick ca e welded to a 5-1/ 11-gage stainless sk outer shell in tl d to each other a	E SA516 or SA arbon steel ou 2-inch thick ca s steel liner. A he region betw round the casi	1537) inner ter shell arbon steel 12-gage yeen the k by eight
			2	60		

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9204 - Revision No. 5 - Docket No. 71-9204

## 5.(a)(2) Description (Continued)

The cask lid is a 5-1/2-inch thick carbon steel plate, and has a 31-inch diameter opening equipped with a secondary lid. The primary lid is sealed with a double silicone O-ring and 24 equally spaced 1-3/4-inch diameter bolts. The secondary lid is 46 inches in diameter, is centered within the primary lid, and is sealed to the primary lid by a double silicone O-ring and 12 equally spaced 1-3/4-inch diameter bolts. The space between the double of the double of the primary lid is provided with a test port for leak testing the primary and secondary lid seals.

The optional cask drain and vent ports are sealed with a plug and an O-ring seal.

The package is equipped with four tie-down lugs welded to the cask outer shell. Two lifting lugs and two redundant lifting lugs are removed during transport. The lid is equipped with three lifting lugs which are covered by the top impact limiter and rain cover during transport.

An optional carbon steel shield insert may be used within the cask cavity.

(3) Drawings

The packaging is constructed and assembled in accordance with Chem-Nuclear Systems Drawing No. C-110-D-29003-010, Sheets 1 through 5, Rev. 10.

An optional shield insert is constructed in accordance with Chem-Nuclear Systems Drawing No. C-119-B-0018, Rev. 1.

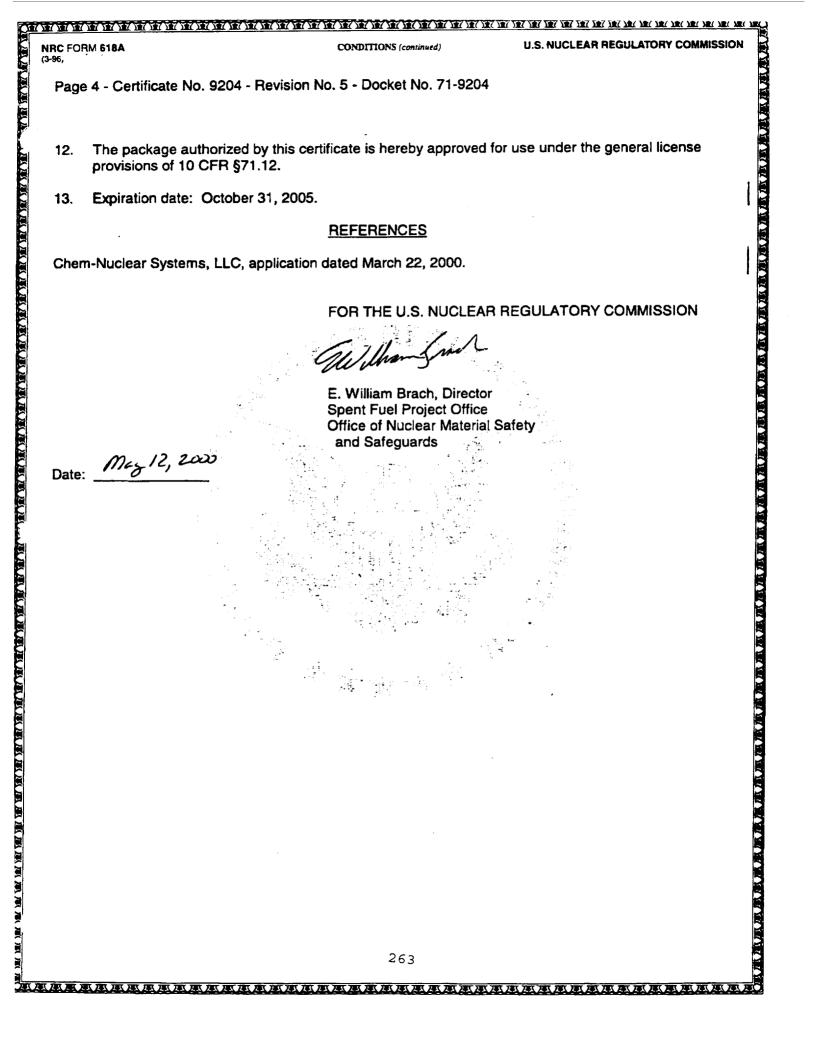
(b) Contents

- (1) Type and form of material
  - (i) Byproduct or source material in the form of solids, dewatered resins or process solids, or solidified waste, contained within secondary containers; or
  - (ii) Radioactive material in the form of activated reactor components.
- (2) Maximum quantity of material per package

Type B quantity of radioactive material, not to exceed 2,000 times a Type A quantity. Decay heat not to exceed 100 watts. Total weight of contents, shoring, secondary containers, and optional shield insert not to exceed 14,500 pounds. Contents may include fissile material contaminants provided the mass limits of 10 CFR §71.53 are not exceeded. Plutonium content not to exceed 0.74 TBq (20 curies).

- 6. Except for close fitting contents, shoring must be placed between the secondary containers or activated components and the cask cavity to prevent movement during accident conditions of transport.
- 7. The cask primary lid must be secured by 24, and the secondary lid by 12, 1-3/4"-8UNC x 5-3/8" long hex cap screws with a flat washer, torqued to 300 ft-lbs  $\pm$  30 ft-lbs (lubricated). The optional drain and vent port plugs must be torqued to 20  $\pm$  2 ft-lbs.

NRÇ FORI 3-96)	M \$18A		CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
	3 - Ce	ertificate No. 9204 - I	Revision No. 5 - Docket No. 71-9204	4
8.	Lift lu	as must be removed	I from the cask body prior to transpo	ort.
		-	nents of Subpart G of 10 CFR Part 7	
9.	in au			
	(a)	Each packaging mu 8 of the application;	ast meet the Acceptance Tests and and and	Maintenance Program of Chapter
	(b)	The package must Operating Procedur	be prepared for shipment and opera res of Chapter 7 of the application; a	ated in accordance with the and
	(c)	The primary lid, sec with new seals if ins first.	condary lid, and the optional vent an spection shows any defects or every	d drain seals must be replaced 12 months, whichever occurs
10.	The p	backage must be lea	k tested as follows:	
	(a)	8.2.2.2 of the applic material or surface standard for low sp	ent, the package must be leak-teste cation. For contents that meet the d contaminated objects in 10 CFR §7 ecific activity material and surface c 2), the pre-shipment leak-test is not	efinition of low specific activity 1.4, and also meet the exemption ontaminated objects in
	(b)	of the application p	tainment system must be leak tester rior to first use of any packaging, aft to each use, and after seal replacer	ter the third use, within the twelve
11.	(a)	generate combustit or by analysis of a l	ontaining water and/or organic subst ble gases, a determination must be representative package that the follo the expected shipment time:	made by tests and measurements
		than 5% by v secondary co	n generated must be limited to a mo olume (or equivalent limits for other intainer gas void if present at STP (i 4.7 psia and 70°F); or	inflammable gases) of the
		that oxygen is	ry container and cask cavity must be s limited to 5% by volume in those p ydrogen greater than 5%.	e inerted with a diluent to assure ortions of the package which
		prepared for shipm made. Shipment p	elivered to a carrier for transport, the ent in the same manner in which de eriod begins when the package is pr vice the expected shipment time.	termination for gas generation is
	(b)	that for low specific 10 days after ventir	ontaining materials with a radioactivi activity material, and shipped withir ng of drums or other secondary cont made, and the time restriction in (a)	n 10 days of preparation, or within ainers, the determination in (a)
		( ) <b>2</b> 5(		T. (#1) (#1) (#1) (#1) (#1) (#1) (#1) (#1)



NRC FORM 618 3-06) 10 CFR 71		CERTIFIC	ATE OF COMP	U.S. PLIANCE	NUCLEAR REGUL	
CERTIFICATE NUMBER	5		C. PACKAGE IDENTIP		d PAGE NUMBER	e. TOTAL NUMBER PAG 4
<ul> <li>2. PREAMBLE <ul> <li>a. This certificate is issue</li> <li>Code of Pederal Regult</li> <li>b. This certificate does no applicable regulatory at</li> </ul> </li> <li>3. THIS CERTIFICATE IS ISSUE <ul> <li>a. ISSUED TO (Nume and Additional Additio</li></ul></li></ul>	ations, Part 71, Pack A relieve the consigned gencies, including the ED ON THE BASIS OF Idress) tment of Energy	A SAFETY ANALYSIS R	b any requirement of the unity through or into w EPORT OF THE PACKAG LE AND IDENTIFICATION Transnuclea	e regulations of the U.S high the package will b	S. Department of Trans be transported. ATION LICATION:	
4. CONDITIONS This certificate is condition	nal upon fulfilling the	e requirements of 10 CI	R Part 71, as applicable	e and the conditions s	pecified below.	
5.	- <b>i</b>					
(a) Packagi (1)	ing Model No.:	TNREG		مینید. چ میر از میر مورد از مورد از م		
(2)						
		package is a cy	lindrical steel ca	sk designed for	shipment of up	to 20 PWR spent
	The TN-REG fuel assembli and 131 incher maximum we pounds. The frame. The containm shell and lid. of 8.5 inches. Grade B24, C machined in 1 O-ring. The c ports and a re sealed using The spent fuel compartment fuel replacent spent fuel as	es The packag is in diameter ight of the conte cask is transport the lid is approved The lid is approved The lid is bolts. The class 1) bolts. The class 1) bolts. The underside of cask is provided esearch instrume Viton O-rings.	e, with impact in The total weight ints, including the ted in a horizont ists of a 9.25-including ists of a 9.25-including commately 82.25 in d to the cask with the cask is sealed the lid. A second with access and entation port in the late a single PW a checkerboard the ternating compa- meral inserts fabr	in the package is a fuel basket as at orientation on the thick forged s inches in diameter h forty-eight 1-5 d with a Viton O d metallic O-ring I vent ports in the he cask body. A hin a 40 compar R assembly. Distantion with spe rtments, resultin icated from an a	is approximate is about 225,000 sembly, is appro- a specially des teel (ASME SA- er and has a ma /8 inch steel (A -ring mounted in g is provided to e lid, and two g ull five of these p tment fuel bask uning transport, ant fuel and hollo in a maximur	a350) cylindrical eximum thickness SME SA-540, in a groove leak test the Vitor as sampling benetrations are et. Each the 40 pw stainless steel in loading of 20

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

<u>蓙戜霕艖匨餥廯旇摝灢蒕鯂<table-cell>笷烍礛灁鵆焑焑澓渜∩凂渜瑘焿熌溸瑘霥焿瘚硛滖湠笍焿熫笍胊笍庣烪嶡笍瘚娋줅豜晀</u>瘚笷庣晀抣莐莐皒鄸滶浜

Page 2 - Certificate No. 9206 - Revision No. 6 - Docket No. 71-9206

5.(a)(2) Continued

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/tie down trunnions bolted to the cask body.

(3) Drawings

(i)

The packaging is constructed in accordance with the following Transnuclear, Inc. Drawings;

3024-150-6, Rev. 4	Front Impact Limiter
3024-150-7, Rev. 3	Rear Impact Limiter
3024-150-11, Rev. 2	Packaging Penetrations
3024-150-12, Rev. 3	Lid Bolt
3024-150-19; Rev. 0	Tie Rods and Tie Road Brackets
3024-150-21 Rev. 1	Longitudinal Section
3024-150-22 Rev, 2	Transverse Sections
3024-150-23 Rev. 1	Shell and Bottom
3024-150-24, Rev. 1	Lid
3024-150-25, Bev. 1 7	
3024-150-26, Rev. 0	Front Impact Limiter and Tie Rod
	Bracket Assembly
3024-150-27 Rev. 0	Rear Impact Limiter and Tie Rod
	Bracket Assembly
3024-150-31, Rev. 0-	Impact Limiter Attachment Bolt
	Disc Spring at Impact Limiter
3024-150-33, Rev. 1	Parts List
3024-150-36, Rev. 0	Impact Limiter Front Spacer
The first best seens	his manufactor in accordance with

The fuel basket assembly is constructed in accordance with the following (ii) 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

RC FCRM 618	4		CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
96) Page 3 - C	ertifica	ite No. 92	06 - Revision No. 6 - Docket No. 71-920	6
•				
5.(D)	Conte	nis		
	(1)	Type and	form of material	
		(I)	Imadiated PWR uranium oxide fuel as	semblies as described in the application and
		(i)	including the following specifications:	
			-	
			Fuel form	UO ₂ pellets 0.367 inch
			Nominal pellet diameter	Zircaloy
			Cladding material	0.024 inch
			Cladding thickness	162 inches
			Maximum fuel rod length	
			Maximum active fuel rod length	144 inches
			Assembly array	14 x 14
			Assembly array Maximum initial fuelpin a second sec	
			pressure at 70°F	
			Maximum mitial U ²³⁵ enrichment	‴-≪_∲ 3,5% W/0
			Initial uranium loading	* 383 kg
			The PWR fuel assemblies have a ma	ximum burnup of 15,000 MWD/MTU. The
			minimum cooling time for any assemi	bly is 17 years.
		د 		
			m quantity of material per package	
	(2)	Maximu	m quanuty diamaterial por provide a	
		ಕ್ಕಿ	Maximum of twenty PWR tuel assem	
		(i)	Maximum primeiny Furrender and	t in exceed 2.7 knowatts. Maximum 135 watts
		(ii)	Waximum decay lear ber backane he	
			per PWR assembly	
		(iii)	Above fuel assembles to be position	ed in the fuel baskets as shown in the
		-	drawings referenced in 5(a) (3) (i)	
	(3)	Transpo	ort Index for Criticality Control	
	(-)			
		Minimu	m transport index to be shown	
		on lahe	for nuclear criticality control:	100 No. 100
-			nust be completed between April 1 and C	October 31.
6.	50	pments n		
_	_			
7.	Bo	it torques:		
				_
	(a)	The cas	sk lid bolts must be torqued to 1120 ft-lbs	5.
	(b)	The bo	ts used to secure the vent and drain por	t covers must be torqued to
	•••	50 ft-lb		
	(C)	The bo	ts used to secure the upper gas samplir	ng port transport plug
	(•)	must b	e torqued to 30 ft-lbs.	
		must D	E INI YUEN IN AN ICINA.	
				a port cover and tort
	(d)	The bo	Its used to secure the lower gas samplin	A horr cover and horr
		transpo	ert plug must be torqued to 15 ft-lbs.	
			266	

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	Page 4	4 - Certificate No. 9206 - Revision No. 6 - Docket No. 71-9206
,	8.	Known or suspected fuel assemblies (rods) with cladding defects greater than pin hole leaks or hairline cracks are not authorized.
	9.	In addition to the requirements of Subpart G of 10 CFR Part 71:
		(a) 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 vacuum dried and backfilled with nitrogen at one atmosphere as described in Chapter 7 of the application.
		(b) Each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application.
		(c) The packaging must be loaded in accordance with Section 7.1.2.19 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: May 31, 2005 REFERENCES
	Supple	nuclear, Inc. application dated September 1, 1989. ements dated: March 7 and October 22, 1990, January 7 and February 11, 1991; November 7, 1994;
	March	FOR THE US NUCLEAR REGULATORY COMMISSION
		Spent Fuel Project Office Office of Nuclear Material Safety
		and Safeguards
	Date _	May 26, 200

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	NRC FORM 618 (3-96)		СЕРТ	TETC	ATE OF COM	U.S. N	IUCLEAR REGUL	ATORY COMMISSION
	10 CFR 71					LS PACKAGES		
	1. a. CERTIFICATE NUMBE	R	b. REVISION N	UMBER	c. PACKAGE IDEN	TIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAGES
	9208		11	1	USA/9	9208/B()	1	4
	2. PREAMBLE						· · · · · · · · · · · ·	
		sued to certify that the pa gulations, Part 71, "Packa				elow, meets the applicable s aterial."	safety standards set f	orth in Title 10,
Ĭ				•		the regulations of the U.S.	Department of Trans	portation or other
λX						which the package will be		
	3. THIS CERTIFICATE IS IS a. ISSUED TO (Name and		A SAFETY ANA			AGE DESIGN OR APPLICAT		orth in Title 10, portation or other
È		·····,	1					
ŝ	ATG Nuclear	Services, LLC			NuPac Sen	vices, Inc., applicat	tion	
	669 Emory V	alley Road			dated April	17, 1991, as supp	lemented.	
	Oak Ridge, T	N 37830				71 0009		
2	4. CONDITIONS	· · · · ·		c. DOC	KET NUMBER	71-9208		
		tional upon fulfilling the	requirements o	f 10 CFF	R Part 71, as applica	able, and the conditions spec	ified below.	
	5. (c) P	lookoging						
Ē	(a) P	ackaging	n an Arran an An Arran an Arran an An Arran an Arran an Arran an Arran an					all nch height. ding a and the 1- nick welded cylindrical uts, is ondary lid the primary
	(1)	Model No.: 10	-142					
Č		_ · · ·						
	(2)	Description		×				
		Steel encased	, lead shie	Ided o	ask for solid	radioactive materi	al. The over	all
		dimensions of	the cask a	und im	pact limiters	are 112-inch diam	eter by 130-i	nch height.
						n steel cylindrical s ick inner shell has		and the 1-
×						e base consists of		nick welded
Ě		steel plates of	66- and 74	4-inch	diameters.	The base is welde	d to the steel	cylindrical
						6, 1-1/2-6 UNC-2A		uts, is
						containing an oper -inch thick upper p		the primary
		lid there is a 10	6-inch or 2	9-inch	n centered se	econdary lid. The	16-inch lid is	secured by
		8, 7/8-inch stu	ds and nut	ts and	the 29-inch	lid is secured by 1	6 <b>, 1-1/4-inch</b> :	studs and
						ne flat gasket. The		t cavity is
Ē						a plugged drain por ed test port. Toroid		iters are
		located at the	top and bo	ottom	of the cask.	The impact limiter	s are 10-gaug	je steel
		sheets filled wi	ith rigid po	lyuret	hane and are	e equipped with pla	astic plugs. A	s an
E		option, interior	and exter	ior su	faces of the	cask body and inte	erior surfaces	of the
ŝ		upper lid may l	be covered		12-gauge 30	04 stainless steel c	adding and s	eal welueu.
						tainless steel them		our
E		skewed lugs, v	velded to t	the ou	ter shell are	used for tie-down.		e gross
		weight is appro	oximately (	68,000	) pounds.			
	(3)	Drawings						
	(0)	-						
		The Model No.	. 10-142 p	ackag	ing is fabrica	ated in accordance	with Nuclear	studs and t cavity is t the cask iters are ge steel s an of the seal welded. Four e gross
5		Inc., Drawing I	NO. X-103-	-110-8	or, oneets 1	through 5, Rev. H	•	
					268			
					200			
		<b>B</b> ( 2 <b>B</b> (	21(21(21(21)					<b>74</b> (74(74(74(74(74(74(74(74(74(

NRC FORM 618A (3-96)

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9208 - Revision No. 11 - Docket No. 71-9208

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

NRC FORM 618A

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

(3-9 Page 3 - Certificate No. 9208 - Revision No. 11 - Docket No. 71-9208

- Except for close fitting contents, dunnage must be provided in the shipping cask cavity 7. 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 torgued to  $300 \pm 25$  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 cask shall be leak tested in accordance with the 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 cask shall be leak tested in accordance with the supplement dated November 24, 1992.
  - d. For contents that meet the definition of low specific activity material or surface contaminated objects in 10 CFR §71.4, and also meet the exemption standard for low specific activity material and surface contaminated objects in10 CFR §71.10(b)(2), the pre-shipment leak test is not required.
- Use of intumescent coating fire shield is not authorized. 10.
- 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: July 31, 2001.

NRC FORM 618A (3-96)

CONDITIONS (continued)

**U.S. NUCLEAR REGULATORY COMMISSION** 

Page 4 - Certificate No. 9208 - Revision No. 11 - Docket No. 71-9208

### **REFERENCES**

Nuclear Packaging, Inc., application dated April 17, 1991.

Supplements dated: May 24, 1991; November 24, 1992; May 19, 1993; January 20, 1994; May 16, 1996; and August 5, 1997.

ATG Nuclear Services, LLC, supplements dated: December 1, 1998; and August 9 and 11, 1999.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

the Man (M

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: 1/11/02

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	NRC FURM 618 (3-96) 10 CFR 71					ATE OF CON	U.S MPLIANCE ALS PACKAGES	S. NUCLEAR REGUL	ATORY COMMISSION
	I. a. CERTIFICATE NUM	IBER				1	TIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAGES
1	9210			5		USA/	9210/B( )	1	3
1	2. PREAMBLE					<u></u>			<u> </u>
	Code of Federal	Regul	lations, Part 71, "Pack	aging and Tran	sportatio	n of Radioactive M			forth in Title 10,
	applicable regula	tory a	igencies, including the	government o	f any cou	ntry through or inte	f the regulations of the U. which the package will KAGE DESIGN OR APPLIC	be transported.	sportation or other
	a. ISSUED TO (Name	and Ad	ddress)			E AND IDENTIFIC.	ATION OF REPORT OR AP	PLICATION:	
	ATG Nuclea 669 Emory Oak Ridge,	Vall					cology Group, In ber 26, 1993, as		3 forth in Title 10, sportation or other cask 3-1/2-inch a 1-inch k welded eel elds. The primary lid tes of rel 6-inch
					c. DOC	KET NUMBER	71-9210		
	4. CONDITIONS				् of 10 CET	Dert 71 ac	able and the conditions -	necified below	
	This certificate is co		nai upon fulfilling the	requirements		cran /1, as applic	able, and the conditions s	pecifica below.	
	(a)	Pac	ckaging						
		(1)	Model No.:	10-135B			artes E		
		• •		*				sé a a di	
		(2)	Description				المراجع المسلم المس مسلم المسلم ال مسلم المسلم ال	dar ar	
			dimensions consists of t thick lead sl thick outer s steel plates cylindrical s top of the ca is of a stepp 76-inch diar thick lid. Th high strengt the center of 3-inch thick 1-1/4 - 7 UN at the cask- also provide Two impact limiters are surfaces of portion of th 10-gauge 3	of the cas two conce- hield. The shell has a of 66- an hells by a ask is pro- bed constr- neter and he primary f the prim plates. T NC high st primary li- d with an limiters a 10-gauge the cask be 04-stainle	sk are entric c 2 ½-inc a 76-in d 74-ir comb vided v ruction 66-inc v lid is The se anay lid the se trength d and the se trength and the ody that ss ste	112-inch dia arbon steel ch thick inne ich OD; the l nch diameter ination of fill with a primal which is ma ch diameter secured to the condary lid is also of st condary lid is also of st condary lid is also of st condary lid is also of st condary lid is also steel a bolts. High the primary lid onal Neopre ated at the to ess steel shi e lid are clace at is not cover el thermal sl	blid radioactive m meter by 130-ind cylindrical shells r shell has a 66-i base consists of s. The base is w et and full penetr y lid and a second de of two, 3-inch oined together to he cask body three which covers the epped construction secured to the temperature silinitia-secondary lid ne seal. op and bottom of ells filled with rigit with 12-gauge 3 red by the impact hield. There is a intained using 1/	ch height. The surrounding a 3 nch ID, and the two, 3-inch thic velded to the str ation groove we hay lid. The p n thick steel play of form an integrough 16, 1-1/2 29-inch diamet on consisting o primary lid throw cone gaskets a interfaces. The the cask. The d polyurethane 304-stainless st ct limiters is cov 1/4-inch gap be	cask 3-1/2-inch a 1-inch k welded eel elds. The orimary lid tes of ral 6-inch - 6 UNC er hole at f two, ugh 16, re provided e latter is impact . The inner eel. The vered with a etween the
			The packag	e gross w	veight	is limited to	68,000 pounds.		
	(3	)	Drawings						
			The packaging Drawing No. S	is constr TD-02-10	ucted 16, She	in accordance ts 1 and 2,	e with Scientific Rev. 1.	Ecology Group	, Inc.,
						:	272		
	ער אוווער אוווער אוווער אוווער אוווער אוווער א		78 78 78 78 78 78 78 78 78 78					21,21,21,21,21,21,21,21	78(78(78(78(78(78(78(78(78(7

NRC FORM 618A

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9210 - Revision No. 5 - Docket No. 71-9210

- (b) Contents
  - (1) Type and form of material:
    - (i) Dewatered, solid, or solidified waste in secondary containers;
    - (ii) Activated solid components in secondary containers; or
    - (iii) Dewatered or solidified ion exchange resins from light water reactors, in secondary containers.
  - (2) Maximum quantity of material per package:

Greater than Type A quantities of radioactive materials which may contain fissile quantities limited to the amounts as exempted under 10 CFR §71.53. Not to exceed a Type A quantity of transuranic materials except for the contents specified in 5(b)(1)(iii) and materials of low specific activity. 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:
  - (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 gmoles/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 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.
- 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.

O							<u>MQ</u>
	NRC FORM (3-96)	1 618A		CONDITIONS (continued)	U.	S. NUCLEAR REGULATORY COMMISSION	TT TT
VEVENE	Page	e 3 - Certifica	te No. 9210 - Re	evision No. 5 - Docket No.	71-9210		
	8.	The contain conditions c	ment vessel mu of ANSI N14.5):	st be leak tested to 1.3 x	10 ⁻⁶ atm-cm ³ /se	ec (at the standard	NTOTOTA
		(a) Prior to t	the first use of e	ach package;			
		(b) After the	e package's third	l use;			
		(c) Within tw	velve months of	the last leak test; and			11/11
		(d) Whenev	er gaskets are r	eplaced.			570570
	9.	(at the stand contents that objects in 1	dard conditions at meet the defir 0 CFR §71.4, ar d surface contar	of ANSI N14.5) to verify the nition of low specific activity and also meet the exemption of all of all o	nat it has been by material or s on standard for	I to 5.0 x 10 ⁻³ atm-cm ³ /sec properly assembled. For urface contaminated low specific activity the pre-shipment leak test	
	10.	The packag license prov	e authorized by visions of 10 CF	this certificate is hereby a R §71.12.	approved for us	se under the general	
	11.	Expiration of	late: January 3				
				REFERENCES		ి జిల్లా ముల్లో భామా:	707 707
			and the second second	plication dated October 2	6, 1993.	and a second sec	
	• •			October 31, 1994.			
$\sim$				upplement dated February		ి. స	0.05
	ATG Nove	a Nuclear Ser ember 30, 19	vices, LLC, sup 199.	plements dated: Decemb	14. C	gust 9 anu 11, 1999, anu	
					SI FAR REGUL	ATORY COMMISSION	101101
				El Man Ja			
				E. William Brach, Di Spent Fuel Project ( Office of Nuclear Ma and Safeguards	rector Office		1101.01301.014
	Date	e: Febru	4, 2000	)			
				274			
				274			
K		A A A A A A	1, 21, 21, 21, 21, 21, 23, 23, 23, 23, 23, 23, 23, 23, 23, 23			<u>/#\/#\/#\/#\/#\/#\/#\/#\/#\/#\/#\/#\</u> /#\/#\/#\/#\/#\/#\/#\/#\/#\/#\/#\/#\/#\/	<u></u>

NRC FORM (3-96)	618		CEDTIEL		U.S. N	UCLEAR REGUL	ATORY COMMISSIO
10 CFR 71			FOR RADIOA	CATE OF CO	MPLIANCE ALS PACKAGES		
1. a. CERTIFICATE NUMBER b. REVISIO				ER c. PACKAGE IDE	NTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PA
9212			0	U	SA/9212/B(M)F-85	1	3
2. PREAMBLE a. This ce Code or	rtificate is is f Federal Re	ssued to certify that the pa gulations, Part 71, "Pack.	ackaging and content aging and Transporta	s described in Item 5 tion of Radioactive 1	below, meets the applicable s Aaterial."	afety standards set i	forth in Title 10,
b. This cer applicat	tificate does ble regulator	s not relieve the consigno y agencies, including the	r from compliance w government of any c	ith any requirement country through or in	of the regulations of the U.S. I to which the package will be t	Department of Trans ransported.	sportation or other
3. THIS CERTIF	TCATE IS IS 10 (Name and	SUED ON THE BASIS OF A Address)			KAGE DESIGN OR APPLICATI ATION OF REPORT OR APPLIC		· · · · · · · · · · · · · · · · · · ·
		of Energy DC 20585			inghouse Electric Co ember 20, 1996, as		
			c. D	OCKET NUMBER	71-9212		
<ol> <li>CONDITION: This certific</li> </ol>	-	tional upon fulfilling the	requirements of 10 C	FR Part 71, as apoli	cable, and the conditions speci	fied below	
5.		· · · · · · · · · · · · · · · · · · ·			the are considered speci		
(a)	Packa	aina					
(a)	racha	Guið			· · · · · ·		
	(1)	Model No: RH-	TRU 72-B				
	(2)	Description			and the Alexandrian Alexandrian		
	(-)	Description		and the second		255 - 11	
		each end of the The cask body stainless steel of inner shell, with 5-inch thick stai and 18, 1 1/4-in seal. The conta lid has a single The separate in steel shell, and by a 6 1/2-inch vessel closure is butyl O-ring sea a combination v A polyurethane body using six,	cask body. (outer cask) c outer shell, an 1 7/8 inches nless steel pla ich diameter b anment seal is vent/sampling ner vessel co a 1 1/2-inch th thick stainless id has three b il, which is lea ent/sampling foam-filled sta 1 1/4-inch dia	onsists of a 1 d a 1-inch thio of lead shield ate. The cash oolts. The ma s the inner bu port that is s nsists of a 3/8 nick stainless s steel lid, and ore-type O-rir k testable. T port that are s ainless steel in meter bolts.	steel vessel, and fo 1/2-inch thick, 41 1 ck, 32 3/8-inch insiding between the two is closed by a 6-inc in closure lid has a c tyl O-ring seal, whic ealed with leak test a-inch thick, 32-inch steel bottom plate. leight, 7/8-inch dian g seals. The conta he inner vessel lid h sealed with leak-test mpact limiter is attac The radioactive conta he the inner vessel.	/8-inch outer e diameter st shells. The ch thick stain double bore- h is leak test able butyl O- outside diam The inner ven eter bolts. inment seal i as a helium h cable butyl O- ched to each	diameter tainless steel cask bottom is less steel lid, type O-ring able. The cask ring seals. theter stainless ssel is closed The inner s the middle backfill port and ring seals. end of the cask
	K JAC JAC J	<u>5, 285, 285, 285, 285, 285, 285, 285, </u>		27			

BC FORM	61 <b>8A</b>	CONDITIONS	(continued)	U.S. NUCLEAR REGULATORY COMMISSIO
P	'age 2 -	Certificate No. 9212 - Revision No. 0 -	Docket No. 71-92	12
5.(a)	(2)	Description (Continued)		
		The approximate dimensions and weig	ghts of the packag	ge are as follows:
		Overall package length	187 3/4 inc	hes
		Impact limiter diameter	76 inc	hes
		Cask length	141 3/4 inc	hes
		Cask outer diameter (OD)	41 1/8 inc	
		Inner vessel length	130 3/4 inc	
		Inner vessel OD	32 inc	
		Cask lead shield thickness	1 7/8 inc	hes
		Maximum package weight		
		(including contents)		nds
		Maximum weight of contents		ada
		(including waste caniste	er) 8,000 pou	
	$\langle 0 \rangle$		÷.	
	(3)	Drawings		
		The packaging is constructed and ass Company Drawing No. X-106-500-SN The carbon steel waste canister is cor Westinghouse Electric Company Draw	P, Sheets 1-9, Re	embled in accordance with
	Conto			₩₩₩₩₩ ₩₩₩₩ ₩
(b)	Conte			
	(1)	Type and form of material		
		Byproduct, source, and special nuclear materials and waste, within the carbon Explosives, corrosives (pH less than 2 and compressed gases are prohibited must not exceed 1 weight percent. FI the headspace of the waste canister.	n steel waste cani 2 or greater than 1 1. Within a waste ammable volatile	ster described in Item 5(a)(3). 2.5), nonradioactive pyrophorics, canister radioactive pyrophorics
	(2)	Maximum quantity of material per pac	kage.	
		Not to exceed 8,000 pounds, including	g the weight of the	e waste canister.
		Fissile material not to exceed 325 gra determined in accordance with Sectio Characterization and Fissile Content.*	ons 9.0 of Appendi	alent. Pu-239 equivalent is x 1.3.7 of the application, "Isotopic
		Maximum decay heat per package no Section 1.2.3 of the application, "Cont	t to exceed 50 watents of Packaging	atts, and not to exceed the limits in g."
(c)	Trans	sport Index for Criticality Control		
		Minimum transport index to be shown on label for nuclear criticality control:	I	0.0
			276	
			<u> </u>	

NRC FORM (3-96)	618A	CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSIO
I	Page 3 - Certificate No. 9212 -	Revision No. 0 - Docket No. 7	1-9212
6.	compatibility, gas generation dose rate must be determined	ed and limited in accordance w	mical properties, chemical otopic inventory, weight, and radiation ith Appendix 1.3.7 of the application for Payload Control (RH-TRAMPAC)."
7.	must be tested for gas gene	ot exceed the decay heat limits ration in accordance with Appe ogen Generation Rate Limits."	in Section 1.2.3 of the application, or endix 1.3.7 of the application, Section
8.	containers overpacked in the in Appendix 1.3.5 of the appl	e waste canister. Filter vents n lication "Specification for Filter ring storage must be aspirated	ster and any sealed secondary nust meet the minimum specifications Vents." Containers which were not in accordance with Appendix 1.3.7 of
9.	In addition to the requiremen	nts of Subpart G of 10 CFR Pa	n 71:-
			operated in accordance with the ocedures," of the application, as
		8.0, "Acceptance Tests and M	aintenance with the procedures
10.	The package authorized by t provisions of 10 CFR 71.12.	his certificate is hereby approv	ed for use under the general license
11.	Expiration date: February 28	<u>REFERENCES</u>	
		application dated December 2	0, 1996.
Suppl	ements dated: March 26 and a	August 23, 1999.	
			EAR REGULATORY COMMISSION
		E. William Brach, Dire	
		Spent Fuel Project Off Office of Nuclear Mate and Safeguards	ice
Date _	March 3,2000	-	
		277	

RC FORM 618 9-96) 9 CFR 71		U.S. NUCLEAR REGULATORY COMMISSIO CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIALS PACKAGES					
a. CERTIFICATE NUMI	BER	b. REVISION NUMB	ER c. PACKAGE IDE	NTIFICATION NUMBER		e. TOTAL NUMBER P.	
9215		5		USA/9215/B(U)	) 1	3	
Code of Federal I b. This certificate do	issued to certify that the p Regulations, Part 71, "Pack wes not relieve the consign ory agencies, including the	aging and Transports or from compliance v	ation of Radioactive l	Material." of the regulations of the U	J.S. Department of Tran		
3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SA a. ISSUED TO (Name and Address)		SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION:					
		с. Г		ducts, Inc. aj 4, 1992, as si 71-9215		ted	
	ditional upon fulfilling the	requirements of 10	CFR Part 71, as appli	cable, and the conditions	specified below.		
(a) Packa	aina						
(1)	Model No.: I	NPI-20WC-6 M	IkII				
(2)	Description						
	20WC-6 wooder thick steel : 3/16-inch th	n overpack. spherical st ick steel tu by bolted e	The cask i well and a c ube. Positi and covers a	contained wit s 24 inches in avity formed l ve closure of t each end of s.	n diameter wi by an 8-1/4-i the shielded	th a 3/8-incl nch ID by cask is	
(3)	Drawings						
		ucts, Inc. [ neet 2 of 2,	Prawing Nos.	ging is consti 240116, Rev.			
(b) Cont	ents						
(1)	Type and form	n of materia	erial ,				
	Cobalt-60 as sealed sources which meet the requirements of special for radioactive material.						
					,		

NRC FORM (3-96)	4 618A		<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISSION
Page	2 – Ce	ertific	ate No. 9215 - Revision No. 5 - Docket No	. 71–9215
(b)	Conte	ents (C	ontinued)	
	(2)	Maxim	um quantity of material per package	
		(i)	For sources contained within drum assemb Neutron Products, Inc. Drawing No. 24012	ly shown as Item 5 on 2, Sheet 1 of 2, Rev. G:
			Maximum activity not to exceed 15,000 cur to exceed 240 watts.	
		(ii)	For sources contained within drum assemb Neutron Products, Inc. Drawing No. 240122	ly shown as Item 4 on 2, Sheet 2 of 2, Rev:
			Maximum activity not to exceed 9,500 cur to exceed 150 watts.	ies, maximum decay heat not
		(iii)	For sources contained within drum assemble Neutron Products, Inc. Drawing No. 240122	ly shown as Item 2 on 2, Sheet 2 of 2, Rev:
			Maximum activity not to exceed 6,300 curi to exceed 100 watts.	ies, maximum decay heat not
6.	In add	dition	to the requirements of Subpart G of 10 CF	R Part 71:
	(a)	The pa	ackage must meet the Acceptance Tests and	
	(b)	The pa the Op	ckage shall be prepared for shipment and perating Procedures of Section 7.0 of the	operated in accordance with application.
7.	The cc any di plugs	ontents rectio and sp	<pre>ckage shall be prepared for shipment and berating Procedures of Section 7.0 of the must be secured in the drum assembly so in to less than 0.25 inch, by lead, steel, acers. ight of the package must not exceed 6,000 shall be snug-fitting with the wooden ove 279</pre>	as to restrict movement in or tungsten full diameter
8.	The gr shield	oss we cask	ight of the package must not exceed 6,000 shall be snug-fitting with the wooden ove	pounds, and the inner rpack.
			279	
		-	412	

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 3 - Certificate No. 9215 - Revision No. 5 - 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, 2002.

#### **REFERENCES**

Neutron Products, Incorporated application dated September 14, 1992.

Supplements dated: October 29, 1992; November 17, 1993; and September 8, 1997.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Cons K. Ch

Cass R. Chappell, Chief Package Certification Section Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: 10/30/97

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(3-96) 10 CFR 71		CERTIFICA FOR RADIOACT	ATE OF COMPLIANCE		EGULATORY COMMISS
1. 2. CERTIFICATE N	JMBER b		c. PACKAGE IDENTIFICATION NUN		ABER e. TOTAL NUMBER
9216		6	USA/9216/B		
2. PREAMBLE					·
Code of Feder b. This certificate	al Regulations, Part 71, "Package e does not relieve the consignor i	ing and Transportation from compliance with	escribed in Item 5 below, meets the a n of Radioactive Material." any requirement of the regulations o ntry through or into which the packa	f the U.S. Department of	
3. THIS CERTIFICATE a. ISSUED TO (Nar	IS ISSUED ON THE BASIS OF A ine and Address)	SAFETY ANALYSIS RE	PORT OF THE PACKAGE DESIGN OR E AND IDENTIFICATION OF REPORT	APPLICATION OR APPLICATION:	
Chem-Nucl	ear Systems, Inc.	Che	m-Nuclear Systems, Inc	application	
140 Stoneri	dge Drive		d November 24, 1987, a		
Columbia, S	SC 29210				
	· · · · · · · · · · · · · · · · · · ·	c. DOC	KET NUMBER 71-9216		
4. CONDITIONS This certificate is (	conditional upon fulfilling the re	autrements of 10 CFR	Part 71, as applicable, and the cond	itions specified below	
5.	up the second			nuons specified below.	
(a) Packa	iging				
(1)	Model No.: CNS 1-	13G			
(2)	Description				
	filled flanged plug fit equipped with a dra	ted with a silic in line and the	one rubber gasket and b physical description is a	olted closure. Ti s follows:	he cavity is
	Cask height, in		67.19		
	Cask diameter,		38.5		
	Cavity height, i		54.0		
	Cavity diamete		26.5		
	Lead shielding,		5.0		
	Protective jack	et height, in	81.8		
	Protective jacke		68.0		
	Packaging weig	ght, Ib	25,500		
(3)	Drawings				
	C-110-B-06402-001	, Rev. A; C-110	cordance with Chem-Nu D-B-06402-002, Rev. 2; C-110-B-06402-004, Rev	-	nc. Drawing Nos.
			281		

NRC FORM 618A (3-96)

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

are the state of t

Page 2 - Certificate No. 9216 - Revision No. 6 - Docket No. 71-9216

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.

500 gm U-235 equivalent mass; or

(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 Zircalloy or stainless steel. Decay heat not to exceed 600 watts. All fuel rods shall be contained within a closed 5-inch Schedule 40 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-inch Schedule 40 pipe.

- (iv) Process solids, either dewatered, solid, or solidified in a secondary sealed container meeting the requirements for low specific activity radioactive material. Fissile materials must meet the exemption standards in 10 CFR §71.53.
- (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 (or 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.

NRC (3-96)	FORM 618A		CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
Pa	ige 3 - Cei	rtificate No. 9216 - Re	evision No. 6 - Docket No. 71	-9216
5.	(c)	Transport Index for	Criticality Control	
		Minimum transport label for nuclear crit	index to be shown on icality control:	
		For contents descril 5(b)(1)(i), 5(b)(1)(ii		62.5
6.		•	s is determined by U-235 mass	s plus 1.66 times U-233 mass plus 1.66 times
	Pu ma	155.		
7.	(a)	generate combustib analysis of a repres	le gases, determination must	substances which could radiolytically be made by tests and measurements or by a following criteria are met over a period of
		5% by volume	(or equivalent limits for other i	molar quantity that would be no more than nflammable gases) of the secondary more than 0.063 g-moles/ft ³ at 14.7 psia and
	(ii)			inerted with a diluent to assure that oxygen of the package which could have hydrogen
		for shipment in the	same manner in which determ the package is prepared (sea	rt, the secondary container must be prepared ination for gas generation is made. Shipment led) and must be completed within twice the
	(b)	low specific activity venting of drums or	material, and shipped within 1	ctivity concentration not exceeding that for 0 days of preparation, or within 10 days after ne determination in (a) above need not be ot apply.
8.				ust be closed with a plug with a melting fore delivery of the package to a carrier.
9.				ust be delivered to a carrier dry and the cavity ts seal at temperatures up to at least 620°F.
10	shorin	g plug shown in Cher	ed metal hardware, the use of m-Nuclear Systems, Inc. Drav nner container must be provid	the auxiliary shielded inner container and ving Nos. 8651-E-02, Rev. A and 8651-C-01, ed with vent and drain lines.
			283	
			203	

NRC FORM 618A (3-96)

CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 4 - Certificate No. 9216 - Revision No. 6 - Docket No. 71-9216

- Shoring must be provided to minimize movement of contents during accident conditions of transport. 11.
- In addition to the requirements of Subpart G of 10 CFR Part 71: 12.
  - The package shall be prepared for shipment and operated in accordance with Chem-Nuclear (a) Systems, Inc. Operating Procedures, Section 7.0.
  - Prior to each shipment the silicone rubber lid gasket(s) must be inspected. This gasket(s) must (b) be replaced if inspection shows any defects or every twelve (12) months, whichever occurs first. Cavity drain line must be sealed with appropriate sealant applied to threads of pipe plug.
  - Prior to each shipment the baseplate to cask shell weld must be visually inspected in (c) accordance with Chem-Nuclear Systems, Inc. Operating Procedures, Section 7.0.
  - The packaging must meet Chem-Nuclear Systems, Inc. Acceptance Tests and Maintenance (d) Program, Section 8.0.
- For packaging of neutron sources, 50 times measured neutron dose rate at one meter from the 13. surface of a cask must be less than 1,000 mrem/hr.
- The contents described in 5(b)(1)(iv) must be transported on a motor vehicle, railroad car, aircraft, 14. inland water crafts, or hold or deck of a seagoing vessel assigned for sole use of the licensee.
- The package authorized by this certificate is hereby approved for use under the general license 15. provision of 10 CFR §71.12.
- Expiration date: December 31, 2002. 16.

# REFERENCES

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

Supplement dated: November 24, 1992, October 31, 1997 and March 31, 1999.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

M. Wayn Holy

E. William Brach, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date 10/19/59

	T		CERTIFIC. FOR RADIOAC	U.S. NUCLEAR REGULATORY COMMISS FOR RADIOACTIVE MATERIALS PACKAGES					
). a. CEI	RTIFICAT	ENUMBER	b. REVISION NUMBER		d. PAGE NUMBER	e. TOTAL NUMBE			
92	217		9	USA/9217/AF	1	3			
2. PREA		· ··· ··· ··· ··· ··· ··· ··· ··· ···	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		<u> </u>			
D. TI ar	Code of F his certif pplicable	ederal Regulations, Part 71, "P icate does not relieve the consi regulatory agencies, including	ackaging and Transportatio gnor from compliance with the government of any cou	any requirement of the regulations of the U mtry through or into which the package will b	S. Department of Trans be transported.				
a. ISS	CERTIFIC SUED TO	ATE IS ISSUED ON THE BASIS (Name and Address)		PORT OF THE PACKAGE DESIGN OR APPLIC LE AND IDENTIFICATION OF REPORT OR APP					
		Power Corporation		Siemens Power Corporation	application				
		n Rapids Road		dated January 26, 2000.					
Hi¢	niand,	WA 99352-0130		71-9217					
			c. DOC	KET NUMBER /1-921/					
COND) This c		is conditional upon fulfilling	the requirements of 10 CFF	t Part 71, as applicable, and the conditions sp	ecified below.				
(-)									
(a)	Pac	kaging		i den De la companya de la					
	(1)	Model No.: ANF-	250	isyst jetis					
	• •								
	(2)	Description							
		flange closure and 22-1/2-inch ID by	d steel welded bot 68-3/8-inch long,	nches ID by 57 inches long, w tom plate. The inner vessel is 16-gauge steel drum by twelve I at the top and the bottom of	centered and e 1/4-inch diam	supported in leter spring			
		flange closure and 22-1/2-inch ID by steel rods welded steel flange and a the outer containe vermiculite. The inner vessel is The outer containe diameter bolt and	d steel welded both 68-3/8-inch long, to the inner vesse 16-gauge inner b r. The annulus be s closed by six 1/2 er is closed with a lock nut. A produ	tom plate. The inner vessel is	e tive vessel. A start op of the inner uter container is hex head nuts op forged lugs d within the inn	supported in leter spring 3/8-inch thick vessel withir s filled with s at each end and a 5/8-ind			
	(3)	flange closure and 22-1/2-inch ID by steel rods welded steel flange and a the outer containe vermiculite. The inner vessel is The outer containe diameter bolt and	d steel welded both 68-3/8-inch long, to the inner vesse 16-gauge inner b r. The annulus be s closed by six 1/2 er is closed with a lock nut. A produ	tom plate. The inner vessel is 16-gauge steel drum by twelve I at the top and the bottom of and position and support the t tween the inner vessel and of -inch square shank studs with 12-gauge locking ring with druct ct container insert is positione	e tive vessel. A start op of the inner uter container is hex head nuts op forged lugs d within the inn	supported in leter spring 3/8-inch thick vessel withir s filled with s at each end and a 5/8-ind			
	(3)	flange closure and 22-1/2-inch ID by steel rods welded steel flange and a the outer containe vermiculite. The inner vessel is The outer containe diameter bolt and The maximum gro Drawings (i) The ANF-25	d steel welded both 68-3/8-inch long, to the inner vesse 16-gauge inner b r. The annulus be s closed by six 1/2 er is closed with a lock nut. A product ss weight of the p	tom plate. The inner vessel is 16-gauge steel drum by twelve I at the top and the bottom of and position and support the t tween the inner vessel and of -inch square shank studs with 12-gauge locking ring with druct ct container insert is positione	e centered and e 1/4-inch diam the vessel. A 3 lop of the inner uter container is n hex head nuts op forged lugs d within the inn pounds.	supported in leter spring 3/8-inch thick vessel within s filled with and a 5/8-inc ler vessel.			
	(3)	flange closure and 22-1/2-inch ID by steel rods welded steel flange and a the outer containe vermiculite. The inner vessel is The outer containe diameter bolt and The maximum gro Drawings (i) The ANF-25 Corporation (ii) The pellet st	d steel welded both 68-3/8-inch long, to the inner vesse 16-gauge inner b r. The annulus be s closed by six 1/2 er is closed with a lock nut. A product ss weight of the p 0 shipping contair Drawing No. EMF	tom plate. The inner vessel is 16-gauge steel drum by twelve I at the top and the bottom of and position and support the t tween the inner vessel and of -inch square shank studs with 12-gauge locking ring with dru ct container insert is positione ackaging and contents is 616 her is constructed in accordan -306,175, Rev. 16.	centered and the vessel. A solution of the inner uter container is the hex head nuts op forged lugs d within the inn pounds.	supported in leter spring 3/8-inch thick vessel within s filled with and a 5/8-inc her vessel.			
	(3)	flange closure and 22-1/2-inch ID by steel rods welded steel flange and a the outer containe vermiculite. The inner vessel is The outer containe diameter bolt and The maximum gro Drawings (i) The ANF-25 Corporation (ii) The pellet sh Corporation	d steel welded both 68-3/8-inch long, to the inner vesse 16-gauge inner b r. The annulus be s closed by six 1/2 er is closed with a lock nut. A product ss weight of the p 0 shipping contair Drawing No. EMF hipping suit case is Drawing No. EMF and pellet product	tom plate. The inner vessel is 16-gauge steel drum by twelve I at the top and the bottom of and position and support the t tween the inner vessel and of -inch square shank studs with 12-gauge locking ring with dru ct container insert is positione ackaging and contents is 616 her is constructed in accordan -306,175, Rev. 16.	centered and the vessel. A solution op of the inner uter container is the hex head nuts op forged lugs d within the inn pounds. ce with Siemens Pounds.	supported in leter spring 3/8-inch thick vessel withir s filled with at each end and a 5/8-ind ler vessel.			

NRC FORM 618A (3-96) CONDITIONS (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9217 - Revision No. 9 - Docket No. 71-9217

5.(b) Contents

- (1) Type and form of material
  - (i) Dry uranium oxide powder enriched to a maximum 5.0 w/o in the U-235 isotope.
  - (ii) Dry uranium oxide pellets enriched to a maximum 5.0 w/o in the U-235 isotope.
  - (iii) Uranium oxide pellets enriched to a maximum of 1 w/o in the U-235 isotope.
  - (iv) Uranium oxide powder enriched to a maximum of 1 w/o in the U-235 isotope.
- (2) Maximum quantity of material per package

Not to exceed 310 pounds and:

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

The contents not to exceed the following:

Maximum Enrichment (wt% U-235)

> 3.4 3.8 4.6 5.0

ům	Maximum	Maximu	i <b>m</b> 🖉 🖏
ment	Uranium Mass	U-235 N	/lass_
J-235	(kg U)	ka U-2	
ч.			 2390
**	82 4	2.12	<b>د</b> ر ا
	2/21 h = 3	1.56	Addet ( Konsta
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Not to exceed a maximum mass of 1149 gH, considering all sources of hydrogenous material within the inner vessel. The contents must be contained in product container described in 5(a)(3)(i).

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

The total contents not to exceed 120 kg U, with the U-235 content not to exceed 6 kg. Not to exceed a maximum mass of 1149 g H, including a maximum mass of 600 g polyethylene, considering all sources of hydrogenous material within the inner vessel. The contents must be contained in product container described in 5(a)(3)(iii).

(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).

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

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).

NRC FOR (3-96)	M 618A		CONDITIONS (continued	Ż)	U.S. NUCLEAR REGULATORY COMMISSIO
Page	3 - Certificate	e No. 9217 - Re	evision No. 9 - Docket i	No. 71-921	7
5.(c)	Transport Ind	ex for Criticality	Control		
		m transport inde r nuclear criticali	ex to be shown on ity control:		
		tents described in 5(b)(2)(i):	in 5(b)(1)(i) and	1.8	
		tents described n 5(b)(2)(ii):	in 5(b)(1)(ii) and	0.6	
		iv), and limited in	in 5(b)(1)(iii) and n 5(b)(2)(iii)	0.4	
6.	In addition to	the requirements	s of Subpart G of 10 CF	R Part 71:	
			repared for shipment an 7 of the application.	d operated in	naccordance with the Operating
	b. The pac applicat		et the Acceptance Test	s and Mainte	nance Program in Chapter 8 of the
		authorized by thi 0 CFR 71.12	is certificate is hereby a	oproved for u	se under the general license
8.	Expiration date	e: June 30, 200	5. REFERENCE	<u>3</u>	
Sieme	ens Power Cor	poration applicat	tion dated January 26, 2	000.	
Supple	ements dated:	January 31, Jun	he 6, and June 15, 2000		)* ~
				J.S.~NUCLE	AR REGULATORY COMMISSION
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			Spent Fuel Office of N	Brach, Direct Project Offic uclear Materi	e
Date:	July 3, 2000	<u>)</u>	and Safeg	juaros	
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	(3-96) 10 CFR 71				ATE OF COI				
	1. a. CERTIFICATE NUMBER		b. REVISION N	UMBER	c. PACKAGE IDE	NTIFICATION	NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAGES
	9218		1	1	U	SA/9218/	B(U)F-85	1	4
=! -	2. PREAMBLE				L			L	
Ĭ	a. This certificate is issued to c	ertify that the pa	ackaging and c	ontents d	escribed in Item 5	below, meets	the applicable s	afety standards set i	forth in Title 10,
	Code of Federal Regulations								
	b. This certificate does not relie applicable regulatory agencie	eve the consignores, including the	r from complia government of	ance with f any cou	any requirement of ntry through or int	of the regulation of the p	ons of the U.S. I ackage will be t	ransported.	sportation or other
NAK	3. THIS CERTIFICATE IS ISSUED ON a. ISSUED TO (Name and Address)	THE BASIS OF	A SAFETY ANA	LYSIS RE b. TITI	PORT OF THE PAC LE AND IDENTIFIC	KAGE DESIG ATION OF RE	N OR APPLICAT PORT OR APPLIC	ON CATION:	
X	Department of Ener	qv		W	estinghouse	e Electric	Corporatio	on application	n
	Washington, DC 20			da	ated August	11, 1999	, as supple	emented.	
							71-9218		
		<u></u>		c. DOC	KET NUMBER		71-9210	<u></u>	
	4. CONDITIONS This certificate is conditional up	on fulfilling the	requirements (	of 10 CF	R Part 71, as applie	able, and the	conditions spec	ified below.	
<u> </u>	5.		•	:		•			
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	(a) Packaging		lara ¹⁸ M						
									:
Ĭ	(1) Mode	No.: TR	UPACT-II						
ŝ	(2) Desc	ription			and a second second	بالمراجع المراجع ترجع الموجع الكر	jî.		
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	doub consi positi thick foam cylind heigh maxi The conta with The are a ICV I ring ( spac cavit inche	le containr ists of an u ioned withi stainless s and a 1/4 der with ou nt. The par mum allow OCA has a ainment se a seal test ICV is a rig opproximat body with a (bore seal) ers are pla y available es height.	nent for sl invented, n an outer steel outer to 3/8-inc tside dime ckage wei able contra- table contra- a domed lin al is provi port and a port and a ht circular ely 73 incla a locking r . The ICV aced in the for the co	hipme 1/4-in r conta r conta r conta h thiclension ighs n ents o d whic ded by a vent r cylin hes di ing. T / is eq e top a ontents	nt of contact ch thick stain ainment asso ainment vess k outer stain is of approxi ot more than f 7,265 pour ch is secured y a butyl rub port. der with dom ameter and The ICV cont uipped with and bottom d s is a cylinde	-handled hless stee embly (O sel (OCV less stee mately 9 h 19,250 hds. I to the C ber O-rin hed ends 98 inches ainment a seal te omed en er of appi	I transuran el inner co CA) consis ), a 10-inch I shell. The 4 inches di pounds wh CA body v g (bore se . The outs s height. T seal is pro st port and ds of the lu oximately	ic waste. The Intainment vesting of an un- thick layer of package is ameter and the loaded with with a locking al). The OCV ide dimensio he ICV lid is vided by a bu vent port. Al CV during sh 73 inches dia	ssel (ICV), ivented 1/4-inch of polyurethane a right circular 122 inches ith the ring. The OCV / is equipped ns of the ICV secured to the ityl rubber O- uminum ipping. The imeter and 75
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NRC FORM 618A (3-96)

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION

Page 2 - Certificate No. 9218 - Revision No. 11 - Docket No. 71-9218

## 5.(a)(3) Drawings

The packaging is constructed in accordance with Packaging Technology Inc. Drawing No. 2077-500 SNP, Sheets 1 through 11, Rev. N. 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. The pipe overpack is constructed and assembled in accordance with U.S. Department of Energy, Carlsbad Area Office, Drawing No. 163-001, Sheets 1 through 3, Rev. 1.

# (b) Contents

(1) Type and form of material

Dewatered, solid or solidified transuranic and tritium-contaminated materials and wastes. Materials must be packaged in one of the following payload containers: a 55-gallon drum, standard waste box (SWB), pipe overpack, or ten-drum overpack (TDOP). The payload containers are described in Appendix 1.3.3 of the application, "Specifications for Authorized Payload Containers." Materials must be restricted to prohibit explosives, corrosives, nonradioactive pyrophorics and pressurized containers. Within a payload container, radioactive pyrophorics must not exceed 1 percent by weight, and free liquids must not exceed 1 percent by volume. Flammable organics are limited to 500 ppm in the headspace of any payload container.

(2) Maximum quantity of material per package

Contents not to exceed 7,265 pounds including shoring and secondary containers. The maximum gross weight for a payload container not to exceed the following:

- (i) 1,000 pounds per 55-gallon drum,
- (ii) 328 pounds per 6-inch pipe overpack,
- (iii) 547 pounds per 12-inch pipe overpack,
- (iv) 4,000 pounds per SWB, and
- (v) 6,700 pounds per TDOP.

Maximum number of payload containers per package and authorized packaging configurations are as follows:

- (i) 14 55-gallon drums,
- (ii) 14 pipe overpacks,
- (iii) 2 SWBs,
- (iv) 2 SWBs, each SWB containing 1 bin,
- (v) 2 SWBs, each SWB containing up to 4 55-gallon drums,
- (vi) 1 TDOP
- (vii) 1 TDOP, containing up to 10 55-gallon drums,
- (viii) 1 TDOP, containing up to 6 85-gallon drums,

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- (ix) 1 TDOP, containing 1 SWB,
- (x) 1 TDOP, containing 1 bin within an SWB, or
- (xi) 1 TDOP, containing up to 4 55-gallon drums within an SWB.

Page 3 - Certificate No. 9218 - Revision No. 11 - Docket No. 71-9218	FORM 618		CONDITIONS (continued)	U.S. NUCI	EAR REGULATORY CO	MMISSION
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Paydad       Purage Pura	5.(b)(2)			160)		
Paybad       Provided Containing:       Parbage         Signalion drum       200 grams       325 grams         Signalion drum       200 grams       326 grams         Signalion drum       200 grams       325 grams         Signalion drum       325 grams       325 grams         Signalion drum       325 grams       325 grams         JOP		Fissile material not to excee	d the following:			
Container Type       Per Payloa Container       1325 grams         Seguend during       200 grams       325 grams         SWB       325 grams       325 grams         SUDP       325 grams       325 grams         Du-239 equivalent must be determined in accordance with Appendix 1.3.7 of the application, Section 3.1, "Nuclear Criticality."         Maximum decay heat per package not to exceed 40 watts. Decay heat per payload container not to exceed the values given in Appendix 1.3.7 of the application, Rates, and Maximum Allowable Wattages."         (c)       Transport Index for Criticality Control         Minimum transport index to be shown on label for nuclear criticality control:       0.0         6.       Physical form, chemical properties, chemical compatibility, configuration of 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).         7.       Each payload container must be assigned to a shipping category in accordance with Appendix 1.3.7 of the application, Section 5.2, "Decay Heat," or must be tested for gas generation in accordance with Appendix 1.3.7 of the application, Section 5.2, "Decay Heat," or must be tested for gas generation in accordance with Appendix 1.3.7 of the application, Section 5.2, "Decay Heat," or must be tested for gas generation in accordance (the application, Section 5.2, "Decay Heat," or must be tested for gas generation in accordance (the application, Section 5.2, "Decay Heat," or filter Vents		Pavload	Pu-239 Equiva	alent		nt
<ul> <li>S5-gallon drum 200 grams 2.600 grams 325 grams</li></ul>		Container Type				
Pipe overpack       200 grains       325 grams       325 grams         SWB       325 grams       325 grams       325 grams         TDOP       325 grams       325 grams       325 grams         Pu-239 equivalent must be determined in accordance with Appendix 1.3.7 of the application, Section 3.1, "Nuclear Criticality."       Maining the application of the exceed the values given in Appendix 1.3.7 of the application fates, and Maximum Allowable Wattages."         (c)       Transport Index for Criticality Control       0.0         Minimum transport index to be shown on label for nuclear criticality control:       0.0         O       0.0       0.0         C       Physical form, chemical properties, chemical compatibility, configuration of waste containers and contents, isotopic inventory, fissile content, decay heat, weight and center of gravity, radiation, "TRUPACT-II Authorized Methods for Payload Control" (TRAMPAC).         C       Each payload container must be assigned to a shipping Category. Each payload container and payload acontainer must be tested to rgas generation in accordance with Appendix 1.3.7 of the application, Section 5.1, "Payload Shipping Category. Payload container and payload container must be labeled to indicate its shipping category. Payload container and payload container must be labeled to indicate its shipping category. Payload containers of 0. "Payload Assembly Requirements."         6.       Each payload container must be equipped with filtered vents meeting the minimum requirements of Appendix 1.3.7 of the application, Section 5.3, "Test Category Requirements."		55-gallon drum	<b>—</b>			
SWB TOP         325 grams         325 grams           Pa:239 equivalent must be determined in accordance with Appendix 1.3.7 of the application, Section 3.1, "Nuclear Criticality."           Maximum decay heat per package not to exceed 40 watts. Decay heat per payload container not to exceed the values given in Appendix 1.3.7 of the application, Table 5-6, "List of Approved Shipping Categories, Maximum Allowable Hydrogen Gas Generation Rates, and Maximum Allowable Wattages."           C1 Transport Index for Criticality Control         0.0           Minimum transport index to be shown on label for nuclear criticality control:         0.0           C1 Stratements, 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-11 Authorized Methods for Payload Control"           C3 Each payload container must be assigned to a shipping category." Each payload container and payload assembly must not exceed the allowable wattage in accordance with Appendix 1.3.7 of the application, Section 5.1, "Payload Shipping Category." Each payload containers and payload assembly must not exceed the allowable wattage in accordance with Appendix 1.3.7 of the application, Section 5.2, "Decay Heat," or must be tested for gas generation in accordance with Appendix 1.3.7 of the application, Section 5.3, "Test Category Requirements."           C3 Each payload container must be labeled to indicate its shipping category. Payload containers of Appendix 1.3.5 of the application, Section 5.3, "Test Category Requirements."           C4 Each payload container must be labeled to indicate its shipping category. Payload containers of Appendix 1.3.5 of the		Pipe overpack	•			
<ul> <li>TDP Carginal</li> <li>Readen and the second provided the second provided the second provided of the second provided shipping Categories, Maximum Allowable Hydrogen Gas Generation, Table 5, "Ist of Approved Shipping Categories, Maximum Allowable Hydrogen Gas Generation States, and Maximum Allowable Wattages."</li> <li>(1) Transport Index for Criticality Control Minimum transport index to be shown on label for nuclear criticality control.</li> <li>(2) Physical form, chemical properties, chemical compatibility, configuration of waste containers and contents, isotopic inventory, fissile content, decay heat, weight and center of gravity, radiation, artupACT-11 Authorized Methods for Payload Control" (TRAMPAC).</li> <li>(3) Each payload container must be assigned to a shipping Category." Each payload containers and payload assembly must not exceed the allowable wattage in accordance with Appendix 1.3.7 of the application, Section 5.1, "Payload Shipping Category." Each payload container must be assigned to a shipping Category. "Each payload container must be assigned to a shipping Category. Bach payload container and payload assembly must not exceed the allowable wattage in accordance with Appendix 1.3.7 of the application, Section 5.1, "Payload Shipping Category. Bach payload containers and payload assembly must not exceed the allowable wattage in accordance with Appendix 1.3.7 of the application, Section 5.2, "Decay Heat," or must be tested for gas generation in accordance with Appendix 1.3.7 of the application, Section 5.3, "Test Category Requirements."</li> <li>(3) Each payload container must be labeled to indicate its shipping category. Payload containers with appendix 1.3.5 of the application, "Specification for Filter Vents." Drums which were not equipped with filtered vents during storage must be aspirated in accordance with Appendix 1.3.7 of the application, Section 5.5, "Venting and Aspiration."</li> </ul>						
<ul> <li>application, Section 3.1, "Nuclear Unituality.</li> <li>Maximum decay heat per package not to exceed 40 watts. Decay heat per payload container not to exceed the values given in Appendix 1.3.7 of the application, Table 5.6, "List of Approved Shipping Categories, Maximum Allowable Hydrogen Gas Generation Rates, and Maximum Allowable Wattages."</li> <li>(c) Transport Index for Criticality Control</li> <li>Minimum transport index to be shown on label for nuclear criticality control</li> <li>O.0</li> <li>Physical form, chemical properties, chemical compatibility, configuration of 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-11 Authorized Methods for Payload Control" (TRAMPAC).</li> <li>Each payload container must be assigned to a shipping Category. "Each payload container and payload assembly must not exceed the allowable wattage in accordance with Appendix 1.3.7 of the application, Section 5.1, "Payload Shipping Category. Payload containers with Appendix 1.3.7 of the application, Section 5.3, "Test Category Requirements."</li> <li>Each payload container must be labeled to indicate its shipping category. Payload containers with Appendix 1.3.7 of the application, Section 5.3, "Test Category. Payload containers of Appendix 1.3.7 of the application, Section 5.5, "Venting and Aspiration for Eliter Vents." Drums which were not equipped with filtered vents during storage must be aspirated in accordance with Appendix 1.3.7 of the application, Section 5.5, "Venting and Aspiration."</li> </ul>			-		-	
<ul> <li>application, Section 3.1, "Nuclear Unituality.</li> <li>Maximum decay heat per package not to exceed 40 watts. Decay heat per payload container not to exceed the values given in Appendix 1.3.7 of the application, Table 5.6, "List of Approved Shipping Categories, Maximum Allowable Hydrogen Gas Generation Rates, and Maximum Allowable Wattages."</li> <li>(c) Transport Index for Criticality Control</li> <li>Minimum transport index to be shown on label for nuclear criticality control</li> <li>O.0</li> <li>Physical form, chemical properties, chemical compatibility, configuration of 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-11 Authorized Methods for Payload Control" (TRAMPAC).</li> <li>Each payload container must be assigned to a shipping Category. "Each payload container and payload assembly must not exceed the allowable wattage in accordance with Appendix 1.3.7 of the application, Section 5.1, "Payload Shipping Category. Payload containers with Appendix 1.3.7 of the application, Section 5.3, "Test Category Requirements."</li> <li>Each payload container must be labeled to indicate its shipping category. Payload containers with Appendix 1.3.7 of the application, Section 5.3, "Test Category. Payload containers of Appendix 1.3.7 of the application, Section 5.5, "Venting and Aspiration for Eliter Vents." Drums which were not equipped with filtered vents during storage must be aspirated in accordance with Appendix 1.3.7 of the application, Section 5.5, "Venting and Aspiration."</li> </ul>		Du 220 oquivalent #	oust be determined in a	accordance wit	h Appendix 1.3.7 c	of the
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<ul> <li>container not to exceed the values given in reporting Allowable Hydrogen Gas Generation Rates, and Maximum Allowable Wattages.</li> <li>c) Transport Index for Criticality Control</li> <li>Minimum transport index to be shown on label for nuclear criticality control: 0.0</li> <li>Physical form, chemical properties, chemical compatibility, configuration of 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).</li> <li>Each payload container must be assigned to a shipping category in accordance with Appendix 1.3.7 of the application, Section 5.1, "Payload Shipping Category," Each payload container and payload assembly must not exceed the allowable wattage in accordance with Appendix 1.3.7 of the application, Section 5.2, "Decay Heat," or must be tested for gas generation in accordance with Appendix 1.3.7 of the application, Section 5.3, "Test Category Requirements."</li> <li>Each payload container must be labeled to indicate its shipping category. Payload containers with appendix 1.3.7 of the application, Section 5.3, "Test Category Requirements."</li> <li>Each payload container must be equipered with filtered vents meeting the minimum requirement of Appendix 1.3.5 of the application. Specification for Filter Vents." Drums which were not equipped with filtered vents during storage must be aspirated in accordance with Appendix 1.3.5 of the application, Specification for Filter Vents." Drums which were not equipped with filtered vents during storage must be aspirated in accordance with Appendix 1.3.7 of the application, Specification for Filter Vents." Drums which were not equipped with filtered vents during storage must be aspirated in accordance with Appendix 1.3.5 of the application, Specification for Filter Vents." Drums which were not equipped with filtered vents during storage must</li></ul>		application, et al.			au haat par pavloai	Ч
<ul> <li>container not to exceed the values given in reporting Allowable Hydrogen Gas Generation Rates, and Maximum Allowable Wattages.</li> <li>c) Transport Index for Criticality Control</li> <li>Minimum transport index to be shown on label for nuclear criticality control: 0.0</li> <li>Physical form, chemical properties, chemical compatibility, configuration of 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).</li> <li>Each payload container must be assigned to a shipping category in accordance with Appendix 1.3.7 of the application, Section 5.1, "Payload Shipping Category," Each payload container and payload assembly must not exceed the allowable wattage in accordance with Appendix 1.3.7 of the application, Section 5.2, "Decay Heat," or must be tested for gas generation in accordance with Appendix 1.3.7 of the application, Section 5.3, "Test Category Requirements."</li> <li>Each payload container must be labeled to indicate its shipping category. Payload containers with appendix 1.3.7 of the application, Section 5.3, "Test Category Requirements."</li> <li>Each payload container must be equipered with filtered vents meeting the minimum requirement of Appendix 1.3.5 of the application. Specification for Filter Vents." Drums which were not equipped with filtered vents during storage must be aspirated in accordance with Appendix 1.3.5 of the application, Specification for Filter Vents." Drums which were not equipped with filtered vents during storage must be aspirated in accordance with Appendix 1.3.7 of the application, Specification for Filter Vents." Drums which were not equipped with filtered vents during storage must be aspirated in accordance with Appendix 1.3.5 of the application, Specification for Filter Vents." Drums which were not equipped with filtered vents during storage must</li></ul>		Maximum decay heat per p	ackage not to exceed 4	40 watts. Dec	ay near per payloa	e 5-6.
<ul> <li>List of Approved Shipping Categories, international and the set of t</li></ul>		container not to exceed the	values given in Appen	dix 1.3.7 of th	e application, Table	ation
<ul> <li>Rates, and Maximum Ailowable Watages.</li> <li>(c) Transport Index for Criticality Control Minimum transport index to be shown on label for nuclear criticality control: 0.0</li> <li>Physical form, chemical properties, chemical compatibility, configuration of waste containers and odse rate must be determined and limited in accordance with Appendix 1.3.7 of the application, "TRUPACT-II Authorized Methods for Payload Control" (TRAMPAC).</li> <li>Each payload container must be assigned to a shipping category." Each payload container and payload assembly must not exceed the allowable wattage in accordance with Appendix 1.3.7 of the application, Section 5.1, "Payload Shipping Category." Each payload container and payload assembly must not exceed the allowable wattage in accordance with Appendix 1.3.7 of the application, Section 5.3, "Test Category Requirements."</li> <li>Each payload container must be labeled to indicate its shipping category. Payload containers within a package shall be selected in accordance with Appendix 1.3.7 of the application, 6.0, "Payload Assembly Requirements."</li> <li>Each payload container must be equipped with filtered vents meeting the minimum requirement of Appendix 1.3.5 of the application, "Specification for Filter Vents." Drums which were not equipped with filtered vents during storage must be aspirated in accordance with Appendix 1.3.2 of the application, Section 5.5, "Venting and Aspiration."</li> </ul>		"List of Approved Shipping	Calegones, maximum	Allowable Hyd	rogen das denere	
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<ul> <li>within a package shall be selected in accordance with opperations of a payload Assembly Requirements."</li> <li>Each payload container must be equipped with filtered vents meeting the minimum requirement of Appendix 1.3.5 of the application, "Specification for Filter Vents." Drums which were not equipped with filtered vents during storage must be aspirated in accordance with Appendix 1.3.5 of the application, Section 5.5, "Venting and Aspiration."</li> </ul>	7.	Each payload container must be a 1.3.7 of the application, Section 5 payload assembly must not excee the application, Section 5.2, "Dec with Appendix 1.3.7 of the applica	assigned to a shipping 6.1, "Payload Shipping ( ed the allowable wattag ay Heat," or must be te ation, Section 5.3, "Tes	category in ac Category." Ea ge in accordan ested for gas g t Category Re	ce with Appendix 1 Jeneration in accord quirements.*	.3.7 of dance
of Appendix 1.3.5 of the application, "Specification for the approximated in accordance with Appendix 1.3. equipped with filtered vents during storage must be aspirated in accordance with Appendix 1.3. of the application, Section 5.5, "Venting and Aspiration."	8.	within a package shall be selecte 6.0. "Payload Assembly Requirer	ments."	<b>₩₽</b>	-	
	9.	of Appendix 1.3.5 of the application	ng storage must be asp	pirated in acco	rdance with Append	not dix 1.3.7
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NRC FORM 6 (3-96)	51 <b>8A</b>		CONDITIONS (cor	ntinued)	U.S. NUCLEAR REGULATORY COMMISSION
Р	age 4 -	- Certificate No. 921	8 - Revision No. 11 - I	Docket No. 71-92	18
10.	In add	dition to the requirem	nents of Subpart G of	10 CFR Part 71:	
	(a)	Each package must the procedures des supplemented.	st be prepared for shi scribed in Chapter 7.0	pment and operat ), "Operating Proc	ed in accordance with cedures," of the application, as
	(b)	Each package mus described in Chap application, as sup	ter 8.0, "Acceptance 7	tained in accordat Fests and Mainter	nce with the procedures nance Program," of the
	(c)	Prior to each shipr vessels must be le "Assembly Verifica	ak tested in accordan	port seals on the ace with Appendix	inner and outer containment 7.4.2 of the application,
	(d)	All free standing w outer containment	vater must be removed vessel cavity before s	d from the inner c shipment.	ontainment vessel cavity and the
11.	The p provis	backage authorized to a sign of 10 CFR §71	by this certificate is he .12.	reby approved for	r use under the general license
12.	Expira	ation date: June 30,	2004.		
			REFERE	<u>NCES</u>	
Westi	nghous	se Electric Corporatio	on application dated A	August 11, 1999.	
Suppl	ements	s dated: July 23 and	October 7, 1999.		
TRU	PACT-I	II Content Codes (TF	RUCON)," DOE/WIPP	9 89-004, Rev. 12,	, dated July 1999.
				here to give	REGULATORY COMMISSION
			The Men	- Jun	
			Spent Fue	Brach, Director I Project Office Nuclear Material S Iguards	Safety
Date:	Decen	nber 28, 1999			
			291		

	ATTATION 1010510510		57657657657		<u> </u>		Or O					
	NRC FORM 618 (3-96) 10 CFR 71			CERTIFIC. FOR RADIOAC	U.S. NUCLEAR REGULATORY COMMISSION CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIALS PACKAGES b. REVISION NUMBER 3 C. PACKAGE IDENTIFICATION NUMBER 3 USA/9221/B()F 1 C. TOTAL NUMBER PAGES							
	1. a. CERTIFICATE	NUMBER 9221		b. REVISION NUMBER	c. PACKAGE IDEN	TIFICATION NUM	^{IBER} /B()F	d. PAGE NUMBER	e. TOTAL NUMBER PAGES			
	2. PREAMBLE a. This certific Code of Fec b. This certific applicable m 3. THIS CERTIFICA a. ISSUED TO (// U.S. Divi Wash 4. CONDITIONS	cate is issued to cenderal Regulations, tate does not relieve egulatory agencies TE IS ISSUED ON T Name and Address) Departmer sion of Nation, DC	rtify that the part 71, "Pack e the consigned, including the THE BASIS OF of of En- tival Rea 20585 n fulfilling the Mode Desc Top	ackaging and contents of aging and Transportation or from compliance with government of any co A SAFETY ANALYSIS R b. TTT ergy ctors c. DO requirements of 10 CF requirements of 10 CF No.: NRBK- ription	described in Item 5 to on of Radioactive M in any requirement of antry through or into EPORT OF THE PACI- LE AND IDENTIFICA Safety An Shipping November CKET NUMBER TR Part 71, as applic -41	elow, meets the a aterial." The regulations co which the packa CAGE DESIGN OR ATION OF REPORT alysis for Cask NRBK- 2, 1995, a 71-9221 able, and the cond	applicable sa of the U.S. I age will be to c APPLICATI r OR APPLIC r Radio -41 dat as supp ditions speci	afety standards set f Department of Trans ransported. ON ATION: Deactive Mat ded lemented.	steel			
		(2)	clad cask high cask prov thic The an e shie surf ther weld stai rece shie to a of t	casks for t has an outs The outer cavity is 5 ided with a k stainless cask is clos lastometer 0 al-welded, 1 id which pro face of the c mal shield. led to the bo nless steel ess is welded id for the b 48-inch squ the package i	ne shipment ide diamete shell is 1 inches in bottom drai steel and i ed by a lea -ring gaske /4-inch thi vides a 1/1 ask outer s A one-inch ttom of cas plate with to the fir ottom surfa are, all we	of irrad r of 27.10 /2-inch t diameter n. The c s shielde d-filled t and bol ck, stain 6-inch ai hell and thick st k. A sec a 1/8-inc st plate ce of the lded, "I"	iated 1 6 inche hick st by 16 f avity 3 d by 10 flanged ted clo less st r gap 1 the ins ainless ond one h deep to pro cask. beam	test specin est and is 4 tainless st inches deep shell is 1/ inches of plug fitt osure. The teel outer between the side surfac side surfac steel pla e-inch thic side a the The cask skid. Gros	ens. The O inches eel. The and is 4-inch tead. ed with cask has thermal couter cask has thermal couter cask has thermal couter mal is bolted			
		(3)	The Memo Shee No.	vings packaging is prial Institu et 2, Rev. E, 1755E01, Rev	te Drawing and Westin . D.	No. 41-00 ghouse El	01, Sh ectric	eet 1, Rev Corporatio	. D, and on Drawing			
AN ANALAN				17 22 (	2	92	( ) ( ) ( )		, 785, 785, 785, 785, 785, 785, 785, 785			

NRC F (3-96)	ORM 618A			CONDITIONS (continued) U.S. NUCLEAR REGULATORY COMMISSIO
	Pag	e 2 -	Certif	ficate No. 9221 – Revision No. 3 – Docket No. 71–9221
	5.	(b)	Conte	ents
			(1)	Type and form of material
				Byproduct and special nuclear material in solid form, contained within either the MIN-41 or the HIP-41 product containers. The MIN-41 container is constructed in accordance with Westinghouse Electric Corporation, Drawing No. 2D77456 Rev. F. The HIP-41 product container is constructed in accordance with Westinghouse Electric Corporation Drawing No. 5D06622, Rev. B.
			(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 plutonium. The maximum decay heat load per package must not exceed 240 Btu/hr.
				Plutonium in excess of twenty (20) curies per package must be in the form of metal, metal alloy or reactor fuel elements.
		(c)	Transp	port Index for Criticality Control
			Minimu label	Im transport index to be shown on for nuclear criticality control: 0.0
	6.	In a	ddition	to the requirements of Subpart G of 10 CFR Part 71:
		(a)	The pa Proced	ackage must be operated in accordance with the Operating Jures in Section 7.0 of the application, as supplemented.
		(b)	The pa Proced	ickage must be maintained in accordance with the Maintenance lures in Section 8.2 of the application, as supplemented.
	7.	poly a cle	vinyl c osed ve	shipping container may be covered with a wrapping of hloride (PVC) during shipment provided the shipment is made in hicle. The applicable requirements of 10 CFR §71.87 must be rior to wrapping the shipping container.
	8.	Expin	ration	date: September 30, 2001.
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NRC FORM 618A (3-96) **CONDITIONS** (continued)

Page 3 - Certificate No. 9221 - Revision No. 3 - Docket No. 71-9221

# **REFERENCES**

Safety Analysis for Radioactive Material Shipping Cask No. NRBK-41 dated November 2, 1995.

Supplement: Naval Reactors letter #S96-11965 dated August 28, 1996.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

William D. Travers, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date:

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NRC FORM 618 (8-2000) 10 CFR 71			ATE OF COMPL TIVE MATERIAL F		ULATORY C	OMMISS				
CERTIFIC	ATE NUMBER	b. REVISION NUMBER	C. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	P				
	9225	24	71-9225	USA/9225/B(U)F-85	1	OF				
2. PREAMBLE	<u> </u>		· ·							
a. This ce forth in	rtificate is issued to certify Title 10, Code of Federal F	that the package (packag Regulations, Part 71, "Pac	ing and contents) descr kaging and Transportati	ibed in Item 5 below meets the application of Radioactive Material."	ble safety sta	andards a				
b. This ce other a	rtificate does not relieve the pplicable regulatory agencie	e consignor from complia es, including the governm	nce with any requirement ment of any country throu	nt of the regulations of the U.S. Depart igh or into which the package will be tr	ment of Trans ansported.	sportatio				
		HE BASIS OF A SAFET	' ANALYSIS REPORT (	OF THE PACKAGE DESIGN OR APPL	ICATION					
a. ISSUEI	) TO (Name and Address)		b. TITLE AND I	DENTIFICATION OF REPORT OR AP						
655 E	International, Inc. Ingineering Drive	NUCLEA	R RNuclear A dated Jan	ssurance Corporation applic นู้ส้าy <u>1</u> 4, 2000, as suppleme	ation					
Suite Norcr	200 oss, GA 30092	JCE		A						
CONDITION	s 🔍	2		0						
This certifica	te is conditional upon foilil	ing the requirements of 1	0 CFR Part 71, as apolic	cable, and the conditions specified bek						
	U;	1881		EXT /						
(a) Pac	Packaging									
(1)	Model No: NA	C-LWT	Kund	0 M N						
(2)	Description									
	The LWT is a st	eel-encased, lead	shielded shipping	cask. The cask is designe	d to trans	oort				
	one PWH assen	ndiv. two BWR as	semblies, up to 15	metallic fuel rode up to 42	MTR fual					
	assemblies and	plates, up to 25 in	dividual PWR rod	s, up to 25 individual high b	umup PW	R				
	or BVVH roas, up	DIO 140 I RIGA tu	el elements, or up	to 560 TRIGA fuel cluster r	ods. The					
	diameter The e	nstorane package	, with impact limit	ers, are 232 inches long by	65 inches	in				
	The cask cavity	is 178 inchestona	and 12 Alinet at	es in length and 44 inches in	n diametei	r.				
	approximately 1	4.5 cubic feet.	and 13.4 mones	in diameter. The volume of	the cavity	IS				
	The cask body c	onsists of a 0.75-i	nch-thick stainles	s steel inner shell, a 5.75-ind	ch-thick le	ad				
	gamma shield, a	1.2-inch-thick sta	inless steel outer	shell, and a neutron shield t	ank. The					
	inner and outer s	snells are welded t	0 a 4-inch-thick s	tainless steel bottom end for	ging. The	Э.				
	thick stainlase et	eel plate and hott	NCK, 20.75-INCN-di	ameter lead disk enclosed b he cask lid is 11.3-inch-thic	y a 3.5-in	ch-				
	steel stenned de	sign secured to a	11 25-inch-thick	ripa forging with twolvo 1 inc	k stainiess	5				

steel stepped design, secured to a 14.25-inch-thick ring forging with twelve 1-inch diameter bolts. The cask seal is a metallic O-ring. A second teflon O-ring and a test port are provided to leak test the seal. Other penetrations in the cask cavity include the fill and drain ports, which are sealed with port covers and teflon O-rings.

The neutron shield tank consists of a 0.24-inch-thick stainless steel shell with 0.50-inch-thick end plates. The neutron shield region is 164-inches long and 5-inches thick. The neutron shield tank contains an ethylene glycol/water solution that is 1% boron by weight.

н	NRC FORM 618 (8-2000) 10 CFR 71		TE OF COMPL		JLATORY	COMM	ISSION
	1. & CERTIFICATE NUMBER	b. REVISION NUMBER	C. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
	9225	24	71-9225	USA/9225/B(U)F-85	2	OF	15

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

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.

REGU = AR (3) Drawings The packaging is constructed in accordance with the following Nuclear Assurance (i) Corporation Drawings: Cask Assembly LWT 315-40-01, Rev. 4 Body Assembly LWT 315-40-02, Rev. 10 LWT-315-40-03, Rev. 15 (Sheets 1-6)* Transport Cask Body Cask Lid Assembly LWT 315-40-04, Rev. 9 Upperstimpact Limiter LWT 315-40-05, Rev 3 Lower Impact Limiter LWT 315-40-06, Rev 7 **Cask Parts Detail** LWT 315-40-08, Rev. 11 / Sheets 1-CD 3 4, and 5 are constructed in accordance * Packaging Unit Nos. 1 with Drawing No. LWT 345-40-03, Rev. 6 (Sheets 1-6). 10-2 The fuel assembly baskets are constructed in accordance with the following Nuclear (ii) Assurance Corporation and NAC International Drawings: PWR Basket Spacer LWT 315-40-09. Rev. 2 PWR Basket LWT 315-40-10, Rev. 3 **BWR Basket Assembly** LWT 315-40-11, Rev. 2 Metal Fuel Basket Assembly LWT 315-40-12, Rev. 3 42 MTR Element Base Module LWT 315-40-045, Rev. 4 42 MTR Element Intermediate Module LWT 315-40-046, Rev. 4 42 MTR Element Top Module LWT 315-40-047, Rev. 4 42 MTR Element Cask Assembly LWT 315-40-048, Rev. 1 28 MTR Element Base Module LWT 315-40-049, Rev. 4 28 MTR Element Intermediate Module LWT 315-40-050, Rev. 4 28 MTR Element Top Module LWT 315-40-051, Rev. 4 28 MTR Element Cask Assembly LWT 315-40-052, Rev. 1 7 Cell Basket TRIGA Base Module LWT 315-40-070, Rev. 3 7 Cell Basket TRIGA Intermediate LWT 315-40-071, Rev. 3 Module LWT 315-40-072, Rev. 3 7 Cell Basket TRIGA Top Module TRIGA Fuel Cask Assembly LWT 315-40-079, Rev. 1 7 Cell Poison Basket TRIGA Base LWT 315-40-080, Rev. 2 Module

NRC FORM 618 (8-2000)				U.S. NUCLEAR REG	ULATORY COMM	ISSION
0 CFR 71			TE OF COMPL			
A. CERTIFICATE NUMBER		D. REVISION NUMBER	IVE MATERIAL F	d. PACKAGES	1.0105	
9225		24	71-9225	USA/9225/B(U)F-85	PAGE 3 OF	PAGES
			11-3225	<u> </u>		15
F(a)/2)/ii) Drowings (as						
5.(a)(3)(ii) Drawings (cor	iunuea)					
LW	T 315-40	0-081, Rev. 2		7 Cell Poison Basket TRIG	A	
				Intermediate Module	~	
LW	T 315-40	)-082, Rev. 2		7 Cell Poison Basket TRIG	A Top Module	
		-083, Rev. 0		Spacer, LWT Cask Assemb		•
				Fuel		
LW	T 315-40	)-084, Rev. 2		LWT Transport Cask Assy	140 TRIGA	
				Elements		
		-090, Rev. 2	DEA	35 MTR Element Base Mod	lule	
LW	1 315-40 T 015 40	-091, Bev 2	1 ncG/	35 MTR Element Base Mod 35 MTR Element Intermedia 35 MTR Element Top Modu	ate Module	
	1 315-40 T 215 40	-092, Rev. 2	¥	35 MTR Element Top Modu	le	
		-094, Rev. 2 -096, Rev. 2		So Ming Element Cask Assi	emply	
		-096, Rev. 2 -098, Rev. 1		Fuel Rod Insert, TRIGA Fue		
I W	T 315-40	-098, Rev. 1		Can Assembly, LWT Pin Sh		
2		0005, 1187. 0		Can Weldment, PWR/BWR	ransport	
LW.	T 315-40	-100 Rev. 1		Lids, PWR/BWR Transport	Canistor	
LW	T 315-40	-101, Rev. 0		4 4 Insert, PWR/BWR Tra	nenort	
	2.0			Canister	noport	
LŴ	T ⁻ 315-40	102, Bev. (	hund )	5 5 Insert, PWR/BWR Tra	nsport	
				Canister 🍣	•	
LW	T _, 315-40	-103, Rev. 70-		Pin Spacer, PWR Transport	Canister	
LW	1 315-40	-104, Rev. 0	Reco	LWT Cask Assembly, PWR	Transport	
1.34/7		So Ma		Canister		
Lvv	1,315-40	-105, Hev. 3-		PWR Insert, PWR/BWR Tra	insport	
I W1	1315-00	-106, Rev. 1 sh				
		/ 100, 110V. 1 SU		MTR Plate Canister, LWT C	ask	
	4		•	NC		
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5.(b) Contents

- (1) Type and form of material
  - (i) Irradiated PWR fuel assemblies. The maximum fuel assembly weight is 1650 pounds, the maximum average burnup is 35,000 MWD/MTU, the minimum cool time is 2 years, and the maximum initial fuel pin pressure at 70°F is 565 psig. The fuel assemblies consist of uranium dioxide pellets within zircaloy cladding, with the specifications listed below, and with fuel rod pitch, rod diameter, clad thickness, and pellet diameter as described in Table 1,2-5, of the application, as supplemented.

		iEG/.		·
25	No. Fuel Rods	Max. Initial Uranium Enrichment (w/o U-235)	Max. Initial Branium Mass (MTU)	Max. Active Fuel Length (in.)
B&W 15x15	208	3.5	0.4750	144.0
B&W 17x17	264	3,5	0.4658	143.0
CE 14x14	and hu	37	0.40370	137.0
CE 16x16	236	3.7	0.441	150.0
WE 14x14 Std	179	35,000	6.414	145.2
WE 14X14 OFA	iro-ffell	este a	0.3612	144.0
WE 15x15	204	3.5.	0.4646	144.0
WE 17x17 Std	264	3.5	0.4671	144.0
WE 17x17 OFA	264	3.5	0.4282	144.0
Ex/ANF 14x14 WE	179 🗶 🗶	3.7	0.3741	144.0
Ex/ANF 14x14 CE	176	3.7	0.3814	134.0
Ex/ANF 15x15 WE	204	3.7	0.4410	144.0
Ex/ANF 17x17 WE	264	3.5	0.4123	144.0

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(ii) Irradiated BWR fuel assemblies. The maximum fuel assembly weight is 750 pounds, the maximum average burnup is 30,000 MWD/MTU, the minimum cool time is 2 years, and the maximum initial fuel pin pressure at 70°F is 565 psig. The fuel assemblies consist of uranium dioxide pellets within zircaloy cladding, with the specifications listed below, and with fuel rod pitch, rod diameter, clad thickness, and pellet diameter as described in Table 1.2-6, of the application, as supplemented.

Fuel Type	No. Fuel Rods		Max Initial Uranium Enrichment (w/o U-235)	Max. Initial Uranium Mass (MTU)	Max. Active Fuel Length (in.)
GE 7x7 🗬	49	0	4.0	0.1923	146
GE 8x8-1	63	1	4.0	0.1880	146
GE 8x8-2	62	12 00	4.0	0.1847	150 ⁽¹⁾
GE 8x8-4	60	A	4.0	0.1787)	150 ^(1,2)
	74	2	40	0.1854	150 (1,3,4)
GE 9x9	79	2	402	0.1979	150 (1,4)
Ex/ANF 7x7	49	AL	4.00	0.1960	144
Ex/ANF 8x8-1	63	1000	4.0	0.1764	145.2
Ex/ANF 8x8-2	62	2	4.0	0.1793	150
Ex/ANF 9x9	79	x x	\$.0 Y	0.1779	150
	74	2	4.0	0.1666	150 ⁽³⁾

(1) Six-inch natural uranium blankets on top and bottom.

(2) One large water hole - 3.2 cm ID, 0.1 cm thickness.

- (3) Two large water holes occupying seven fuel rod locations 2.5 cm ID, 0.07 cm thickness.
- (4) Shortened active fuel length in some rods.
- (iii) Irradiated PWR rods, consisting of uranium dioxide pellets within zircaloy cladding. The maximum uranium enrichment is 5 weight percent U-235, the maximum active fuel length is 150 inches, and the maximum pellet diameter is 0.3765 inches. The maximum burnup is 60,000 MWD/MTU and the minimum cool time is 150 days. Up to two rods may have a maximum burnup of 65,000 MWD/MTU.

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(iv) Irradiated HEU MTR fuel assemblies positioned within the MTR fuel basket specified in 5.(a)(3)(ii). The fuel assemblies are composed of aluminum clad plates, with initial uranium enrichment of from 80 to 94.0 weight percent U-235, and meeting the following specifications:

	HEU MTR	HEU MTR	HEU MTR
	Assemblies	Assemblies	Assemblies
Maximum Number of Plates (including outer-plates, which may or may not contain fuel)	Assemblies EG//23/24	19 እ	10
Fuel Composition		U ₃ O ₈ -Al, or U ₃ Si	2 <b>-Al</b>
Maximum Fuel Assembly Weight	A	713 10 (5.9 kg)	
Maximum Active Fuel Thickness	<ul> <li>0.021 m (0.053 cm)</li> </ul>	0.04 in (0.1016 cm)	0.069 in (0.175 cm)
Minimum Clad Thickness	0.0145 in (0.037 cm)	0.00945 in (0.024 cm)	0.015 in (0.038 cm)
Maximum Initial U-235 Mass per Assembly	355 grams 8	262 grams	140 grams
Maximum Initial U-235 Mass per Fuel Plate	19.5.grams ⁽²⁾	<b>93</b> .8 grams	14.0 grams
Maximum Burnup	'হ্ট	4,700 MWD/MTU	(1)
Maximum Decay Heat per Fuel Assembly	**	120 watts (1)	
Maximum Decay Heat per Package		1.26 kilowatts	
Minimum Cool Time		90 days ⁽¹⁾	

- (1) The minimum cool time shall be consistent with the decay heat limits in Item 5.(b)(2)(iv) and determined using the operating procedures in Section 7.1.5 and Figure 7.1-2 of the application, as supplemented. Maximum burnup for NISTR is 642,000 MWD/MTU, and the minimum cool time is 3.5 years for any fuel with a burnup exceeding 554,700 MWD/MTU.
- (2) NISTR fuel is shipped as two fuel element segments per basket cell. The maximum initial U-235 mass for NISTR fuel may not exceed 181 grams per fuel element segment or 362 grams per basket cell. The maximum initial U-235 mass for NISTR fuel may not exceed 10.65 grams per fuel plate segment.

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(v) Irradiated LEU MTR fuel assemblies positioned within the MTR fuel basket specified in 5(a)(3)(ii). The fuel assemblies are composed of aluminum clad plates, with a maximum initial uranium enrichment of 20.0 weight percent U-235, and meeting the following specifications:

	LEU MTR Assemblies	LEU MTR Assemblies
Maximum Number of Plates (including outer <b>A</b> plates, which may or may not contain fuel).	REGaula	10
Fuel Composition	U-AI, U ₃ O ₆ -A	l, or U ₃ Si ₂ -Al
Maximum Fuel Assembly Weight	13 lb (5	5.9 kg)
Maximum Active Fuel Thickness	0.033 in (0.084 cm)	<b>O</b> 0.069 in (0.175 cm)
Minimum Clad Thickness	0.013 in (0.033 cm)	<0.015 in (0.038 cm)
Maximum Initial U-235	340 grams	210 grams
Maximum Initial U-235 Mass per Fuel Plate	21:0 grams	<b>2</b> 21.0 grams
Maximum Burnup	90,490 MWD/MT	U (50% U-235)
Maximum Decay Heat per Fuel Assembly	24 w	atts
Maximum Decay Heat per Package	1.0 kilo	owatt
Minimum Cool Time	1 ye	ar

(vi) 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.

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(vii) Irradiated TRIGA fuel elements with a 0.225" diameter zirconium rod in the center and meeting the following specifications:

	TRIGA HEU (Notes 1& 2)	TRIGA LEU (Notes 1& 2)	TRIGA LEU (Notes 1& 2)
Fuel Form	Clad U-ZrH rod	Clad U-ZrH rod	Clad U-ZrH rod
Maximum Element Weight, Ibs	132	13.2	6.4
Maximum Element Length, in	45	45	28.4
Element Cladding	Stainless Steel	Stainless Steel	Aluminum
Clad Thickness, in	0.02	0.02	0.03
Active Fuel Length, in	152	15 6	14-15 (Note 4)
Element Diameter, in	1.478 max.	1.478 max.	<b>1</b> .47 max.
Fuel Diameter, in	1.435 max.	1 435 max / /	<b>1</b> .41 max.
Maximum Initial U Content/Element, kilograms	0.196	0.845	°0.205
Maximum Initial 235U Mass; grams	137	169 5	41
Maximum Initial ²³⁵ U Enrichment, weight percent	70 444	20 4 ,0	20
Zirconium Mass, grams	2060	1886 - 2300	2300
Hydrogen to Zirconium Ratio, max.	1.6 ***	1.7	1.0
Maximum Average Burnup, MWD/MTU	460,000 (80% ²³⁵ U)	151,100 (80% ²³⁵ U)	151,100 (80% ²³⁵ U)
Minimum Cooling Time	90 days (Note 3)	90 days (Note 3)	90 days (Note 3)

Notes:

1. Mixed TRIGA LEU and HEU contents authorized.

2. TRIGA Standard, instrumented and fuel follower control rod type elements authorized.

3. Maximum decay heat of any element is 7.5 watts.

4. Aluminum clad fuel with 14 inch active fuel is solid and has no central hole with a zirconium rod.

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(viii) Irradiated TRIGA fuel cluster rods with a maximum average burnup of 600,000 MWD/MTU (80% ²³⁵U) and a minimum cooling time of 160 days meeting the following specifications prior to irradiation:

	TRIGA Fuel Cluster Rods
Fuel Form	Clad U-ZrH rod
Maximum Rod Weight, Ibs R R	G1 1.5
Maximum Rod Length, in	٢, ٢
Rod Cladding	Incoloy 800,
Minimum Clad Thickness, in	0.015
Maximum Active Fuel Length, in	22.5
Maximum Fuel Pellet Diameter, in	( £ 0.53 Q
Maximum U Content/Rod, grams	) 48.6
Maximum 235U Mass, grams	45.4/
Maximum ²³⁵ U Enrichment weight percent	93.3 5
Maximum Zirconium Mass, grams	421 6
Hydrogen to Zirconium Ratio, max.	^{**} 1,60

- (ix) Irradiated high bumup PWR rods, consisting of uranium dioxide pellets within zircaloy cladding. The maximum uranium enrichment is 5 weight percent U-235, the maximum active fuel length is 150 inches, and the maximum pellet diameter is 0.3765 inches. The maximum burnup is 80,000 MWD/MTU and the minimum cool time is 150 days.
- (x) Irradiated high burnup BWR rods, consisting of uranium dioxide pellets within zircaloy cladding. The maximum uranium enrichment is 5 weight percent U-235, the maximum active fuel length is 150 inches, and the maximum pellet diameter is 0.490 inches. The maximum burnup is 80,000 MWD/MTU and the minimum cool time is between 150 - 270 days, as specified in the table below:

BWR Fuel Type Array Size	Burnup, b (GWD/MTU)	Minimum Cool Time (days)
7 x 7	b ≤ 60 60 < b ≤ 70 70 < b ≤ 80	210 240 270
8 x 8 ¹	b ≤ 80	150

Note 1: Includes rods from all larger BWR assembly arrays (e.g., 9 x 9, 10 x 10)

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5.(b)(2)	Maxii	mum quar	ntity of material po	er package				
	Not to	o exceed	4,000 pounds, inc	cluding contents a	and fuel assembly basket.			
	(i)	within t	contents describ he PWR fuel asso s per PWR asso	embly basket. Ma	)(i): one PWR assembly p aximum decay heat not to a	ositione exceed 2	d 2.5	
	<b>(</b> ii)	with the	contents describ BWR fuel assents per BWR asse	nbly basket. Max	)(ii): two BWR assemblies imum decay heat not to ex	position	ned 1	
	(iii)	Type 30 inches	04 stainless steel	spacer canister w the PWR or BWF	1)(iii): up to 25 intact indiv vith a wall thickness of at l basket. Maximum decay	east 0.12	2	-
	(iv)	Up to 4 assemt cut in h opening caniste equival 5.(b)(1) (a)	2 fuel assemblies blies per basket n alf, producing 84 gs may contain a r are limited to th ent to an intact M (v). For HEU MTR fu 126 kilowatts pe not to exceed 12 with the center a assemblies not to	s positioned within nodule). For NIS fuel-bearing sect loose plate canis e number of fuel p ITR fuel element, el assemblies, the r package, with e 0 watts. The cen 0 watts. The two ssembly for trans b exceed 30 watts	the MTR fuel assembly b The MTR fuel assembly b The fuel the 42 fuel assembly fors. Each of the MTR ba- ter. The contents of each plates, dimensions, and ma- as specified in Items 5.(b) the maximum decay heat no ach MTR fuel assembly ba- ter fuel assembly in any ba- exterior fuel assemblies ve- port are not to exceed 70 v s may be loaded in any ba-	asket (7 lies may sket cell loose pla asses th (1)(iv) an t to exce sket mo sket mo ertically i sket pos	y be ate at are nd wed wedule wed in-line uel ition.	s
			For LEU MTR fur watts per fuel as		e maximum decay heat noi	to exce	ed 24	
		(c)	Mixed LEU and H above, are autho		ts, with decay heat limits a	s specifi	ed	
		(d)	are authorized, p	provided the total	on and/or mechanically dar surface area of through-cla not exceed 2,775 cm ² per	ad corros	sion	g
	(v)	positio	ned within the ap	propriate basket.	)(vi): up to 15 intact meta Maximum decay heat not Il rods not to exceed 1,805	to excee	d	

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5.(b)(2)	Maxi	mum qı	uantity of material	per package (cont	inued)			
	(vi)	For fa	ailed metallic fuel	rods of the type de	escribed in Item 5.(b)(1)(vi)			
		(a) (b)	canister. The c as shown on Nu D2, Rev. 10, an Assurance Com maximum decay to 5 watts: of	anisters are 2.75-i uclear Assurance ( ad are placed in a s poration Drawing N wheat load for a d h HEG	e defective metallic fuel rod nch I.D. failed fuel rod can Corporation Drawing No. 34 six-hole liner as shown on f to. 315-040-43, Rev. 1. Th efective metallic fuel rod is	isters 40-108- Nuclear le limited		
		STATES	fuel rods per ca canisters are 4. Nuclear Assurat and are placed Assurance Corr of the filters is li containing fuel r canister; and for heat load is 5 w	nister or up to 10 f 00-inch I.D. failed nce Corporation D in a three-hole bas poration Drawing N mited to 1,25 poun ods, the maximum r canisters contain	ailed fuel filters per caniste fuel rod canisters as showr rawing No. 340-108-D1, Re ket as shown on Nuclear lo. 315-40-12, Rev. 3. The ds per canister. For canist decay heat load is 15 wat ing filters, the maximum de The plutonium content of th	er. The on ev. 10, weight ers ts per ecay		
	(vii)	Maxin equiv be po TRIG TRIG	num decay heat n alent for failed fue sitioned in either t A fuel basket. Fue A fuel basket.	ot to exceed 7.5 w 1) and 1050 watts i he non-poisoned 1 el may not be load	atts per TBIGA fuel elemen per package. TRIGA fuel e FRIGA fuel basket or in the ed in the center cell of the	elements r poisoned non-poiso	ned	
		(a)	Up to 120 fuel e 140 fuel elemen basket cell).	lèménts in the non ts in the poisoned	-poisoned TRIGA fuel bask TRIGA fuel basket (4 fuel o	ket, and up elements p	o to per	
		(b)	up to 14 screene screened caniste 315-40-074, Rev	ed canisters in the ers are in accordar /. 1, 315-40-075, F	non-poisoned TRIGA fuel poisoned TRIGA fuel bask nce with NAC International Rev. 1, and 315-40-076, Re pr screened canister.	et. The Drawing	Nos.	

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

- (c) Up to 12 sealed canisters in the non-poisoned TRIGA fuel basket, and up to 14 sealed canisters in the poisoned TRIGA fuel basket. The sealed canisters are in accordance with NAC International Drawing Nos. 315-40-086, Rev. 0, 315-40-087, Rev. 3, and 315-40-088, Rev. 2. Up to a maximum equivalent of two fuel elements in the form of intact fuel, failed fuel or fuel debris per sealed canister. If the total failed fuel plutonium content of a package is greater than 20 Ci, all failed fuel containing plutonium must be enclosed in a sealed canister which is then leak tested to  $3.2 \times 10^{-7}$  std cm³/sec (He) prior to shipment.
- (d) Mixed intact and failed fuel contents are authorized. Base and top fuel basket modules may contain intact fuel elements, screened canisters, or sealed canisters. Intermediate fuel basket modules may contain only intact TRIGA fuel elements.
- (viii) For TRIGA fuel cluster rods as described in Item 5.(b)(1)(viii): Maximum decay heat not to exceed 1.875 watts per TRIGA fuel cluster rod (or equivalent for failed fuel) and 1050 watts per package. TRIGA fuel cluster rods

equivalent for failed fuel) and 1050 watts per package. TRIGA fuel cluster rods must be positioned in either the non-poisoned TRIGA fuel basket or in the poisoned TRIGA fuel basket. Fuel may not be loaded in the center cell of the nonpoisoned TRIGA fuel basket.

- (a) Up to 480 rods in the non-poisoned TRIGA fuel basket, and up to 560 rods in the poisoned TRIGA fuel basket. TRIGA fuel cluster rods must be positioned within the fuel rod inserts as shown on NAC International Drawing No. 315-40-096, Rev. 2.
- (b) Up to 12 sealed canisters in the non-poisoned TRIGA fuel basket, and up to 14 sealed canisters in the poisoned TRIGA fuel basket. The sealed canisters are in accordance with NAC International Drawing Nos. 315-40-086, Rev. 0, 315-40-087, Rev. 3, and 315-40-088, Rev. 2. Up to a maximum equivalent of six TRIGA fuel cluster rods in the form of intact fuel, failed fuel or fuel debris per sealed canister. If the total failed fuel plutonium content of a package is greater than 20 Ci, all failed fuel containing plutonium must be enclosed in a sealed canister which is then leak tested to 3.2 x 10⁻⁷ std cm³/sec (He) prior to shipment.
- (c) Mixed intact and failed fuel contents are authorized. Base and top fuel basket modules may contain intact fuel rods or sealed canisters. Intermediate fuel basket modules may contain only intact fuel rods.
- (ix) For high burnup PWR rods as described in Item 5.(b)(1)(ix): up to 25 intact individual rods in the appropriate insert, placed within a sealed or free-flow canister, and positioned within the standard PWR basket. Maximum decay heat not to exceed 2.3 kilowatts per package.

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

(x) For high burnup BWR rods as described in Item 5.(b)(1)(x): up to 25 intact individual rods in the appropriate insert, placed within a sealed or free-flow canister, and positioned within the standard PWR basket. Maximum decay heat not to exceed 2.1 kilowatts per package.

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5.(c) Transport Index for Criticality Control

Minimum transport index to be shown on label for nuclear criticality control:

- (1) For TRIGA fuel elements, TRIGA fuel cluster rods, metallic fuel rods, MTR fuel assemblies, up to 25 PWR fuel rods, and up to 25 high burnup PWR or BWR rods: 0.0
- (2) For PWR fuel assemblies:
- (3) For BWR fuel assemblies
- 6. Known or suspected failed fuel assemblies (rods) or elements, and fuel with cladding defects greater than pin holes and hairline cracks are not authorized, except as described in Items 5.(b)(2)(iv)(d), 5:(b)(2)(vi), 5.(b)(2)(vii)(c), and 5.(b)(2)(viii)(b).
- 7. The cask must be dry (no free water) when delivered to a carrier for transport.
- 8. Bolt torque: The cask lids bolts must be torqued to 260 ft-bs. The folts used to secure the vent and drain port covers must be torqued to 100 inch-lbs.
- 9. Prior to each shipment, the package must be leak tested to  $1 \times 10^{-3}$  std cm³/sec, except that replaced seals must be leak tested to  $5.5 \times 10^{-7}$  std cm³/sec (He). Prior to first use, after third use, and at least once within the 12-month period prior to each subsequent use, the package must be leak tested to  $5.5 \times 10^{-7}$  std cm³/sec (He).
- 10. In addition to the requirements of Subpart G of 10 CFR Part 71:
  - (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, as supplemented; and
  - (c) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application, as supplemented. 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.
- 11. When shipping PWR, BWR, MTR assemblies, TRIGA fuel elements, TRIGA fuel cluster rods, individual PWR rods, or high burnup PWR or BWR rods, the neutron 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.

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- 12. A personnel barrier must be used when shipping PWR or BWR assemblies. Shipments of MTR fuel assemblies, TRIGA fuel elements, TRIGA fuel cluster rods, individual PWR rods, or high burnup PWR or BWR rods must use the ISO container or a personnel barrier.
- 13. Packages used to ship metallic fuel rods may be shipped in a closed shipping 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 shipped in a closed shipping container, the center of gravity of the combined cask, closed shipping container and trailer must not exceed 75 inches.
- 14. The one-time shipment of HEU MTR fuel from the MNR Reactor at McMaster University, located in Ontario, Canada, is authorized as follows:

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# Type and form of material

Irradiated HEU MTR fuel assemblies positioned within the MTR fuel basket specified in Condition 5.(a)(3)(ii). The fuel assemblies are composed of aluminum clad plates, with an initial uranium enrichment up to 94.0 weight percent U-235. The fuel assemblies are limited to either:

(a) a maximum of 10 plates (including outer plates which may or may not contain fuel) with a maximum initial U-235 mass per fuel plate of 19 grams, maximum initial U-235 mass per fuel assembly of 190 grams, and a minimum fuel plate thickness (fuel plus cladding) of 0.145 cm; or

b) a maximum of 18 plates including a maximum of 16 fuel plates and 2 outer plates (which do not contain fuel) with a maximum initial U-235 mass per fuel plate of 15 grams, maximum initial U-235 mass per fuel assembly of 240 grams, and a minimum fuel plate thickness (fuel plus cladding) of 0.119 cm; or

c) a control assembly consisting of 9 fuel plates and 2 aluminum inner guide plates (which do not contain fuel), with a maximum initial U-235 mass per fuel plate of 15 grams, maximum initial U-235 mass per fuel assembly of 135 grams, and a minimum fuel plate thickness (fuel plus cladding) of 0.119 cm.

The fuel assemblies shall also meet the following specifications for Thin-Plate Assemblies specified in Condition 5.(b)(1)(iv); Fuel Composition, Maximum Fuel Assembly Weight, Maximum Burnup, Maximum Decay Heat per Fuel Assembly, Maximum Decay Heat per Package, and Minimum Cool Time.

NRC FORM 618 (8-2000) 10 CFR 71

# CERTIFICATE OF COMPLIANCE

U.S. NUCLEAR REGULATORY COMMISSION

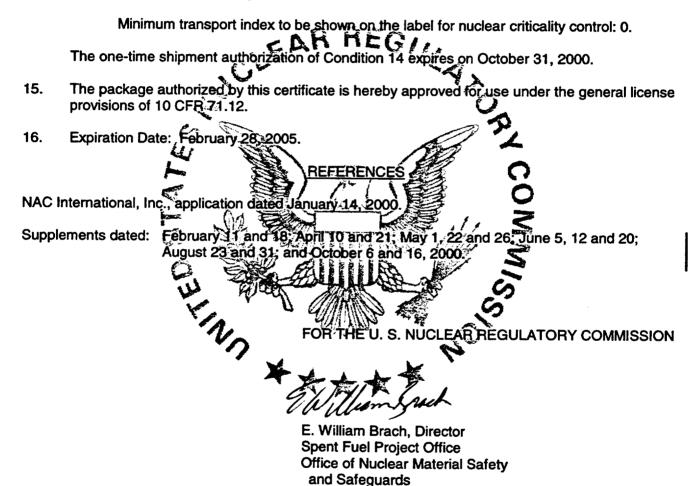
1. a. CERTIFICATE NUMBER         b. REVISION NUMBER         c. DOCKET NUMBER         d. PACKAGE IDENTIFICATION NUMBER         PAGE         PAGES           9225         24         71-9225         USA/9225/B(U)F-85         15         OF         15		FOR RADIOACT	IVE MATERIAL P	ACKAGES			1
9225 24 71-9225 USA/9225/B(U)F-85 15 OF 15	1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	C. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
	9225	24	71-9225	USA/9225/B(U)F-85	15	OF	15

14. (continued)

Maximum quantity of material per package

The assemblies shall meet the requirements of Condition 5.(b)(2)(iv) of the Certificate of Compliance.

**Transport Index for Criticality Control** 



Date: _____0ctober 20, 2000

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	(3-9		618			ATE OF COMPLIANCE TIVE MATERIALS PACKAGES			
	l. a	. CERTIFIC 9226	ATE NUMBER	b. REVISION NU	UMBER	c. PACKAGE IDENTIFICATION NUMBE USA/9226/B(U)F		d. PAGE NUMBER 1	e. TOTAL NUMBER PAGES 7
	- 2. I					escribed in Item 5 below, meets the appl n of Radioactive Material."	icable sa	fety standards set fo	orth in Title 10,
		b. This ce	rtificate does not relieve the consigno	or from complian	ice with	any requirement of the regulations of the ntry through or into which the package	e U.S. D will be tr	epartment of Transpansported.	portation or other
	3. 1		FICATE IS ISSUED ON THE BASIS OF TO (Name and Address)	A SAFETY ANAL		PORT OF THE PACKAGE DESIGN OR AP LE AND IDENTIFICATION OF REPORT OF			
		3550	eral Atomics ) General Atomics Court Diego, California 92121- [.]	1194		General Atomics applicatio August 31, 1994, as supple			
		oan			c. DOC	KET NUMBER		71-92	26
		CONDITION This certifi	-	requirements of	f 10 CFF	R Part 71, as applicable, and the condition	ons speci	fied below.	
	5.	5.a	Packaging						
		(1)	Model No.: GA-4	a an					
ž		(2)	Description	an a				4 <b>.</b> .	
			The GA-4 Legal Weight	Truck Sper	nt Fue	el Shipping Cask consists on The packaging is designed to	of the p	backaging (ca	ask and impact
			pressurized-water reacto	or (PWR) in	radiat	ed spent fuel assemblies a	s autr	porized conte	nts. The
	F		packaging includes the c	ask assem	ibly a	nd two impact limiters, eac	h of w	hich is attach	ed to the cask
	L		with eight bolts. The over and 234 inches long.	erall dimens	sions	of the packaging are appro	ximat	ely 90 inches	in diameter
								des Sel	lata); acak
			I he containment system closure; closure bolts; ga gas sample valve, and d	as sample v	ne ca: valve	sk body (cask body wall, fla body; drain valve; and prim	ange, a lary O	-ring seals fo	r the closure,
			provided when shipping is constructed of stainles external dimensions are support structure divides inches square and 167 is the cask flange with 12 c inches thick, and weighs	specified s ss steel, de approxima the cask c nches long 1-inch diam about 151	hort fi pleted tely 1 avity . The leter t 0 lbs.		mover ous ne les in o tment ne cas ximate	nent of the fu eutron shield. diameter. A f s, each appro k body and is ely 26 inches	el. The cask The cask fixed fuel oximately 8.8 attached to square, 11
			diameter port (hereafter vacuum drying, leakage draining, leakage testing port. The primary seals	referred to testing, or g, or filling to for the gas om puncture	as the inertir he car samp	to the cask cavity. The close e gas sample valve) for gas ng. A 1-inch diameter port vity with water. A separate ole valve and drain valve ar he gas sample valve and th	s sam in the drain re rece	pling, venting bottom plate valve opens essed from th	, pressurizing, allows and closes the le outside cask
						310			

NRC FORM 618A (3-96)

**CONDITIONS** (continued)

U.S. NUCLEAR REGULATORY COMMISSION 

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**Revision 0** 

## Cask

The cask includes the containment (flange, cask body, bottom plate and drain valve seals); the cavity liner and fuel support structure; the impact limiter support structure; the trunnions and redundant lift sockets; the depleted uranium gamma shield; and the neutron shield and its outer shell. The cask body is square, with rounded corners and a transition to a round outer shell for the neutron shield. The cask has approximately a 1.5 inch thick stainless steel body wall, 2.6 inch thick depleted uranium shield (reduced at the corners), and 0.4 inch thick stainless steel fuel cavity liner.

The cruciform fuel support structure consists of stainless steel panels with boron-carbide (B₄C) pellets for criticality control. A continuous series of holes in each panel, at right angles with the fuel support structure axis, provides cavities for the  $B_{4}C$  pellets. The fuel support structure is welded to the cavity liner and is approximately 18 inches square by 166 inches long and weighs about 750 lbs.

The flange connects the cask body wall and fuel cavity liner at the top of the cask, and the bottom plate connects them at the bottom. The gamma shield is made up of five rings, which are assembled with zero axial tolerance clearance within the depleted uranium cavity, to minimize gaps. The impact limiter support structure is a slightly tapered 0.4 inch thick shell on each end of the cask. The shell mates with the impact limiter's cavity and is connected to the cask body by 36 ribs.

The neutron shield is located between the cask body and the outer shell. The neutron shield design maintains continuous shielding immediately adjacent to the cask body under normal conditions of transport. The details of the design are proprietary. The design, in conjunction with the operating procedures, ensures the availability of the neutron shield to perform its function under normal conditions of transport.

Two lifting and tie-down trunnions are located about 34 inches from the top of the cask body, and another pair is located about the same distance from the bottom. The trunnion outside diameter is 10 inches, increasing to 11.5 inches at the cask interface. Two redundant lift sockets are located about 26 inches from the top of the cask body and are flush with the outer skin.

## **Materials**

All major cask components are stainless steel, except the neutron shield, the depleted uranium gamma shield, and the B₄C pellets contained in the fuel support structure. All O-ring seals are fabricated of ethylene propylene.

## Impact Limiters

The impact limiters are fabricated of aluminum honeycomb, completely enclosed by an all-welded austenitic stainless steel skin. Each of the two identical impact limiters is attached to the cask with eight bolts. Each impact limiter weighs approximately 2,000 lbs.

## (3) Drawings

The package shall be constructed and assembled in accordance with the following GA Drawing Number:

Drawing No. 031348, sheets 1 through 19, Revision D GA-4 Spent Fuel Shipping Cask Packaging Assembly

NRC FORM 618A (3-96)

**CONDITIONS** (continued)

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# 5.b Contents of Packaging

# (1) Type and Form of Material:

- (a) Intact fuel assemblies. Fuel with known or suspected cladding defects greater than hairline cracks or pinhole leaks is not authorized for shipment.
- (b) The fuel authorized for shipment in the GA-4 package is irradiated 14x14 and 15x15 PWR fuel assemblies with uranium oxide fuel pellets. Before irradiation, the maximum enrichment of any assembly to be transported is 3.15 percent by weight of uranium-235 (²³⁵U). The total initial uranium content is not to exceed 407 Kg per assembly for 14x14 arrays and 469 Kg per assembly for 15x15 arrays.
- (c) Fuel assemblies are authorized to be transported with or without control rods or other non-fuel assembly hardware (NFAH). Spacers shall be used for the specific fuel types, as shown on sheet 17 of the Drawings.
- (d) The maximum burnup for each fuel assembly is 35,000 MWd/MTU with a minimum cooling time of 10 years and a minimum enrichment of 3.0 percent by weight of ²³⁵U or 45,000 MWd/MTU with a minimum cooling time of 15 years (no minimum enrichment).
- (e) The maximum assembly decay heat of an individual assembly is 0.617 kW. The maximum total allowable cask heat load is 2.468 kW (including control components and other NFAH when present).
- (f) The PWR fuel assembly types authorized for transport are listed in Table 1. All parameters are design nominal values.

# (2) Maximum Quantity of Material per Package

- (a) For material described in 5.b(1): four (4) PWR fuel assemblies.
- (b) For material described in 5.b(1): the maximum assembly weight (including control components or other NFAH when present) is 1,662 lbs. The maximum weight of the cask contents (including control components or other NFAH when present) is 6,648 lbs., and the maximum gross weight of the package is 55,000 lbs.

NRC FORM 618A (3-96)

**CONDITIONS** (continued)

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······································	I abl	<u>e 1 - PWF</u>	R Fuel Asser	nbly Charac	teristics	
<u>Fuel Type</u> MfrArray (Versions)	Design Initial U (kg/assy.)	No. of Fuel Rods	Fuel Rod Pitch (in.)	Pellet Diameter (in.)	Zr Clad Thickness (in.)	Active Fuel Length (in.)
W-15x15 (Std/ZC)	469	204	0.563	0.3659	0.0242	144
W-15x15 (OFA)	463	204	0.563	0.3659	0.0242	144
BW-15x15 (Mk.B,BZ,BGD)	464	208	0.568	0.3686	0.0265	142
Exx/A-15x15 (WE)	432	204	0.563	0.3565	0.030	144
CE-15x15 (Palisades)	413	204	0.550	0.358	0.026	144
CE-14x14 (Ft.Calhoun)	376	176	0.580	0.3765	0.028	128
W-14x14 (Model C)	397	176	0.580	0.3805	0.026	137
CE-14x14 (Std/Gen.)	386	176	0.580	0.3765	0.028	137
Exx/A-14x14 (CE)	381	176	0.580	0.370	0.031	137
W-14x14 (OFA)	358	179	0.556	0.3444	0.0243	144
W-14x14 (Std/ZCA,/ZCB)	407	179	0.556	0.3674	0.0225	145.5
Exx/A-14x14 (WE)	379	179	0.556	0.3505	0.030	142

5.c **Transport Index for Criticality Control** 

Minimum transport index to be shown on the label for nuclear criticality control: 100

6. Fuel assemblies with missing fuel pins shall not be shipped unless dummy fuel pins that displace an equal amount of water have been installed in the fuel assembly.

IRC FORM 3-96)		CONDITIONS (continued)	U.S. NUCLEAR REGULATORY COMMISSION
	Certificate of Compliance No. 92	26 Page 5 of 7	Revision 0
7.	• •	ocedures, in addition to t	he requirements of Subpart G of
	written operating procedures developed using the specific	<ul> <li>Procedures for both prep ations contained within the</li> </ul>	operated in accordance with detailed paration and operation shall be application. At a minimum, those
	procedures shall require the	2.	
	<ol> <li>Identification of the fuel to specifications of Condition</li> </ol>		t verification that the fuel meets the
	10 CFR 71.47 and ass calibrated for the energ (b) Verify that measured d	adiation survey to assure co sure that the neutron and ga gy spectrums being emitted lose rates meet the followin	ompliance with 49 CFR 173.441 and Imma measurement instruments are from the package. g correlation to demonstrate othetical accident dose rates:
	1.0 x (gamma dose rat	e at that location) ≤ 1000 r removable contamination le	k surface at its midlength) + nR/hr. evels meet the requirements of
	(d) Inspect all containmen containment seals with leak test shall have a t second of air (std-cm ³ /	t seals and closure sealing a gas pressure rise test al est sensitivity of at least 1 x /sec) and there shall be no and maintenance test may	surfaces for damage. Leak test all ter final closure of the package. The 10 ⁻³ standard cubic centimeters per detectable pressure rise. A higher be required as discussed in
		lowing closure bolt and value I be torqued to 235 ± 15 ft-l and drain valve shall be tor	bs.
	moisture from the containr (a) Cask evacuation to a p	ment vessel in accordance	g, the removal of water and residual with the following specifications: h Hg) or less for a minimum of 1 hour. 0.1 psi in 10 minutes.
	(5) Before shipment, independent described in SAR Section		erial condition of the neutron shield as
	detailed written procedures.	Procedures for fabrication	be performed in accordance with , acceptance testing, and maintenance vithin the application and shall include
		314	

IRC FORM 618A 3-96)		<b>CONDITIONS</b> (continued)	U.S. NUCLEAR REGULATORY COMMISS
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(1)	body wall to the bottom plate accordance with ASME Code final fabrication weld joint cor	, shall be radiographed e Section III, Division 1 nnecting the cask body	orication weld joint connecting the cask and liquid-penetrant examined in Subsection NB. Examination of the wall to the bottom plate may be ed in lieu of radiographic and liquid
(2)	axial direction, to 300 percen trunnion and per lifting socke upper and lower lifting trunnic	t of their maximum wor t, in accordance with th ons shall be load tested n working load (20,625	kets shall be load tested, in the cask king load (79,500 lbs. minimum) per ne requirements of ANSI N14.6. The d, in the cask transverse direction, to lbs. minimum) per trunnion, in
(3)	The cask containment bound per 10 CFR 71.85(b). The m	ary shall be pressure to inimum test pressure s	ested to 150% of the design pressure hall be 120 psig.
(4)	All containment seals shall be	e replaced within the 12	2-month period prior to each shipment.
(5)	O-ring seals prior to first use. the third use of each package replaced or repaired containn tests shall verify that the containn	Additionally, all contai and within the 12-mor nent system componer ainment boundary leak	containment components including the inment seals shall be leak tested after onth period prior to each shipment. Any of shall be leak tested. The leakage age rate does not exceed the design shall have a test sensitivity of at
(6)	coverage during fabrication to	ensure that there are certify that the shield m	ed with 100 percent inspection no shielding discontinuities. The aterial meets the minimum specified ielding analysis.
(7)	Qualification and verification t honeycomb type and lot to be	ests to demonstrate the utilized in the impact li	e crush strength of each aluminum miters shall be performed.
(8)	The boron carbide pellets, fue content in the depleted uraniu specifications of Table 2 to er	im shall be fabricated a	l fuel cavity dimensions, and ²³⁵ U and verified to be within the
		315	

NRC FORM 618A (3-96) **CONDITIONS** (continued)

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Table 2		· · · · · · · · · · · · · · · · · · ·
Specified Parameter	Minimum	Maximum
B₄C boron enrichment	96 wt% ¹⁰ B	N/A
Diameter of each B₄C pellet	0.426 in	0.430 in
Height of each B₄C pellet stack	7.986 in	8.046 in
Mass of ¹⁰ B in each B₄C pellet stack	31.5 g	N/A
Mass of each B₄C pellet stack	43.0 g	45.0 g
Diameter of each fuel support structure hole	0.432 in	0.44 in
Fuel support structure nominal hole pitch	N/A	0.55 in
Fuel support structure hole depth minus B₄C pellet-stack height (at room temperature)	0.009 in	0.129 in
Thickness of each fuel support structure panel	0.600 in	0.620 in
Fuel cavity width	N/A	9.135 in
²³⁵ U content in depleted uranium shielding material	N/A	0.2 wt%

- 8. This package is approved for exclusive-use transport by rail, truck or marine.
- 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, 2003.

# REFERENCES

General Atomics Safety Analysis Report for the GA-4 Legal Weight Truck Spent Fuel Shipping Cask, Revision G (Proprietary) and Revision H (Non-Proprietary), transmitted by letter dated August 5, 1998.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

lho

William F. Kane, Director Spent Fuel Project Office Office of Nuclear Material Safety and Safeguards

Date: October 27, 1998