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NL Nuclear

1979 JUN 25 PM 2 11

IN REPLY REF. NT - 2135

EXPORT/IMPORT
AND
INTERNAT'L SFGROD

June 22, 1979

ISNM79008
11000695

Assistant Director
Export/Import and
International Safeguards
U. S. Nuclear Regulatory
Commission
Washington, DC 20555

SUBJECT: Import License Application for Spent Nuclear
Research Fuel Assemblies; Government (Canada)
To Government (U.S.) Transaction

Gentlemen:

NL Industries, Inc., as transportation agent for the Canadian Government, hereby makes application for an import license, under 10 CFR 110.34, to import no more than twenty-seven (27) kilograms (26,825 grams initial estimate) of U-235 as spent nuclear research reactor fuel for delivery to U.S. DOE, Savannah River Project, to be processed under contract EY-76-C-09-1033.

NL routinely has been transporting similar loads of spent fuel from Chalk River Nuclear Laboratories in Ontario, Canada, to SRP, Aiken, South Carolina since 1966.

Data in support of our request for an import license is attached as Appendix A to this letter. If further information is required, please contact us.

NL Nuclear/NL Industries, Inc.
1130 Central Avenue, Albany, N.Y. 12205 Tel. (518) 459-2700

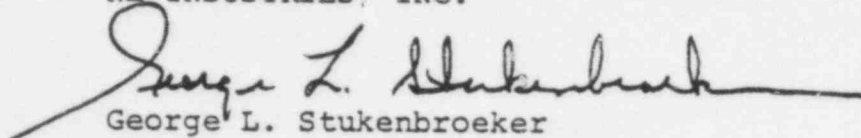
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7908240031

SUBJECT: Import License Application for Spent Nuclear
Research Fuel Assemblies; Government (Canada)
To Government (U.S.) Transaction

Very truly yours,

NL INDUSTRIES, INC.



George L. Stukenbroeker
Manager, Nuclear Transportation

GLS/amc

Attachments: Appendix A
Exhibit A
Exhibit B
Exhibit C

cc: P. Dixon

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APPENDIX A

RECEIVED
U.S. NRC

Application for Import License: Shipments of
Irradiated Research Reactor Fuel Assemblies
from Chalk River to Savannah River Project. 5 PM 11

I. 10 CFR 110.34

EXPORT/IMPORT
AND
INTERNATIONAL SECURE

(a) NL Industries, Inc.
1130 Central Avenue
Albany, NY 12205

ATTENTION: G. L. Stukenbroeker

(b) From:

Chalk River Nuclear Laboratories
Chalk River, Ontario, Canada

(c) For:

Chalk River Nuclear Laboratories
Atomic Energy of Canada, Limited (AECL)
Chalk River, Ontario, Canada PO: JKOJ1JO

(d) To:

Department of Energy
Savannah River Plant
Dunbar ton, South Carolina (USA)

The spent fuel assemblies are to be
reprocessed at SRP.

(e) Starting date of proposed shipments:

Shipments would start within ten (10)
days upon receipt of an import license.
NL proposes to start the first shipment
about July 30, 1979.

(f) Completion date of proposed shipments:

NL anticipates a total of nine (9) shipments
from Chalk River to SRP. The first shipment
is expected to be complete about ten (10)
weeks after the first shipment.

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APPENDIX A

(Continued)

- (g) Description of Special Nuclear Material to be imported:

The materials to be imported are irradiated NRU and NRX-type fuel assemblies used at the AECL Chalk River Research Laboratories.

1. The chemical/physical form is solid U-Al fuel rods which originally contained uranium enriched to 93 weight percent U-235.
2. These spent fuel assemblies contain no more than trace quantities of plutonium.

- (h) Quantity of Special Nuclear Material to be imported:

	<u>Summary:</u> <u>Type rod</u>	<u>Original U-235</u> <u>Weight/rod (gm)</u>	<u>Post Irradiation U-235</u> <u>Weight-Total (gm)</u>
1	NRU	302	117.3
17	NRU	380	1,266.0
121	NRU	495	9,677.0
76	NRX	550	15,764.0
	<u>Total U-235</u>		26,824.3 grams
	<u>Total U (U-238, U-236, & U-235)</u>		47,010.1 grams

Detailed information on each fuel assembly is attached as Exhibit A (NRU) and Exhibit B (NRX).

- (i) Mode of Transport:

The proposed nine (9) shipments from AECL to SRP will be by legal weight truck in NL Industries' Cask System #6502.

NRC has issued Certificate of Compliance #9103, Revision 1, for the NL 6502 Cask, which has an expiration date of May 31, 1983. Also attached in Exhibit C is IAEA and Canadian endorsement of the NRC Certificate of Compliance.

APPENDIX A

(Continued)

- (j) The enriched uranium was acquired from the USA, fuel was fabricated by AECL, utilized in a research reactor at Chalk River by the Canadians and is now being returned to the USA (SRP) for fuels reprocessing.

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ORIGINAL

RESIDUAL
8 U235

REMAINING
U236

GRAMS
U238

CONSUMED
U235

FORMED
G U236

LOST FS
G U235

TOTAL
HWD

TOTAL U
(GRAMS)

INITIAL WEIGHT
U238 U235

DATE IN DATE OUT

ROD NAME

ROD NAME	DATE IN	DATE OUT	INITIAL WEIGHT U238	INITIAL WEIGHT U235	TOTAL HWD	G U235 LOST FS	G U236 FORMED	CONSUMED U235	GRAMS U238	REMAINING U236	TOTAL U 8 U235	RESIDUAL 8 U235
FC 236	760503	770403	28.0	379.0	250.5	263.5	47.0	310.6	81.94	28.0	143.5	47.70
FC 239	760509	770323	28.0	380.0	256.3	269.7	48.1	317.8	83.64	28.0	138.3	44.95
FC 241	760606	770324	28.0	380.0	253.8	267.0	47.7	314.7	82.81	28.0	141.0	46.33
FC 273	761114	771002	29.0	380.0	250.8	263.8	47.1	310.9	81.83	29.0	145.2	47.57
FC 274	761120	771102	29.0	380.0	248.5	261.5	46.7	308.2	81.45	29.0	147.5	48.70
FC 275	761123	771111	29.0	380.0	249.6	262.6	46.9	309.5	81.45	29.0	146.4	48.17
FC 276	761130	771029	28.0	382.0	246.0	258.9	6.2	305.1	79.86	28.0	151.1	50.90
FC 277	761219	770908	28.0	382.0	249.5	262.5	46.9	309.4	80.99	28.0	147.5	49.24
FC 279	770214	771124	28.0	380.0	243.1	255.8	45.7	301.5	79.34	28.0	152.2	51.59
FC 280	770215	771218	28.0	378.0	240.8	253.3	45.2	298.5	78.98	28.0	152.7	52.04
FC 281	770517	780421	28.0	384.0	248.5	261.5	46.7	308.2	80.25	28.0	150.5	51.39
FC 282	770603	780213	28.0	383.0	243.9	256.7	45.8	302.5	78.97	28.0	154.3	52.18
FC 283	770626	780322	28.0	384.0	251.1	264.2	47.2	311.3	81.07	28.0	147.8	49.16
FC 284	770707	780730	28.0	385.0	246.9	259.8	46.4	306.2	79.53	28.0	153.2	51.45
FC 285	770718	780506	28.0	384.0	244.5	257.3	45.9	303.2	78.97	29.0	155.7	51.87
FC 286	770828	780408	28.0	384.0	244.1	256.7	45.8	302.7	78.82	28.0	155.2	52.42
FCX 287	770828	780408	28.0	384.0	244.1	256.8	45.8	302.7	78.82	28.0	155.2	52.42
FE 289	750424	760514	37.0	495.0	352.1	370.4	66.1	436.6	88.20	37.0	171.6	36.17
FB 920	680205	680810	22.2	302.0	150.3	156.7	28.0	184.7	61.16	22.2	117.3	70.03
FE 324	760725	780414	37.0	495.0	332.3	349.6	62.4	412.0	83.24	37.0	182.4	45.49
FE 327	760914	771007	37.0	487.0	341.5	359.3	64.1	423.5	86.95	37.0	164.7	38.58
FE 330	760929	780514	36.0	487.0	330.1	347.3	62.0	409.3	84.05	36.0	175.7	44.22
FE 331	761005	771122	36.0	488.0	334.1	351.5	62.7	414.3	84.89	36.0	172.5	42.75
FE 332	761014	770921	36.0	489.0	345.8	363.8	64.9	428.7	87.68	36.0	161.2	37.38
FE 333	761020	771117	36.0	491.0	337.9	355.5	63.5	419.0	85.33	36.0	171.5	40.77
FE 334	761030	780110	36.0	491.0	340.5	358.3	64.0	422.2	85.99	36.0	168.7	40.00
FE 335	761103	771016	36.0	494.0	344.3	362.2	64.7	426.9	86.42	36.0	167.8	40.00
FE 336	761211	780323	37.0	490.0	335.5	348.8	62.3	411.0	83.88	37.0	178.2	44.31
FE 337	761122	771203	36.0	491.0	330.4	347.6	62.0	409.6	83.43	36.0	179.4	45.35
FE 338	761211	771211	36.0	491.0	338.2	355.9	63.5	419.4	85.08	36.0	173.1	42.50
FE 339	761212	780124	35.0	492.0	343.6	361.5	64.5	426.0	86.59	35.0	165.5	39.86
FE 340	761213	780107	36.0	493.0	343.2	361.1	64.5	425.5	86.31	36.0	167.9	40.18
FE 341	761215	780304	34.0	496.0	336.1	353.7	63.1	416.8	84.04	34.0	176.3	44.91
FE 342	761216	780110	36.0	491.0	339.4	357.1	63.7	420.8	85.71	36.0	169.9	41.30
FE 343	761216	780121	36.0	492.0	336.8	354.4	63.3	417.6	84.88	36.0	173.6	42.84
FE 344	761218	780423	36.0	492.0	331.4	348.7	62.2	410.9	83.52	36.0	179.3	45.21
FE 345	761229	771219	36.0	492.0	335.9	353.4	63.1	416.5	84.65	36.0	174.6	43.26
FE 347	770108	771220	36.0	492.0	341.6	359.4	64.2	423.5	86.08	36.0	168.6	40.60
FE 348	770109	771124	36.0	491.0	334.0	351.5	62.7	414.2	84.36	36.0	175.5	43.75
FE 349	770116	780128	36.0	491.0	332.9	350.3	62.5	412.8	84.08	36.0	176.7	44.24
FE 350	770123	780706	37.0	490.0	351.2	369.5	66.0	435.4	88.87	37.0	157.5	34.64
FE 351	770124	780212	36.0	491.0	338.6	356.2	63.6	419.8	85.50	36.0	170.8	41.68
FE 352	770204	771223	36.0	491.0	337.2	354.8	63.3	418.2	85.17	36.0	172.2	42.30
FE 353	770203	780221	36.0	491.0	339.1	356.8	63.7	420.5	85.64	36.0	170.2	41.42
FE 354	770206	780225	36.0	491.0	334.3	351.8	62.8	414.6	84.44	36.0	175.2	43.62
FE 355	770207	780430	36.0	491.0	340.2	357.9	63.9	421.8	85.91	36.0	169.1	40.92
FE 356	770207	780126	36.0	491.0	337.4	355.0	63.4	418.4	85.22	36.0	172.0	42.21
FE 357	770217	771217	36.0	491.0	332.1	349.4	62.4	411.8	83.87	36.0	177.6	44.60
FE 358	770209	780224	36.0	491.0	337.9	355.5	63.5	419.0	85.33	36.0	171.5	42.01
FE 359	770216	780203	36.0	491.0	339.5	357.2	63.8	421.0	85.75	36.0	169.8	41.23
FE 360	770531	780625	37.0	490.0	332.9	350.3	62.5	412.8	84.25	37.0	176.7	43.68
FE 361	770220	780613	36.0	491.0	337.1	354.7	63.3	418.0	85.13	36.0	172.3	42.37
FE 362	770227	780512	36.0	491.0	334.9	352.3	62.9	415.2	84.57	36.0	174.7	43.38
FE 363	770304	780330	36.0	491.0	331.0	348.3	62.2	410.4	83.59	36.0	178.7	45.07
FE 363	770304	780330	36.0	491.0	336.4	353.9	63.2	417.1	84.78	36.0	174.1	43.62

FE 366	770327	780302	36.0	493.0	529.0	333.7	351.1	62.7	413.7	83.92	36.0	62.7	79.3	177.9	41.70
FE 367	770330	780311	37.0	492.0	529.0	333.2	356.6	62.6	413.2	83.99	37.0	62.6	78.8	178.4	44.16
FE 368	770403	780203	36.0	492.0	528.0	337.5	355.2	63.4	418.6	85.07	36.0	63.4	73.4	175.3	42.49
FE 369	770410	780330	37.0	493.0	530.0	337.1	354.7	63.3	418.0	84.80	37.0	63.3	75.0	175.3	42.77
FE 370	770418	780303	36.0	491.0	527.0	335.6	353.1	63.0	416.1	84.75	36.0	63.0	74.9	173.9	43.05
FE 371	770421	780603	36.0	491.0	527.0	335.3	352.8	63.0	415.8	84.69	36.0	63.0	75.2	174.2	43.17
FE 372	770503	780113	36.0	491.0	527.0	338.3	355.9	63.5	419.5	85.44	36.0	63.5	71.5	171.1	41.81
FE 373	770512	780507	36.0	491.0	527.0	333.4	350.8	62.6	413.5	84.21	36.0	62.6	77.5	176.2	44.02
FE 374	770514	780327	36.0	491.0	527.0	334.4	351.9	62.8	414.7	84.45	36.0	62.8	76.3	175.1	43.59
FE 375	770516	780614	36.0	491.0	527.0	339.1	356.7	63.7	420.4	85.63	36.0	63.7	70.6	170.3	41.45
FE 376	770518	780427	36.0	491.0	527.0	334.0	351.4	62.7	414.1	84.34	36.0	62.7	76.9	175.6	43.78
FE 377	770523	0	36.0	491.0	528.0	332.0	349.3	62.4	411.1	83.85	36.0	62.4	79.3	177.7	44.64
FE 378	770531	780810	37.0	491.0	528.0	330.4	347.6	62.1	409.7	83.44	37.0	62.1	81.3	180.4	45.08
FE 380	770611	780513	36.0	490.0	526.0	335.6	353.1	63.0	416.1	84.92	36.0	63.0	73.9	172.9	42.73
FE 381	770620	780506	36.0	489.0	525.0	339.5	357.2	63.8	420.9	86.08	36.0	63.8	68.1	167.8	40.56
FE 382	770622	780624	36.0	491.0	527.0	334.9	352.3	62.9	415.2	84.57	36.0	62.9	75.8	174.7	43.38
FE 383	770625	780714	36.0	490.0	526.0	338.6	356.3	63.6	419.9	85.69	36.0	63.6	70.1	169.7	41.32
FE 384	770629	780531	36.0	493.0	529.0	335.7	353.3	63.1	416.3	84.45	36.0	63.1	76.7	175.7	43.63
FE 385	770630	780618	36.0	491.0	527.0	340.9	358.6	64.0	422.7	86.08	36.0	64.0	68.3	168.4	40.59
FE 386	770705	780522	36.0	491.0	527.0	336.7	354.2	63.2	417.5	85.02	36.0	63.2	73.5	172.8	42.56
FE 387	770723	780615	36.0	493.0	529.0	333.0	350.4	62.5	412.9	83.76	36.0	62.5	80.1	178.6	44.83
FE 388	770719	780924	36.0	492.0	528.0	335.5	353.0	63.0	416.0	84.55	36.0	63.0	76.0	175.0	43.42
FE 389	770723	780901	36.0	494.0	530.0	333.4	350.8	62.6	413.4	83.69	36.0	62.6	80.6	179.2	44.96
FE 390	770724	780720	37.0	492.0	529.0	334.2	351.6	62.8	414.4	84.22	37.0	62.8	77.6	177.4	43.76
FE 391	770729	780727	36.0	492.0	528.0	336.1	356.2	63.6	419.7	85.31	36.0	63.6	72.3	171.8	42.05
FE 392	770731	780708	36.0	492.0	528.0	336.1	353.6	63.1	416.7	84.70	36.0	63.1	75.3	174.4	43.17
FE 393	770812	780725	36.0	492.0	528.0	331.6	348.9	62.3	411.2	83.58	36.0	62.3	80.8	179.1	45.11
FE 394	770813	781007	37.0	494.0	531.0	333.5	350.9	62.6	413.6	83.71	37.0	62.6	80.4	180.1	44.67
FE 395	770822	780820	37.0	494.0	531.0	332.9	350.3	62.5	412.8	83.56	37.0	62.5	81.2	180.7	44.93
FE 396	770823	780814	36.0	495.0	531.0	331.1	348.4	62.2	410.6	82.95	36.0	62.2	84.4	182.6	46.23
FE 397	770825	780812	37.0	495.0	532.0	329.1	346.3	61.8	408.1	82.44	37.0	61.8	86.9	185.7	46.80
FE 398	770901	780831	36.0	495.0	531.0	331.3	350.5	62.6	413.0	83.44	36.0	62.6	82.0	180.5	45.40
FE 399	770906	780908	36.0	496.0	532.0	342.5	360.3	64.3	424.7	85.62	36.0	64.3	71.3	171.7	41.56
FE 400	770908	780804	36.0	496.0	532.0	337.6	355.2	63.4	418.7	84.41	36.0	63.4	77.3	176.8	43.76
FE 401	770909	780629	37.0	496.0	533.0	340.5	358.3	63.9	422.2	85.12	37.0	63.9	73.8	174.7	42.23
FE 402	770911	780716	36.0	496.0	532.0	341.6	359.5	64.2	423.6	85.41	36.0	64.2	72.4	172.5	41.95
FE 403	770925	780906	37.0	495.0	532.0	334.0	351.4	62.7	414.1	83.67	37.0	62.7	80.9	180.6	44.77
FE 404	771002	781103	36.0	496.0	532.0	330.5	347.7	62.1	409.8	82.62	36.0	62.1	86.2	184.3	46.78
FE 405	771006	781115	36.0	497.0	533.0	330.5	347.8	62.1	409.8	82.46	36.0	62.1	87.2	185.2	47.05
FE 406	771016	780921	37.0	495.0	532.0	335.5	353.0	63.0	416.0	84.05	37.0	63.0	79.0	179.0	44.12
FE 407	771021	781101	36.0	495.0	531.0	336.4	354.0	63.2	417.2	84.28	36.0	63.2	77.8	177.0	43.97
FE 408	771025	781201	37.0	496.0	533.0	336.8	354.4	63.3	417.7	84.21	37.0	63.3	78.3	178.6	43.86
FE 409	771027	781125	37.0	496.0	533.0	332.8	350.2	62.5	412.7	83.21	37.0	62.5	83.3	182.8	45.56
FE 410	771028	781219	37.0	496.0	533.0	342.2	360.1	64.3	424.3	85.55	37.0	64.3	71.7	172.9	41.44
FE 411	771101	780919	37.0	496.0	533.0	345.0	363.0	64.8	427.8	86.25	37.0	64.8	68.2	170.0	40.13
FE 412	771105	781019	37.0	496.0	533.0	335.8	353.4	63.1	416.4	83.96	37.0	63.1	79.6	179.6	44.29
FE 413	771109	780819	36.0	496.0	532.0	332.7	350.1	62.5	412.6	83.18	36.0	62.5	83.4	181.9	45.86
FE 414	771111	781011	36.0	495.0	531.0	333.9	351.4	62.7	414.1	83.66	36.0	62.7	80.9	179.6	45.04
FE 415	771112	781004	37.0	496.0	533.0	340.3	358.0	63.9	421.9	85.07	37.0	63.9	74.1	175.0	42.32
FE 416	771117	781023	36.0	496.0	532.0	335.7	353.3	63.1	416.3	83.94	36.0	63.1	79.9	178.7	44.58
FE 417	771123	781221	37.0	496.0	533.0	335.5	353.1	63.0	416.1	83.89	37.0	63.0	80.1	179.2	44.67
FE 418	771130	781018	36.0	497.0	534.0	336.2	353.6	63.1	416.9	83.89	36.0	63.1	80.1	179.2	44.67
FE 419	771202	781110	37.0	497.0	534.0	333.2	350.6	62.6	413.1	83.13	37.0	62.6	83.9	183.4	45.71
FE 420	771210	790320	37.0	497.0	534.0	342.9	360.8	64.4	425.2	85.55	37.0	64.4	71.8	173.2	41.46
FE 421	0	0	36.0	496.0	532.0	0.0	0.0	0.0	0.0	0.00	36.0	0.0	496.0	532.0	93.23
FE 422	771216	790118	36.0	497.0	533.0	348.2	366.4	65.4	431.8	86.88	36.0	65.4	65.2	166.6	39.14
FE 423	771217	781031	36.0	497.0	533.0	341.4	359.2	64.1	423.3	85.17	36.0	64.1	73.7	173.8	42.40
FE 424	771219	790325	36.0	497.0	533.0	340.3	358.1	63.9	422.0	84.91	36.0	63.9	75.0	174.9	42.87
FE 425	771220	780317	37.0	497.0	534.0	115.7	121.8	21.7	143.5	28.88	37.0	21.7	353.5	412.2	85.75
FE 426	771222	781217	36.0	496.0	530.0	339.8	357.5	63.8	421.3	85.28	36.0	63.8	72.7	172.5	42.14
FE 427	771222	781114	36.0	495.0	531.0	330.3	347.5	62.0	409.6	82.74	36.0	62.0	85.4	183.5	46.56
FE 428	780202	781228	37.0	497.0	534.0	344.9	362.8	64.8	427.6	86.04	37.0	64.8	69.4	171.2	40.54

FE 430	780117	780115	36.0	497.0	533.0	341.6	359.4	64.2	423.6	85.42	36.0	64.2	70.7	176.5	43.46
FE 431	780120	790106	36.0	498.0	534.0	339.7	357.5	63.8	421.3	84.59	36.0	63.8	70.7	176.5	43.46
FE 433	780106	790113	36.0	497.0	533.0	342.4	360.3	64.3	424.6	85.42	36.0	64.3	72.4	172.7	41.94
FE 434	780112	781202	36.0	487.0	523.0	338.0	355.7	63.5	419.2	86.07	36.0	63.5	67.8	167.3	40.54
FE 435	780125	790113	36.0	490.0	526.0	344.8	362.7	64.8	427.5	87.24	36.0	64.8	62.5	163.3	38.29
FE 436	780211	790304	36.0	486.0	522.0	341.7	359.5	64.2	423.7	87.18	36.0	64.2	62.3	162.5	38.35
FE 437	780212	781213	36.0	488.0	524.0	341.7	359.5	64.2	423.7	86.82	36.0	64.2	64.3	164.5	39.09
FE 438	780214	790125	36.0	486.0	522.0	337.5	355.2	63.4	418.5	86.12	36.0	63.4	67.5	166.8	40.43
FE 439	780216	790329	36.0	487.0	523.0	339.8	357.6	63.8	421.4	86.53	36.0	63.8	65.6	165.4	39.60
FE 440	780217	790418	36.0	487.0	523.0	340.8	358.6	64.0	422.6	86.77	36.0	64.0	64.4	164.4	39.18
FE 441	780220	790424	36.0	487.0	523.0	332.9	350.3	62.5	412.8	84.76	36.0	62.5	74.2	172.7	42.97
FE 442	780220	790217	36.0	486.0	522.0	344.9	362.9	64.8	427.6	87.99	36.0	64.8	58.4	159.1	36.67
FE 443	780225	790103	36.0	487.0	523.0	343.7	361.6	64.6	426.2	87.51	36.0	64.6	60.8	161.4	37.69
FE 444	780223	790227	36.0	487.0	523.0	345.7	363	64.9	428.7	88.03	36.0	64.9	58.3	159.2	36.67
FE 445	780228	781129	35.0	488.0	523.0	295.0	310	55.4	365.8	74.97	35.0	55.4	122.2	217.5	57.47
FE 446	780301	790123	36.0	488.0	524.0	340.5	358.3	64.0	422.2	86.52	36.0	64.0	65.8	165.7	39.68
FE 447	780302	790224	36.0	487.0	523.0	336.8	354.4	63.3	417.6	85.76	36.0	63.3	69.4	168.6	41.13
FE 448	780304	790311	36.0	488.0	524.0	340.1	357.9	63.9	421.8	86.43	36.0	63.9	66.2	166.1	39.87
FE 449	780322	790308	36.0	486.0	522.0	339.9	357.7	63.8	421.5	86.73	36.0	63.8	64.5	164.3	39.25
FE 450	780323	790518	36.0	487.0	523.0	337.6	355.2	63.4	418.6	85.96	36.0	63.4	68.4	167.8	40.75

GRAND TOTAL 139 4882.2 66356.3 71238.2 46920.2 8375.4 55295.7 4882.2 8375.4 11060.3 24318.0

AVERAGE RESIDUAL % U235 =44.36

778 020

EXHIBIT B

NRC
76 - NRC IRRADIATED RODS FOR SHIPMENT

AECL/CHALK RIVER

778 021

ROD NAME	DATE IN	DATE OUT	INITIAL WEIGHT (GRAMS)			TOTAL MWD	G U235 LOST FS	G U236 FORMED	U235 CONSUMED		GRAMS REMAINING				RESIDUAL	
			U238	U235	TOTAL U				G	%	U238	U236	U235	TOTAL U	% U235	
MS 014	720121	740601	40.0	543.7	583.7	277.2	288.8	51.6	340.4	62.61	40.0	51.6	203.3	294.9	68.95	
MS 040	721216	770726	40.1	546.0	586.1	350.6	365.3	65.2	430.5	78.85	40.1	65.2	115.5	220.8	52.30	
MS 046	730221	761215	40.0	546.0	586.0	343.2	357.6	63.8	421.4	77.19	40.0	63.8	124.6	228.4	54.54	
MS 048	730324	770705	40.0	546.0	586.0	351.7	366.5	65.4	431.9	79.10	40.0	65.4	114.1	219.5	51.98	
MS 050	730420	771220	40.0	546.0	586.0	363.9	379.2	67.7	446.9	81.84	40.0	67.7	99.1	206.8	47.93	
MS 055	730629	771220	40.0	546.0	586.0	361.1	376.3	67.2	443.4	81.21	40.0	67.2	102.6	209.7	48.90	
MS 056	730629	771031	40.0	546.0	586.0	361.6	376.8	67.3	444.0	81.33	40.0	67.3	102.0	209.2	48.73	
MS 057	730629	771220	40.0	546.0	586.0	360.5	375.6	67.1	442.7	81.08	40.0	67.1	103.3	210.4	49.11	
MS 058	730724	771220	40.0	546.0	586.0	357.1	372.1	66.4	438.5	80.31	40.0	66.4	107.5	213.9	50.25	
MS 064	731130	770608	40.0	546.0	586.0	348.6	363.2	64.8	428.1	78.40	40.0	64.8	117.9	222.8	52.94	
MS 065	731130	770726	40.0	546.0	586.0	353.5	368.3	65.8	434.1	79.51	40.0	65.8	111.9	217.7	51.41	
MS 066	731130	771220	40.0	546.0	586.0	360.3	375.4	67.0	442.4	81.03	40.0	67.0	103.6	210.6	49.18	
MS 067	731221	771220	40.0	546.0	586.0	364.2	379.5	67.7	447.2	81.91	40.0	67.7	98.8	206.5	47.83	
MS 070	740118	771220	40.0	546.0	586.0	357.4	372.4	66.5	438.9	80.38	40.0	66.5	107.1	213.6	50.15	
MS 073	740308	771220	40.0	546.0	586.0	361.0	376.2	67.1	443.3	81.19	40.0	67.1	102.7	209.8	48.94	
MS 074	740308	771220	40.0	546.0	586.0	355.3	370.2	66.1	436.3	79.91	40.0	66.1	109.7	215.8	50.84	
MS 076	740403	771220	40.0	546.0	586.0	356.7	371.7	66.3	438.0	80.22	40.0	66.3	108.0	214.3	50.38	
MS 078	740403	770914	40.0	546.0	586.0	346.2	360.7	64.4	425.1	77.86	40.0	64.4	120.9	225.3	53.66	
MS 081	740602	770228	40.0	546.0	586.0	323.2	336.8	60.1	396.9	72.69	40.0	60.1	149.1	249.2	59.83	
MS 082	740614	770608	40.0	546.0	586.0	329.6	343.4	61.3	404.7	74.13	40.0	61.3	141.3	242.6	58.23	
MS 083	740614	771031	40.0	546.0	586.0	350.4	365.1	65.2	430.3	78.81	40.0	65.2	115.7	220.9	52.38	
MS 085	740731	770228	40.0	546.0	586.0	316.1	329.4	58.8	388.2	71.09	40.0	58.8	157.8	256.6	61.50	
MS 086	740731	770228	40.0	546.0	586.0	326.5	340.2	60.7	400.9	73.43	40.0	60.7	145.1	245.8	59.02	
MS 087	740921	771220	40.0	546.0	586.0	349.9	364.6	65.1	429.7	78.70	40.0	65.1	116.3	221.4	52.54	
MS 090	741018	770228	39.0	544.0	583.0	300.0	312.6	55.8	368.4	67.72	39.0	55.8	175.6	270.4	64.94	
MS 091	741018	761104	42.0	543.0	585.0	282.5	294.4	52.5	346.9	63.89	42.0	52.5	196.1	290.6	67.47	
MS 092	741109	760726	42.0	541.0	583.0	251.6	262.2	46.8	309.0	57.11	42.0	46.8	232.0	320.8	72.32	
MS 093	741109	771220	40.0	543.0	583.0	337.0	351.2	62.7	413.8	76.21	40.0	62.7	129.2	231.8	55.71	
MS 094	741203	761014	39.0	543.0	582.0	246.1	256.4	45.8	302.2	55.66	39.0	45.8	240.8	325.6	73.96	
MS 095	750102	770208	42.0	545.0	587.0	275.4	287.0	51.2	338.2	62.05	42.0	51.2	206.8	300.0	68.93	
MS 096	750102	770228	39.0	544.0	583.0	283.8	295.7	52.8	348.5	64.06	39.0	52.8	195.5	287.3	68.05	
MS 097	750205	770228	41.0	544.0	585.0	270.7	282.1	50.4	332.4	61.11	41.0	50.4	211.6	302.9	69.84	
MS 098	750327	770228	42.0	544.0	586.0	263.3	274.4	49.0	323.3	59.44	42.0	49.0	220.7	311.6	70.81	
MS 099	750327	0	39.0	542.0	581.0	340.1	354.4	63.3	417.6	77.06	39.0	63.3	124.4	226.6	54.88	
MS 100	750327	0	39.0	544.0	583.0	339.4	353.7	63.1	416.8	76.61	39.0	63.1	127.2	229.3	55.47	
MS 101	750327	770228	38.0	543.0	581.0	261.0	272.0	48.5	320.5	59.03	38.0	48.5	222.5	309.0	72.00	
MS 102	750417	760607	38.0	546.0	584.0	205.1	213.7	38.1	251.9	46.13	38.0	38.1	294.1	370.3	79.44	
MS 103	750417	761014	39.0	544.0	583.0	225.5	235.0	41.9	276.9	50.90	39.0	41.9	267.1	348.0	76.74	
MS 104	750508	761014	39.0	545.0	584.0	227.7	237.3	42.4	279.6	51.01	39.0	42.4	265.4	346.7	76.54	
MS 105	750327	770109	41.0	546.0	587.0	244.2	254.5	45.4	299.9	54.92	41.0	45.4	246.1	332.5	74.01	
MS 106	750627	761215	39.0	546.0	585.0	227.7	237.3	42.4	279.6	51.21	39.0	42.4	266.4	347.7	76.61	
MS 107	750627	770412	42.0	544.0	586.0	283.9	295.8	52.8	348.6	64.09	42.0	52.8	195.4	290.2	67.33	
MS 108	750627	761104	41.0	546.0	587.0	226.0	235.5	42.0	277.5	50.83	41.0	42.0	268.5	351.5	76.38	
MS 109	750627	761215	40.0	546.0	586.0	231.5	241.2	43.1	284.3	52.07	40.0	43.1	261.7	344.8	75.91	
MS 110	750828	770914	40.0	545.0	585.0	284.3	296.2	52.9	349.1	64.06	40.0	52.9	195.9	288.8	67.83	
MS 111	750828	770228	40.0	545.0	585.0	237.7	247.7	44.2	291.9	53.56	40.0	44.2	253.1	337.3	75.03	
MS 113	750627	770902	36.0	545.0	581.0	262.7	273.7	48.9	322.6	59.19	36.0	48.9	222.4	307.3	72.38	
MS 114	750926	770109	39.0	546.0	585.0	227.2	236.7	42.3	279.0	51.10	39.0	42.3	267.0	348.3	76.67	
MS 115	751009	771115	40.0	543.0	583.0	283.5	295.4	52.7	348.1	64.11	40.0	52.7	194.9	287.6	67.76	
MS 116	751029	770823	42.0	545.0	587.0	262.6	273.6	48.8	322.5	59.17	42.0	48.8	222.5	313.4	71.01	
MS 117	751029	780217	41.0	544.0	585.0	272.4	283.8	50.7	334.5	61.49	41.0	50.7	209.5	301.2	69.56	
MS 118	751121	770329	42.0	544.0	586.0	220.6	229.9	41.0	270.9	49.80	42.0	41.0	273.1	356.1	76.69	
MS 119	751227	770912	39.0	544.0	583.0	248.2	258.6	46.2	304.8	56.03	39.0	46.2	239.2	324.4	73.74	
MS 121	760116	771220	40.0	544.0	584.0	261.8	272.8	48.7	321.5	59.10	40.0	48.7	222.5	311.2	71.50	
MS 122	760218	770228	40.0	545.0	585.0	166.9	173.9	31.0	205.0	37.61	40.0	31.0	340.0	411.1	82.72	

MS 124	760313	0	40.0	544.0	584.0	282.0	293.8	52.5	346.3	63.66	40.0	52.5	177.7	290.2	68.14
MS 125	760319	780914	41.0	544.0	585.0	276.1	287.7	51.4	339.1	62.33	41.0	51.4	204.9	297.3	68.94
MS 126	760331	0	41.0	544.0	585.0	268.5	279.8	49.9	329.7	60.61	41.0	49.9	214.3	305.2	70.21
MS 128	760430	771007	40.0	544.0	584.0	214.0	223.0	39.8	262.8	48.31	40.0	39.8	281.2	361.0	77.89
MS 129	760430	771220	41.0	544.0	585.0	245.2	255.5	45.6	301.1	55.35	41.0	45.6	242.9	329.5	73.72
MS 130	760527	780328	40.0	544.0	584.0	248.1	258.5	46.1	304.7	56.00	40.0	46.1	239.3	325.5	73.53
MS 131	760706	0	40.0	544.0	584.0	256.0	266.8	47.6	314.4	57.79	40.0	47.6	229.6	317.2	72.38
MS 133	760721	770912	40.0	546.0	586.0	192.9	201.0	35.9	236.9	43.38	40.0	35.9	309.1	385.0	80.29
MS 134	760730	780213	40.0	546.0	586.0	219.5	228.7	40.8	269.5	49.37	40.0	40.8	276.5	357.3	77.38
MS 135	760730	0	40.0	546.0	586.0	267.1	278.3	49.7	328.0	60.07	40.0	49.7	218.0	307.7	70.85
MS 139	761014	0	40.0	547.0	587.0	263.6	274.7	49.0	323.7	59.18	40.0	49.0	223.3	312.3	71.49
MS 141	761105	0	40.0	545.0	585.0	236.6	246.5	44.0	290.5	53.31	40.0	44.0	254.5	338.5	75.18
MS 143	761119	771125	40.0	544.0	584.0	174.1	181.4	32.4	213.8	39.30	40.0	32.4	330.2	402.6	82.02
MS 145	761216	770228	40.0	546.0	586.0	42.3	44.1	7.9	51.9	9.51	40.0	7.9	494.1	541.9	91.17
MS 146	761227	770105	39.0	543.0	582.0	172.4	179.6	32.1	211.7	38.99	39.0	32.1	331.3	402.4	82.34
MS 150	770304	0	40.0	546.0	586.0	214.5	223.5	39.9	263.4	48.24	40.0	39.9	282.6	362.5	77.96
MS 154	770330	0	40.0	539.0	579.0	243.2	253.4	45.2	298.6	55.41	40.0	45.2	240.4	325.6	73.82
MS 159	770610	0	40.0	544.0	584.0	225.7	235.2	42.0	277.2	50.95	40.0	42.0	266.8	348.8	76.50
MS 174	771223	0	40.0	549.0	589.0	59.6	62.1	11.1	73.2	13.33	40.0	11.1	475.8	526.9	90.30
MS 187	780420	0	40.4	548.6	589.0	120.7	125.8	22.5	148.2	27.02	40.4	22.5	400.4	463.2	86.43

GRAND TOTAL 76 3042.5 41417.3 44459.8 21767.7 3885.6 25653.3 3042.5 3885.6 15764.0 22692.1

AVERAGE RESIDUAL % U235 =66.85

773
022



Atomic Energy Control Board
 P.O. Box 1046
 Ottawa, Canada
 K1P 5S9

Commission de contrôle de l'énergie atomique
 C.P. 1046
 Ottawa, Canada
 K1P 5S9

8 June 1978

RECEIVED
U.S. NRC

Our file No. reference

30-10-2-123

Revision 1.

CANADIAN ENDORSEMENT (E53) FOR TYPE B FISSILE RADIOACTIVE MATERIAL PACKAGE DESIGN AND SHIPMENT APPROVAL CERTIFICATE USA/9103/B()F

This certifies that the package design for the National Lead Industries Inc. Model NLI-6502 approved by the USA Department of Transport (US DOT) under IAEA Certificate of Competent Authority USA/9103/B()F granted to National Lead Industries Inc., Barnwell, South Carolina is hereby approved for shipment in Canada by road, rail and marine transport subject to IAEA (1) and the Canadian regulations (2) (3) (4) (5) as appropriate, for the transport of radioactive material.

Each shipper under this authorization, other than the original applicant, shall register his identity with the Atomic Energy Control Board prior to the first use of this authorization and shall certify that he possesses the necessary instructions of the package for shipment.

PACKAGING DESCRIPTION

As set out in the attached US DOT certificate USA/9103/B(U)F, the packaging consists generally of a cylindrical steel shell nominally 0.84 m in diameter and 3.25 m in length containing lead and depleted uranium shielding material and having 2 lids, one at each end, both 0.61 m in diameter and extending 0.13 m into the cask recess. Fuel rods are contained within an approximately 0.29 m square by 3.21 m long basket of stainless steel angle and strap with a full length stainless steel clad Boral poison plate with two partial poison plates incorporated in the sides of the basket. A metal screen encloses the package during transportation and the package gross weight is about 19,200 kg. This packaging shall bear the competent authority identification mark "USA/9103/B()F".

AUTHORIZED RADIOACTIVE CONTENTS

The authorized contents consist of either 20 NRU or 28 NRX irradiated aluminum-uranium alloy fuel rods with a maximum decay heat load of 14,000 BTU/h (4100 W) as further limited in U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9103. The average surface heat flux is approximately 400 W/m².

SHIPMENT

Shipment shall be made as a Fissile Class III consignment in accordance with the conditions specified in USNRC approval certificate USA/9103/B()F - copy attached - and shall be further prepared for shipment, shipped and carried in accordance with the most recent Canadian regulations for road (2) rail (3) marine (4) and with IAEA regulations (1). This certificate authorizes shipment road, rail and marine transport.

This certificate is issued in accordance with the IAEA regulations (1) the Atomic Energy Control Regulations (2) and by agreement with the Canadian Transportation regulatory authorities.

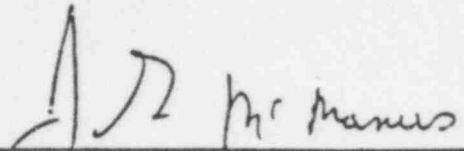
EXPIRY DATE

This certificate expires 18 April 1981.

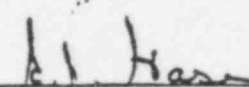
778 023

Certified by:

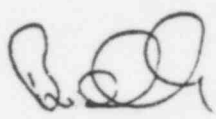
Endorsed by:



J. G. McManus
Chief - Safeguards - Nuclear Materials
Licensing Division
Directorate of Licensing
Atomic Energy Control Board
P. O. Box 1046
Ottawa, CANADA
(Acting competent authority for
road transport)



E. J. Hase
Director of Operation
Railway Transport Committee
Canadian Transport Commission
Ottawa, CANADA



G.W.R. Graves - Chairman
Board of Steamship Inspection
Ship Safety Branch
Canadian Coast Guard
Ottawa, CANADA

REFERENCES

- (1) IAEA "Regulations for the Safe Transport of Radioactive Materials", 1973 Edition Safety Series No. 6, International Atomic Energy Agency, Vienna STI/PUB/323.
- (2) Atomic Energy Control Regulations, SOR/74-334 dated 4 June 1974.
- (3) Regulations for the Transportation of Dangerous Commodities by Rail, as issued by the Canadian Transport Commission.
- (4) IMCO "International Dangerous Goods Code" published by the Inter-Governmental Maritime Consultative Organization, London. Refer also to National Harbours Board and St. Lawrence Seaway Authority regulations as appropriate.
- (5) IATA "Restricted Articles Regulations" Radioactive materials packaged and shipped in accordance with Part 2 of these regulations are deemed to meet the requirements of Sec. 800 of the Air Regulations for Canada. See Flight Information Manual and Criteria for the Carriage of Dangerous Goods and Magnetized Materials, Civil Aeronautics Branch, Transport Canada.

Revision 1: 8 June 1978. Expiry date changed.



DEPARTMENT OF TRANSPORTATION
RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION
WASHINGTON, D. C. 20590
IAEA CERTIFICATE OF COMPETENT AUTHORITY

Type B Fissile Radioactive Material Package Design

REFER TO:

Certificate Number USA/9103/B()F
(Revision 1)

This establishes that the packaging design described herein, when loaded with the authorized radioactive contents, has been certified by the National Competent Authority of the United States as meeting the regulatory requirement for Type B packaging for fissile radioactive materials as prescribed in IAEA¹ Regulations and in accordance with §§ 173.393b and 173.396(c)(3) of the USA² Regulations for the transport of radioactive materials.

I. Package Identification - NLI-6502.

II. Packaging Description - Packaging authorized by this certificate consist of a 1/2 inch thick steel shell 33 1/2 inch in diameter and 130 inches in length containing lead and depleted uranium shielding material and having 2 lids, one at each end, both 24 1/2 inches in diameter and extending 5 inches into the cask recess. Fuel rods are contained within an approximately 11 1/2 inch square by 128 1/2 inches long basket of stainless steel angle and strap with a full length stainless steel clad Boral poison plate with two partial poison plates incorporated in the sides of the basket. A metal screen encloses the package during transportation and the package gross weight is about 45,300 pounds.

III. Authorized Radioactive Contents - The authorized contents consist of either 20 NRU or 28 NRX irradiated aluminum-uranium alloy fuel rods with a maximum decay heat load of 14,000 BTU/hr as further limited in U. S. Nuclear Regulatory Commission Certificate of Compliance No. 9103 (Appendix A).

Shipments are authorized as Fissile Class III with a maximum of one package per shipment.

IV. General Conditions -

a. Each user of this certificate must have in his possession a copy of this certificate.

b. Each user of this certificate, other than NL Industries, Inc., Barnwell S. C., shall register his identity in writing to the Office of Hazardous Materials Regulations, U. S. Department of Transportation
U. S. Department of Transportation, Washington, D. C.
20590.

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c. This certificate does not relieve any consignor or carrier from compliance with any requirement of the Government of any country through or into which the package is to be transported.

V. Marking and Labeling - The package must also bear the marking USA/9103/B()F as well as the other marking and labels prescribed by the USA Regulations.

VI. Expiration Date - This certificate, unless renewed, expires on April 18, 1981.

This certificate is issued in accordance with the requirements of the IAEA and USA Regulations and in response to the October 11, 1977 and May 5, 1978 petitions by NL Industries, Barnwell, S. C. and in consideration of the associated information provided in U. S. Nuclear Regulatory Commission Certificate of Compliance No. 9103 (Appendix A).

Certified by:


for A. W. Grella
Chief, R & D Management Division
Office of Program Support
Materials Transportation Bureau

6/1/78
(DATE)

1 "Safety Series No. 6, Regulations for the Safe Transport of Radioactive Materials, 1967 Edition" published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

2 Title 49, Code of Federal Regulations, Parts 100-199, USA.

Revision 1 issued to incorporate Rev. 1 of NRC Certificate 9103 and to extend expiration date.

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