doc #f 041690

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF GOVERNMENTAL AND PUBLIC AFFAIRS, REGION I
475 Allendale Road, King of Prussia, Pa. 19406
Tel. 215-337-5330

Ma
Maryland Calif
Penn

No. I-90-29
Contacts: Karl Abraham
Steve Horwitz

March 9, 1990

NRC INSPECTORS GO TO THE BOSTON AREA TO BACKTRACK THE ROUTE OF A CRATE CONTAINING A RADIATION SOURCE, SHIPPED FROM OVERSEAS TO BURLINGTON, MA

KING OF PRUSSIA, PA--Two Nuclear Regulatory Commission radiation specialist inspectors this morning went to the Boston area to backtrack part of the route of a shipment of supposedly empty "source changer" devices that on reaching Amersham, Inc. of Burlington, MA, was found to contain a strong radiation source normally used for industrial purposes.

The source was in the contents of a wooden crate that came from Korea by ship, to the port of Los Angeles, and later was trucked across the country, with intermediate stops, eventually to be delivered to the Amersham Industries facility in Burlington, yesterday afternoon (3/8).

The crate contained shield devices normally utilized to transport radiation sources used in industrial radiography--for the making of X-ray like picture of welds, structural steel, etc. The containers are routinely used to provide adequate shielding for the shipment of these sources from a manufacturer to the ultimate user. In Korea, the sources should have been removed and inserted into devices actually used to do the radiography. The 14 containers were shipped back to Amersham for use in other shipments.

On arrival at Amersham, a preliminary survey of the truck carrying the crate of devices showed higher than permitted but not life-threatening levels of radiation (100 millirem per hour) outside the rear of the truck. As a company radiation safety officer was being summoned to make a more detailed radiation survey, the truck driver unloaded the crate from the truck. When the next measurement was taken of the crate, the reading was about 150 rem per hour (about 1500 times greater,) ~~six inches from one~~ of the source changers. A careful search for the source of the radiation revealed a small pellet the size of a pencil eraser, highly radioactive, lying loose in the bottom of one of the source changer boxes, free of the shielding portions of the changer in which it should have been enclosed. It was immediately removed with adequate shielding and long tongs, and put in a shielded container for relocation to a specially shielded compartment, called a hot cell, in the Amersham facility.

at the surface

It is not believed that the truck driver, in handling the crate, received an exposure that would lead to any immediately observable symptoms of radiation exposure.

(more)

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However, it remains to be determined whether any persons in the places where the crate was temporarily stored enroute to Amersham, might have come close enough to it for a long enough period of time to get more than a minimal radiation exposure.

The preliminary itinerary of the shipment was the following: the ship, The Hanjin Mokpo, departed Korea on January 29 and docked in Los Angeles on February 9. The crate was warehoused in the port until it cleared customs on February 14, and in a Los Angeles warehouse until February 16, when it was loaded aboard a truck, to begin a journey across the United States, with two stops in Pennsylvania and one in Maryland, before arriving in Boston on February 22, to be warehoused.

One of the first places to be visited in the Boston area is the warehouse used by the Patriot Transportation Company, which housed the crate from February 22 to March 8. Health officials of the Commonwealth of Massachusetts are accompanying the NRC inspectors on their rounds of Boston.

The NRC staff has obtained assistance from the U.S. Department of Transportation, which will help to track the cross-country route, stops, and the various drivers involved, and learn to what extent individuals may have spent time near the radiation source before its discovery in Burlington, MA. Information has been exchanged with the appropriate authorities in Korea. NRC Region V, which has California in its jurisdiction, has been in touch with the government of that State, itself a regulator and inspector of radioactive materials under "Agreement State" status with the NRC.

At the present, while Amersham is working to identify the exact identity of the radioactive isotope in the pellet, it appears that anyone three feet or more from the package while it was in transit or warehouse storage should not expect to have sustained a radiation dose large enough to cause medically observable symptoms. However, the various agencies involved will attempt to question anyone who was near the shipment at any time to determine more accurately whether anyone suffered an injurious radiation exposure.

The Commonwealths of Massachusetts and Pennsylvania and the States of California and Maryland have been informed of these events.

#

041690

Tech/Ops doc'g

Memorandum

To: John Munro III

cc: Joseph Lima

From: Eric T. Clarke

Subject: Standard Cobalt-60 Sources

Date: March 7, 1984 Revised 24 Oct 1984

On 3 December 1983, NBS measured a new standard cobalt source, NBS S-692, to emit 235 mRhm, and we subsequently found that STD 427 is 2.032 times as intense as NBS S-692. Comparison with our old values (my memo of 2 May 1983) indicates that our earlier standard sources were 1.7% too high. Accordingly, I have recalculated the strengths of our standard sources using this new NBS calibration as the primary standard and applying the ratios determined earlier. Uncertainty of the NBS source is stated to be ±0.9%; precision is believed to be better than ±1%.

The decay table is based on a half-life of 5.272 years. Curies are based on a specific gamma ray constant of 1.30. Measurements recorded on pp 23 and 27, Book VII.

Source	As of 1 January 1984		Ratio (± .01)
	Rhm	Ci	
NBS S-692	0.233	0.179	2.03
STD 427	0.473	0.364	4.81
STD 1004	2.28	1.75	3.88
STD 1257	8.84	6.79	2.98
STD 1606	26.3	20.2	

Cobalt Decay			
Age in	Years	Months	
0	1	1	1 Jan
1	.8768	.989	1 Feb
2	.7688	.978	1 Mar
3	.6741	.968	1 Apr
4	.5910	.957	1 May
5	.5182	.947	1 June
6	.4544	.936	1 July
7	.3984	.926	1 Aug
8	.3493	.916	1 Sept
9	.3063	.906	1 Oct
10	.2685	.896	1 Nov
11	.2355	.886	1 Dec
12	.2064	.877	
20	.07211		
30	.01936		

ETC:mct

04-015-90
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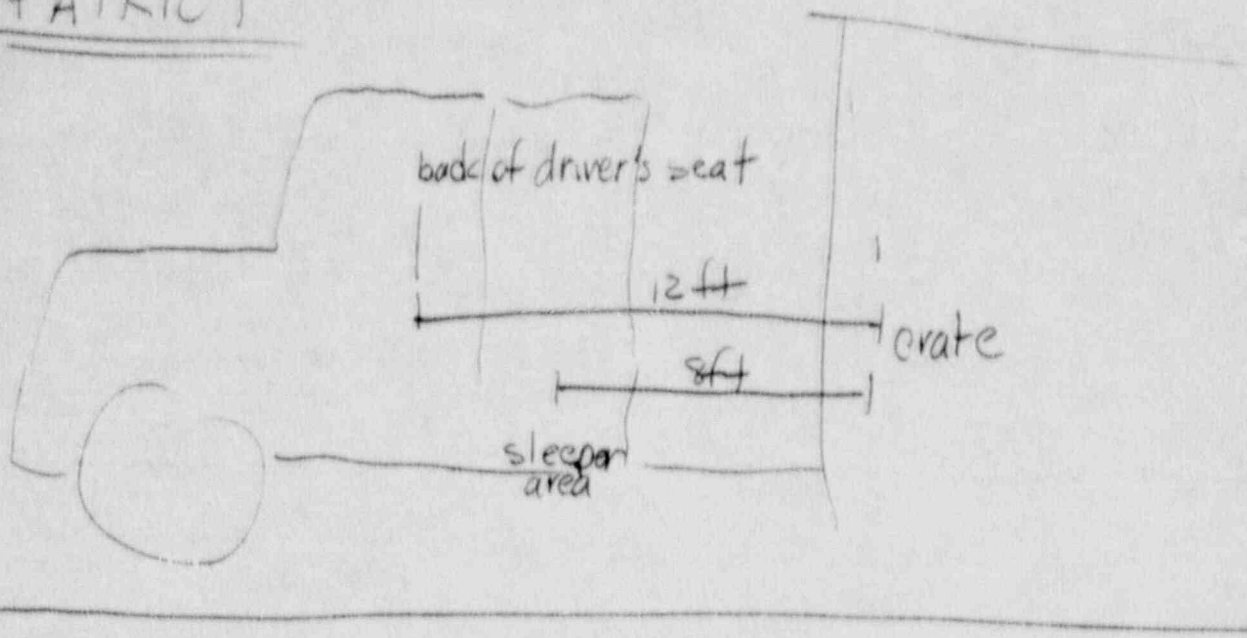
PATRICT



04-06-90

AMERSHAM

Press Contact - Dr. Bryan Baker
Environmental & Regulatory Affairs

Amersham has reported incident to their agent in Korea, Seoul NDI

McDaniel & Roughan stated that they have been shipping sources to Korea since the inception of Tech Ops. Currently, Amersham ships 20 sources/month to Korea.

Amersham stated that the radiographic source was definitely not manufactured by them. It had been connected to a pigtail made of aircraft cable. The suspect it was manufactured by a Korean company, KAERI.

In hot cell, measured ~~SR~~ 13.5 - 14 Rhr^{-1} @ 1 ft ⇒ 2.8 Curies
1/8" lead - dose dropped 1/2 HVL - Ir-192 1/8" Pb

04-016-90

4 source changers received - All AI-500SU
All had bolts
3 did not have locks
1 without a lock had a seal wire (copper wire @ lead)
SN 610 Also had a source

Source changers and truck were wipe-tested prior to release of vehicle - Nothing above background detect

Source leak test - 0.5 nCi
leak tested later - 1.3 nCi

Other source changers surveyed
11 - 1.5-2 mR hr⁻¹
1 - 5 mR hr⁻¹ 1 - 6 mR hr⁻¹
All changers labeled with YELLOW II & III
All but one labeled with radioactive materials special form NOS, UN2974. The exception had label, but it was illegible

AI-500SU SN 610
YELLOW II TI 0.9 Rad Nat Label

04-016-90

Richard Magnani

Worked for 2 years, 1 month for Amersham } Rad Tech Shipping & Receiving Dept
6 years for Gamma Industries }

* Come out to truck, door was open - source changers were on the floor of the truck and the wooden crate was turned upside down on top of the changers. Crate was empty

* When I entered the truck, my chirper sounded. I went back to the receiving area and got a survey meter. I came back out to the truck and measured approximately 60 mR hr^{-1} @ 3 ft from the back of the truck. I told the driver to stay inside. I didn't give him a reason because I didn't want to frighten him.

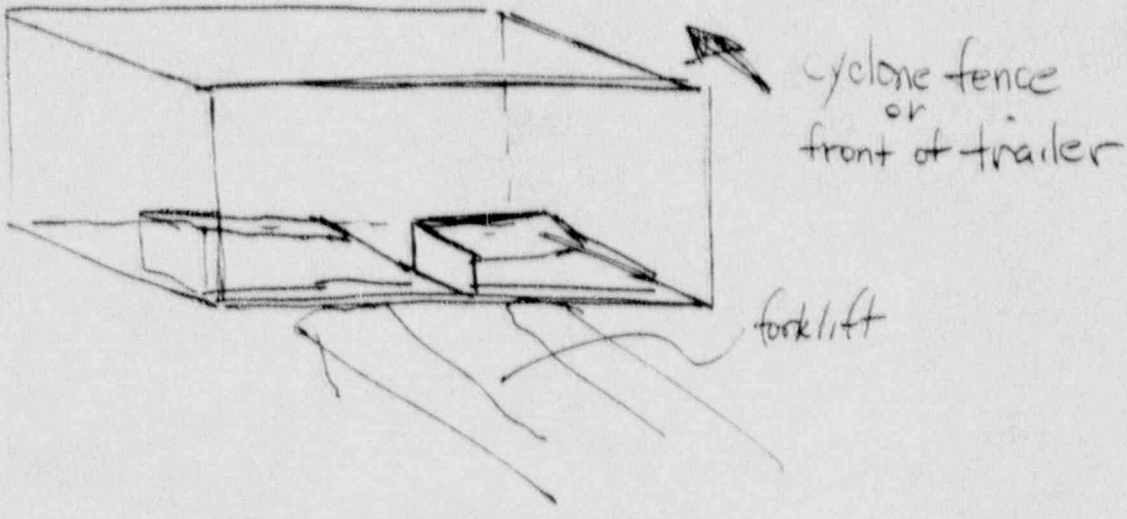
* I went to get RSO, driver was in the receiving area. I estimate I was gone ≈ 30 seconds. During that time, the driver left the receiving area, went to the truck, pulled the crate of the changers, and returned to receiving area.

* The inspectors timed Rich going to & from RSO's office ⇒ 1 minute

04-016-90

Interview @ Richard Faber Age 22

- Spends 2-2½ hours/day in bonded area (works 8 hr day)
+ does not eat lunch or take breaks or hang out in bonded area
+ package was broken open when it arrived @ Patriot.
~~Initially~~ appeared ~~to have~~ been crushed. He pulled the ~~part~~ crate apart far enough that he could count all the changers. He removed two changers, was not intimidated by their weight, and placed the changers back in the crate. Estimated it took him 1 minute to remove changers and return to package
+ Unloaded truck from Los Angeles. It took 2-3 hrs The crate was one of the last items unloaded.



+ ~~Did~~ Performed reenactment of unloading crate from truck from LA and placing crate in bonded storage area 2 minutes crate to driver distance was 6 ft
420 mR hr⁻¹

* ~~Performed~~ re-enactment of loading crate on to Patriot truck. 5 minutes, estimated he sat on

04-016-90

* Swept floor in vicinity of crate, but no closer than five or six feet for ~~x~~15 minutes. He swept up what Tony Sabella swept out from around the crate

04-016-90

Interview @ Tony Sabella 37/15

- Frequents the bonded area when moving material, but not on a regular basis (infrequent)
* Swept floor around the crate. Estimates he was within 3 feet for 10 minutes
* Never ate lunch, took a break, or rested near the crate

Interview @ Larry Upton

* Walked by crate several times, no closer than 5 ft
* Spent time in area stacking a palate, but was approximately 20 ft from crate

Interview @ Walter Collette 18 yrs

* Spends 2-2½ hrs in the bonded area/day
* Never ate lunch, took a break, or hung out near the crate
* Swept floor @ Sabella & Foker, did not get near crate
* wrote lettering on crate
max time - 30 seconds

04-016-90

Tony Mucci

* 45 foot tractor/trailer => trailer was 45ft long
  crate was loaded on back of trailer on right side,
  4 ft from back door

* Crate was broken open, however all changers were
  in the crate at time of departure
* Drove approximately 30 minutes to Amersham,
  exactly 13 miles, no stops. Stayed @
  Amersham approximately 1 hour
* Upon arrival at Amersham, Tony opened the door
  of the truck, noticed the source changers
  were all over the floor of the truck except for
  one source changer that remained in the crate
  I physically removed the changer from the
  crate, and pulled the crate out of the truck
  and placed it off to side of Amersham dock.
  I went inside and told the Amersham person
  (Rich) he came out, looked at the shipment,
  didn't like what he saw and went inside to
  get a geiger counter. He ~~made some~~ came outside
  and ~~measure~~ told me to stay away from truck
  I went inside and stayed inside. (Rich)
  he went and got the woman (Kate). I followed
  (Kate) outside and she told me to go

04-016-90

inside and wait.

* Performed a timed re-enactment with Tony
Opened door, removed changer, pulled out crate,
left to tell Rich ≈ 1½ minutes
30 seconds max spent in truck among changers
Tony spent another 30 seconds max at edge
of truck while Rich went to get a survey meter

* ~~Tom~~ On day of shipment, I walk into bonded
area and approached the crate, verified it was
there and walked away. Prior to that, never
noticed crate in the warehouse

04-016-90

3Ci 5R/Ci@1ft

1
15R@ 1ft
60R@ 6"
86@ 5"
135@ 4"
240 @ 3"
1.7 @ 3ft
600mR@ 5ft
230mR@ 8ft
150mR@ 10ft
38mR@ 20ft
17mR@ 30ft
9mR@ 40ft

PERSONS CONTACTED

Amersham

Kate Roughan - RSO
William McDaniel - General Manager
Richard Magnani - Radiation Technician - Shipping & Receiving Dept
Arturo Leonin - Radiation Technician - Shipping & Receiving Dept
Ed Schaffer - Hot Lab Supervisor
John Graziadei - Radiation Safety Specialist

State of Massachusetts

Bob Watkins
George Swible

Patriot Trucking

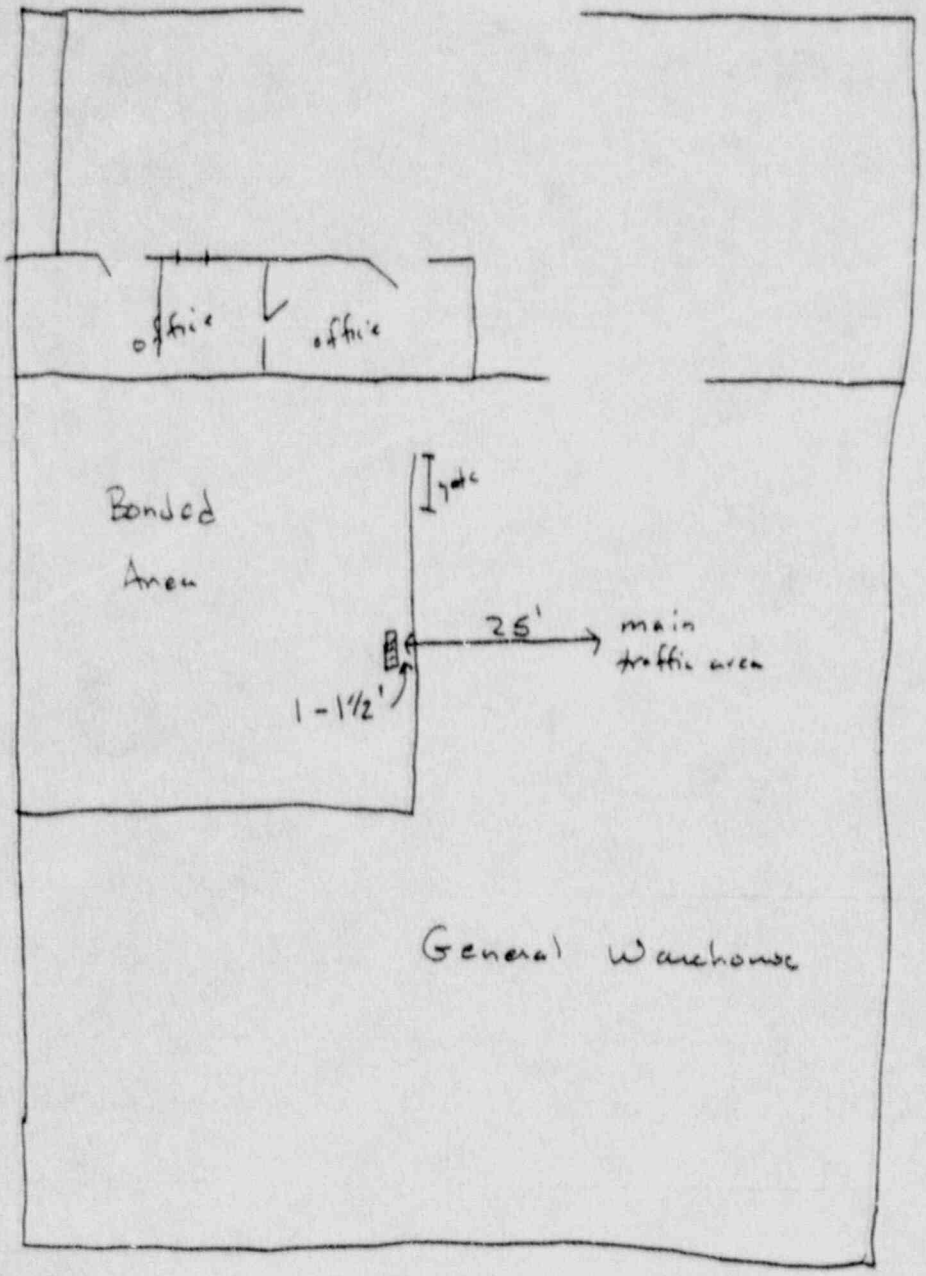
Peter DeFeo - President
James DeSimone - Vice President
Richard Faber Jr. Fork truck operator (works in bonded area)
Walter Collette - works in bonded area
& freguents bonded area
Tony Sabella -
Larry Upton
Tony Mucci - truck driver

Tom Madsen was not available 3/9 - works in bonded area

04-016-90

PATRIOT

TRUCKING



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04-016-90
doc # i

AMERSHAM SHIPPING INCIDENT

CHRONOLOGY:

DATE	EVENT	INTERVAL IN DAYS
January 29, 1990	Shipment left Busan, Korea	11
February 9, 1990	Arrived Los Angeles, CA	5
February 14, 1990	Cleared customs, shipped to Nova Trucking warehouse	2
February 16, 1990	Left warehouse via Covenant (shipping firm) 2 Docs in PA 1 Doc in MO	6
February 22, 1990	Arrived Patriot warehouse, Boston, MA via Patriot Transportation	13
March 8, 1990	Left Patriot warehouse, shipped to Amersham	1

21 10

4' 2.5

617 273 2216

04-016-90

TRANSMITTED FROM 617 273 2216 03.08.90 18:14 P.01 •AMERSHAM T'O

doc # j

MASTER

AMERSHAM CORPORATION BURLINGTON, MA U.S.A. FAX # 617-273-2216

10

FAX TO: John White

FAX #: 215-337-~~5324~~ 5269

FAX MSG #

PAGE 1 OF 2

LOCATION: NRC, Region 1

DATE: 8 March 1990

FROM: Kate Roughda

COPIES TO:

URGENT

John.

Received model 500SA SN 610 w/ approxmately 7 curits @ (Iridium-192) assumed Source model is not Amersham manufacture and does not look familar. Source was on aircraft cable based on observations of source capsule where wire was cut.

Shipment of 14 model 500SA changers was shipped from N.D.I Corporation
168-5 POI-DONG,
GANGNAM-GU
SEOUL, KOREA

via Jessel - HANJIN MOKPO Shipment # 092E

AMERSHAM CORPORATION **BURLINGTON, MA U.S.A.** **FAX # 617-273-2216**

FAX TO:

FAX #:

LOCATION:

FROM:

COPIES TO:

FAX MSG #

PAGE 2 OF ____

DATE: 8 March 1990

arrived Los Angeles, CA

~~Fidelity~~ consolidater in CA

Fidelity Transport Inc. 213-921-3995

Shipment ~~arrived~~ transported by Covenant Transportation to Boston

In Boston trucked to Burlington (Amersham) via Patriot.

I will be contacting Fidelity and Covenant for more information ie shipping dates ok,

I have enclosed pertinent paperwork and drawing of 500 Si changer showing location of source.

The contact reading at the 500Si was ~150 R/hr at the front. Remaining source changers in shipment ~~were~~ had normal radiation levels

04-016-90

3 of 5

Shipment arrived in crate with no DOT labels. 500 SU SN 610 had no lock only a seal wire. All DOT labels on source changers ~~on~~ were same labels that we prepared for transport when they were shipped to Korea.

I will be in touch.

617 273 2216 04-016-90

TRANSMITTED FROM 617 273 2216 03.08.90 18:58 P.01 •AMERSHAM T'O

doc# K-MSTER

Amersham

FAX MESSAGE

AI-HK OFFICE FAX 852-834-8812

Post-it™ brand fax transmittal memo 7671	# of pages ▸ 1
To SAM LIU	From LINDA SHEEE
Co. AI/HONG KONG	Co. P/BURLINGTON
Dept. CC: JO HUNT	Phone #
Fax # AYLESBURY	Fax # 617-273-2216

Page 1 of 1

Date 23RD FEB., 90

Fax Msg. # TL0223-05

DEAR JO,

RE : YR FAX 19/2
RETURN OF CONTAINERS

THE FOWARDING COMPANY IN KOREA HAVE SENT THE ORIGINAL DOCUMENTS TO BURLINGTON DIRECTLY BY DHL.

REGARDS,

ALIANA

Dear Sam + Aliana:

As of today, 3/02/90, we still have not received these documents. We cannot get these containers out of customs without these documents. Please do what you can to expedite this.

L. M..

TRANSMITTED FROM 617 273 2216 03.08.90 18:14 P.04 AMERSHAM T'O

04-016-90
doc #6 misc

Consignor

NDI CORPORATION
168-5 POI-DONG, GANGNAM-GU,
SEOUL, KOREA

FBL No. UBO-900171 KR 410

NEGOTIABLE FIATA
COMBINED TRANSPORT
BILL OF LADING

Issued subject to ICC Uniform Rules for a Combined Transport Document (ICC publication 298)

Consigned to order of

AMERSHAM CORPORATION
40 NORTH AVENUE, BURLINGTON,
MASSACHUSETTS 01803, U.S.A
TEL : (617)272-2000

DAEIL SHIPPING CO., LTD

ROYAL BLDG., SUITE 331
5, DANGJU-DONG, CHONGRO-KU
SEOUL 110-071, KOREA
PHONE: (82)(2)734-4351 (Rep.)
FAX: (82)(2)734-4350
TELEX: K23285 DAEILSH
MAIL: CENTRAL P.O. BOX 435
SEOUL 100-604, KOREA

Notify address

SAME AS CONSIGNEE

Place of receipt: BUSAN, KOREA

Ocean vessel: HANJIN MOKPO V-002E

Port of loading: BUSAN, KOREA

Port of discharge: LOS ANGELES

Place of delivery: BOSTON, MA

Post-it™ brand fax transmittal memo 7671 | # of pages » 3

To DENNIS	From LINDA SHEFF
Co. I.S.I.	Co. AMERSHAM
Dept.	Phone #
Fax # 357-9436	Fax # 617-273-2216

60|60

Marks and numbers	Number and kind of packages	Description of goods	Gross weight	Measurement
	1BOX(ES)		371KGS	0.230CBM

ADDR
BOSTON
FROM : NDI CORP.
MADE IN U.S.A

SAID TO CONTAIN :
14EA OF
TRANSPORTATION EMPTY
CONTAINER OF RADIOISOTOPES

MODEL : SU 500
S/N : 541,606,527,610,618,
532,556,517,522,518,
681,660,699,559

COPY

NON-NEGOTIABLE

"FREIGHT PREPAID"

SAY:ONE (1) WOODEN BOX ONLY.

LADEN ON BOARD CFS/CFS
JAN. 29, 1990

according to the declaration of the consignor

The goods and instructions are accepted and dealt with subject to the Standard Conditions printed overleaf.

" O.FREIGHT PREPAID AS ARRANGED "
D.D.C : US$25.60/MINIMUM = US$25.60 (COLLECT)

Taken in charge in apparent good order and condition, unless otherwise noted herein, at the place of receipt for transport and delivery as mentioned above.

One of these Combined Transport Bills of Landing must be surrendered duly endorsed in exchange for the goods. In Witness where of the original Combined Transport Bills of Lading all of this tenor and date have been signed in the number stated below, one of which being accomplished the other(s) to be void.

Freight amount	Freight payable at	Place and date of issue
	SEOUL, KOREA	SEOUL, KOREA JAN. 1990
Cargo Insurance through the undersigned ☐not covered ☐Covered according to attached Policy	Number of Original FBL's: THREE/03	Stamp and signature

For delivery of goods please apply to

04-017-96
doc #2
master

AMERSHAM SHIPPING INCIDENT

CHRONOLOGY:

DATE	EVENT	INTERVAL IN DAYS
January 29, 1990	Shipment left Busan, Korea via ship, Hanjan Mokpo	11
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February 16, 1990	Left warehouse via Covenant Transportation - 2 drops in PA 1 drop in MD	6
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March 8, 1990	Left Patriot warehouse, via Patriot Transportation, to Amersham	1

04-017-90
~~[illegible]~~
doc #3

Karl Abraham

1. We're developing some more questions — Don't hang up yet -

---

Truck Driver [illegible]
APS [illegible]
~~[illegible]~~
Peter [illegible] Harris

2. Is Dave (and Phil) going to LA? If so, make sure region will continue to pursue route info and arrange and conduct interview if Driver is found!

- Copy of driving logs?
- Describe Truck - dimensions, make etc
- Take pictures of truck, get dimensions to sleeper -- to driver, location of crate.
- Tape record interview if time to arrange stops doesn't permit dictation
- What were the offloads like at the other stops -- how many trips into truck were needed
- # stops at Toll booths, weighing stations, service stations or areas, off-loadings, stops by police, motels?
- receipts for gas etc?
- Overnight stops?
- Can we get copies of manifests

1- CONTACTS LIST

2- Agencies not fi-l

3- Agency commitments

4- NRC Actions

5- Chronology of Incident

6- Info on ~~respon~~ involved firms

LOOSE SOURCE EVENT LOG

030890
RECIEVED CALL FROM KATE ROUGHAN, AMERSHAM RSO (617-272-2000). SHE INFORMED ME AND JOHN MILLER OF THE FOLLOWING EVENT: THEY HAD JUST RECIEVED A SHIPMENT OF 14 AUTOMATION INDUSTRIES MODEL 500-SU SOURCE CHANGERS FROM THEIR CUSTOMER, NDI, INC., SEOUL, KOREA (PRESIDENT ISKIM KI TANG, 02-574-3698, FAX 02-572-9195). AS THE TECH APPROACHED THE TRUCK (PATRIOT TRANSPORTATION, INC.) HE NOTICED A DOSE RATE OF ABOUT 100 TO 150 MR/HR. HE LEFT THE AREA TO INFORM THE RSO. WHEN SHE ARRIVED, THE TRUCK DRIVER HAD ALREADY REMOVED A BROKEN PORTION OF THE WOODEN CRATE BUT THE SOURCE CHANGERS WERE STILL ON THE TRUCK. SHE FIRST ATTEMPTED MEASUREMENT WITH A PORTABLE INSTRUMENT AND REPORTED THAT IT WENT OFF-SCALE AT 10 R/HR WHEN SHE WAS 3 TO 4 FEET FROM THE SOURCE. SHE THEN TOOK MEASUREMENTS WITH A TELETECTOR AND DETERMINED 150 R/HR AT CONTACT WITH ONE OF THE SOURCE CHANGES (S/N 610). SHE INDICATED THAT THIS PARTICULAR SOURCE CHANGER WAS SHIPPED TO NDI ON 101389.

FOLLOWING THIS DISCOVERY, AMERSHAM PERSONNEL, USING REMOTE HANDLING TOOLS, PORTABLE LEAD SHIELEDING, AND A TRANSPORT PIG CONDUCTED SOURCE RETRIEVAL. THE SOURCE WAS REMOVED TO A HOT CELL FACILITY. AMERSHAM PERSONNEL INDICATE THAT THE SOURCE IS NOT OF THEIR MANUFACTURE AND SUSPECT THAT IT WAS OF KOREAN ORIGIN; AND APPEARED TO HAVE BEEN CUT OFF A PIGTAIL CONNECTOR. IT WAS ESTIMATED TO BE ABOUT 7 CURIES BASED ON DOSE RATE MEASUREMENTS. NO OTHER LOOSE SOURCES WERE FOUND IN ANY OF THE OTHER CHANGERS. NO LOOSE SURFACE CONTAMINATION WAS FOUND.

FOLLOWUP INVESTIGATION BY AMERSHAM AND NRC REGION I REVEALED THE FOLLOWING:

THE CRATE WAS SHIPPED FROM PUSAN, KOREA ON OR ABOUT 012989 BY SHIP, HANJIN MOKPO, V-092E. IT ARRIVED IN LOS ANGELES, CA ON 020989; BETWEEN 020990 AND 021490 THE CRATE WAS PROCESSED BY CUSTOMS AND REMOVED TO A WAREHOUSE (NOVA TRANSPORTATION COMPANY, 213-921-3995, JOHN RYUN, STELLA). ON 021690 THE CRATE WAS TRANSPORTED BY COVENANT TRANSPORTATION (800-334-9686) TO THE EAST COAST. INTERMEDIATE DROPS WER MADE AS FOLLOWS:

1. CORAPOLIS, PA, NEW TRANSFER TRUCKING 115 MCLAUGHLIN RD.
2. BALTIMORE, MD, PORT EAST TRANSFER, INC, 1801 SOUTH CLINTON ST.
3. PHILADELPHIA, PA, EVANS DELIVERY SERVICE, 3755 EAST THOMPSON ST.

ON 022290 THE TRUCK ARRIVED AT THE PATRIOT TRANSPORTATION COMPANY WAREHOUSE, 161 PRESCOTT STREET, EAST BOSTON, MA (JIM DISOMONE, BOB EMMONS ARE CONTACTS 617-569-5699). PERSONNEL THERE REMEMBER THAT THE CRATE WAS ONE OF THE LAST TO BE UNLOADED FROM THE TRUCK. THE CRATE REMAINED STORED AT THAT LOCATION UNTIL IT WAS TRANSPORTED BY PATRIOT TRUCK (DRIVER: TONY MUCCI) ON 030890. THREE OTHER PROPLE AT PATRIOT MAY HAVE ALSO HANDLED THE CRATE.

WHEN THE CRATE ARRIVED AT AMERSHAM, IT WAS SEVERLY DAMAGED (WE UNDERSTAND THAT IT WAS NOTICED TO BE DAMAGED ON ARRIVAL IN LOS ANGELES). ONLY ONE SOURCE CHANGER WAS IN THE BOX. THE REST WERE SCATTERED OVER THE FLOOR OF THE TRUCK. THE DRIVER ESTIMATES THAT HE WAS IN THE VICINITY OF THE BACK OF THE TRUCK FOR ABOUT 1 TO 1.5 MINUTES; ABOUT 30 SEC IN CLOSE PROXIMATY TO THE CHANGERS.

030990
CUSTOMS ENTRY NUMBER IS 050-0129704-1. US CUSTOMS REPORTED IN LETTER DATED 030990 THEIR INVESTIGATION OF THE PACKAGE. NO CUSTOMS REGS WERE VIOLATED AS REPORTED BY DAN BAKER
A FEMALE US CUSTOMS INSPECTOR IS REPORTED TO HAVE INSPECTED THE CRATE WHILE AT PATRIOT

AMERSHAM CUSTOM BROKER IS ISI.
CRATE WAS 18"X18"X4".

I INFORMED MIKE WANGLER DOT 366-4498, FAX 366-3753.
HE INDICATED THAT DOT WOULD STANDBY AND MONITOR NRC INVESTIGATIVE EFFORTS.

IIT FORMED PER CHARTER 030990.

BULLETIN 60-100

04-18-90
MSTC copy
RECVD
3/12/90

GAMMA RADIOGRAPHY

SOURCES EQUIPMENT SERVICES

AUTOMATION INDUSTRIES, INC.
SPERRY DIVISION
P.O. BOX 245 PHOENIXVILLE, PA. 19460
(215) 935-8961

Supersedes Bulletin 60-100 dated 10/69

RADIOGRAPHY EQUIPMENT

Automation Industries makes three basic lines of radiography units:

IRIDITRONS — Portable, lightweight units designed to use iridium 192 in capacities up to 100 curies. Widely used in shipyard and field work where ease of transport and handling combined with reasonably high source strengths are the prime requirements.

MULTITRONS — Our most versatile units. These multiple-source machines can contain up to three separate sources of different types and strengths. The isotopes may be of any type with combined capacities up to 200 curies. Their high degree of flexibility made possible by this wide capacity range permits radiographing varied products ranging from welded pipe and boilers to large castings. Ideal for general use in foundries and metal fabricating shops. These units are also portable, being mounted on large wheels with pneumatic tires.

UNITRONS — These are medium weight, portable units primarily designed to handle cobalt 60 in strengths to 10 curies. Used where the long life and radiation characteristics of cobalt 60 are desirable, but the high capacity and versatility of a Multitron unit is not needed. These units will also accept high strength iridium sources.

Within each of these lines there are several different models to satisfy different requirements as to capacity and degree of portability. In addition, special mounts or other allowable variations from the standard units can be supplied. Many of the source drive controls and other parts are interchangeable among the standard machines.

GENERAL DESCRIPTION

All Automation Industries radiography units are operated in the same way since they are all made up of the following basic components:

SHIELDED HEAD — On all units, the shielded head is made up of one or more S-shaped, stainless steel tubes surrounded by shielding material (lead or spent uranium). The amount of shielding used in the heads varies according to the capacity of the unit. Enough shielding is used to reduce the radioactivity at the outer surface of the head to an absolutely safe level for shipment, storage, and handling while a source is in the head. Corrosion-resistant material is used for the outer shell of all units; some are aluminum castings, but most are stainless steel. The radioactive source is kept in a safe position in the "S" tube until an authorized operator wants to make a radiograph. All heads have a built-in, key-operated lock which prevents movement of the source except by an authorized operator.

All heads have threaded connections for attachment of a source drive control cable and a source guide tube. In the front of some heads there is a conical depression to permit beam-type radiography; others can be fitted with an adapter for this purpose.

SOURCE TUBE — This is a flexible, braided-metal hose with a permanently attached cap on one end, and a threaded swivel fitting on the other end which fits a threaded connection at the front of the shielded head. The tube guides the source from the safe position within the shielded head to the "exposure" position at the capped end of the tube. Standard length of the source tube is 23 ft., but longer or shorter tubes are available.

SOURCE DRIVE CONTROL ASSEMBLY — This assembly provides the means for moving the source from the safe position within the shielded head to the "exposure" position at the end of the source tube. It consists of a helical-wrap conduit with a drive cable inside. The conduit has a threaded swivel fitting on one end that fits a threaded connection at the back of the shielded head. The inside drive cable has a disconnect on one end which mates with a matching disconnect at the end of a cable attached to the radioactive source capsule. The drive cable is extended by means of a manually operated crank.

After unlocking the shielded head, the operator moves the source from the shielded head to the exposure position in the source tube by means of the crank. A dial indicator on the crank assembly shows where the source is at all times. Standard length of the source drive control assembly is 25 ft. Longer ones are available.

MOUNT — Being hand portable, the lighter units (Iriditrons) do not really require a mount, but if one is desired, the standard mounting offered for these units is a two-wheeled, magnesium hand truck.

Some larger units are trunnion-mounted between two large wheels with pneumatic tires. They can be manually propelled. One model is trunnion-mounted on a manually propelled fork lift truck. Other mounts can be provided on request. All units can be operated while mounted.

RADIOACTIVE SOURCES

Automation Industries supplies two types of radioactive sources: Iridium 192 and Cobalt 60. The radioactive material is in the form of wafers or pellets, and is contained in a hermetically sealed (welded or brazed) stainless steel capsule. (See illustration below.) Permanently attached to the capsule is a cable with a disconnect at the end. These are also made of stainless steel. The size and configuration of the capsule and the length of the cable will differ depending upon the strength and type of radioactive material and the type of radiography unit with which the capsule assembly will be used.

Availability

Sources are available from Automation Industries own source-loading facility in Phoenixville, Pa. If you need a source in a hurry, you can order it by telephone and it will be on its way to you within 24 hrs. You can order sources of just about any strength you want. If necessary you can order sources after business hours by using our answering recording service.

Each source is accompanied by a certification of source strength. A certification of leak test also comes with the source to show that the source capsule assembly has been checked and does not exceed allowable limits of removable contamination. For the convenience of the radiographer, a decay curve is also supplied.

Selection

The selection of proper sources for gamma radiography depends on the careful analysis and balance of several factors. These include: (1) density and thickness of material to be radiographed, (2) number of exposures to be made per day, (3) degree of portability required, (4) protective measures available.

The basic features of the two most commonly-used gamma sources are given in the table at the right. Automation Industries personnel will be glad to help you select the correct source and strength for your application.

Iridium 192

By far the most popular isotope for industrial radiography today. The three basic factors that account for its widespread use are.

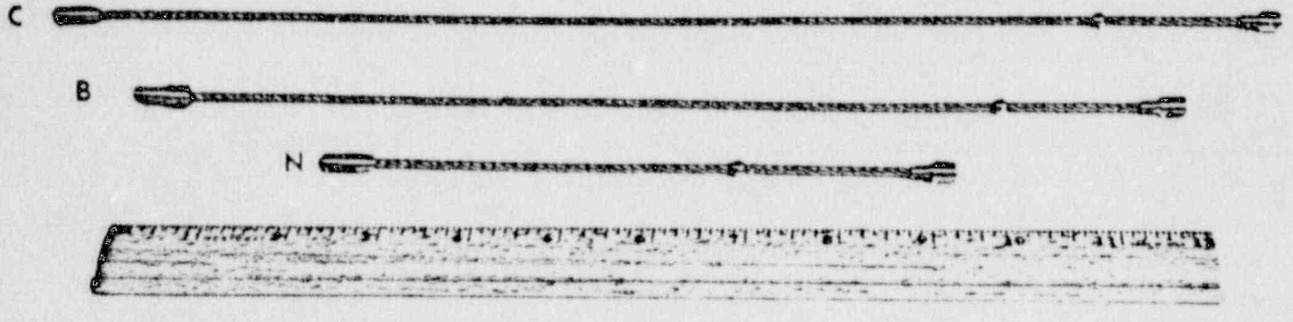
(1) its relatively "soft" radiation results in higher quality radiographs;
(2) it is available in high specific activities resulting in small focal spots, low exposure times and reduced radiographic costs;
(3) the light weight shielding required makes it ideal for applications where portability is a must, such as shipyards and field inspection applications.

Cobalt 60

Where thicker materials need to be radiographed—up to 12" of steel or equivalent, cobalt 60 is the recommended source. Its long half life makes it ideal where there is only occasional need for making radiographs. A variety of source sizes and strengths are available to meet almost any inspection requirement. Because of its high energy and low amount of scatter, cobalt 60 is used extensively for in-service checks on the wall thicknesses of piping in refineries and chemical plants.

SOME PROPERTIES OF RADIOGRAPHY ISOTOPES

	Iridium 192	Cobalt 60
Average energy (MEV)	.375	1.27
Mr/hr output/curie @ 1 ft.	5,950	14,400
Half life	75 days	5.2 yrs.
Range in steel	1/4" - 3"	3/4" - 12"
Focal spots: (approx. size)		
1 mm	6- 8 curies	1- 3 curies
1/16"	20- 30 curies	2- 4 curies
1/8"	100-120 curies	20-25 curies
1 cm	N.A.	2000 curies



A few typical source capsule assemblies are illustrated. Others in general use are similar in appearance and construction.
N—"N" style capsule for Iriditrons. Hold iridium sources only.
B—"B" style capsule used with Series 50B Multitrons and Unitron to hold cobalt or iridium sources.
C—"C" style capsule for Series 60C Multitrons. Capsule illustrated is designed to hold only iridium sources.

ADVANTAGES

Versatility — Automation Industries' radiography units can be used for all three methods of exposure —beam, panoramic, or internal. The larger units will accommodate extremely strong sources for thick materials and rapid production work, and the smaller, portable units hold smaller sources for field inspection. Our Multitron units are available in models which can hold up to three separate sources at the same time. The sources can have different strengths, if necessary. This arrangement permits great flexibility since a variety of materials of differing densities or thickness can be tested with the same unit. None of our units require any external power so they can be used in the most remote field locations. Since the radiating source is contained in a very small capsule, it can be positioned in difficult-to-reach areas such as inside piping and small castings, and in space-limited aircraft structures.

Portability — One man can easily handle any Automation Industries radiography unit, except the largest models specifically designed for permanent installation. Because of their light weight (the Iriditron Model 520 weighs only 40 lbs.) and completely mechanical operation, they may be taken anywhere. They are ideal for shipyard, field and shop work. Wheel mounting is available on all models.

Safety — Automation Industries' equipment provides maximum safety with maximum utility. The hermetically sealed source capsule assemblies are always under complete mechanical control of the operator. The source position indicator on the control drive shows the exact position of the source at all times. A specially designed lock prevents operation or exposure of the source by unauthorized persons. This lock cannot be operated until the source is completely within the shielded head in a safe position. On multiple-source machines, each source has its own lock. The source heads have been carefully designed to meet all federal and state regulations pertaining to equipment design and radiation shielding.

Reliability — The simplicity of design of all Automation Industries' radiography units, the high strength, corrosion resistant construction of components, minimum of moving parts, and the absence of electronic circuitry assure low maintenance. Few spare parts are necessary and repairs, when needed, can be easily made in the field.

APPLICATIONS

Gamma radiography lends itself equally well to the inspection of large or small, solid or hollow, simple or complex items—on either a production or occasional basis. Some examples which indicate the wide range of successful applications are:

Transcontinental pipe lines
Shipboard plate and piping
Valves and other fittings
Locomotive parts and rails
Wrought metal products
Large machinery parts and assemblies
Castings and forgings
Pressure vessels
Structural weldments
Aircraft Parts

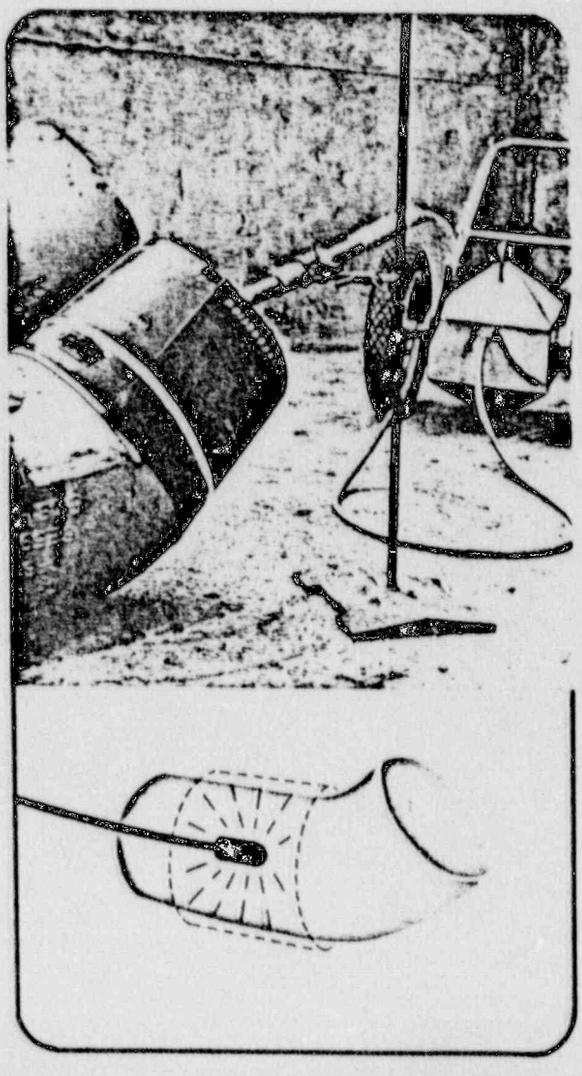
In addition to inspection for flaws in items such as those listed above, gamma radiography is also well suited for relative measurements of material thickness; for example, checking for erosion in pipe walls.

METHODS OF EXPOSURE

Internal

Internal radiography is a variation of panoramic exposure. It is exceptionally valuable as a fast, practical, economical way to inspect the entire circumference of many items. The illustration shows this technique applied to a circular casting. The flexible source tube is positioned inside the vessel, and the entire girth is radiographed with a single exposure. This method is applicable to tanks and pressure vessels of all shapes and sizes, and to pipe, castings and a wide variety of other structures.

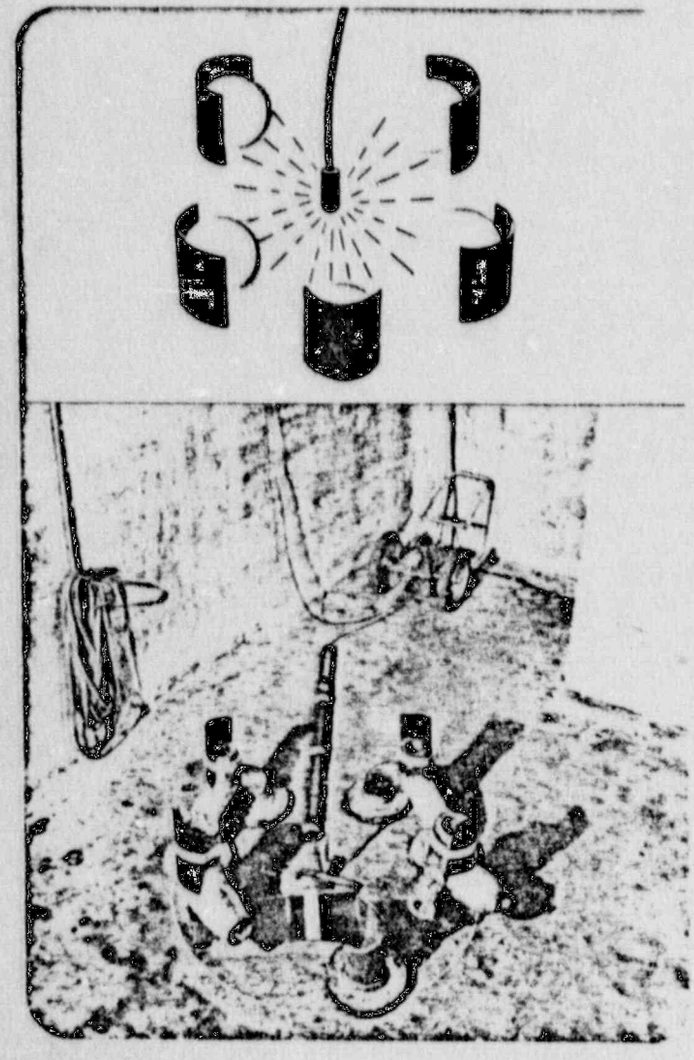
Model 50 Multitron being used to make internal radiograph of a pipe casting.



Panoramic

One of the most useful features of gamma radiography is its ability to provide radiation in all directions simultaneously, in addition to beam-type radiation. Panoramic radiation permits a number of individual items—of different thicknesses, sizes and materials if desired—to be radiographed at the same time. The usual method is simply to scribe concentric circles on the floor, with the point of exposure at the center. The items are then placed at varying distances from the center, depending on the intensity of radiation required for each. The end of the flexible source tube is positioned at the center of the circle, and the source is exposed by remote control. This method of exposure offers considerable savings in time and money.

Model 50 Multitron being used to make multiple panoramic radiographs of castings.

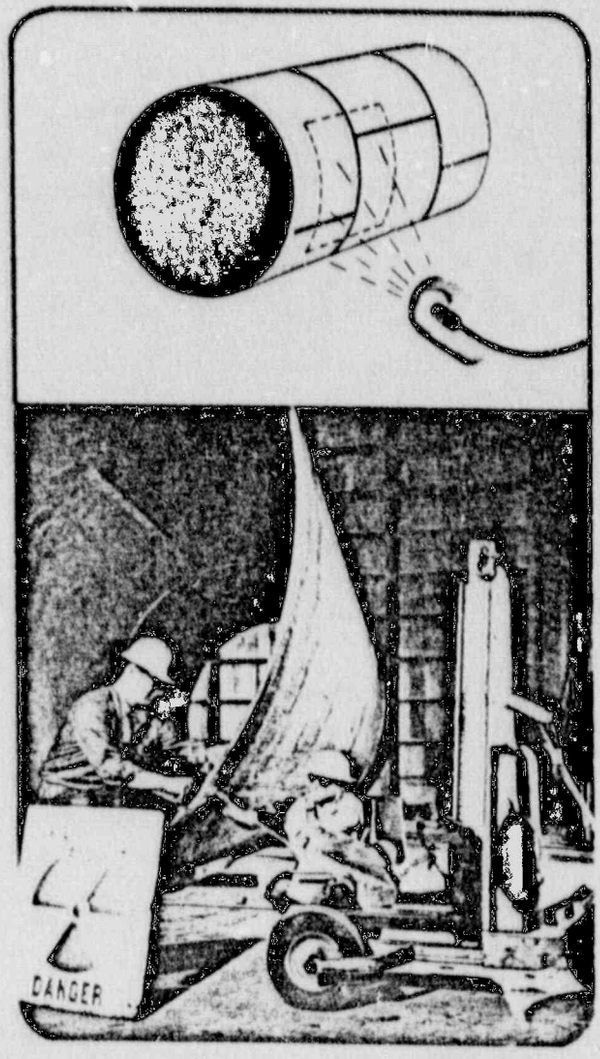


Beam

This method uses a uni-directional beam of radiation obtained by exposing the source through an opening in its shield or head. The beam technique is ideal for inspecting individual welds, castings, complete assemblies and other items.

Because all-around shielding is not required for uni-directional radiation, beam exposures can be made right on the job, without moving the item to be radiographed. Since the operator is protected by the built-in shielding of the source "head", the only other protection required is adequate space or shielding behind the object to be radiographed.

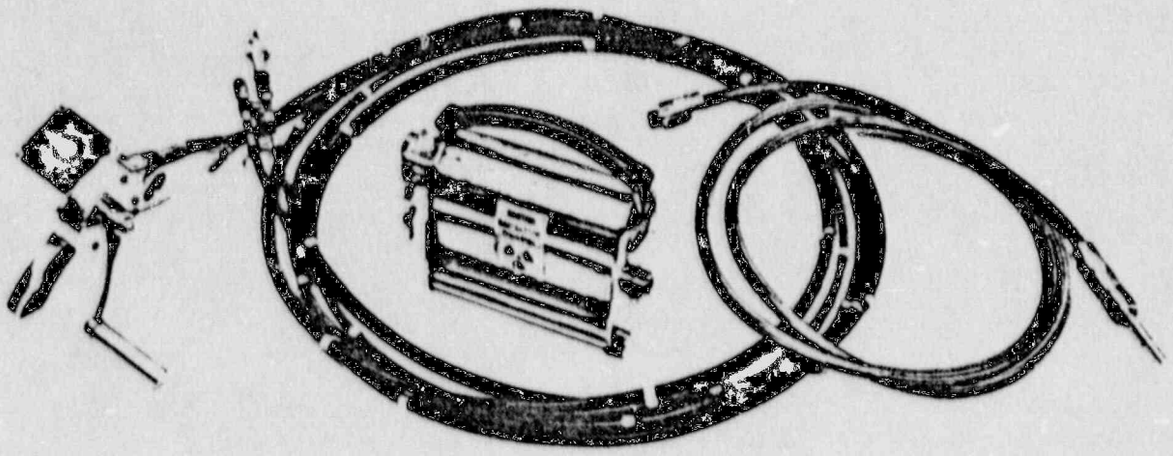
Setting up Model 60 Multitron for beam inspection of weld area in large-diameter pipe.



IRIDITRON

Capacities to 100 curies of iridium 192

Ideal where portability is a must—shipyards, field use, fabrication shops



BEAMERS — Two beamers are available for use with the Model 520. These beamers, along with the standard source tube supplied with the Model 520, will make any type of exposure possible.

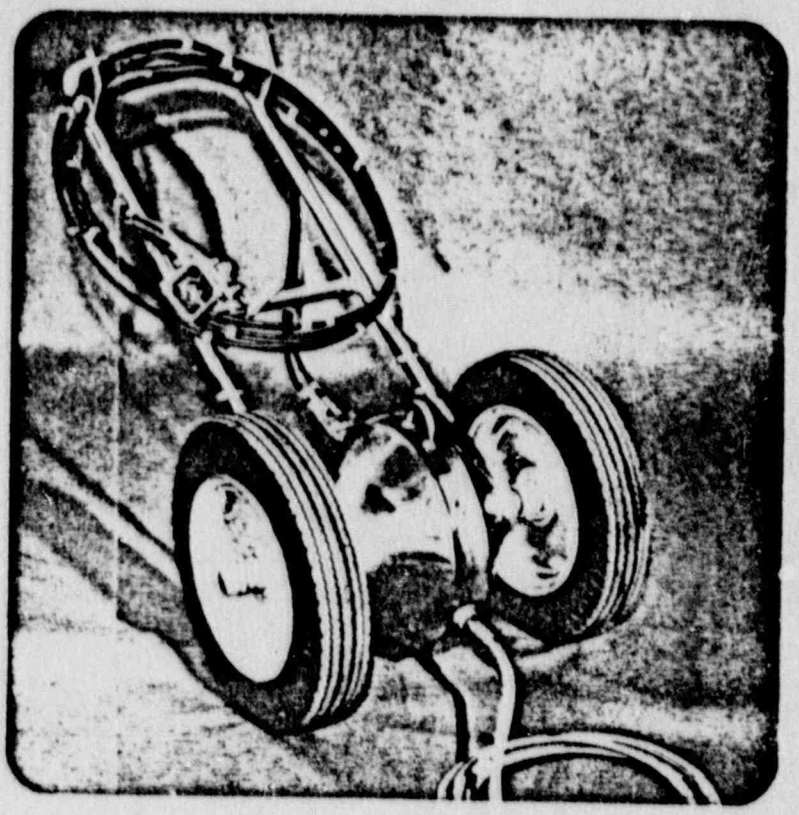
The cone beamer provides a 70° cone of radiation which can be projected in any direction if the beamer is connected to a source tube, or mounted on the optional tripod. If the beamer is connected directly to the outlet of the shielded head, the radiation will be projected at right angles to the outlet. The shielding factor for this beamer is 100 for Iridium192.

Part No. 200-520-004

The 360° beamer provides a full circle of radiation with a beam spread of approximately 20°. Like the cone beamer, it can be used with a source tube, or mounted on a tripod or connected directly to the outlet of the shielded head. This beamer is ideal for internal exposures in pipe or cylindrical vessels where circumferential radiographs of welds must be made.

Part No. 300-520-360

Model	520
Source	Iridium 192
Capacity	100 Curies
Capsule Style	N
Shielding	Depleted Uranium — less than 50 mr/hr @ 6" from surface
Method of Exposure	Internal — with standard source tube Panoramic — with standard source tube, or with 4" stub-type source tube connected directly to outlet of shielded head. Beam — with optional beamer accessories. See description at left.
Dimensions	10" long x 5¼" wide x 7" high
Weight of Head	40 Lbs. (approx.)
Outer Shell	1/8" Stainless Steel



UNITRON

Wheel mounted unit with all the features of Iriditrons except extra shielding to handle cobalt 60.

Model	110AB
Method of Exposure	Internal — with source tube Panoramic — with standard source tube Beam — with optional beamer accessory
Source	Cobalt 60 or Iridium 192
Capacity	10 curies cobalt 60 or approx. 300 curies of Iridium 192
Capsule Style	B
Shielding	Lead—less than 200 mr/hr at surface
Mount	Trunnion mounted on large wheels with fully pneumatic tires and handle provided for convenience
Weight of Head	600 Lbs.
Outer Shell	Stainless Steel

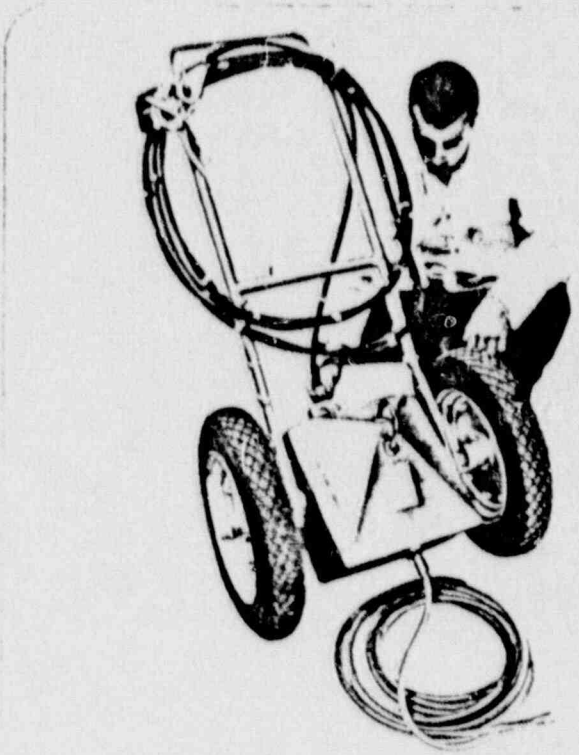
MULTITRONS

Four different series, twelve different models.
Capacities up to 200 curies of cobalt 60
Ideal for foundries and boiler shops
Multiple source capacity provides unequalled versatility
S.P.I. controls of Series 50B & 60C Multitrons are interchangeable with all Triditron & Unitron machines.
Series 150H & 160J use special screw-type source disconnect for extra safety.

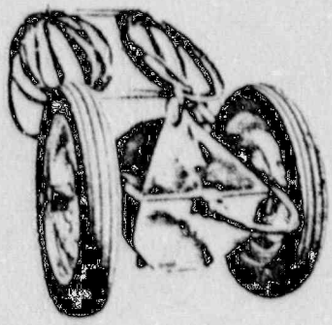
Capacities — Co 60

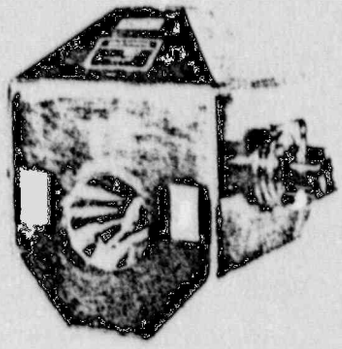
Model No.	No. of Tubes	Total Capacity
51, 61	1	40
52, 62	2	30
151,161	1	200
152,162	2	150

All models will handle maximum practical limit of other gamma sources such as Iridium 192.

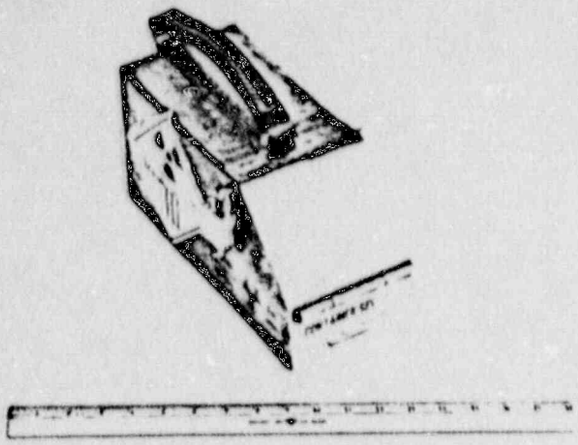


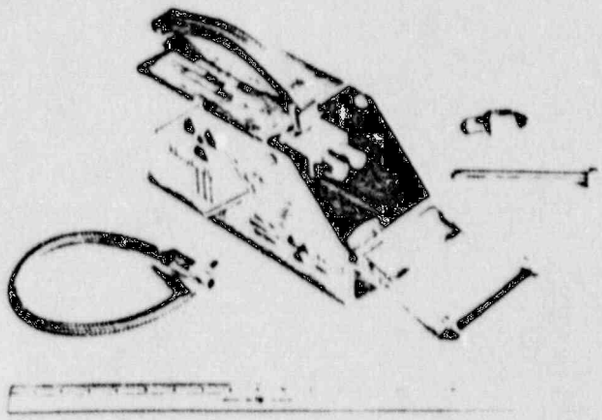
SERIES	50B
Method of Exposure	Internal, Panoramic Beam (with beamer accessory—see p. 14)
Number of Sources	1 or 2
Source	Any sealed source
Capacity	See table
Capsule Style	B
Shielding	Lead—less than 200 mr/hr @ surface
Mount	Trunnion mounted on large wheels with fully pneumatic tires. Handle provided for convenience.
Weight of Head	820 Lbs.
Outer Shell	Stainless Steel





60C	150H	160J
Beam — Internal — Panoramic	Internal, Panoramic Beam (with beamer accessory—see p. 14)	Beam — Internal — Panoramic
1 or 2	1 or 2	1 or 2
Any sealed source	Any sealed source	Any sealed source
See table	See table	See table
C	H	J
Lead—less than 200 mr/hr @ surface	Lead—less than 200 mr/hr @ surface	Lead—less than 200 mr/hr @ surface
Fittings for trunnion mounting are supplied. Customer can mount on fork lift truck	Trunnion mounted on large wheels with fully pneumatic tires. Handle provided for convenience.	Mounted on trunnions for mounting to customer specifications.
1,095 Lbs.	2,000 Lbs.	3,000 Lbs.
Stainless Steel	Stainless Steel	Stainless Steel





Model 500-su Source Changer Max. cap.: 300 curies Ir^{192} Meets D.O.T. Type B packaging requirements.

On initial purchase of radiography units, the type and strength of the source to be used in the unit is usually specified by the customer. In these cases, the radiography unit itself, being well shielded, is perfectly suitable for use as a shipping container, and the unit is delivered with the source already inside.

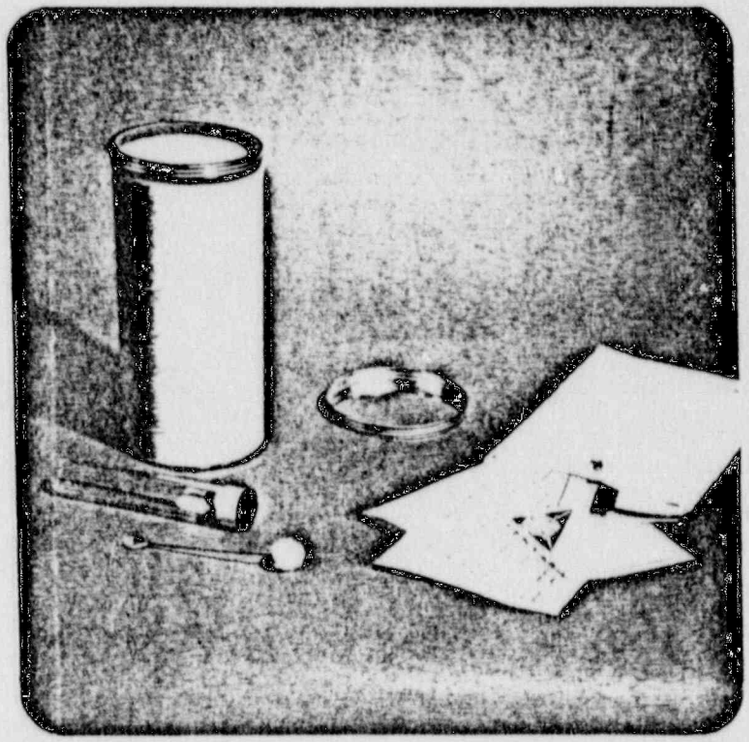
When only a source is ordered, a unit like the one pictured is used as the shipping container. It is supplied complete with the proper connectors and source tube for transfer of the customer's decayed source from his radiography unit into the changer, and transfer of the new source from the changer into the radiography unit. This takes only a matter of minutes. There is no expensive down time or interruption in testing schedule.

The entire source changer shipping unit, with the decayed source inside, is then sealed and sent back to Automation Industries, Instruments Division, which handles all details of disposal.

If desired, empty source changer/shipping units may be purchased and kept at the customer's location. Having extra source changers on hand can be a great convenience, because they will always be available not only as shipping containers, but also as a place for storage of extra sources. For example, a low-strength iridium source can be kept in the changer and transferred into a radiography unit only at those times when the job requires this type of source. When the job is finished, the extra source can be put back in the changer and the normally-used source can be put back in the radiography unit for normal work.

LEAK TEST KIT

The kit pictured meets all Federal and State regulations concerning contamination testing of radiography equipment. It includes a test tube and test solution, a sampling swab, information card, radiation warning labels, leak-test certificate, and instructions. Leak test samples can be easily and quickly obtained, but a qualified radiographer should do the sampling. After checking the sample with a survey meter to make sure that there is no gross contamination, the sample may be sent to Automation Industries, Instruments Division, for certification. The container in which the kit is supplied is also used as the shipping container for the sample. Instruments Division personnel will check the sample and issue a certification of leak test to the sender. This service is included in the purchase price of the kit.



SPECIAL EQUIPMENT, ACCESSORIES, AND SERVICES

SPECIAL DESIGNS AND APPLICATIONS

In addition to the standard line of equipment and accessories described on the preceding pages, Automation Industries can provide specially designed equipment on request. Items such as extra-length source drives, rigid source tubes, and special mounts for radiography units and accessories are available on special order. Our engineering personnel have had extensive experience in the design of specialized equipment, and they will be glad to discuss your application problem with you. Perhaps a minor equipment modification, special accessory item, or even a variation in test technique is all that would be needed to satisfy your testing requirement. Feel free to consult us about the design of special equipment, or the feasibility of adapting our standard equipment to your specialized needs.

SOURCE REPLACEMENT SERVICE

Replacement sources are shipped in special containers which permit replacement of your decayed source in a matter of minutes. There need be no expensive down time or interruptions in testing schedule. Decayed sources are returned to our Phoenixville, Pa. Facility where all details are taken care of. Sources can be ordered one at a time, or on an annual contract which provides for automatic programmed replacement of decayed sources.

FIELD SERVICES

Automation Industries has qualified field service personnel who are available on request to perform special services at your location. These services include the replacement of decayed sources and the leak testing of your radiography equipment. Certification of leak testing is always supplied. Of course, these same people are also qualified to handle any servicing or repair problem that may arise in connection with the use of our equipment.

ACCESSORIES

A complete line of accessory items are available for use with our exposure units. These include beamers, beam-collimators, source tube extension sections, bolt-action source drives, and mounting tripods.

AUTOMATION INDUSTRIES, INC.
SPERRY DIVISION

P.O. BOX 245
PHOENIXVILLE, PA. 19460
(215) 933-8961

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Master
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RADIOGRAPHY DEVICES AND SOURCES SUPPLIED BY LICENSED COMPANIES

ISOTOPE	ACT	AMERSHAM	SPEC	IN	RTG
** DEVICE MODEL NUMBER = 10SA					
CO-60	10CI	S-16			
** DEVICE MODEL NUMBER = 20V					
IR-192	120CI	RG-13,RGSA-13,A1A,A2A, 848	G-1,G-3,G-1F,G-3F	2	
** DEVICE MODEL NUMBER = 20VS					
IR-192	120CI	RG-13,RGSA-13,A1A,A2A, 848	G-1,G-3,G-1F,G-3F	2	
** DEVICE MODEL NUMBER = 35					
IR-192	35CI	A-1-A,A-2-A,848,899	G-1,G-3,G-1F,G-3F	2,8	
** DEVICE MODEL NUMBER = 35S					
IR-192	35CI	A-1-A,A-2-A,848.899	G-1,G-3,G-1F,G-3F	2,8	
** DEVICE MODEL NUMBER = 35SA					
IR-192	35CI	A-2-A,848.899	G-3,G-3F	8	
** DEVICE MODEL NUMBER = 402					
IR-192	240CI	A424-1,A424-9		1,7	
CO-60	18CI			1,7	
** DEVICE MODEL NUMBER = 404, 404A					
IR-192	100CI	A424-1		1	
CO-60	10CI				
** DEVICE MODEL NUMBER = 40V					
IR-192	240CI	RG-13,RGSA-13,A1A,A2A, 848	G-1,G-3,G-1F,G-3F	2	
** DEVICE MODEL NUMBER = 40VS					
IR-192	240CI	RG-13,RGSA-13,A1A,A2A, 848	G-1,G-3,G-1F,G-3F	2	
** DEVICE MODEL NUMBER = 412, 412A					
IR-192	50CI	A424-1	T1,T2,T3,T1F,T2F	1	
** DEVICE MODEL NUMBER = 446					
CO-60	75CI		T4,T4F		
** DEVICE MODEL NUMBER = 489					
IR-192	10CI	A424-1	T1,T2,T3,T1F,T2F	1	
** DEVICE MODEL NUMBER = 490					
IR-192	100CI	A424-1	T1,T2,T3,T1F,T2F	1	

RADIOGRAPHY DEVICES AND SOURCES SUPPLIED BY LICENSED COMPANIES

ISOTOPE	ACT	AMERSHAM	SPEC	IN	RTG
** DEVICE MODEL NUMBER = 490X					
CO-60	180MC	A424-1			
** DEVICE MODEL NUMBER = 491					
IR-192	100CI	A424-1	T4,T4F	1	
CO-60	20CI		T4,T9		
** DEVICE MODEL NUMBER = 496					
IR-192	100CI	A424-1	T1,T2,T3	1	
CO-60	3CI		T4,T9		
** DEVICE MODEL NUMBER = 498, 498A					
IR-192	50CI	A424-1	T1,T2,T3,T1F,T2F	1	
** DEVICE MODEL NUMBER = 500					
CO-60	200C	A424-8	T4,T4F		
** DEVICE MODEL NUMBER = 501					
CO-60	10CI		T4,T9		
** DEVICE MODEL NUMBER = 520					
CO-60	1000C	A424-7,A453-2,-5,-6			
** DEVICE MODEL NUMBER = 524					
IR-192	100CI	A424-1		1	
** DEVICE MODEL NUMBER = 525					
IR-192	100CI	A424-1			
** DEVICE MODEL NUMBER = 532					
IR-192	10CI	A424-1			
** DEVICE MODEL NUMBER = 533					
IR-192	100CI	A424-1	T1,T1F	1	
** DEVICE MODEL NUMBER = 5SA					
CO-60	5CI	S-16			
** DEVICE MODEL NUMBER = 616					
IR-192	240CI	A58101-8	T11		
** DEVICE MODEL NUMBER = 644					
IR-192	100CI	A58101-8	T11		
** DEVICE MODEL NUMBER = 660					
IR-192	120CI	A424-9	T5,T5F,T7	7	702
TM-170	200CI	A424-21			
YB-169	200CI	918			
CO-60	0.1CI	A424-19			

RADIOGRAPHY DEVICES AND
SOURCES SUPPLIED BY
LICENSED COMPANIES

ISOTOPE	ACT	AMERSHAM	SPEC	IN	RTG
** DEVICE MODEL NUMBER = 676					
CO-60	300CI	A424-13			
** DEVICE MODEL NUMBER = 680					
CO-60	100CI	A424-14			
** DEVICE MODEL NUMBER = 683					
IR-192	100CI	68309	T6		
** DEVICE MODEL NUMBER = 684					
CO-60	10CI	A424-15			
IR-192	200CI	A424-20			
** DEVICE MODEL NUMBER = 699					
IR-192	200CI	A424-1			
** DEVICE MODEL NUMBER = 713					
IR-192	120CI			7	
** DEVICE MODEL NUMBER = 741					
CO-60	30CI	A424-18			
** DEVICE MODEL NUMBER = 773					
CS-137	165MC	77302			
** DEVICE MODEL NUMBER = 796					
IR-192	10CI	A-424-9			
** DEVICE MODEL NUMBER = 858					
CO-60	100CI	A424-14			
** DEVICE MODEL NUMBER = 865					
IR-192	240CI	86520			
** DEVICE MODEL NUMBER = 920					
IR-192	240CI	90003			
** DEVICE MODEL NUMBER = AI 520					
IR-192	120CI	866,899,B-5-A	B-16,B-16F	5,6	
** DEVICE MODEL NUMBER = CENTURY					
IR-192	120CI	A-1-A,A-2-A.848,899	G-1,G-3,G-1F,G-3F	2	
** DEVICE MODEL NUMBER = CENTURY UNIVERSAL					
IR-192	120CI	A-1-A.A-2-A,848,899	G-1,G-3,G-1F,G-3F	2,8	
** DEVICE MODEL NUMBER = CENTURY S					
IR-192	120CI	A-1-A,A-2-A.848,899	G-1,G-3,G-1F,G-3F	2,8	

RADIOGRAPHY DEVICES AND
SOURCES SUPPLIED BY
LICENSED COMPANIES

ISOTOPE	ACT	AMERSHAM	SPEC	IN	RTG
** DEVICE MODEL NUMBER = CENTURY SA					
IR-192	85CI	A-2-A, 848, 89912	G-3,G-3F	8	
** DEVICE MODEL NUMBER = CENTURY SA UNIVERSAL					
IR-192	120CI	A-2-A,848, 89912	G-3,G-3F	8	
** DEVICE MODEL NUMBER = GAMMATRON 10					
CO-60	10CI	A-3-A	G-9,G-9F		
** DEVICE MODEL NUMBER = GAMMATRON 100					
CO-60	100CI	A-5-A	G-13, G-13F		
** DEVICE MODEL NUMBER = GAMMATRON 100A					
CO-60	100CI	A-8-A	G-21, G-21F		
** DEVICE MODEL NUMBER = GAMMATRON 10A					
CO-60	10CI	A-6-A	G-15, G-15F		
** DEVICE MODEL NUMBER = GAMMATRON 20					
CO-60	20CI	A-4-A	G-11,G-11F		
** DEVICE MODEL NUMBER = GAMMATRON 200					
CO-60	200CI	A-5-A			
** DEVICE MODEL NUMBER = GAMMATRON 200A					
CO-60	200CI	A-8-A			
** DEVICE MODEL NUMBER = GAMMATRON 20A					
CO-60	20CI	A-7-A	G-17, G-17A		
** DEVICE MODEL NUMBER = GAMMATRON 5					
CO-60	5CI	A-3-A	G-9,G-9F		
** DEVICE MODEL NUMBER = GAMMATRON 50					
CO-60	50CI	A-4-A	G-11,G-11F		
** DEVICE MODEL NUMBER = GAMMATRON 50A					
CO-60	50CI	A-8-A	G-19,G-19F		
** DEVICE MODEL NUMBER = GAMMATRON 5A					
CO-60	5CI	A-6-A	G-15, G-15F		
** DEVICE MODEL NUMBER = IR100					
IR-192	120CI	87703,899		32,3	
** DEVICE MODEL NUMBER = IRIDITRON 100A					
IR-192	100CI		B-2, B-2F		

RADIOGRAPHY DEVICES AND
SOURCES SUPPLIED BY
LICENSED COMPANIES

ISOTOPE	ACT	AMERSHAM	SPEC	IN	RTG
** DEVICE MODEL NUMBER = IRIDITRON 103A					
IR-192	100CI		B-2, B-2F		
** DEVICE MODEL NUMBER = IRIDITRON 10A					
IR-192	100CI		B-2, B-2F		
** DEVICE MODEL NUMBER = IRIDITRON 20A					
IR-192	60CI		B-2, B-2F		
** DEVICE MODEL NUMBER = IRIDITRON 30BA					
IR-192	30CI		B-2, B-2F		
** DEVICE MODEL NUMBER = IRIDITRON 40AD					
IR-192	30CI		B-8,B-8F		
** DEVICE MODEL NUMBER = IRIDITRON 40BA					
IR-192	30CI		B-2,B-2F		
** DEVICE MODEL NUMBER = IRIDITRON 40E					
IR-192	100CI		B-10, B-10F		
** DEVICE MODEL NUMBER = MAGNAFLUX IC-100					
IR-192	100CI	899,879		9	
** DEVICE MODEL NUMBER = MULITIRON 50B SERIES					
IR-192	300CI		B-4		
** DEVICE MODEL NUMBER = MULTITRON 150 SERIES					
IR-192	100CI		B-12		
CO-60	100CI		B-12		
** DEVICE MODEL NUMBER = MULTITRON 160 SERIES					
IR-192	100CI		B-14		
CO-60	100CI		B-14		
** DEVICE MODEL NUMBER = MULTITRON 50B SERIES					
CO-60	40CI		B-4		
** DEVICE MODEL NUMBER = MULTITRON 60C SERIES					
IR-192	100CI		B-6		
CO-60	40CI		B-6		
** DEVICE MODEL NUMBER = PIPELINER 201					
IR-192	200CI	PL-2	G-38		
** DEVICE MODEL NUMBER = PIPELINER PTL 100					
IR-192	100CI	GP	G-23		

RADIOGRAPHY DEVICES AND
SOURCES SUPPLIED BY
LICENSED COMPANIES

ISOTOPE	ACT	AMERSHAM	SPEC	IN	RTG
** DEVICE MODEL NUMBER = PIPELINER PTL 125U					
IR-192	125CI	GP	G-23		
** DEVICE MODEL NUMBER = PIPELINER PTL 230U					
IR-192	230CI	GP	G-23		
** DEVICE MODEL NUMBER = PIPLINER 1					
IR-192	100CI	GP, 87551	G-23		
** DEVICE MODEL NUMBER = PIPLINER CRC-100					
IR-192	100CI		G-23		
** DEVICE MODEL NUMBER = SPEC 2T					
IR-192	240CI	848,899	G-1,G-3,G-1F,G-3F	2,8	
** DEVICE MODEL NUMBER = SPEC MODEL I					
CO-60	110CI	SP	G-37,G37F		
** DEVICE MODEL NUMBER = SPEC-CHECK I					
IR-192	100CI	GP	G-23		
** DEVICE MODEL NUMBER = SPEC-CHECK II					
IR-192	150CI		G-36		
** DEVICE MODEL NUMBER = UNITRON 102A					
IR-192	100CI		B-2, B-2F		
CO-60	100CI		B-2, B-2F		
** DEVICE MODEL NUMBER = UNITRON 110AB					
IR-192	120CI		B-4		
CO-60	18CI		B-4		
** DEVICE MODEL NUMBER = UTILITY TWIN 100					
IR-192	240CI		G-5		
CO-60	110CI		G-21, G-22		
** DEVICE MODEL NUMBER = UTILITY TWIN 100A					
IR-192	240CI		G-7		
CO-60	110CI		G-21, G-22		
** DEVICE MODEL NUMBER = UTILITY TWIN 20					
IR-192	240CI		G-5, G-7		
CO-60	20CI		G-5,G-7		
** DEVICE MODEL NUMBER = UTILITY TWIN 200A					
CO-60	110CI		G-21, G-22		
** DEVICE MODEL NUMBER = UTILITY TWIN 20A					
IR-192	240CI		G-7, G-8		

RADIOGRAPHY DEVICES AND
SOURCES SUPPLIED BY
LICENSED COMPANIES

ISOTOPE	ACT	AMERSHAM	SPEC	IN	RTG
CO-60	20CI		G-20		
** DEVICE MODEL NUMBER = UTILITY TWIN 50					
IR-192	240CI		G-5,G-7		
CO-60	50CI		G-5,G-7		
** DEVICE MODEL NUMBER = UTILITY TWIN 50A					
IR-192	240CI		G-7		
CO-60	50CI		G-7		

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RADIOGRAPHY DEVICES
WITH
SOURCE CHANGERS

ISOTOPE ACTIVITY SOURCE CHANGER

** DEVICE MODEL 10SA
CO-60 10CI C-8

** DEVICE MODEL 20V
IR-192 120CI IR-50,C-1,C-4,C-10,U-110,500SU

** DEVICE MODEL 20VS
IR-192 120CI IR-50,C-1,C-4,C-10,U-110,500SU

** DEVICE MODEL 35
IR-192 35CI IR-50,C-1,C-4,C-10,U-110,500SU

** DEVICE MODEL 35S
IR-192 35CI IR-50,C-1,C-4,C-10,U-110,500SU

** DEVICE MODEL 35SA
IR-192 35CI IR-50,C-1,C-4,C-10,U-110,500SU

** DEVICE MODEL 402
IR-192 240CI IR-50(120CI),650,500SU
CO-60 18CI C-8,771

** DEVICE MODEL 404, 404A
IR-192 100CI IR-50,650,500SU
CO-60 10CI C-8,770,771

** DEVICE MODEL 40V
IR-192 240CI U-110,C-10,500SU,IR-50(120CI)

** DEVICE MODEL 40VS
IR-192 240CI U-110,C-10,500SU, IR-50(120CI)

** DEVICE MODEL 412, 412A
IR-192 50CI C-1, IR-50, 650, 500SU

** DEVICE MODEL 446
CO-60 75CI C-8, 770, 771

** DEVICE MODEL 489
IR-192 10CI C-1,IR-50,650,U-110,50

** DEVICE MODEL 490
IR-192 100CI C-1,IR-50,650,U-110,50

** DEVICE MODEL 490X
CO-60 180MC RETURN FOR LOADING

** DEVICE MODEL 491
IR-192 100CI IR-50,C-1,650,500SU

RADIOGRAPHY DEVICES
WITH
SOURCE CHANGERS

ISOTOPE ACTIVITY SOURCE CHANGER

CO-60 20CI C-8,770,771

** DEVICE MODEL 496
IR-192 100CI C-1, IR-50,500SU
CO-60 3CI RETURN FOR LOADING

** DEVICE MODEL 498, 49
IR-192 50CI C-1,IR-50,650,U-110,50

** DEVICE MODEL 500
CO-60 200C 770,771

** DEVICE MODEL 501
CO-60 10CI C-8

** DEVICE MODEL 520
CO-60 1000C RETURN TO LOAD. 770,771(500CI)

** DEVICE MODEL 524
IR-192 100CI IR-50,650,500SU

** DEVICE MODEL 525
IR-192 100CI 416

** DEVICE MODEL 532
IR-192 10CI 650,500SU

** DEVICE MODEL 533
IR-192 100CI C-1,IR-50,C-4,500SU,650

** DEVICE MODEL 5SA
CO-60 5CI C-8

** DEVICE MODEL 616
IR-192 240CI RETURN FOR LOADING

** DEVICE MODEL 644
IR-192 100CI RETURN FOR LOADING

** DEVICE MODEL 660
IR-192 120CI C-1, IR-50,C-1,650,500SU
TM-170 200CI 650,500SU
YB-169 200CI 650,500SU
CO-60 0.1CI 650

** DEVICE MODEL 676
CO-60 300CI 770,771

RADIOGRAPHY DEVICES
WITH
SOURCE CHANGERS

ISOTOPE ACTIVITY SOURCE CHANGER

** DEVICE MODEL 680
CO-60 100CI 770,771

** DEVICE MODEL 683
IR-192 100CI RETURN FOR LOADING

** DEVICE MODEL 684
CO-60 10CI 770,771
IR-192 200CI 500SU,650

** DEVICE MODEL 699
IR-192 200CI 650,500SU

** DEVICE MODEL 713
IR-192 120CI IR-50

** DEVICE MODEL 741
CO-60 30CI 771

** DEVICE MODEL 773
CS-137 165MC RETURN FOR LOADING

** DEVICE MODEL 796
IR-192 10CI 650,500SU

** DEVICE MODEL 858
CO-60 100CI 771

** DEVICE MODEL 865
IR-192 240CI RETURN FOR LOADING

** DEVICE MODEL 920
IR-192 240CI 850

** DEVICE MODEL AI 520
IR-192 120CI C-1,IR-50,500SU,650,U110,C10

** DEVICE MODEL CENTURY
IR-192 120CI IR-50,C-1,C-4,C-10,U-110,500SU

** DEVICE MODEL CENTURY UNIVERSAL
IR-192 120CI IR-50,C-1,C-4,C-10,U-110,500SU

** DEVICE MODEL CENTURY S
IR-192 120CI IR-50,C-1,C-4,C-10,U-110,500SU

** DEVICE MODEL CENTURY SA
IR-192 85CI IR-50,C-1,C-10,500SU,U-110

RADIOGRAPHY DEVICES
WITH
SOURCE CHANGERS

ISOTOPE ACTIVITY SOURCE CHANGER

** DEVICE MODEL CENTURY SA UNIVERSAL
IR-192 120CI IR-50,C-1,C-4,C-10,U-110,500SU

** DEVICE MODEL GAMMATRON 10
CO-60 10CI C-8

** DEVICE MODEL GAMMATRON 100
CO-60 100CI C-8

** DEVICE MODEL GAMMATRON 100A
CO-60 100CI C-8

** DEVICE MODEL GAMMATRON 10A
CO-60 10CI C-8

** DEVICE MODEL GAMMATRON 20
CO-60 20CI C-8

** DEVICE MODEL GAMMATRON 200
CO-60 200CI C-8

** DEVICE MODEL GAMMATRON 200A
CO-60 200CI C-8

** DEVICE MODEL GAMMATRON 20A
CO-60 20CI C-8

** DEVICE MODEL GAMMATRON 5
CO-60 5CI C-8

** DEVICE MODEL GAMMATRON 50
CO-60 50CI C-8

** DEVICE MODEL GAMMATRON 50A
CO-60 50CI C-8

** DEVICE MODEL GAMMATRON 5A
CO-60 5CI C-8

** DEVICE MODEL IR100
IR-192 120CI 650,IR-50,500SU,C-10,U-110

** DEVICE MODEL IRIDITRON 100A
IR-192 100CI C-1

** DEVICE MODEL IRIDITRON 103A
IR-192 100CI C-1

RADIOGRAPHY DEVICES
WITH
SOURCE CHANGERS

ISOTOPE ACTIVITY SOURCE CHANGER

** DEVICE MODEL IRIDITRON 10A
IR-192 100CI C-1

** DEVICE MODEL IRIDITRON 20A
IR-192 60CI C-1

** DEVICE MODEL IRIDITRON 30BA
IR-192 30CI C-1

** DEVICE MODEL IRIDITRON 40AD
IR-192 30CI C-1

** DEVICE MODEL IRIDITRON 40BA
IR-192 30CI C-1

** DEVICE MODEL IRIDITRON 40E
IR-192 100CI C-1

** DEVICE MODEL MAGNAFLUX IC-100
IR-192 100CI IR-50,C-10,U-110,650

** DEVICE MODEL MULITIRON 50B SERIES
IR-192 300CI C-1

** DEVICE MODEL MULTITRON 150 SERIES
IR-192 100CI C-1(A)
CO-60 100CI C-8

** DEVICE MODEL MULTITRON 160 SERIES
IR-192 100CI C-1
CO-60 100CI C-8

** DEVICE MODEL MULTITRON 50B SERIES
CO-60 40CI C-8

** DEVICE MODEL MULTITRON 60C SERIES
IR-192 100CI C-1
CO-60 40CI C-8

** DEVICE MODEL PIPELINER 201
IR-192 200CI RETURN FOR LOADING

** DEVICE MODEL PIPELINER PTL 100
IR-192 100CI RETURN FOR LOADING

** DEVICE MODEL PIPELINER PTL 125U
IR-192 125CI RETURN FOR LOADING

RADIOGRAPHY DEVICES
WITH
SOURCE CHANGERS

ISOTOPE ACTIVITY SOURCE CHANGER

** DEVICE MODEL PIPELINER PTL 230U
IR-192 230CI RETURN FOR LOADING

** DEVICE MODEL PIPLINER 1
IR-192 100CI RETURN FOR LOADING

** DEVICE MODEL PIPLINER CRC-100
IR-192 100CI RETURN FOR LOADING

** DEVICE MODEL SPEC 2T
IR-192 240CI C1,C4,C10,U110,IR50(120),500SU

** DEVICE MODEL SPEC MODEL I
CO-60 110CI RETURN FOR LOADING

** DEVICE MODEL SPEC-CHECK I
IR-192 100CI RETURN FOR LOADING

** DEVICE MODEL SPEC-CHECK II
IR-192 150CI RETURN FOR LOADING

** DEVICE MODEL UNITRON 102A
IR-192 100CI C-1
CO-60 100CI C-8

** DEVICE MODEL UNITRON 110AB
IR-192 120CI C-1
CO-60 18CI C-1

** DEVICE MODEL UTILITY TWIN 100
IR-192 240CI C-1,C-10
CO-60 110CI C-10

** DEVICE MODEL UTILITY TWIN 100A
IR-192 240CI C-1(A),C-10
CO-60 110CI C-8

** DEVICE MODEL UTILITY TWIN 20
IR-192 240CI C-1,C-10
CO-60 20CI C-8

** DEVICE MODEL UTILITY TWIN 200A
CO-60 110CI C-8

** DEVICE MODEL UTILITY TWIN 20A
IR-192 240CI C-1(A)
CO-60 20CI C-8

RADIOGRAPHY DEVICES
WITH
SOURCE CHANGERS

ISOTOPE ACTIVITY SOURCE CHANGER

** DEVICE MODEL UTILITY TWIN 50

IR-192	240CI	C-1
CO-60	50CI	C-8

** DEVICE MODEL UTILITY TWIN 50A

IR-192	240CI	C-1(A)
CO-60	50CI	C-8

04-20-90
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Rec'vd
3/12/90

AMERSHAM SHIPPING INCIDENT

CHRONOLOGY:

DATE	EVENT	INTERVAL IN DAYS
January 29, 1990	Shipment left Busan, Korea	11
February 9, 1990	Arrived Los Angeles, CA	5
February 14, 1990	Cleared customs, shipped to Nova Trucking warehouse	2
February 16, 1990	Left warehouse via Covenant (shipping firm) 2 Drops in PA 1 Drop in MO	6
February 22, 1990	Arrived Patriot warehouse, Boston, MA via Patriot Transportation	13
March 8, 1990	Left Patriot warehouse, shipped to Amersham	1

2' 10
4' 2.5

617 273 2216

04-02-90

TRANSMITTED FROM 617 273 2216 03.08.90 18:58 P.01 *AMERSHAM T'D (1)

Amersham

FAX MESSAGE

AI-HK OFFICE FAX 852-834-8612

Post-it™ brand fax transmittal memo 7671	# of pages ▸ 1
To SAM L-U	From LINDA SHEFF
Co. H/HONG KONG	Co. BURLINGTON
Dept. CC: J. HUNT	Phone #
Fax # AL: SBURY	Fax # 617-273-2216

Page 1 of 1

Date 3RD FEB., 90

Fax Msg. # TL0223-05

DEAR JO,

RE : YR FAX 19/2
RETURN OF CONTAINERS

THE FOWARDING COMPANY IN KOREA HAVE SENT THE ORIGINAL DOCUMENTS TO BURLINGTON DIRECTLY BY DHL.

REGARDS,

ALIANA

Dear Sam + Aliana:

As of today, 3/02/90, we still have not received these documents. We cannot get these containers out of Customs without these documents. Please do what you can to expedite this.

Linda Sheff

617 273 2216

TRANSMITTED FROM 617 273 2216 03.08.90 18:58 P.02 •AMERSHAM T D

04-020-90 (1)

Customs Brokers • International Freight Forwarders • Consolidators

177 MILK STREET • BOSTON, MASS. 02109

SHIPPER

AMERSHAM CORPORATION
2636 SOUTH CLEARBROOK DR
ARLINGTON HEIGHTSIL60005

REF

03-07-90 129704

EXPORTING CARRIER

HANJIN MOKPO

PATRIOT TRUC

98029 PUSAN RE

USCPUSA16149303 | 03-02-90

067914512 | 02-14-90 | 2704

CONSIGNED

ENTRY NO.

081-0129704-1

I.T. CARRIER

COVENANT TRANS

HAWB NO.

UB0900171

INLAND CARRIER

AIRCARGO Patriot Truck

DELIVERY CLERK, DELIVER TO

AMERSHAM CORPORATION
2636 SOUTH CLEARBROOK DR
ARLINGTON HEIGHTSIL60005

REF

CARRIER NOTE: IF ANY DIFFICULTIES ARE ENCOUNTERED PLEASE TELEPHONE US

NO. OF PKGS.	DESCRIPTION OF ARTICLES, SPECIAL MARKS & EXCEPTIONS	WEIGHT
1	CTNS EMPTY SOURCE CHANGERS	817

ONE BOX CONTAINING 14 SOURCE CHANGERS

****exempt from specification packaging, shipping paper and****
certification marking and labeling and exempt from the re-*
quirements of part 175 per 49 cfr 173.421-1 and 49 cfr *
***173.424, exempted from the iata restricted articles regulations
(28th edition) per paragraph 5.7.29, page 369." *

PIER LOADING CHARGES FOR ACCT. CONSIGNEE UNLESS SPECIFIED OTHERWISE ABOVE

CARRIER NOTE: THIS ORIGINAL DELIVERY ORDER WITH SIGNATURE MUST BE PRESENTED TO PIER TO EFFECT PICK-UP

INTERNATIONAL SPECIALISTS, INC. (AS AGENTS ONLY)
177 Milk Street • Boston, Mass. 02109

INLAND FREIGHT COLLECT

ORIGINAL

04-026-90 (1)

Consignor

NDI CORPORATION
166-5 POI-DONG, GANGNAM-GU,
SEOUL, KOREA

FBL. No. UBO-900171 KR 410

NEGOTIABLE FIATA
COMBINED TRANSPORT
BILL OF LADING

Issued subject to ICC Uniform Rules for a Combined Transport Document(ICC publication 298)

Consigned to order of

AMERSHAM CORPORATION
40 NORTH AVENUE, BURLINGTON,
MASSACHUSETTS 01803, U.S.A
TEL : (617)272-2000

DAEIL SHIPPING CO., LTD.

ROYAL BLDG., SUITE 331
5, DANGJU-DONG, CHONGRO-KU
SEOUL 110-071, KOREA
PHONE: (82)(2)734-4351 (Rep.)
FAX: (82)(2)734-4350
TELEX: K23285 DAEILSH
MAIL: CENTRAL P.O. BOX 435
SEOUL 100-604, KOREA

Notify address

SAME AS CONSIGNEE

Place of receipt
BUSAN, KOREA

GPIKP

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 3

To DENNIS	From LINDA SHEFF
Co T.S.I.	Co AMERSHAM
Dept	Phone #
Fax # 357-9436	Fax # 617-273-2216

Ocean vessel V. 002E
HARJIN MOKPO

Port of loading
BUSAN, KOREA

Port of discharge
LOS ANGELES

Place of delivery
BOSTON, MA

Marks and numbers	Number and kind of packages	Description of goods	Gross weight	Measurement
ADDR BOSTON FROM : NDI CORP. MADE IN U.S.A	1BOX(ES)	SAID TO CONTAIN : 1EA OF TRANSPORTATION EMPTY CONTAINER OF RADIOISOTOPES MODEL : SU 500 S/N : 544,606,527,610,618, 550,556,517,522,518, 684,660,699,559	371KGS	0.230CBM

NON-NEGOTIABLE COPY

"FREIGHT PREPAID"

SAY:ONE (1) WOODEN BOX ONLY.

LADEN ON BOARD JAN. 29, 1990 CFS/CFS

according to the declaration of the consignor

The goods and instructions are accepted and dealt withsubject to the Standard Conditions printed overleaf

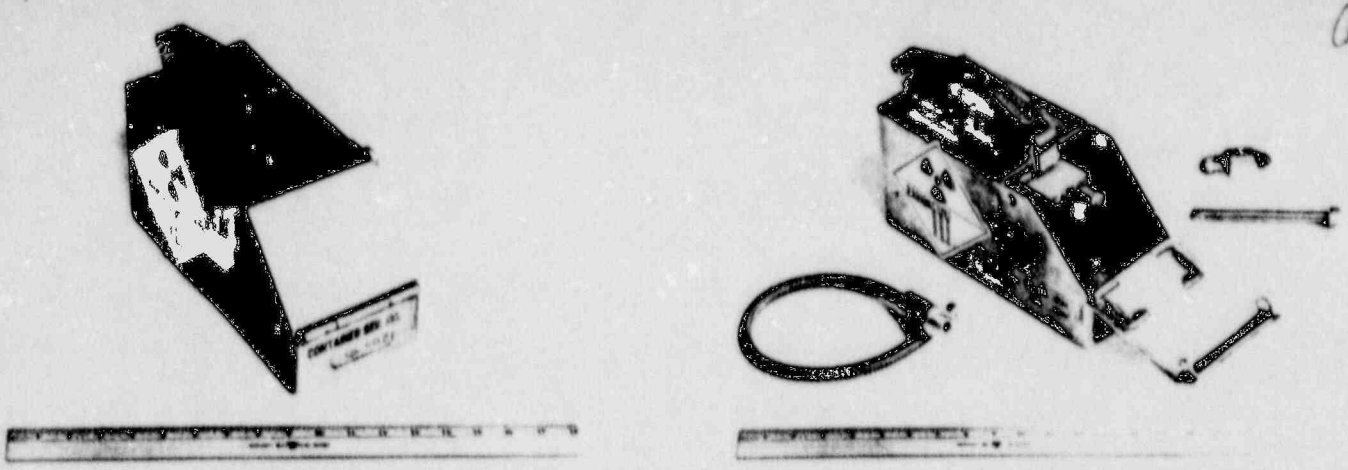
" O.FREIGHT PREPAID AS ARRANGED "
D.D.C : US$25.60/MINIMUM = US$25.60 (COLLECT)

Taken in charge in apparent good order and condition, unless otherwise noted herein, at the place of receipt for transport and delivery as mentioned above.

One of these Combined Transport Bills of Landing must be surrendered duly endorsed in exchange for the goods. In Witness where of the original Combined Transport Bills of Lading of this tenor and date have been signed in the number stated below, one of which being accomplished the other(s) to be void.

Freight amount	Freight payable at	Place and date of issue
	SEOUL, KOREA	SEOUL, KOREA JAN. 1990
Cargo insurance through the undersigned ☐not covered ☐Covered according to attached Policy	Number of Original Bs/L	Stamp and signature
	THREE/03	

For delivery of goods please apply to



Model 500-su Source Changer Max. cap.: 300 curies Ir^{192} Meets D.O.T. Type B packaging requirements.

On initial purchase of radiography units, the type and strength of the source to be used in the unit is usually specified by the customer. In these cases, the radiography unit itself, being well shielded, is perfectly suitable for use as a shipping container, and the unit is delivered with the source already inside.

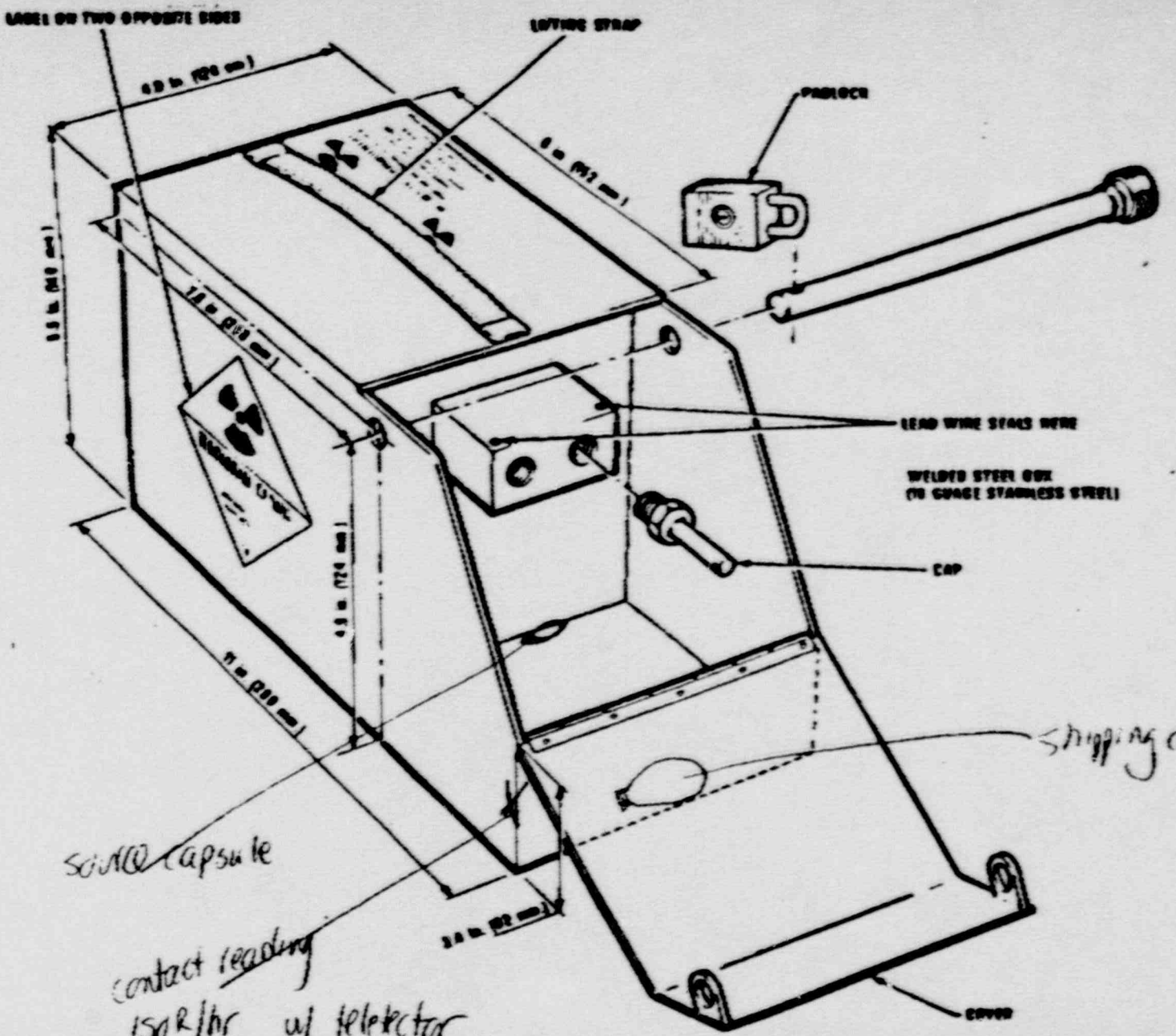
When **only** a source is ordered, a unit like the one pictured is used as the shipping container. It is supplied complete with the proper connectors and source tube for transfer of the customer's decayed source from his radiography unit into the changer, and transfer of the new source from the changer into the radiography unit. This takes only a matter of minutes. There is no expensive down time or interruption in testing schedule.

The entire source changer/shipping unit, with the decayed source inside, is then sealed and sent back to Automation Industries, Instruments Division, which handles all details of disposal.

If desired, empty source changer/shipping units may be purchased and kept at the customer's location. Having extra source changers on hand can be a great convenience, because they will always be available not only as shipping containers, but also as a place for storage of extra sources. For example, a low-strength iridium source can be kept in the changer and transferred into a radiography unit only at those times when the job requires this type of source. When the job is finished, the extra source can be put back in the changer and the normally-used source can be put back in the radiography unit for normal work.

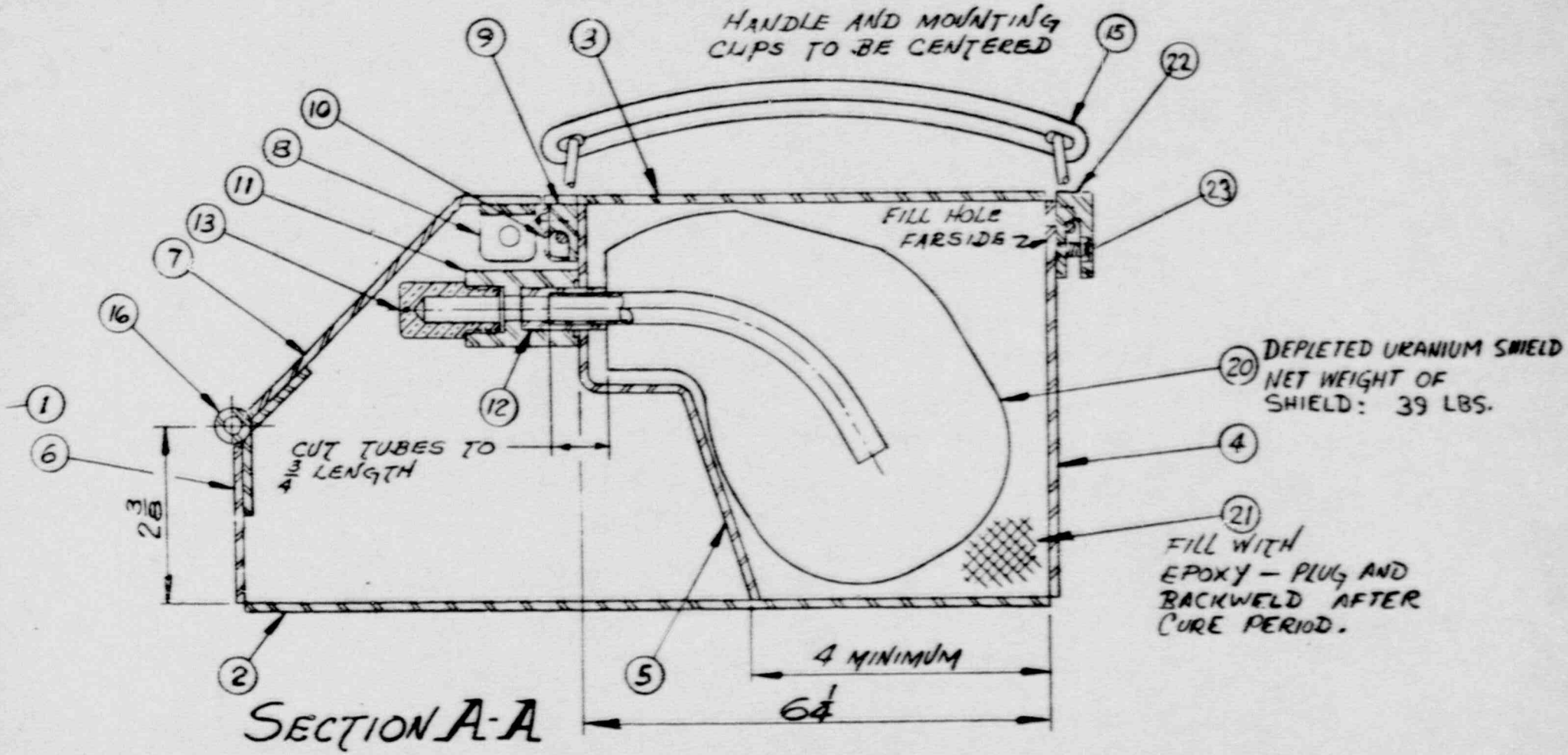
LEAK TEST KIT

The kit pictured meets all Federal and State regulations concerning contamination testing of radiography equipment. It includes a test tube and test solution, a sampling swab, information card, radiation warning labels, leak-test certificate, and instructions. Leak test samples can be easily and quickly obtained, but a qualified radiographer should do the sampling. After checking the sample with a survey meter to make sure that there is no gross contamination, the sample may be sent to Automation Industries, Instruments Division, for certification. The container in which the kit is supplied is also used as the shipping container for the sample. Instruments Division personnel will check the sample and issue a certification of leak test to the sender. This service is included in the purchase price of the kit.



AS NOTED	MOD 500-7U SOURCE CHANGER DESCRIPTIVE ASSEMBLY
	A A15005U90

04-20-90



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LETTERING FOR ITEM #6

ITEM	QTY.	DWG SIZE	PART NUMBER	DESCRIPTION	MATERIAL	MATL SPEC
23	1			ALLEN CAP SCREW #10-32 × ½ LNG. UNDER HEAD	STN. STL.	
22	1			HANDLE BLOCK - REAR	STN. STL.	
21	AS REQ'D			EPOXY - CIBA ARALDITE #502	+ LANCAST	"A"
20	1		500-SU-1	PIG ASS'Y - NET WEIGHT 39	LB. (SPENT URANIUM)	
19	1		CORBIN	PAD LOCK - TUMBLER KEY #4R1616C		STL. SHACKLE.
18	1			SEAL BOLT	SST	
17	2			SCREW - #8-32NC × ⅜ LG.	SST	
16	1			HINGE-BUTT 1¼ × 1¼ × ⅛ × 4⅜ LG; ⅛ PIN		SST
15	1			HANDLE - CHASE LEATHER		
14	1			LOCK BOX CAP - HEX TYPE		BRASS
13	1			LOCK BOX CAP - ROUND TYPE		BRASS
12	2			TUBE SLEEVE		302/304 SST
11	1			LOCKBOX - 2 TUBE		
10	1			HANDLE CLIP		
9	1			HANDLE BLOCK - FRONT		
8	1			LOCKING STRAP	#10 GA.	
7	1			COVER PLATE		
6	1			FRONT PLATE		
5	1			SPACER PLATE		
4	1			BACK PLATE		
3	1			TOP PLATE		
2	1			BOTTOM PLATE		
1	2			SIDE PLATE	#10 GA	302/304 SST

LIST OF MATERIAL

SIGNATURES	DATE
DRAWN Lusch	7-12-73
CHECKED Santa	7-16-73
ENGR	

INSTRUMENTS DIVISION
AUTOMATION INDUSTRIES, INC.
P.O. BOX 245
PHOENIXVILLE, PA.
19460

TITLE

IRIDIUM-192 SOURCE CHANGER
120 CURIE CAPACITY
MODEL "SU" (SPENT URANIUM)

APPROVED DESIGN ACTIVITY

APPROVED M.P. Santa 7/14/73

SIZE	CODE IDENT NO.	DRAWING NO.	REV.
D	07995	500-SU	C

SCALE VAR. SHEET 1 OF 1

2 1

IDP4 00830

617 273 2216 04-026-90

TRANSMITTED FROM 617 273 2216 03.08.90 13:14 P.01 *AMERSHAM T'D (1)

AMERSHAM CORPORATION **BURLINGTON, MA U.S.A.** **FAX # 617-273-2216**

FAX TO: John White
FAX #: 215-337-~~5324~~ 5269
LOCATION: NRC, Region 1
FROM: Kate Roughan
COPIES TO:

FAX MSG # 10
PAGE 1 OF ~~2~~
DATE: 8 March 1990

URGENT

John.

Received model 500SA SN 610 w/ approximately 7 Curies of (Iridium-142) assumed Source model is not Amersham manufacture and does not look familar. Source was on aircraft cable based on observations of source capsule where wire was cut.

Shipment of 14 model 500SA changers was shipped from N.D.I Corporation
168-5 POI-DONG,
GANGNAM-GU
SEOUL, KOREA

Via Vessel - HANJIN MOKPO Shipment # 092E

617 273 2216

04-2090

TRANSMITTED FROM 617 273 2216 03.08.90 18:58 P.01 *AMERSHAM T'O(1)

Amersham

FAX MESSAGE

AI-HK OFFICE FAX 852-834-5012

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 1

To SAM L-U	From LINDA SHEE
Co. H/HONG KONG	Co. H/BURLINGTON
Dept. CC: J. HUNT	Phone #
Fax # AL: SBURY	Fax # 617-273-2216

Page 1 of 1

Date 23RD FEB., 90

Fax Msg. # TL0223-05

DEAR JO,

RE : YR FAX 19/2
RETURN OF CONTAINERS

THE FOWARDING COMPANY IN KOREA HAVE SENT THE ORIGINAL DOCUMENTS TO BURLINGTON DIRECTLY BY DHL.

REGARDS,

ALIANA

Dear Sam + Aliana:

As of today, 3/02/90, we still have not received these documents. We cannot get these containers out of Customs without these documents. Please do what you can to expedite this.

L. Shee

AMERSHAM CORPORATION **BURLINGTON, MA U.S.A.** **FAX # 617-273-2216**

FAX TO:

FAX #:

LOCATION:

FROM:

COPIES TO:

FAX MSG #

PAGE 2 OF ____

DATE: 8 March 1990

arrived Los Angeles, CA

~~East~~ consolidater in CA

Fidelity Transport Inc. 213-921-3995

Shipment ~~arrived~~ transpated by Covenant Transportation to Boston

In Boston trucked to Burlington (Amersham) via Patriot.

I will be contacting Fidelity and covenant for more information ie shipping dates etc,

I have enclosed pertinent paperwork and drawing of 500 SU changer showing location of source.

The contact reading at the 500SU was ~150R/hr at the front. Remaining source changes in shipment ~~were~~ had normal radiation levels

617 273 2216

** TRANSMITTED FROM 617 273 2216 03.08.90 18:14 P.03 *AMERSHAM TO 04-020-90

3 of 5

Shipment arrived in crate with no DOT labels. SOO SU SN 610 had no lock only a seal wire. All DOT labels on source changers ~~and~~ were same labels that we prepared for transport when they were shipped to Korea.

I will be in touch.

04-20-90
DOC #2
M 5/R

AMERSHAM CORPORATION **BURLINGTON, MA U.S.A.** **FAX # 617-273-2216**

FAX TO: John White
FAX #: 215-337-5324
LOCATION: NRC, Region 1
FROM: Kate Roughan
COPIES TO:

Mike Wang
FAX 366-3753 (FTS)
Conf 366-4498

FAX MSG # 10
PAGE 1 OF 3
DATE: 8 March 1990

URGENT

John.

Received model 500SU SN 610 w/ approximately 7 Curies of (Iridium-192) assumed source model is not Amersham manufacture and does not look familiar. Source was on aircraft cable based on observations of source capsule where wire was cut.

Shipment of 14 model 500SU changers was shipped from N.D.I Corporation
168-5 POI-DONG
GANGNAM-GU
SEOUL, KOREA

Via Vessel - HANJIN MOKPO Shipment # 092 E

AMERSHAM CORPORATION BURLINGTON, MA U.S.A. FAX # 617-273-2216

FAX TO:

FAX #

LOCATION:

FROM:

COPIES TO:

FAX MSG #

PAGE 2 OF ____

DATE: 8 March 1990

arrived Los Angeles, CA

~~Los~~ Consolidater in CA

Fidelity Transport Inc. 213-921-3995

Shipment ~~arrived~~ transported by Covenant Transportation to Boston

In Boston trucked to Burlington (Amersham) via Patriot.

I will be contacting Fidelity and Covenant for more information ie shipping dates etc,

I have enclosed pertinent paperwork and drawing of 500 SU changer showing location of source.

The contact reading at the 500SU was ~150R/hr at the front. Remaining source changers in shipment ~~were~~ had normal radiation levels

3 of 5

Shipment arrived in crate with no DOT labels. 500 SU SN 610 had no lock only a seal wire. All DOT labels on some changers ~~and~~ were same labels that we prepared for transport when they were shipped to Korea.

I will be in touch.

TRANSMITTED FROM 617 273 2216 03.08.90 17:43 P.04 AMERSHAM T.O 04-620-90 2

Consignor

NDI CORPORATION
166-5 POI-DONG, GANGNAM-GU,
SEOUL, KOREA

FBL No. UBO-900171 KR 410

NEGOTIABLE FIATA
COMBINED TRANSPORT
BILL OF LADING

issued subject to ICC Uniform Rules for a Combined Transport Document(ICC publication 298)

Consigned to order of

AMERSHAM CORPORATION
40 NORTH AVENUE, BURLINGTON,
MASSACHUSETTS 01803, U.S.A
TEL : (617)272-2000

DAEIL SHIPPING CO., LTD.

ROYAL BLDG., SUITE 331
5, DANGJU-DONG, CHONGRO-KU
SEOUL 110-071, KOREA
PHONE:(82)(2)734-4351 (Rep.)
FAX:(82)(2)734-4350
TELEX:K23285 DAEILSH
MAIL:CENTRAL P.O.BOX 435
SEOUL 100-604, KOREA

Notify address

SAME AS CONSIGNEE

6160

Post-It™ brand fax transmittal memo 7671	# of pages ▸ 3
To DENNIS	From LINDA SHEFF
Co. I.S.I.	Co. AMERSHAM
Dept	Phone #
Fax # 357-9436	Fax # 617-273-2216

	Place of receipt: BUSAN, KOREA
Ocean vessel: HANJIN MOKPO V-002E	Port of loading: BUSAN, KOREA
Port of discharge: LOS ANGELES	Place of delivery: BOSTON, MA

Marks and numbers	Number and kind of packages	Description of goods	Gross weight	Measurement
ADDR BOSTON FROM : NDI CORP. MADE IN U.S.A	1BOX(ES)	SAID TO CONTAIN : 12EA OF TRANSPORTATION EMPTY CONTAINER OF RADIOISOTOPES MODEL : SU 500 S/R : 547,656,527,610,618, 535,526,517,522,518, 665,560,699,559	371KGS	0.230CBM

COPY

NON-NEGOTIABLE

"FREIGHT PREPAID"

SAY:ONE (1) WOODEN BOX ONLY.

LADEN ON BOARD CFS/CFS
JAN. 29, 1990

according to the declaration of the consignor

The goods and instructions are accepted and dealt with subject to the Standard Conditions printed overleaf.

" O.FREIGHT PREPAID AS ARRANGED "
D.D.C : US$25.60/MINIMUM = US$25.60 (COLLECT)

Taken in charge in apparent good order and condition, unless otherwise noted herein, at the place of receipt for transport and delivery as mentioned above.

One of these Combined Transport Bills of Lading must be surrendered duly endorsed in exchange for the goods. In Witness whereof the original Combined Transport Bills of Lading all of this tenor and date have been signed in the number stated below, one of which being accomplished the other(s) to be void.

Freight amount	Freight payable at: SEOUL, KOREA	Place and date of issue: SEOUL, KOREA JAN. 1990
Cargo Insurance through the undersigned ☐not covered ☐Covered according to attached Policy	Number of Original FBL's: THREE/03	Stamp and signature

04-020-90 (2)

FIDELITY TRANSPORT, INC.

INVOCC/CONSOLIDATOR • INTERNATIONAL FREIGHT FORWARDER • FMC #320

FEB 9 1990

ARRIVAL NOTICE/INVOICE

NOTIFY: AMERSHAM CORPORATION
40 NORTH AVENUE
BURLINGTON, MA 01803
617-272-2000

DATE: 02/05/90
REF#: FEDS-0802

ARRIVAL INFORMATION

VESSEL/VOY. NO: HANJIN MOKPO V-092E
ARRIVAL DATE : 02/09/90
HOUSE B/L NO : UBO-900171
SHIPPER .....: NDI CORPORATION
CONSIGNEE ....: AMERSHAM CORPORATION
PACKAGE: 1 BOX WEIGHT: 371 KGS MEASUREMENT: 0.230 CBM
CARGO LOCATION: PATRIOT TRUCKING, INC. (617-569-5699)
MASTER B/L NO.: HJSCPUSA16149303

INTERMODAL INFORMATION

I.T. NO.:

DATE: / /

INVOICE

O/FREIGHT	: $	0.00
ODC	: $	25.60
HANDLING	: $	35.00
OTHERS	: $	0.00
TOTAL	: $	60.60

NOTES

**PLEASE MAKE CHECKS PAYABLE TO FIDELITY TRANSPORT, INC. PERSONAL CHECK IS NOT ACCEPTED.
**SHIPMENTS WILL NOT BE RELEASED UNLESS ORIGINAL B/L AND CHARGES ARE DULY RECEIVED.
**SHIPMENTS ARE ALLOWED ONLY 7 DAYS FREE TIME. ANY DEMURRAGE AND/OR CHARGES AT DESTINATION WAREHOUSE ARE PAYABLE BY CONSIGNEE DIRECTLY TO THE WAREHOUSE CONCERNED.

SINCERELY,
FIDELITY TRANSPORT, INC.

Stella

INBOUND DEPT

Amersham

FAX MESSAGE

AI-HK OFFICE FAX 852-834-5818

04-020-90 (2)

Fax To: LINDA SHEFF
Location: BURLINGTON
From: ALIANA
Copies To:

— URGENT —

Page 1 of 1
Date 5TH MARCH, 90
Fax Msg # JL0305-11

DEAR LINDA,

RE: YR FAX 2/3
RETURN OF CONTAINERS

INFORMED BY KOREA TODAY.
THE ORIGINAL OF BILL OF LADING ARRIVED IN FIDELITY TRANSPORT, INC.
TEL: (213) 921-3995, MR PYUN.

PLS CHASE, TKS.

REGDS

ALIANA

Amersham

FAX MESSAGE

AI-HK OFFICE FAX 852-834-5612

Post-it * brand fax transmittal memo 7671	# of pages * 1
To SAM + J	From LINDA SHEPPARD
Co. BURLINGTON HONG KONG	Co. BURLINGTON
Dept. CC: T. HUNT	Phone #
Fax # ALDERSBURG	Fax # 617-273-2210

Page 1 of 1

Date 23RD FEB., 90

Fax Msg # TL0223-05

DEAR JO,

RE : YR FAX 19/2
RETURN OF CONTAINERS

THE FOWARDING COMPANY IN KOREA HAVE SENT THE ORIGINAL DOCUMENTS TO BURLINGTON DIRECTLY BY DHL.

REGARDS,

ALIANA

Dear Sam + Aliana:

As of today, 3/02/90, we still have not received these documents. We cannot get these containers out of Customs without these documents. Please do what you can to expedite this.

Linda Shepp

TRANSMITTED FROM 617 273 2216 03.08.90 17:43 P.08 AMERSHAM

04-020 90(2)

Customs Brokers • International Freight Forwarders & Consolidators

177 MILK STREET • BOSTON, MASS. 02109 • 617-357-9343

SHIPPER

AMERSHAM CORPORATION
2636 SOUTH CLEARBROOK DR
ARLINGTON HEIGHTSIL60005

REF

03-07-90 129704

EXPORTING CARRIER	LOCATION	
HALLIN MOLLER	PATRIOT TRUC	58029 PUSAN RE

	ARRIVAL DATE	FREE TIME EXP.	I.T. NO.		
USCPUSA161149303	03-02-90		067914512	02-14-90	2704

CONSIGNEE:

AMERSHAM CORPORATION
2636 SOUTH CLEARBROOK DR
ARLINGTON HEIGHTSIL60005

REF

ENTRY NO. 051-0129704-1

I.T. CARRIER: COVENANT TRANS

HAWB NO. UB0900171

INLAND CARRIER: CARGO

DELIVERY CLERK DELIVER TO

CARRIER NOTE: IF ANY DIFFICULTIES ARE ENCOUNTERED PLEASE TELEPHONE US IMMEDIATELY

NO. PKGS.	DESCRIPTION OF ARTICLES, SPECIAL MARKS & EXCEPTIONS	WEIGHT
1	CTNS EMPTY SOURCE CHANGERS	817

ONE BOX CONTAINING 14 SOURCE CHANGERS

```
****exempt from specification packaging, shipping paper and****
***certification marking and labeling and exempt from the re-****
***quirements of part 175 per 49 cfr 173.421-1 and 49 cfr    ****
***173.424, exempted from the iata restricted articles regulations
***(28th edition) per paragraph 5.7.29, page 369."           ****
```

PIER LOADING CHARGES FOR ACCT. CONSIGNEE UNLESS SPECIFIED OTHERWISE ABOVE

CARRIER NOTE: THIS ORIGINAL DELIVERY ORDER WITH SIGNATURE MUST BE PRESENTED TO PIER TO EFFECT PICK-UP

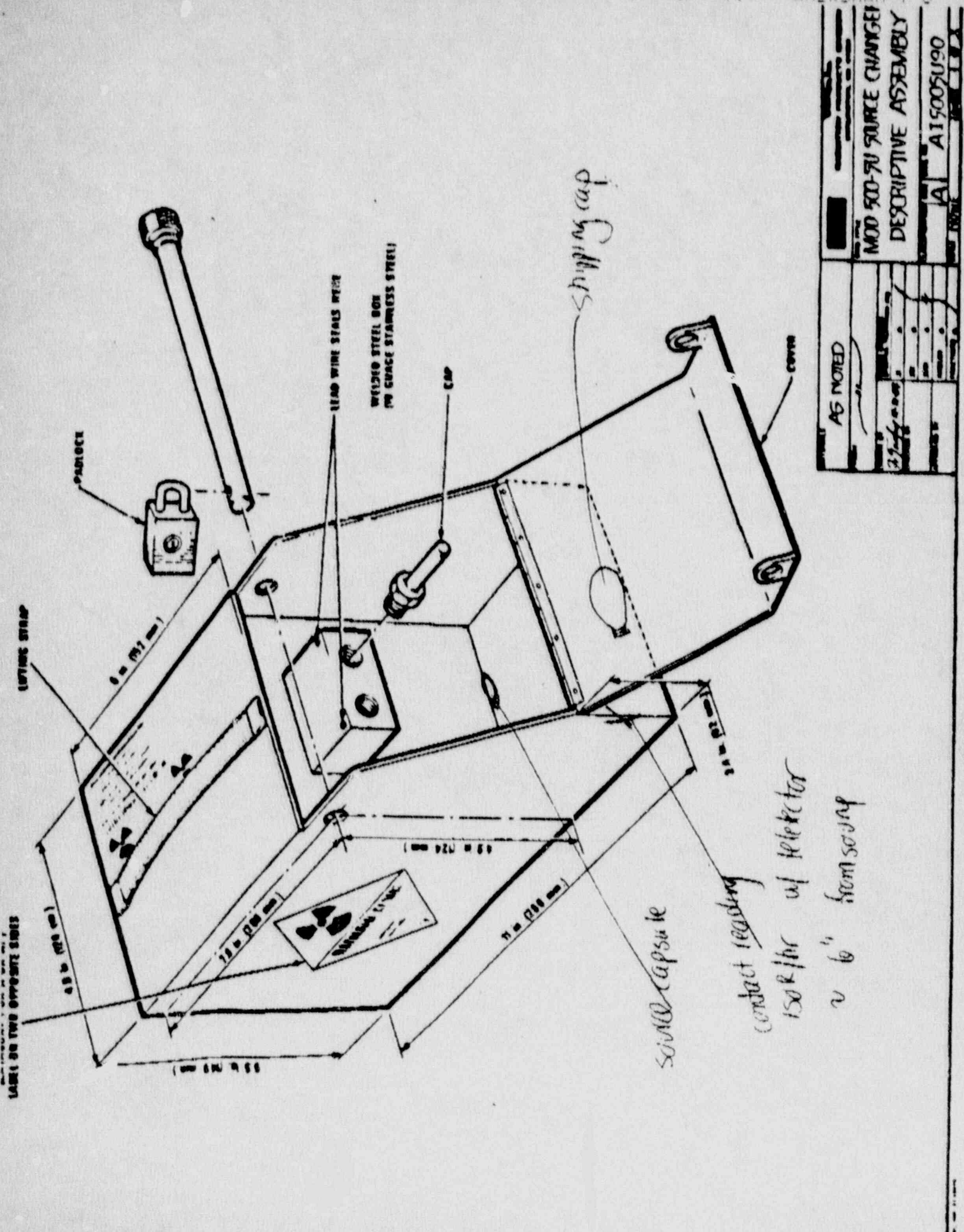
INTERNATIONAL SPECIALISTS INC (AS AGENTS ONLY)
177 Milk Street • Boston Mass 02109

PER:

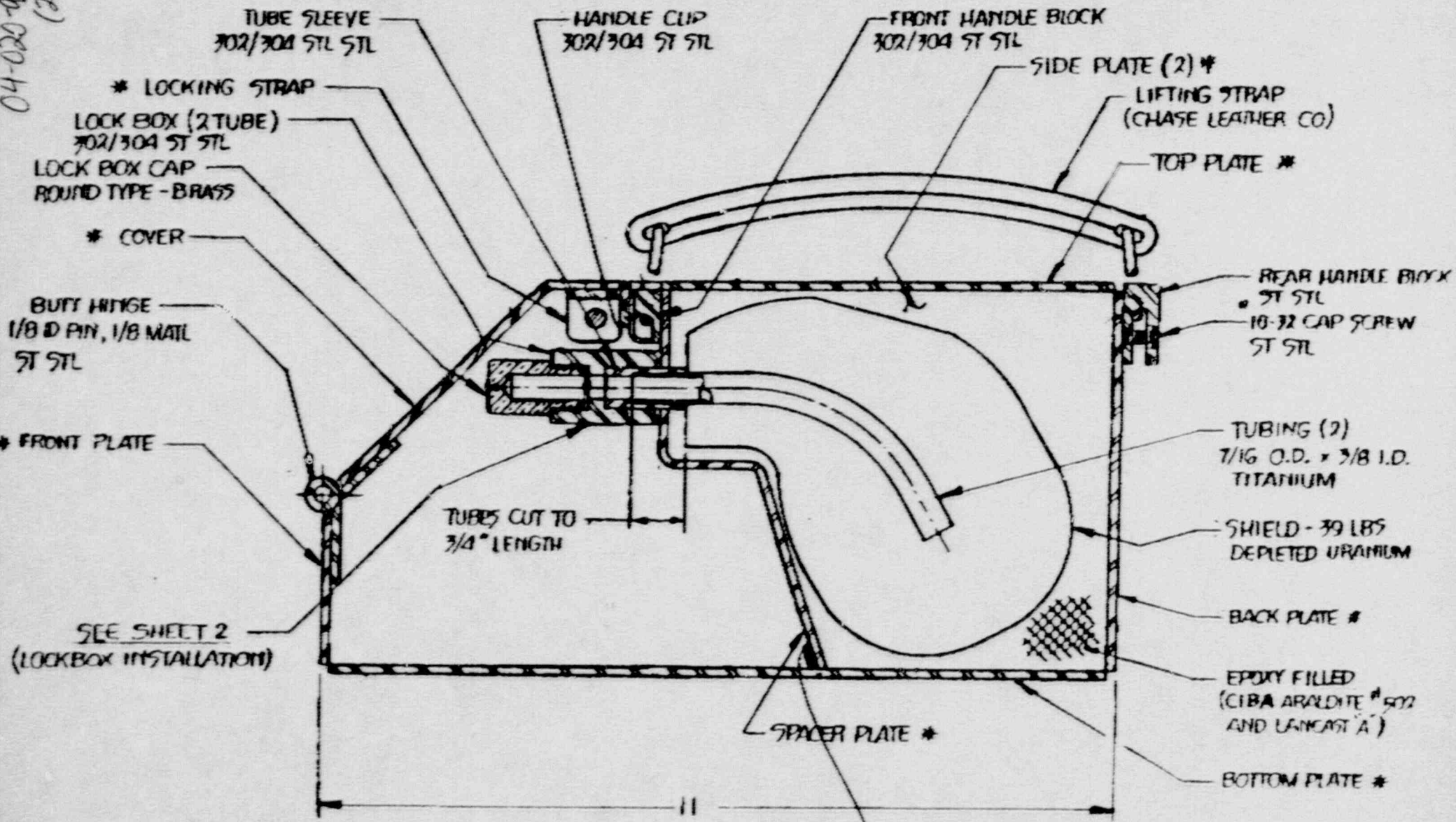
INLAND FREIGHT COLLECT

ORIGINAL

04-02090 (2)


MOD 500-9U SOURCE CHANGER
DESCRIPTIVE ASSEMBLY
A1500SU90
A
AS NOTED
COVER
Shipping cap
CAP
WELDED STEEL BOX
20 GUAGE STAINLESS STEEL
LEAD WIRE SEALS HERE
PADLOCK
LIFTING STRAP
LABEL ON TWO OPPOSITE SIDES
Source capsule
contact reading
150R/hr w/ teletector
~ 6" from source

04-020-AB (2)



NOTES:

1. ALL JOINTS & SEAMS ARE 1/16 WELD, FULL LENGTH WITH FULL PENETRATION
2. * MATL: 302/304 ST STL, 10 GA

AS NOTED	MOD. 500-9U SOURCE CHANGER DESCRIPTIVE ASSEMBLY

617 273 2216

TRANSMITTED FROM 617 273 2216 03.09.90 15:37 P.01 *AMERSHAM T-O

04-020-90 (2)

AMERSHAM CORPORATION **BURLINGTON, MA U.S.A.** **FAX # 617-273-2216**

FAX TO: John White

FAX #: 215-337-~~5229~~ 5269

LOCATION: NRC Region 1

FROM: Kate Roughan

COPIES TO:

FAX MSG #

PAGE 1 OF 2

DATE: 9 mar 90

URGENT

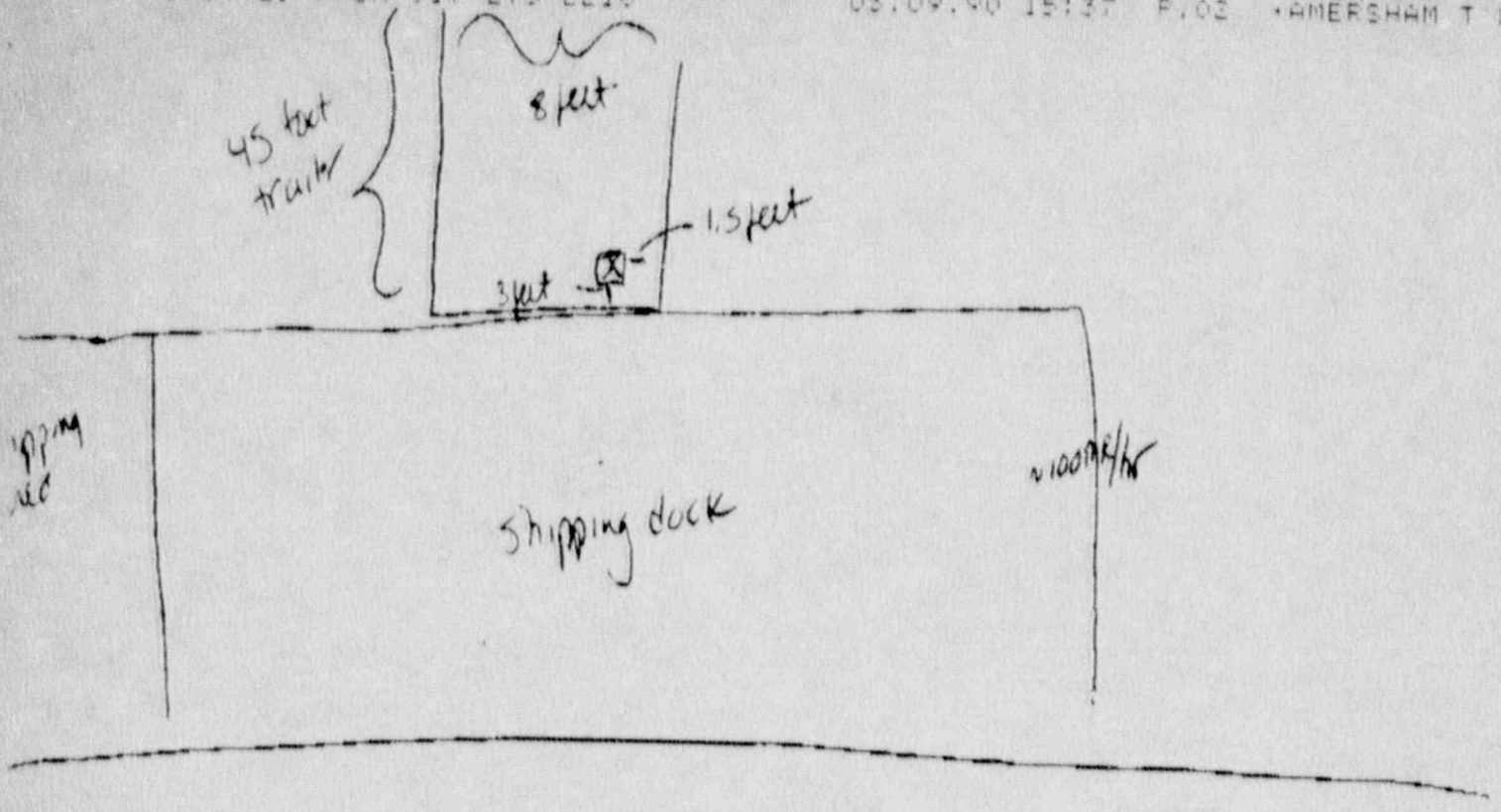
- The two source changers suspected of having sources were empty. A more thorough survey indicated radiation levels for an empty source changer (1.5-2 mR/hr) and upon opening the changer there were no sources visible

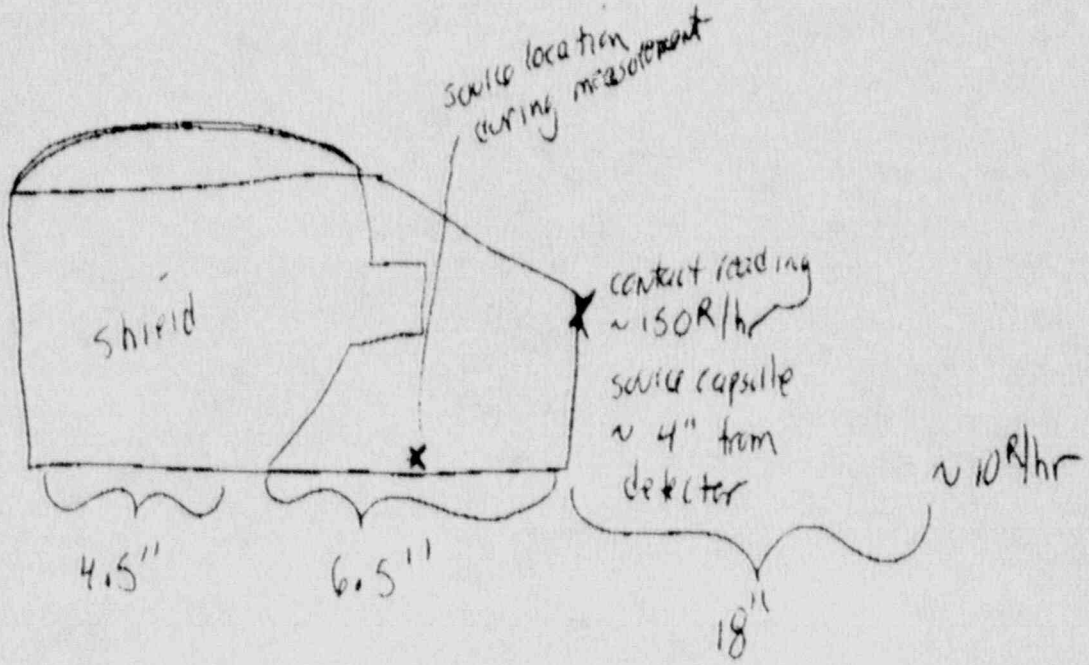
- We still have not checked out each source changer, we still need to conduct a wipe test of each tube to assure there is no internal contamination. All of the source changers were free of contamination on the external surface.

- Attached is a sketch showing approximate radiation levels of the 500 Ci and a sketch showing its location on the Patriot Truck.

- measurement of the activity indicates about 3 curies of Ir-192

04-020-90 (2)





- If you need more accurate measurements we may be able to place source capsule in changer and take radiation measurements. Let me know if you would like us to do this.

04-020490 (2)

TRANSMITTED FROM 617 273 2210 05.08.90 16:14 P.02 AMERSHAM TO

AMERSHAM CORPORATION **BURLINGTON, MA U.S.A.** **FAX # 617-273-2216**

FAX TO:

FAX #:

LOCATION:

FROM:

COPIES TO:

FAX MSG #

PAGE 2 OF ____

DATE: 8 March 1990

arrived Los Angeles, CA

~~Fedex~~ consolidater in CA

Fidelity Transport Inc. 213-921-3995

Shipment ~~arrived~~ transported by Covenant Transportation to Boston

In Boston trucked to Burlington (Amersham) via Patriot.

I will be contacting Fidelity and Covenant for more information ie shipping dates etc.

I have enclosed pertinent paperwork and drawing of 500 Ci changer showing location of source.

The contact reading at the 500Ci was ~150 R/hr at the front. Remaining source changers in shipment ~~were~~ had normal radiation levels

(2)
04-020-90

AS NOTED

MOD 500-7U SOURCE CHANGER

DESCRIPTIVE ASSEMBLY

A1500U90

617 273 2216

TRANSMITTED FROM 617 273 2216 03.08.90 18:14 P.01 •AMERSHAM T'D

04-020-90 (2)

AMERSHAM CORPORATION **BURLINGTON, MA U.S.A.** **FAX # 617-273-2216**

FAX TO: John White
FAX #: 315-337-~~5824~~ 5269
LOCATION: NRC, Region 1
FROM: Kate Roughan
COPIES TO:

FAX MSG # 10
PAGE 1 OF 8
DATE: 8 March 1990

URGENT

John.

Received model 500SA SN 610 w/ approxmately 7 curies @ (Iridium-192) assumed Source model is not Amersham manufacture and does not look familar. Source was on aircraft cable based on obsrvations of source capsule where wire was cut.

Shipment of 14 model 500SA changers was shipped from (shipped from) N.D.I Corporation 168-5 POI-DONG, GANGNAM-GU SEOUL, KOREA

via Vessel - HANJIN MOKPO Shipment # 092E

617 273 2216

04-020-90 (2)

TRANSMITTED FROM 617 273 2216 03.08.90 18:58 P.01 •AMERSHAM T'D

Amersham

FAX MESSAGE

AI-HK OFFICE FAX 852-834-5612

Post-it™ brand fax transmittal memo 7671	# of pages ▸ 1
To SAM LIU	From LINDA SHEFF
Co. AI/HONG KONG	Co. AP/BURLINGTON
Dept. CC: JC HUNT	Phone #
Fax # AYLESBURY	Fax # 617-273-2216

Page 1 of 1

Date 23RD FEB. 90

Fax Msg. # TL0223-05

DEAR JO,

RE : YR FAX 19/2
RETURN OF CONTAINERS

THE FOWARDING COMPANY IN KOREA HAVE SENT THE ORIGINAL DOCUMENTS TO BURLINGTON DIRECTLY BY DHL.

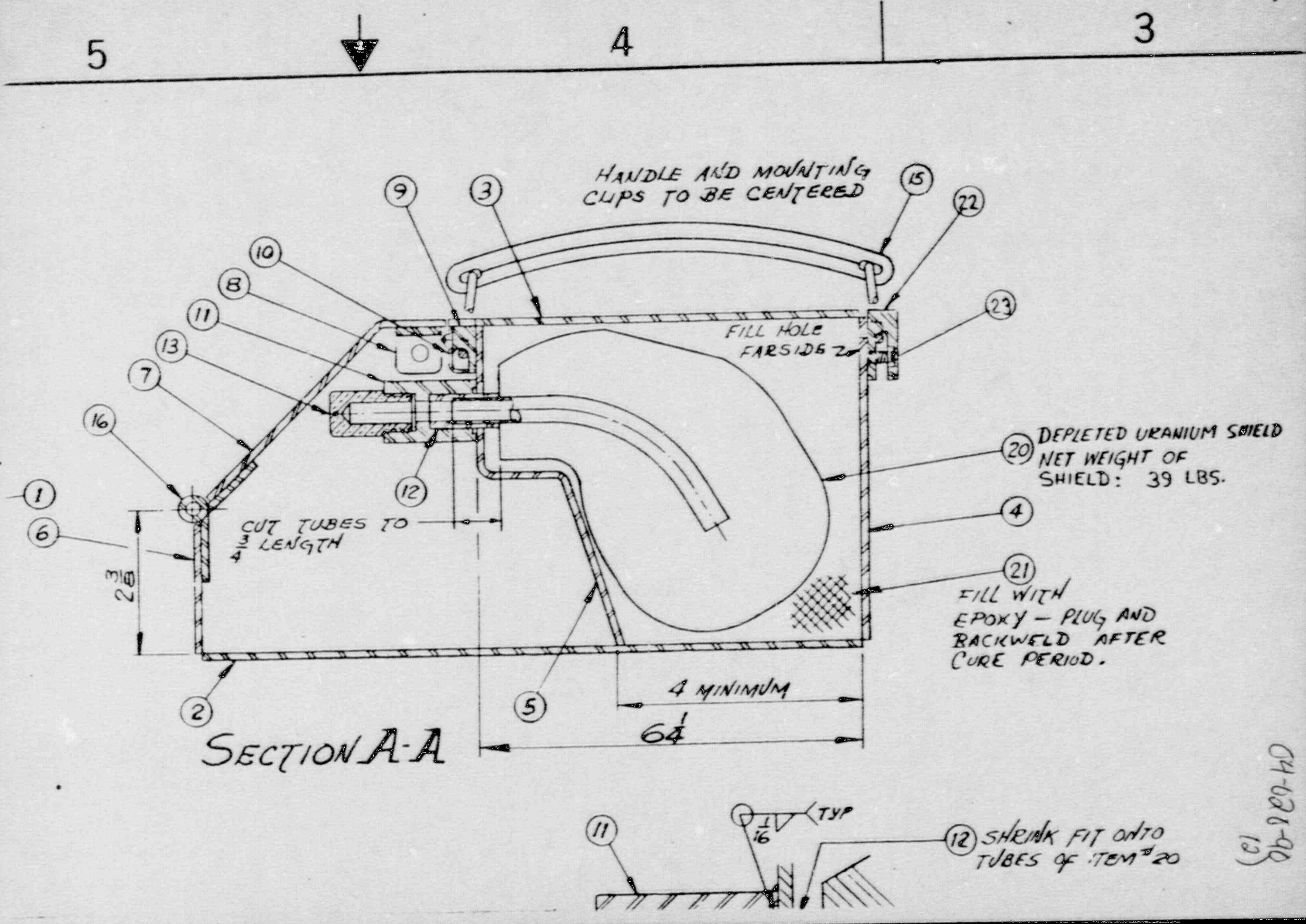
REGARDS,

ALIANA

Dear Sam + Aliana:

As of today, 3/02/90, we still have not received these documents. We cannot get these containers out of customs without these documents. Please do what you can to expedite this.

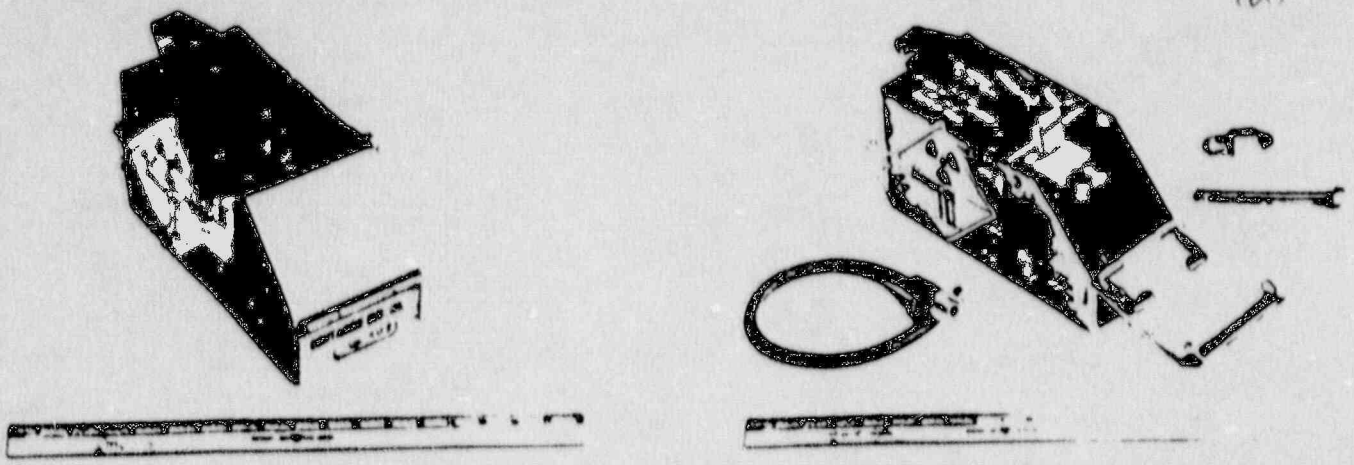
L. Sheff



SECTION A-A

04-026-90 (12)

04-020-90
12)



Model 500-su Source Changer Max. cap.: 300 curies Ir^{192} Meets D.O.T. Type B packaging requirements.

On initial purchase of radiography units, the type and strength of the source to be used in the unit is usually specified by the customer. In these cases, the radiography unit itself, being well shielded, is perfectly suitable for use as a shipping container, and the unit is delivered with the source already inside.

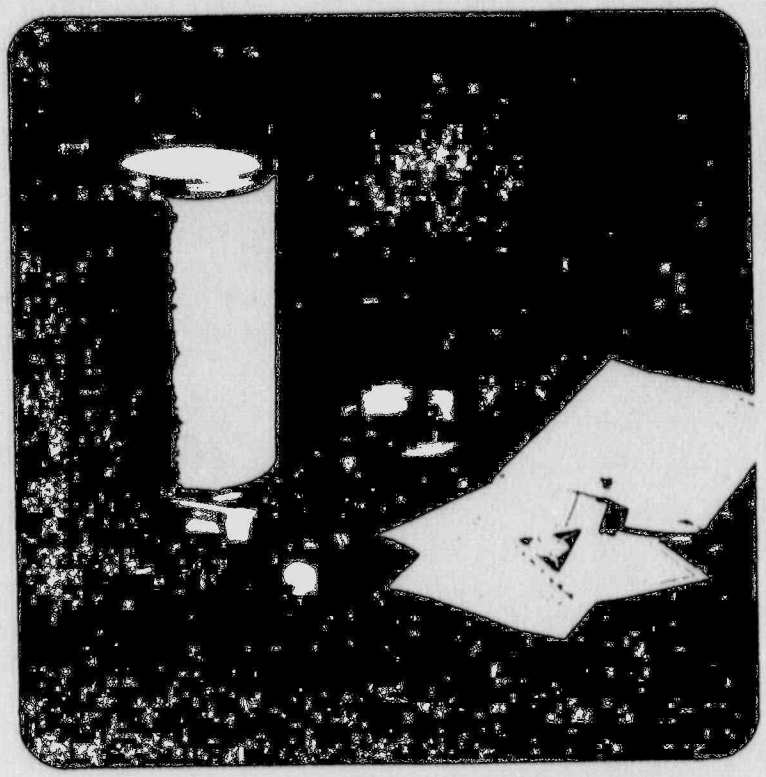
When only a source is ordered, a unit like the one pictured is used as the shipping container. It is supplied complete with the proper connectors and source tube for transfer of the customer's decayed source from his radiography unit into the changer, and transfer of the new source from the changer into the radiography unit. This takes only a matter of minutes. There is no expensive down time or interruption in testing schedule.

The entire source changer/shipping unit, with the decayed source inside, is then sealed and sent back to Automation Industries, Instruments Division, which handles all details of disposal.

If desired, empty source changer/shipping units may be purchased and kept at the customer's location. Having extra source changers on hand can be a great convenience, because they will always be available not only as shipping containers, but also as a place for storage of extra sources. For example, a low-strength iridium source can be kept in the changer and transferred into a radiography unit only at those times when the job requires this type of source. When the job is finished, the extra source can be put back in the changer and the normally-used source can be put back in the radiography unit for normal work.

LEAK TEST KIT

The kit pictured meets all Federal and State regulations concerning contamination testing of radiography equipment. It includes a test tube and test solution, a sampling swab, information card, radiation warning labels, leak-test certificate, and instructions. Leak test samples can be easily and quickly obtained, but a qualified radiographer should do the sampling. After checking the sample with a survey meter to make sure that there is no gross contamination, the sample may be sent to Automation Industries, Instruments Division for certification. The container in which the kit is supplied is also used as the shipping container for the sample. Instruments Division personnel will check the sample and issue a certification of leak test to the sender. This service is included in the purchase price of the kit.



04-026906(2)

LETTERING FOR ITEM #6

ITEM	QTY.	DWG SIZE	PART NUMBER	DESCRIPTION	MATERIAL	MATL SPEC
23	1			ALLEN CAP SCREW #10-32 x 1/2 LNG. UNDER HEAD - STN. STL.		
22	1			HANDLE BLOCK - REAR	STN. STL.	
21	AS REQ'D			EPOXY - CIBA ARALDITE #507	+ LANCAST	"A"
20	1		500-SU	PIG ASS'Y - NET WEIGHT 39	LB. (SPENT URANIUM)	
19	1		CORBIN	PAD LOCK - TUMBLER KEY #4RIGILIC		STL. SHACKLE.
18	1			SEAL BOLT	SST	
17	2			SCREW - #8-32NC x 3/8 LG,	SST	
16	1			HINGE - BUTT 1 1/4 x 1 1/4 x 1/8 x 4 3/8 LG, 1/8 PIN		SST
15	1			HANDLE - CHASE LEATHER		
14	1			LOCK BOX CAP - HEX TYPE		BRASS
13	1			LOCK BOX CAP - ROUND TYPE		BRASS
12	2			TUBE SLEEVE		302/304 SST
11	1			LOCKBOX - 2 TUBE		
10	1			HANDLE CLIP		
9	1			HANDLE BLOCK - FRONT		
8	1			LOCKING STRAP	#10 GA.	
7	1			COVER PLATE		
6	1			FRONT PLATE		
5	1			SPACER PLATE		
4	1			BACK PLATE		
3	1			TOP PLATE		
2	1			BOTTOM PLATE		
1	2			SIDE PLATE	#10 GA	302/304 SST

LIST OF MATERIAL

SIGNATURES	DATE
DRAWN Lusch	7-12-73
CHECKED Santon	7-16-73
ENGR	

INSTRUMENTS DIVISION
AUTOMATION INDUSTRIES, INC.
P.O. BOX 245
PHOENIXVILLE, PA.
19460

TITLE

IRIDIUM-192 SOURCE CHANGER
120 CURIE CAPACITY
MODEL "SU" (SPENT URANIUM)

APPROVED DESIGN ACTIVITY

APPROVED M.P. Santon 7/14/73

SIZE	CODE IDENT NO.	DRAWING NO.	REV
D	07995	500-SU	C

SCALE VAR. SHEET 1 OF 1

2 1

IDP4 80838

04-020-90
(21)

AMERSHAM SHIPPING INCIDENT

CHRONOLOGY:

DATE	EVENT	INTERVAL IN DAYS
January 29, 1990	Shipment left Busan, Korea	11
February 9, 1990	Arrived Los Angeles, CA	5
February 14, 1990	Cleared customs, shipped to Nova Trucking warehouse	2
February 16, 1990	Left warehouse via Covenant (shipping firm) 2 Dest. in PA 1 Dest. in MO	6
February 22, 1990	Arrived Patriot warehouse, Boston, MA via Patriot Transport, Inc.	13
March 8, 1990	Left Patriot warehouse, shipped to Amersham	1

21 40

41 2.5

Consignor

NDI CORPORATION
166-5 PO-DONG, GANGNAM-GU,
SEOUL, KOREA

FBL No. UBO-900171 KR 410

NEGOTIABLE FIATA COMBINED TRANSPORT BILL OF LADING

Issued subject to ICC Uniform Rules for a Combined Transport Document(ICC publication 298)

Consigned to order of

AMERSHAM CORPORATION
40 NORTH AVENUE, BURLINGTON,
MASSACHUSETTS 01803, U.S.A
TEL : (617)272-2000

DAEIL SHIPPING CO., LTD

ROYAL BLDG., SUITE 331
5, DANGJU-DONG, CHONGRO-KU
SEOUL 110-071, KOREA
PHONE: (82)(2)734-4351 (Rep.)
FAX: (82)(2)734-4350
TELEX: K23285 DAEILSH
MAIL: CENTRAL P.O BOX 435
SEOUL 100-604, KOREA

Notify address

SAME AS CONSIGNEE

6110

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 3

To DENNIS	From LINDA SHEFF
Co T S I.	Co AMERSHAM
Dept	Phone #
Fax # 357-9436	Fax # 617-273-2214

Place of receipt: BUSAN, KOREA

Ocean vessel: HANJIN MOKPO V. 0022E

Port of loading: BUSAN, KOREA

Port of discharge: LOS ANGELES

Place of delivery: BOSTON, MA

Marks and numbers	Number and kind of packages	Description of goods	Gross weight	Measurement
ADDR BOSTON FROM : NDI CORP. MADE IN U.S.A	1BOX(ES)	SAID TO CONTAIN : 1 4EA OF TRANSPORTATION EMPTY CONTAINER OF RADIOISOTOPES MODEL : SU 500 S/N : 544,066,527,610,618, 555,556,517,522,518, 666,660,689,559	371KGS	0.230CBM

COPY

NON-NEGOTIABLE

"FREIGHT PREPAID"

SAY: ONE (1) WOODEN BOX ONLY.

LADEN ON BOARD CFS/CFS
JAN. 29, 1990

according to the declaration of the consignor

The goods and instructions are accepted and dealt with subject to the Standard Conditions printed overleaf

" O.FREIGHT PREPAID AS ARRANGED "
D.D.C : US$25.60/MINIMUM = US$25.60 (COLLECT)

Taken in charge in apparent good order and condition, unless otherwise noted herein, at the place of receipt for transport and delivery as mentioned above.

One of these Combined Transport Bills of Landing must be surrendered duly endorsed in exchange for the goods. In Witness where of the original Combined Transport Bills of Lading of this tenor and date have been signed in the number stated below, one of which being accomplished the other(s) to be void.

Freight amount	Freight payable at	Place and date of issue
	SEOUL, KOREA	SEOUL, KOREA JAN. 1990
Cargo insurance through the undersigned ☐not covered ☐Covered according to attached Policy	Number of Original FBL's THREE/03	Stamp and signature
For delivery of goods please apply to		

8

Shipment arrived in crate with no DOT labels. 500 su SN 610 had no lock only a seal wire. All DOT labels on source changers were same labels that we prepared for transport when they were shipped to Korea.

I will be in touch.

04-020-90 (1)

Consignor

NDI CORPORATION
168-5 YOI-DONG, GANGNAM-GU,
SEOUL, KOREA

FBL No. UBO-90[illegible]71 KR 410

NEGOTIABLE FIATA COMBINED TRANSPORT BILL OF LADING

Issued subject to ICC Uniform Rules for a Combined Transport Document(ICC publication 298)

Consigned to order of

AMERSHAM CORPORATION
40 NORTH AVENUE, BURLINGTON,
MASSACHUSETTS 01803, U.S.A
TEL : (617)272-2000

DAEIL SHIPPING CO., LTD.

ROYAL BLDG., SUITE 331
5, DANGJU-DONG, CHONGRO-KU
SEOUL 110-071, KOREA
PHONE:(82)(2)734-4351 (Rep.)
FAX:(82)(2)734-4350
TELEX:K23285 DAEILSH
MAIL:CENTRAL P.O.BOX 435
SEOUL 100-604, KOREA

Notify address

SAME AS CONSIGNEE

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 3

To DENNIS	From LINDA SHEFF
Co T.S.I.	Co AMERSHAM
Dept.	Phone #
Fax # 357-9436	Fax # 617-273-2216

Place of receipt	
BUSAN, KOREA	
Ocean vessel V-0922E HANJIN MOKPO	Port of loading BUSAN, KOREA
Port of discharge LOS ANGELES	Place of delivery BOSTON, MA

Marks and numbers	Number and kind of packages	Description of goods	Gross weight	Measurement
	1BOX(ES)		371KGS	0.230CBM

ADDR
BOSTON
FROM : NDI CORP.
MADE IN U.S.A

SAID TO CONTAIN :
14EA OF
TRANSPORTATION EMPTY
CONTAINER OF RADIOISOTOPES

MODEL : SU 500
S/N : 541,666,527,610,618,
533,556,517,522,518,
[illegible],600,699,559

COPY

NON-NEGOTIABLE

"FREIGHT PREPAID"

SAY:ONE (1) WOODEN BOX ONLY.

LADEN ON BOARD CFS/CFS
JAN. 29, 1990

according to the declaration of the consignor

The goods and instructions are accepted and dealt with subject to the Standard Conditions printed overleaf.

" O.FREIGHT PREPAID AS ARRANGED "
D.D.C : US$25.60/MINIMUM = US$25.60 (COLLECT)

Taken in charge in apparent good order and condition, unless otherwise noted herein, at the place of receipt for transport and delivery as mentioned above.

One of these Combined Transport Bills of Landing must be surrendered duly endorsed in exchange for the goods. In Witness where of the original Combined Transport Bills of Lading all of this tenor and date have been signed in the number stated below, one of which being accomplished the other(s) to be void.

Freight amount	Freight payable at	Place and date of issue
	SEOUL, KOREA	SEOUL, KOREA JAN. 1990
Cargo Insurance through the undersigned ☐not covered ☐Covered according to attached Policy	Number of Original FBLs THREE/03	Stamp and signature

AM CORPORATION BURLINGTON, MA U.S.A. FAX # 617-273-2216

FAX TO: John White
FAX #: 315-337-~~5324~~ 5269
LOCATION: NRC, Region 1
FROM: Kate Roaghda
COPIES TO:

FAX MSG # 10
PAGE 1 OF ~~2~~
DATE: 8 march 1990

URGENT

John.

Received model 500SA SN 610 w/ approxmately 7 curits @ (Iridium-192) assumed Sorce model is not Amersham manufacture and does not look familar. Sorce was on aircraft cable based on obsrvations of sorce capsule where wire was cut.

Shipment of 14 model 500SA changers was shipped from N.D.I Corporation
168-5 POI-DONG,
GANGNAM-GU
SEOUL, KOREA

via vessel - HANJIN MOKPO Shipment # 092E

3 of 5

Shipment arrived in crate with no DOT labels. 500 SU SN 610 had no lock only a seal wire. All DOT labels on source changers ~~on~~ were same labels that we prepared for transport when they were shipped to Korea.

I will be in touch.

AMERSHAM CORPORATION BURLINGTON, MA U.S.A. FAX # 617-273-2216

FAX TO:

FAX #:

LOCATION:

FROM:

COPIES TO:

FAX MSG #

PAGE 2 OF ___

DATE: 8 March 1990

arrived Los Angeles, CA

~~Fedex~~ Consolidater in CA

Fidelity Transport Inc. 213-921-3995

Shipment ~~arrived~~ transported by Covenant Transportation to Boston

In Boston trucked to Burlington (Amersham) via Patriot.

I will be contacting Fidelity and covenant for more information. ie shipping dates etc.

I have enclosed pertinent paperwork and drawing of 500 Ci changer showing location of source.

The contact reading at the 500Ci was ~150R/hr at the front. Remaining source changers in shipment ~~were~~ had normal radiation levels

Amersham

FAX MESSAGE

AI-HK OFFICE FAX 852-834-5612

04-22-90 MASTER

Rec'd 3/12/90

Fax To: Bill McDaniel — Page 1 of 5

Location: Amersham Corp. - Burlington — Date 12/3/90

Form: Tony Lawson/Sam Lau — Fax Msg. # APL0312-05

Copies To: Phil Douglas/C. Manuele/Guy Hawking/L. Sheff/ C. Roughan/Kevin Pritchard

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Attached just received. Note it managed to make the Korean press.

NDI have responded. I believe there will be a major overhaul of the local regulations in Korea now.

I will be in U.K. next week and will discuss with G.H. and K.P.

Plse advise Sam if you require further information - I believe the USA Embassy have been involved as well.

Question! How many distributors check container insides with a wipe test?

Rgds
Tony Maggie (PP)

NU
COORDINATION
98-1, Hannam-Dong, Yongsan-Ku
SEOUL, KOREA
TEL : (02)796-8425
FAX : (02)796-9195

04-022-90

저장실 선량기록부

장 소	저 장 실	1990년 1월 20일 토 요일

1 측정기기 (SURVEYMETER)

(1) 제작회사명 : Dosimeter Corp. (2) MODEL NO. EH 40 F6

(3) 측 정 방법 : _____ (4) CALIBRATION DATE : 89.12.8

2 정기적인 선량율

장소 \ 위치	정면MRem/hr	우면 MRem/hr	좌면 MRem/hr	뒷면 MRem/hr	상면 MRem/hr
저장암 (I) 표면	0.5				
저장암 (I) 표면 /m					
저장암 (II) 표면					
저장암 (II) 표면 /m					
메기암 표면					
메기암 표면 /m					
저장실	0.03				

3 방사선 위험표시판 부착여부

장소 \ 위치	부 착	주 위	장소 \ 위치	부 착	주 위
저 장 암 I	✓	전 면	메 기 암		
저 장 암 II	✓	전 면	저장실주위	출입문	

4 비 고 한국공업 엔지니어링 50 X 1 Container 반송 14 ea
고려공업 검사 50 X 1 매월 1/22 선량 check o/c

측정자	김 기 양	확인자	김 기 양

04-022901

작년 예산黑字 3조1천억

歲入 25조에 歲出 21조 집계

루마니아와 곧 修交교섭

印,파키스탄에 對中·蘇수교협조 요청도

未成年者 연령 단연 재조정

이상점 피해보상제도 마련

合算稅率 최

지방토지稅法 政府案대로

CORPORATION
Hanwoong Bldg., 166-8, Poi-Dong, Gangnam-Gu,
Seoul, Korea
TEL:(02)574-3697~8 FAX:(02)572-8195

04-02290

FAX TRANSMISSION

FAX MSG NO: 90060

DATE: 12 MAR, 1990

TO: Amersham HK Office

ATTN: Tony Lawson / Sam Lau

FROM: K. Y. Kim

I apologize to you for this incident.
MOST, Atomic Safety Center, we and our customer had a meeting at MOST Office.
We had nothing special at the meeting but listening the process of container return. They will be coming for investingation tomorrow.
Followings are answers to your questions.

1. A.D.D.R. means address.
2. There is no reason not to return spent source.
   It is just usual practice. Spent sources are kept in lead container by the users.
3. Name of customer.
   Korea Industrial Testing Co., Ltd.
4. One of the employee of the above company.
   They had used this container as temporary disposal and forgot to take the spent source out.
5. When we handed over container to the forwarder, generally source tube cap is screwed into the source tube. But we are not sure whether it is screwed tightly or not.
6. We NDI put the seal wire prior to handing over to the forwarder.
7. What is blue Q.C. tag?
   What is the source lodge?
8. We normally do survey prior to handing over to the forwarder.

Could you give us full account of this incident in detail?

RGDS,
K. Y. Kim

04-022907F

경도왕업(주)
KYUNG DO ENTERPRISE LTD.
683-31, YOKSAM-DONG, KANGNAM-KU
C.P.O BOX 8183 SEOUL KOREA
TEL (02)555-8181 FAX (02)555-3171

FACSIMILE MESSAGE

DATE March 12, 1990 FAX REF NO KD 057

FOR THE ATTENTION OF: Dr Tony Lawson

Amersham

SENDER: Ja Ho Koo

Dear Dr Tony Lawson

Following copy of newspaper dated on March 11 on Cho Sun Ilbo regarding radioactive incident.

RADIOACTIVE MATERIALS WERE FOUND AT THE CARGO OF KOREAN SHIP.

- United authorities investigates the route

USA authorities announced that they are in pursuit of the route becauae unshielded radioactive materials was found at the cargo of liner shipment which shipped from Korea to the one of Industrial Radioactive Supplier (manufacturer) in USA.
A spokesman of Nucleus Supervision Committee located in King of Prussia, Pennsylvania, announced that materials was proved as Iridium 192 and was held in wooden box with the consignee is Amersham in Burlington, USA.

Regards,

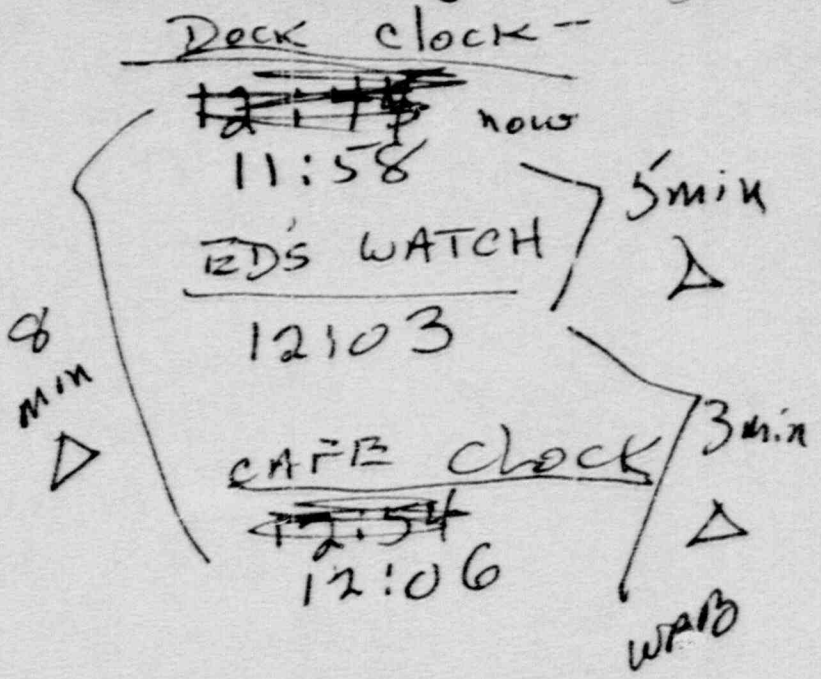
Koo Ja Ho

Ja Ho Koo

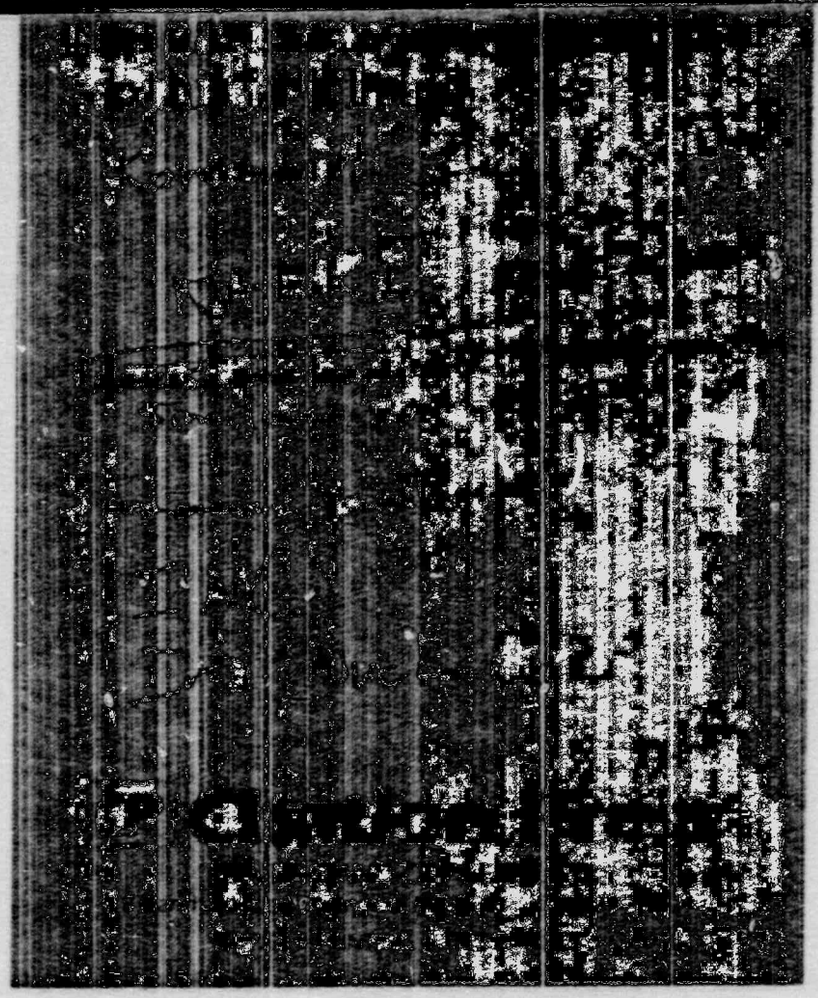
MASTER
04-23-90

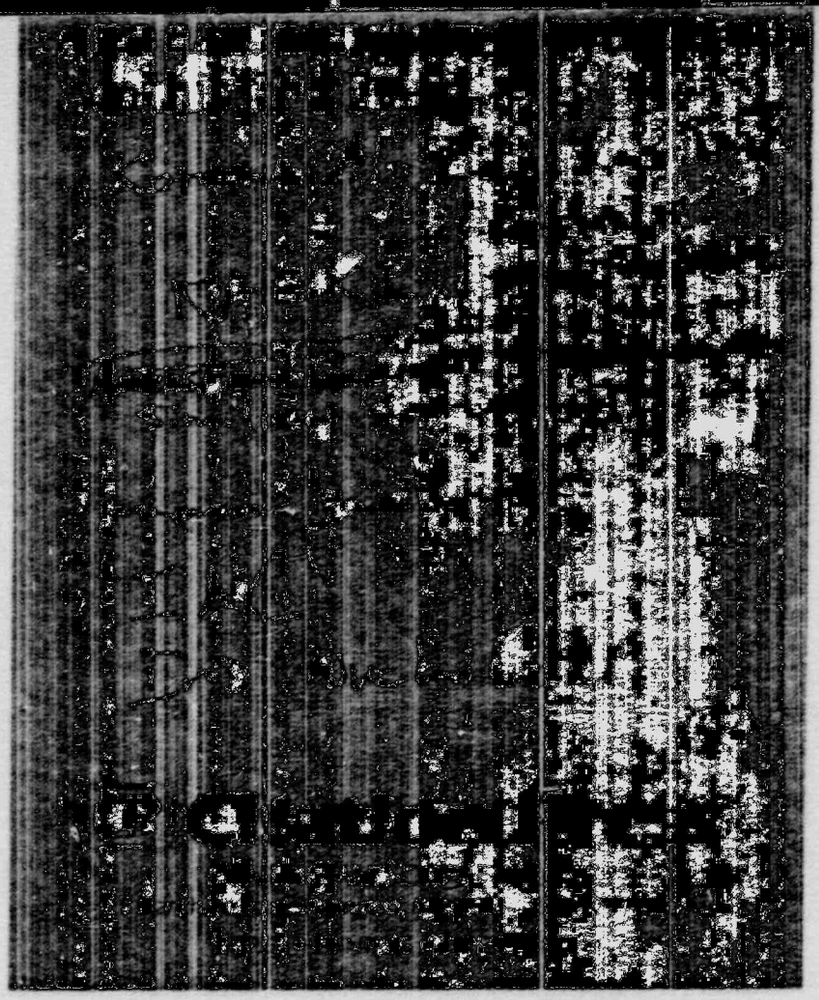
It's hard to believe grown-ups do this for a living.

3/12/90



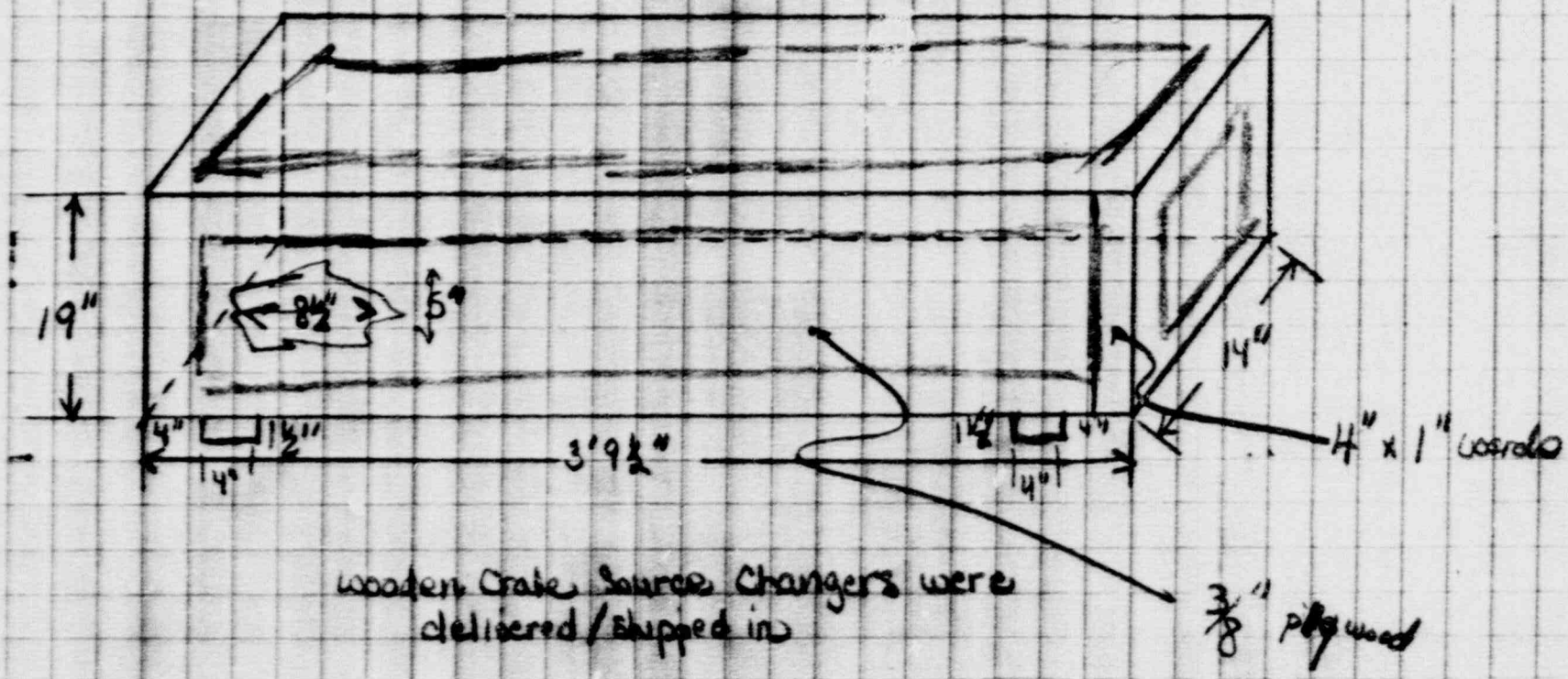
04-23-90
MASTER





04-23-90
MASTER

MASTER
3/12/90
04-2590



wooden Crate Source Changers were delivered / shipped in