



STATE of NEBRASKA

DEPARTMENT OF HEALTH  
DIVISION OF RADIOLOGICAL HEALTH  
301 CENTENNIAL MALL SOUTH (3rd FLOOR)  
P.O. BOX 95007  
LINCOLN, NEBRASKA 68509  
(402) 471-2168

December 5, 1980

Joel O. Lubenau  
Acting Assistant Director  
for State Agreements Program  
Office of State Programs  
U. S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Joel:

Enclosed are copies of the reports from Becton-Dickinson and AECL concerning the incident at Becton-Dickinson on October 24, 1980. As was noted on the phone there were no injuries or over-exposures. The plant was out of operation for four days and have not experienced any further problems with their source rack since that time.

If you have any questions please contact me.

Sincerely,

A handwritten signature in cursive script that reads "Kenneth E. Steele".

Kenneth E. Steele  
Radiological Health Specialist  
Division of Radiological Health

KES/jkb

Encl.

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8104130421

**BECTON  
DICKINSON**

RECEIVED  
DEPARTMENT OF HEALTH

November 5, 1980

NOV 06 1980

DIVISION  
RADIOLOGICAL HEALTH

State of Nebraska  
Department of Health  
Division of Radiological Health  
301 Centennial Mall South  
P. O. Box 95007  
Lincoln, Nebraska 68509

Attn: H. Ellis Simmons, Director

Dear Mr. Simmons:

At 11:50 A. M. October 24, 1980, we manually shut our irradiator off in order to be able to go inside to make a machine check. Our audible alarm started ringing, indicating the source was traveling. In a matter of seconds the source rack fault indicator light came on which indicates that the source rack had not completed its travel in the pre-determined amount of time. After waiting two or three minutes longer, the audible alarm continued to ring indicating that the source rack was stuck in the raised position.

As a means of checking to determine if the source was indeed stuck in the raised position, we checked the operation of the L-118 entry monitor. It would not work since the source wasn't completely down. We then went to the roof to check the position of the air operated winch that raises and lowers the source rack. The position of the winch also indicated that the source was stuck. We also surveyed the roof source hoist building with our survey meter and found that there was a small radiation field around the source rack cable.

At approximately 1 P. M. we called Atomic Energy of Canada and spoke with Eric Counow. He advised that we run an auxiliary air line to the winch, and repipe it so we could manually raise the source rack up to its full raised position. He then wanted us to relieve the air pressure to let the source rack go back down. It was thought that by doing this, whatever might be holding the source rack would fall out of the way and allow the rack to return to the pool. After several attempts at this, and no progress being made, AECL was called back. They then decided to send two people down to trouble shoot the problem. At all times someone remained in the area to constantly monitor the situation.

**B-D**

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**BECTON  
DICKINSON**

Page Two  
H. Ellis Simmons  
November 5, 1980

At approximately 9 P. M. that evening, we noticed that smoke was coming out of the maze conveyor entrance. We assumed that due to the intense heat put out by the cobalt and the drying factor involved, that the cardboard cases of product had started to smolder. At 10:40 P. M., a sprinkler head inside the cell fused sounding our fire alarm and put the fire out. On two other occasions between then and 1:30 P. M. October 25 we turned the water back on to put out other fires. We continually monitored the area and the D. I. water loop for any radioactivity. Nothing was noted.

At 1 P. M. October 25 Eric Counow and Dick McKinnon of AECL arrived in Broken Bow. They attempted to lower the source by the same means they had told us to try. On their second attempt, the source rack went down into the pool. When we entered the cell, we discovered that three product tote boxes had the corners bent out and had evidently been holding the source rack up. There were also four product tote boxes in which the product had burned. The pool was black from the fire and also the dirty sprinkler water.

After fourteen hours of recirculating the pool water through a filtering system, the pool was clean enough to examine the source pencils for any damage. AECL personnel used a telescope and underwater light to examine the individual pencils for damage. There was no apparent damage to the source pencils. They also took a water sample and performed a wipe test on the source. They took these samples back to Canada with them to have them analyzed. A copy of these results will be sent to you when they are available. After examination of the source and removal of the bent totes, AECL raised and lowered the source rack several times to check for any mechanical problems.

Since there was some fire related damage to the source pass conveyors themselves, we did not begin operation until 2 P. M. October 28. We also cut six inches off the top of all our product tote boxes to eliminate the split corners. This should eliminate the possibility of any further bent corners.

AECL advised me today (October 30, 1980) that they were coming back to Broken Bow the week of November 3 to remove a dummy pencil from the source rack. They will remove one from the area of the fire and do metallurgy tests on it to see if the fire might have been hot enough to do damage to the active pencils. We will request a written report of the results, and will forward a copy to you.

**E-D**

Becton Dickinson VACUTAINER Systems  
P.O. Box 686  
Broken Bow, Nebraska 68822

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**BECTON  
DICKINSON**

Page Three  
H. Ellis Simmons  
November 5, 1980

If you have any further questions, please contact me.

Regards,

Becton Dickinson VACUTAINER Systems  
P. O. Box 686  
Broken Bow, Nebraska 68822

*Terry D. Beckenhauer*

Terry D. Beckenhauer  
Sterilization Supervisor

cc: D. J. Siefken

me

BD

Atomic Energy  
of Canada Limited

L'Energie Atomique  
du Canada, Limitee

Commercial Products

Produits Commerciaux

P.O. Box 6300  
Ottawa, Canada  
K2A 3W3

C.P. 6300  
Ottawa, Canada  
K2A 3W3

Tel. (613) 992-2790  
Telex 053-4162

FILE: Q2.9.2  
QA80-11-292

1980 November 12

Mr. Ellis H. Simmons,  
Director,  
Division of Radiological Health,  
Department of Health,  
301 Centennial Mall, South,  
P.O. Box 95007,  
Lincoln, Nebraska, 68509.

RECEIVED  
DEPARTMENT OF HEALTH

NOV 14 1980

DIVISION  
RADIOLOGICAL HEALTH

Dear Mr. Simmons:

- EMERGENCY SERVICE REPORT -  
AECL-CP TYPE IR 96 CATEGORY IV IRRADIATOR  
BECTON DICKINSON, BROKEN BOW, NEBRASKA

This is further to our telecon of Saturday, 25 October, 1980, in which we notified you of our intent to perform emergent service on the subject irradiator.

We are pleased to attach a copy of our service report for your examination.

In summary, our service personnel discovered that the radiation source rack had become lodged against damaged product tote boxes, all machine safety interlocks functioned properly, there was no radiation hazard at any time, and the source was returned to the fully shielded position by our service personnel within 20 minutes of their arrival at the site. Normal plant operations were resumed on 29 October, 1980.

The cause of the source jam has been established as being the use of severely damaged totes. The Licensee has been advised that under no circumstances should he continue to run the plant in this manner.

We trust this report is satisfactory. If we can be of further assistance to you in this regard please contact the writer at your convenience.

Yours sincerely,

*E.F. Ridout*

E.F. Ridout  
Manager  
Regulatory Affairs  
Quality Assurance

/sd  
enclosure

c.c. R.G. McKinnon  
E.K. Curnow

REPORT ON SOURCE JAM ATB-D, BROKEN BOW

On Friday, October 24, 1980 at approximately 2:00 p.m. we received a phone call from Terry Beckenhauer informing us that his source rack would not go down to the storage position.

During our initial discussion, Terry explained that his totes were in poor condition, having splits on the top corners of four to six inches in length.

We speculated that a box side could have bent when cross transferring. This could get into the path of the source rack and cause it to jam.

At approximately 3:00 p.m. we called Terry and asked him to apply air directly to the source hoists which would raise it to the fully up position and then release the air at a controlled rate. We had hoped this would release the obstruction and allow the source to go down.

At approximately 4:30 p.m. Terry called again to say that this had been attempted and was unsuccessful. We told him that someone from AECL would be on site as soon as possible.

Eric Curnow and Dick McKinnon travelled that evening, spending the night in Toronto. Terry Beckenhauer met us at Broken Bow on Saturday, October 25, 1980 at approximately 12:45 p.m. and informed us that they had a fire in the irradiation cell at approximately 9:00 p.m. the previous night.

We arrived on site about 1:10 p.m. and thick smoke was still coming from the cell. We took the following action:

1. Ensured that the ventilation fan was off.
2. Surveyed the carbon and resin beds with the Berthold Rato F survey meter.
3. Surveyed the air filter housing with the Berthold Rato F survey meter.
4. Had the water sprinkler turned on to soak the product.
5. Went on to the roof and applied air pressure directly to the source hoists, then released it directly to atmosphere by opening the speed controls in the exhaust line.

The rack did not go down at first attempt but on the second attempt, the rack kept going down and the exhaust air was choked to allow a smooth descent. This was approximately 1:30 p.m. on Saturday, October 25, 1980.

The maze door was then opened and the ventilation fan started in order to clear the smoke.

A constant check was kept on the deionizer beds and the air filter by surveying at regular intervals with the Berthold Rato F survey meter.

The readings were negative at all times. Within a half hour after the source was lowered, we managed to get into the cell. The pool was black in colour and it had overflowed. Several totes were still smoking but the damage to the machine did not appear to be too bad. Our main problem was the clarity of the water. We asked the customer to get a diatomaceous earth filter and circulate the pool water through it. This was obtained quite quickly and circulation started at approximately 4:30 a.m. Sunday, October 26, 1980.

The smouldering totes were quenched with water and an inspection was made to determine the cause of the jam.

Most of the totes on the machine had splits in the corners. The splits ran from the open top down the corner between four and six inches in length. The sides on some of these totes had been peeled open as shown in the attached photographs so that the corner could protrude into the central space occupied by the source rack. The source rack had been held by three totes on an inside pass on the upper level (Figures 1 and 2) and by one on an inside pass on the lower level (Figure 3). The marks left by the rack could be seen on the flaps on all four totes.

The flaps presumably had got peeled open during a cross transfer at the end of a pass where one box slides against another.

The only damage to the source pass mechanism was that some rollers under the hottest tote had sagged due to heat (Figure 3).

The hottest tote was in a position that the sprinkler water did not reach and this tote had a couple of holes burned in the side (Figure 4).

This side was an interface between two smouldering boxes.

At about 5:00 p.m. on Sunday the water was clear enough to visually inspect the source rack and pencils. This was done by putting a light in the pool and using a telescope clamped to the handrail.

There was no damage evident on either the rack or the pencils.



We advised the customer that under no circumstances could he run the plant with split totes and that as a temporary measure, he could cut the top six inches off each tote and as long as there were no splits remaining, he could run with cut-down totes. They were advised to replace the totes with new totes of minimum 12 gauge (.081 inch) aluminum 5052-H34.

Mike Wahl asked about a method to detect split totes on the machine. I advised that his loading personnel should be instructed to remove any split totes from the machine and have them repaired before using again. This would be the most positive method of detection.

A sample of the pool water was returned to AECL for analysis and this showed no detectable contamination. A wipe test was taken across all of the source pencils. The results of the leak test was negative when read with the Berthold Rato F meter. This was verified by our Quality Assurance department and a copy of this certificate is enclosed.

After discussions with our capsule engineers and metallurgist, it was decided to remove a dummy pencil from the hottest location in the rack and return it to AECL for metallurgical examination. An active pencil may be returned at the next source replenishment depending on the results of the dummy pencil analysis.

The action taken by B-D personnel was correct in the circumstances. They called AECL immediately and called the Nebraska Licensing Authority. They attempted to free the jam according to instructions by AECL.

They let the sprinkler system run periodically to keep the fire under control until AECL personnel arrived on site.

Conclusion:

1. B-D personnel acted correctly in the circumstances.
2. The jam was caused by damaged totes.
3. Damaged totes should never be allowed to enter the irradiation cell.
4. The sprinkler system minimized damage to the machine.
5. The source rack and pencils appeared to be undamaged.
6. A dummy pencil will be returned immediately to AECL for metallurgical examination.
7. An active pencil may be returned for examination at the next replenishment.
8. The machine safety interlocks functioned properly and there was never a radiation hazard to personnel.

E. Curnow

R.G. McKinnon

1980 November 7

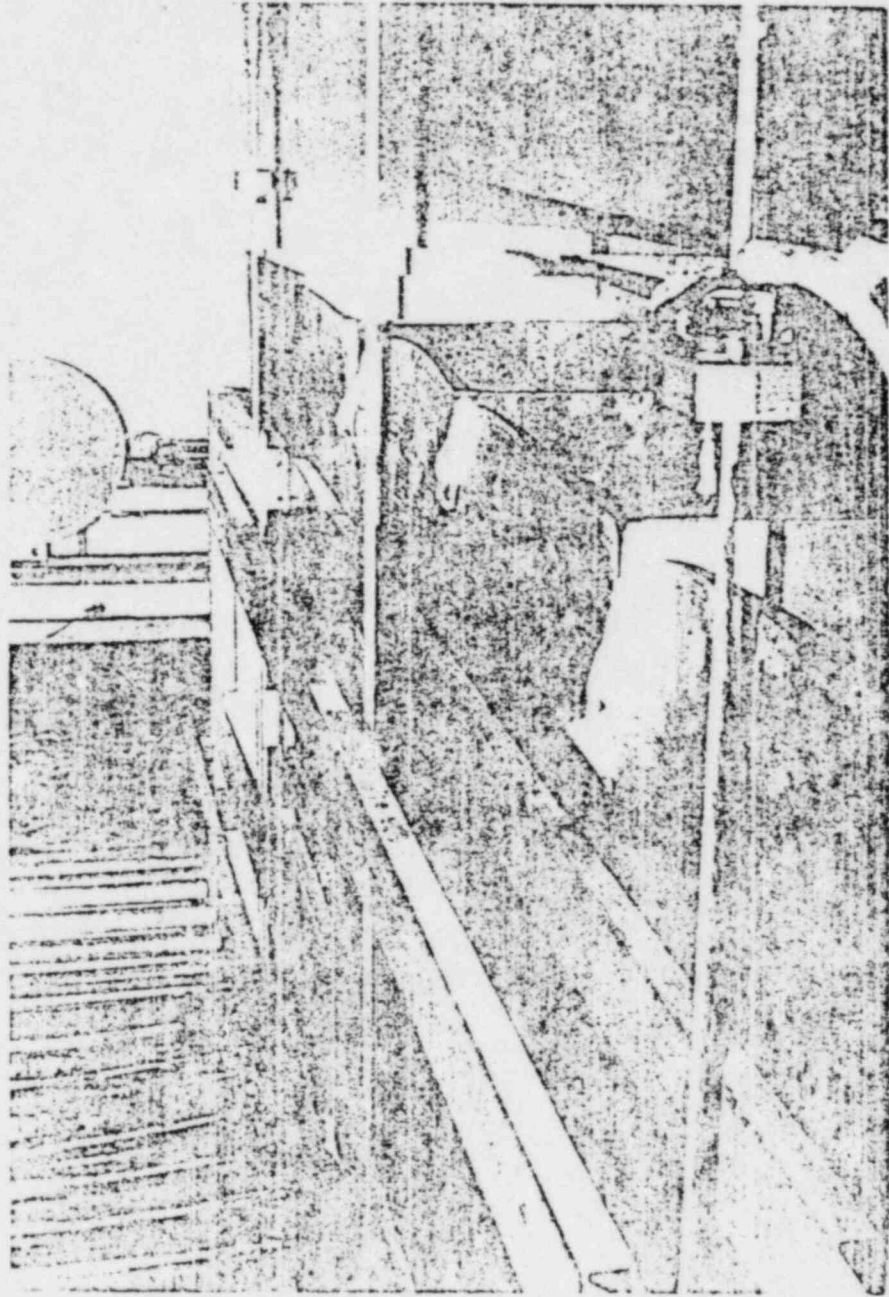


FIGURE 1



FIGURE 2

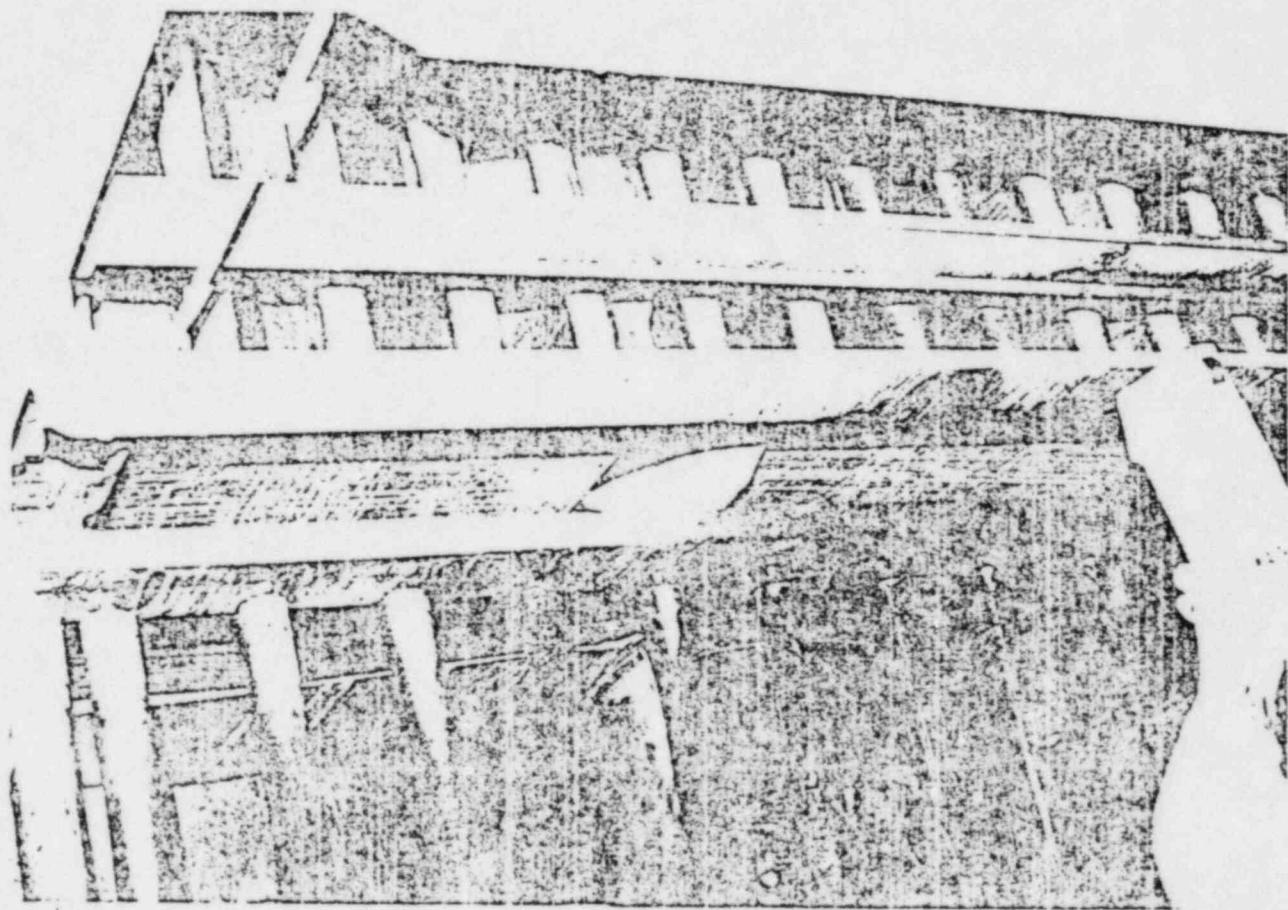


FIGURE 3

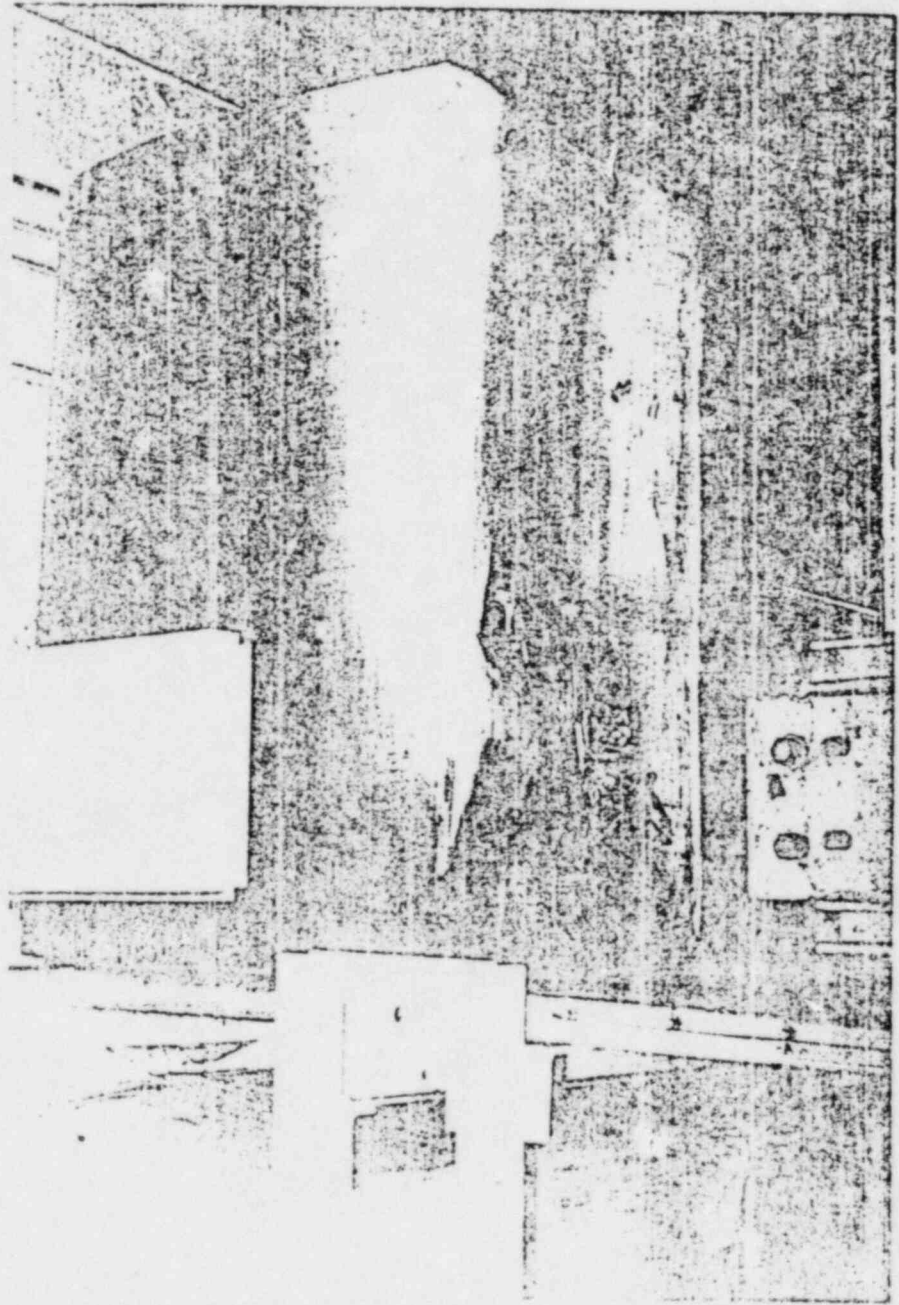


FIGURE 4

REPORT OF ROUTINE WIPE TEST FOR CONTAMINATION

P&S 41452

IMPORTANT:

Sources shall be tested for leakage at intervals not to exceed six months. Records of test results shall be kept in units of microcuries and maintained for inspection by the appropriate Licensing Authority.

CUSTOMER LOCATION:

B-D COMPANY  
BROKEN BOW, NEBRASKA

MODEL & SERIAL NO. 96

DATE OF TEST(S): 80-10-26

DESCRIPTION OF SOURCE(S) TESTED:

Source in Rack   
Drawer hole   
Collimator

for <sup>60</sup>Co  , <sup>137</sup>Cs  , <sup>238</sup>U

Survey Meter Used: Berthold RATO/F

Serial No. 506750

Instrument Sensitivity: 

	A	B	
400 c/min	= 0.05	µCi	<sup>60</sup> Co <input checked="" type="checkbox"/>
1000 c/min	= 0.05	µCi	<sup>137</sup> Cs <input type="checkbox"/>
140 c/min	= 0.005	µCi	<sup>238</sup> U <input type="checkbox"/>

Calibration Date: 80-10-7

FOR UNIT HISTORY

Leak Test(s) Performed:

- 1. Routine wipe contamination test as detailed in the Facility Instruction and Maintenance Manual or Field Service Instructions.
- 2. Other test(s) as described on reverse side.

Gross Wipe Reading = 20 c/min  
Background Reading = 20 c/min

Net Wipe Reading = 0 c/min x (B)  $\frac{0.05 \text{ } \mu\text{Ci}}{400 \text{ c/min}}$  = 0 µCi

Test Evaluation:

- 1. NEGATIVE - Test showed less than reportable limit.
- 2. POSITIVE - Readings and initial corrective action to be detailed on reverse side.

It is hereby certified that the test(s) indicated above have been carried out under the supervision of the undersigned.  
Conversion to S.I. Radiological Units 0.35 µCi = 1.85 kBq and 1 mrem = 10 µSv.

Date 80-10-26

Signed E. Lunn  
Title Project Leader

CONTAMINATION REPORT:

The test wipes returned to AECL-CP have been examined and re-measured with BERTHOLD LB-1200 instrument. The instrument efficiency is 1100 cpm per 0.05 $\mu$ Ci  $^{60}\text{Co}$ . The measurement confirmed that the radioactive contamination on the above-mentioned wipes is <0.05 $\mu$ Ci.

INITIAL CORRECTIVE ACTION:

DETAILS OF OTHER TESTS: