

CORRECTED TABLE

License reviewer evaluation of licensee's inventory as a result of NRC inspection on May 2010

Licensee: South Dakota Department of Health

License: 40-11733-02

Docket: 030-37803

Roberto J. Torres – September 2, 2010

Purpose: Inspector Larry Donovan requested assistance from DNMS Branch B to evaluate the licensee's inventory to determine what material is specifically licensed and what material is exempt from licensing requirements.

Liquids – Byproduct Material

Nuclide	Concentration reported by the licensee	Total quantity reported by the licensee	Record available from license	Exempt concentration limit (10 CFR 30.14 and 30.70)	Exempt quantity limit (10 CFR 30.18 and 30.71)	Exempt from licensing requirements?	Specifically licensed material?
Ra-228 [#]	43.22 pCi/ml	12,966 pCi (0.01296 microcuries)	Yes	Not applicable	Not applicable	Ra-228 is not regulated by the NRC	Ra-228 is not regulated by the NRC
Ra-226 [*]	45.15 pCi/ml	13,546 pCi (0.013546 microcuries)	Yes	Not listed as having an exempt concentration	0.1 microcurie	No	Yes, not listed as exempt concentration
Sr-90	29.7 pCi/ml	29,700 pCi (0.0297 microcuries)	Yes	Not listed as having an exempt concentration	0.1 microcurie	No	Yes, not listed as exempt concentration
Cs-137	95.7 pCi/ml	8,613 pCi (0.008613 microcuries)	No	Not listed as having an exempt concentration	10 microcuries	No	Yes, not listed as exempt concentration
Am-241	25.39 pCi/ml	17,773 pCi (0.017773 microcuries)	Yes	Not listed as having an exempt concentration	Not applicable	No	Yes, not listed as exempt concentration
Ra-228 [#]	4.00 pCi/ml	560 pCi (0.00056 microcuries)	Yes	Not applicable	Not applicable	Ra-228 is not regulated by the NRC	Ra-228 is not regulated by the NRC
Sr-90	2.00 pCi/ml	460 pCi (0.00046 microcuries)	Yes	Not listed as having an exempt concentration	0.1 microcurie	No	Yes, not listed as exempt concentration

[#] Ra-228 is naturally occurring radioactive material (NORM) that does not meet the definition of byproduct material in 10 CFR 30.4(3).

^{*} Ra-226 meets the definition of byproduct material in a discrete source as described in 10 CFR 30.4.

Liquids – Source Material

Nuclide	Concentration reported by the licensee	Total quantity reported by the licensee	Record available from licensee	Unimportant quantities of source material, exemption limit (10 CFR 40.13)	Exempt from licensing requirements?	Specifically licensed material?
Th-230	150 pCi/ml	150 pCi (0.00015 microcuries)	Yes	Yes	Yes	No

Specific activity of Th-230 is 0.020 Ci/g
 (150 x E-12 Ci/ml) (ml/0.020 Ci) (100) = 7.5 x E-7 % by weight

The Th-230 concentration is an unimportant quantity as per 10 CFR 40.13.

Sealed Sources – Byproduct Material

Nuclide	Concentration reported by the licensee	Total quantity reported by the licensee	Record available from licensee	Exempt concentration limit (10 CFR 30.14 and 30.70)	Exempt quantity limit (10 CFR 30.18 and 30.71)	Exempt from licensing requirements?	Specifically licensed material?
Co-57	Not applicable	1.17 microcuries	Yes	Not applicable	100 microcuries	Yes	No
Cd-109	Not applicable	9.5 microcuries	Yes	Not applicable	10 microcuries	Yes	No
Mn-54	Not applicable	0.96 microcuries	Yes	Not applicable	10 microcuries	Yes	No
Na-22	Not applicable	1.16 microcuries	Yes	Not applicable	10 microcuries	Yes	No
Ba-133	Not applicable	1.13 microcuries	Yes	Not applicable	10 microcuries	Yes	No
Cs-137	Not applicable	1.04 microcuries	Yes	Not applicable	10 microcuries	Yes	No
Cs-137	Not applicable	8 microcuries	No	Not applicable	10 microcuries	Yes	No
Sr-90	Not applicable	0.0207 microcuries	Yes	Not applicable	0.1 microcuries	Yes	No

Sealed Sources – Source Material

Nuclide	Concentration reported by the licensee	Total quantity reported by the licensee	Record available from licensee	Unimportant quantities of source material, exemption limit (10 CFR 40.13)	Exempt from licensing requirements?	Specifically licensed material?
Th-230	Not applicable	15,600 dpm (0.00702 microcuries)	No	No information was provided by the licensee to make a determination whether material is exempted or not	Most likely yes but no documentation to support it	Will have to be listed in the license because of lack of documentation to prove otherwise
Nat U	Not applicable	No data provided by the licensee	No	No information was provided by the licensee to make a determination whether material is exempted or not	Most likely yes but no documentation to support it	Will have to be listed in the license because of lack of documentation to prove otherwise

1 microcuries = 2.22×10^6 dpm = 2,220,000 dpm

To determine instrument efficiency:
 (gross cpm – background cpm)/activity = instrument efficiency

To convert cpm to microcuries:
 Gross cpm – background cpm = net cpm
 Net cpm/instrument efficiency = dpm
 dpm/ 2.22×10^6 = microcuries

Plated Sources – Byproduct Material

Nuclide	Concentration reported by the licensee	Total quantity reported by the licensee	Record available from licensee	Exempt concentration limit (10 CFR 30.14 and 30.70)	Exempt quantity limit (10 CFR 30.18 and 30.71)	Exempt from licensing requirements?	Specifically licensed material?
C-14	Not applicable	13,154.8 cpm (licensee needs to convert to microcuries)	No	Not applicable	100 microcuries	No data was provided to make a determination	Will have to be listed in the license because of lack of documentation to prove otherwise
Sr-90 / Y-90	Not applicable	29,800 dpm (0.01346 microcuries)	Yes	Not applicable	0.1 microcuries	No	Will have to be listed in the license because of lack of documentation to prove otherwise
Am-241	Not applicable	1,668 x E3 Bq (45.081 microcuries)	Yes	Not applicable	Not listed as having an exempt quantity	No	Yes
Ra D+E (Ra-226 D+E)	Not applicable	No data provided by the licensee	No	Not applicable	Pb-210 = 0.1 uCi Bi-210 = 1 uCi	No data was provided to make a determination	Will have to be listed in the license because of lack of documentation to prove otherwise

Ra D+E meets the definition of byproduct material in a discrete source as described in 10 CFR 30.4.

Radium D = Pb-210 (beta/gamma emitter, 22.26 years half life)

Radium E = Bi-210 (beta emitter, 5.013 days half life)

Torres, RobertoJ

From: Stacy.Ellwanger@state.sd.us
Sent: Tuesday, August 17, 2010 11:51 AM
To: Torres, RobertoJ
Cc: Donovan, Larry
Subject: NRC4
Attachments: NRC4.doc

Please let me know what else I need to do.

Thanks

Stacy Ellwanger

In response to NRC email from 7/21/10.

Liquids

Our records indicate the Sr-90 (29.7 pCi/ml and a total of 29.7 nCi) was received 6/96. The Sr-90 (2pCi/ml for a total of 0.46 nCi) was received 7/09. Just for my information can you tell me why these need a specific license since the total is under the 100 nanocuries on Schedule B. I will then have it in my records for future NRC audits.

Sealed Sources

I'm including a picture from the 5 sources. All we have are the containers the sources are stored in and the serial number on the sources. The Th-230 is the newest of the sources at 7/31/80. The Laboratory Director Mike Smith is sure that all the sources are pre 1981.

The label on the storage box has Th-230 as the isotope with a serial number of 11272 from Eberline. The box label has 15,699 dpm and a date of 7/31/80. We counted the source and received 15,482 for dpm which is 0.007 microcuries. Eberline's staff referred me to their catalog to look at DNS-11. This is the same source as the one we have. They say it hasn't changed.

The Cs-137 is stored in the original envelope which has the serial number of 2949. The source has printed on it: check source CS-7A at approximately 8 uC Cs-137.

The natural uranium has a serial number of 436. We counted the source and used our alpha efficiency for Th-230, we had 0.0077 microcuries. The beta efficiency for Sr 90 was used plus a beta count of the source to calculate the value of 0.011 microcuries. It appears to be a source for checking survey meters that has been here for many years.

Plated Sources

C-14 had a cpm for our instrument of 2578. Canberra gave us a value of 30% efficiency value and special settings on the counter to achieve this efficiency. By using these calculations we come up with 0.004 microcuries.

Radium D + E has a serial number of 5429. We did a beta count and it was 6782. If we use our beta efficiency for Sr-90 than we would have a concentration of 0.00687 microcuries.

As you can see, we have very small levels. Every time we have been audited, these sources have been looked at and did not seem to be a problem. All of these plated and sealed sources are not used anymore by the South Dakota Health Laboratory. The best solution would be to dispose of all 5 of the above sources. We could send the source out to another laboratory and have them calculate for the activity so we have paperwork with the information you would need but since we don't use these it seems like a waste of money. We would like to have this settle for any future audits. Please advise what NRC would find acceptable.

Torres, RobertoJ

From: Stacy.Ellwanger@state.sd.us
Sent: Tuesday, August 17, 2010 12:02 PM
To: Torres, RobertoJ
Cc: Donovan, Larry
Subject: NRC4
Attachments: Cs137b.jpg; R&Da.jpg; Cs137a.jpg; Natural uranium1.jpg; R&D.jpg; natural uranium.jpg; R&D1.jpg; Cs137.jpg; Th230.jpg; Th230a.jpg; C14.jpg; NRC4.doc

Sorry I forgot the pictures.
stacy ellwanger
SDPHL

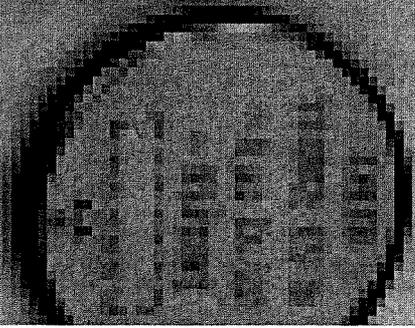
OF 7A CHECK SOURCE ENCLOSED

The subject was not reproducible 1/19/42 1/19/42

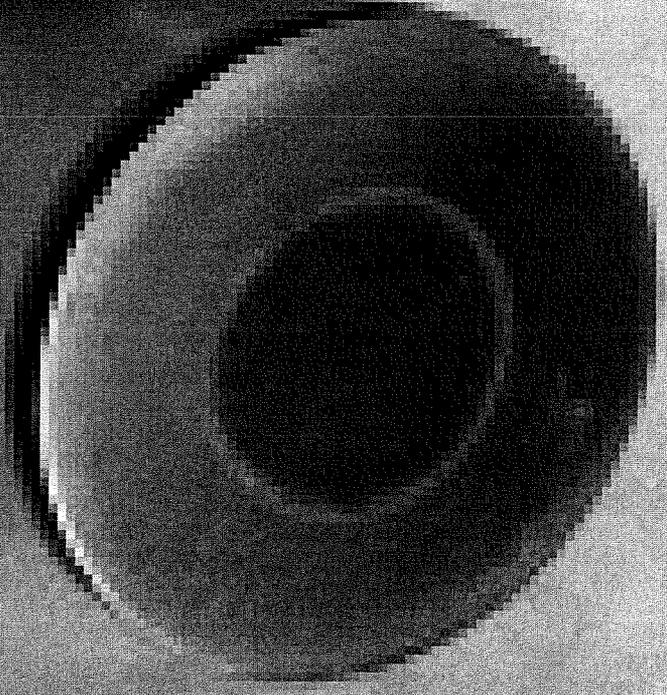
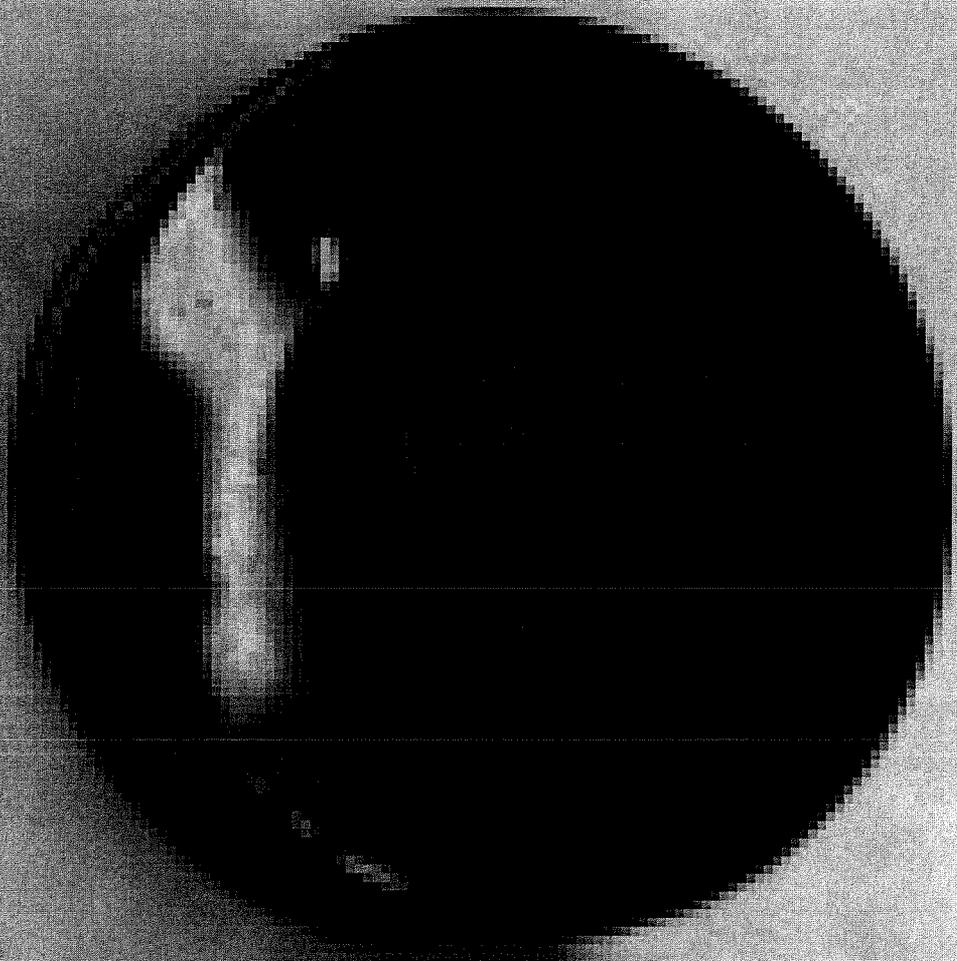
then reproduced on the 1/19/42 and 1/19/42

and 1/19/42

Due to confusion in use and publishing of check source on the
factor, we use my ability a slightly different reading.



→ 8μCi Cs-137



CS 7A CHIEF SOURCE EXCERPTS

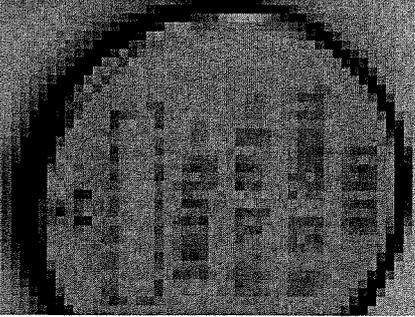
The subject was not apprehended 1/19/68 1/19/68

who happened on the X 1/19 1/19 1/19

and 1/19/68

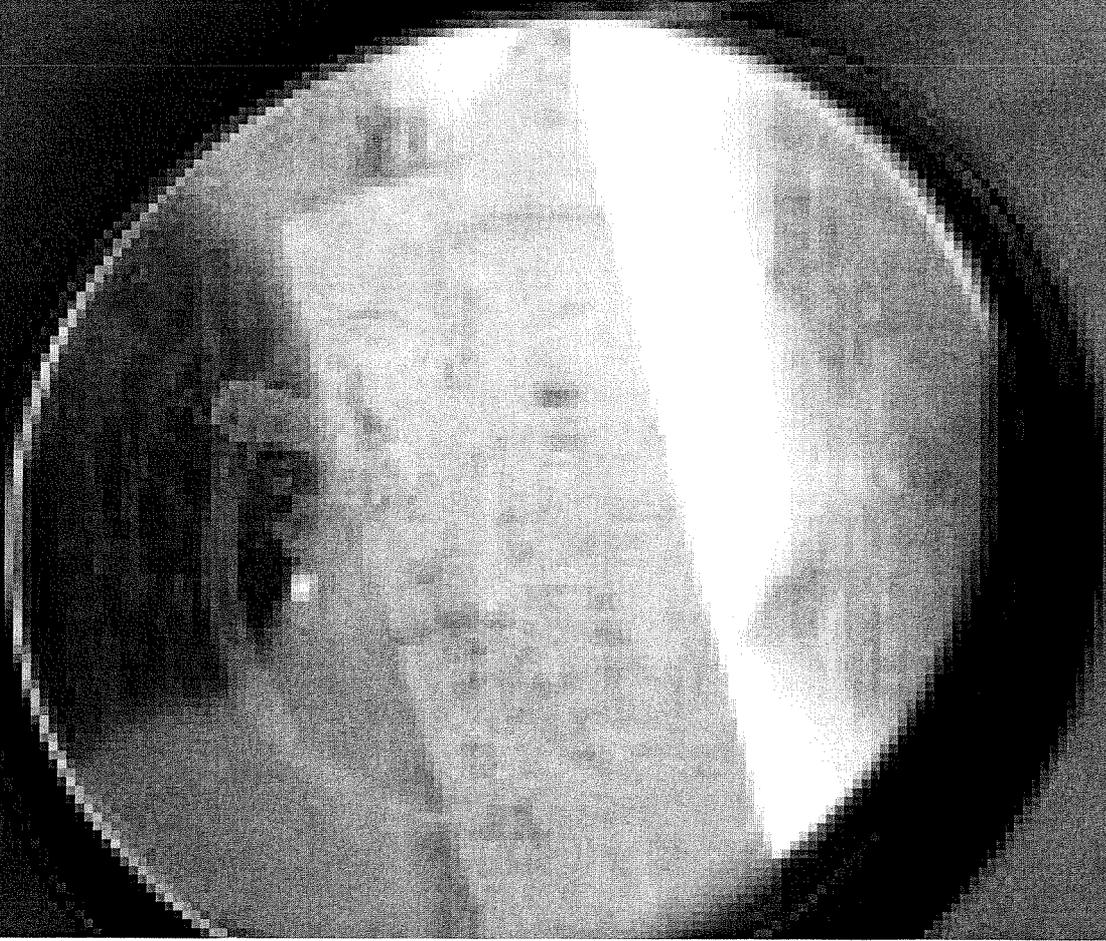
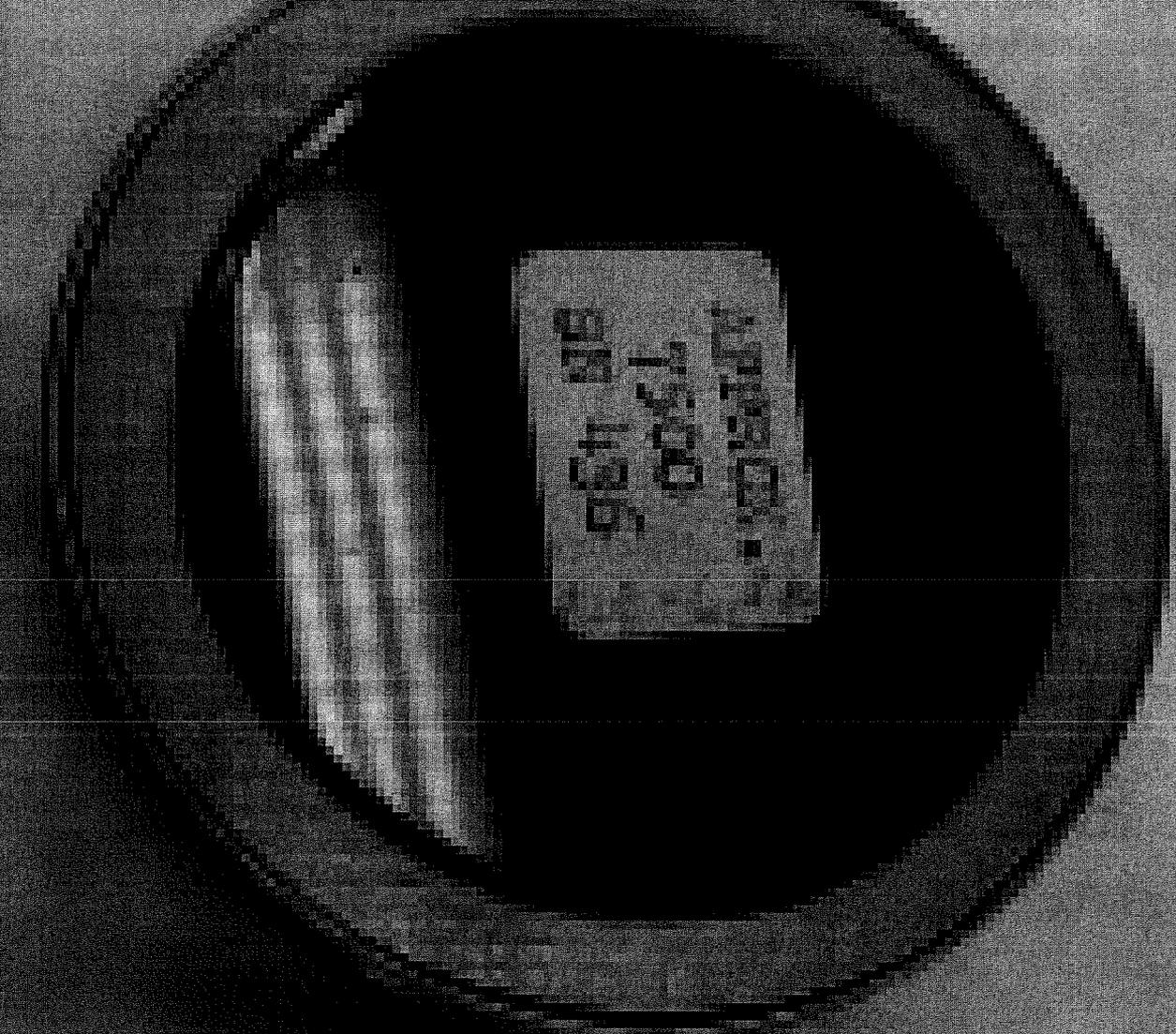
Due to confusion in use and proliferation of check covers on the
fiction web use may include a slightly different reading.

→ 8µCi Cs-137

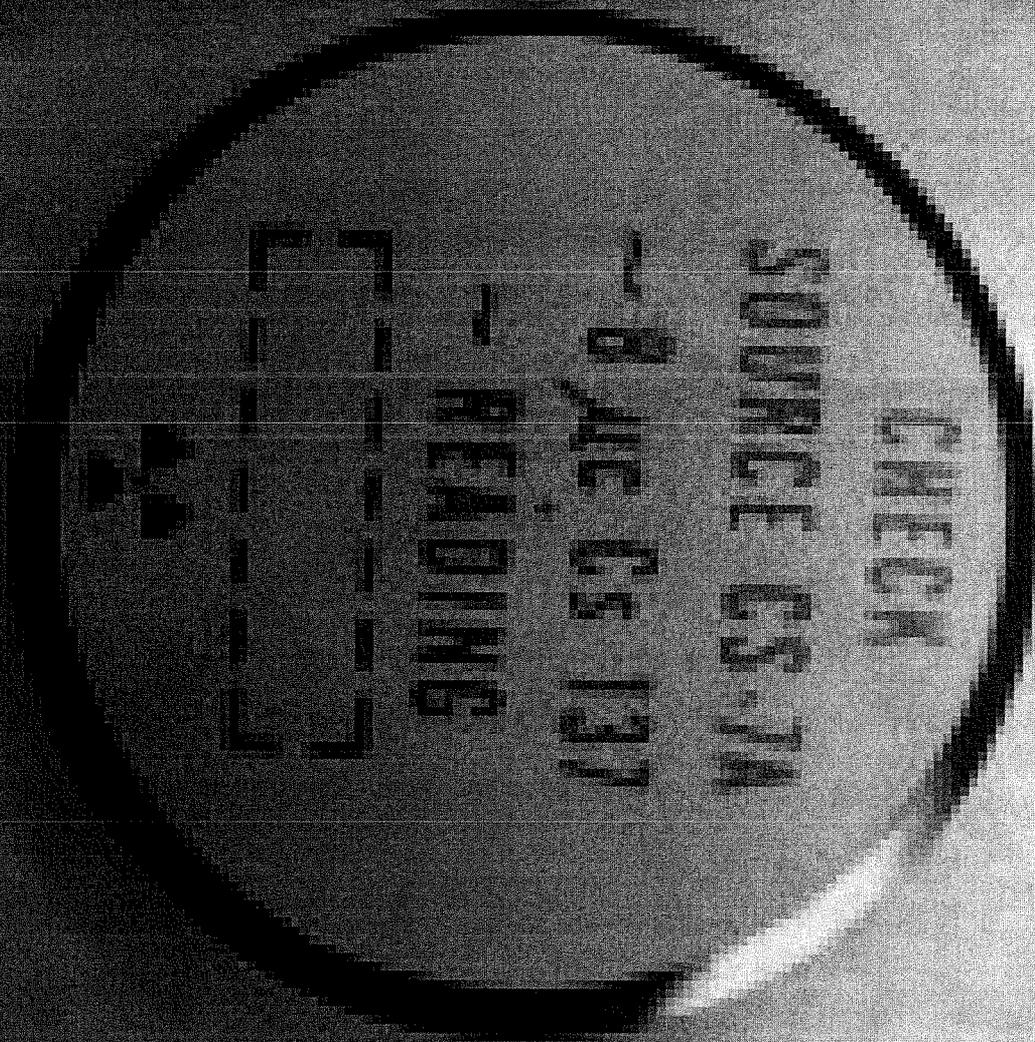


MAY 1. 11 AM
CALIF. to PA 3 39
CALIF. to PA 15:5









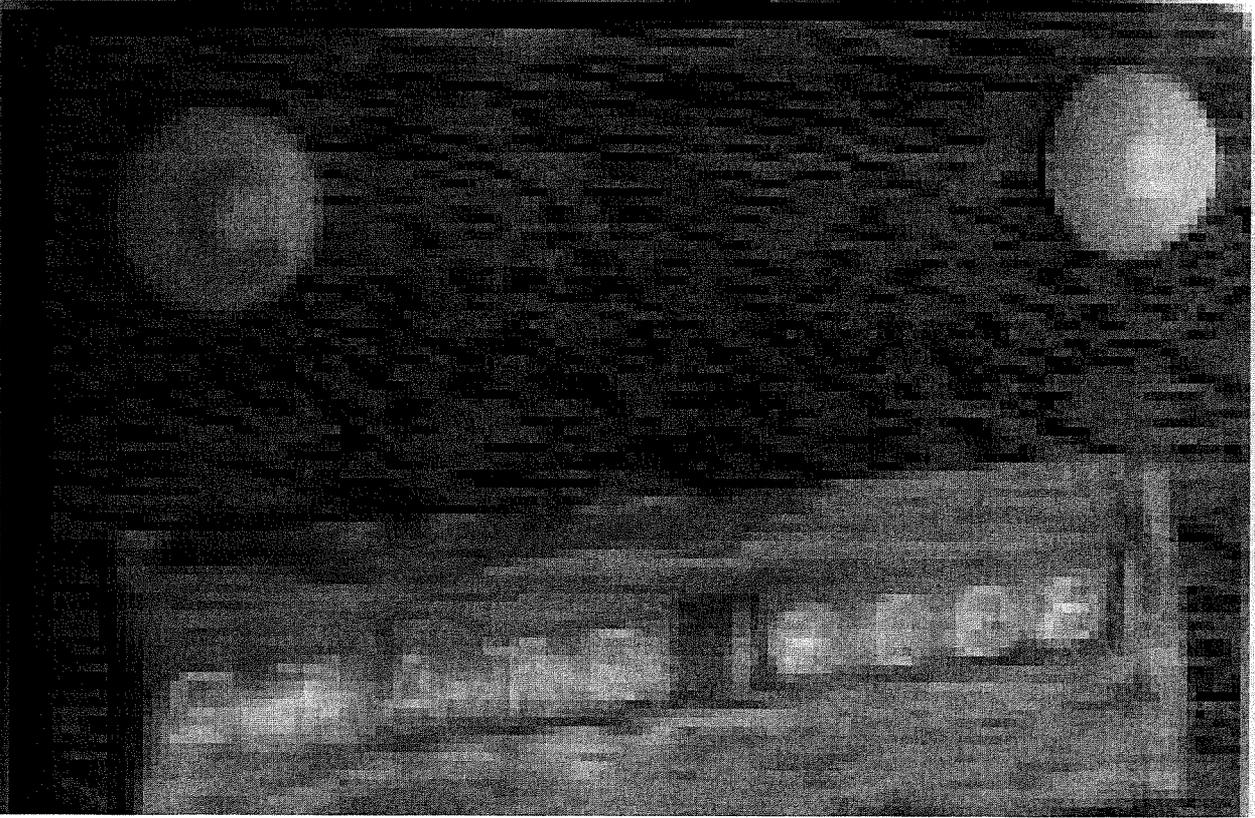
↓
8 Jul 65 137

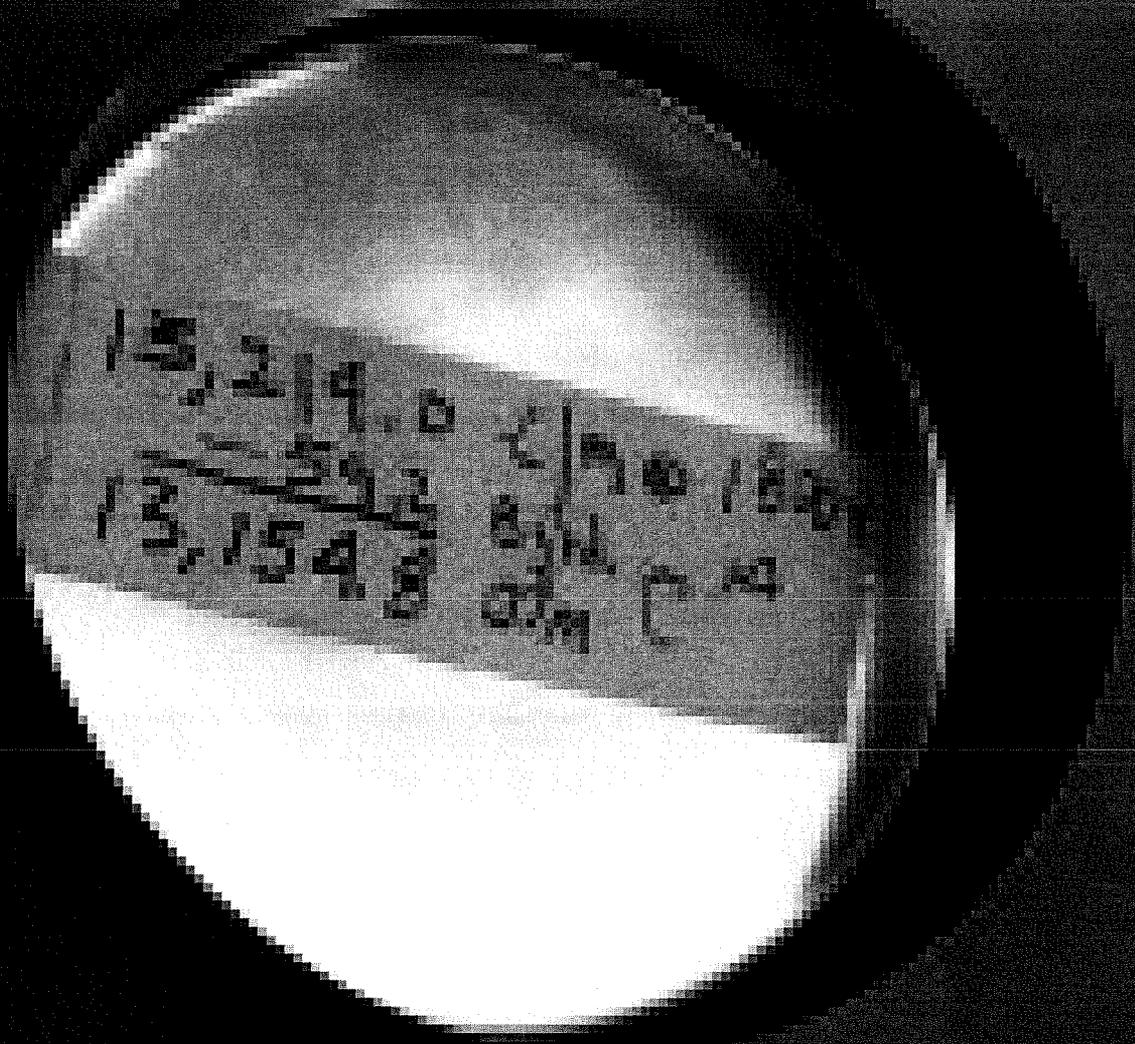
CAUTION
RADIOACTIVE
MATERIAL

ISOTOPE T11-2300
AMOUNT 15,600 QP
DATE 7-31-80

IN 200
SOURCE

MATERIAL
MATERIAL
MATERIAL





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Torres, RobertoJ

From: Donovan, Larry
Sent: Tuesday, August 17, 2010 6:08 PM
To: Stacy.Ellwanger@state.sd.us; Torres, RobertoJ
Subject: RE: NRC4

Stacy:

Roberto and I are in class Tuesday thru Thursday at noon so it may not be until Thursday afternoon that we get back with you. I have the dates that your provided from when you received the material but as far as the licensing issues, Roberto will have to review your response and decide what else he needs. From my cursory review, you need to understand that just because an isotope is less than the schedule B quantities, that does not necessarily mean it is exempt. The source has to be **manufactured and distributed** as an exempt distribution source. Usually, the documentation will tell you this explicitly. If it doesn't, then it is specifically licensed. Also, since you contacted Eberline, you might ask them point blank: Is this source manufactured and distributed as an exempt distribution source, yes or no?

Also, you mentioned that this hadn't come up before in previous inspections. Keep in mind that the NRC conducts *performance based* inspections, not compliance inspections. Therefore, a given inspector from the past will not review everything necessarily but will just observe and ask questions and look at a few select records. It could be you told past inspectors the sources in question were exempt and the inspectors didn't bother to verify it. But after 9/11 the NRC is scrutinizing all radioactive materials that licensees possess and the origins of such material and that is why we need to know about all of your materials from cradle to grave. User accountability for **all** materials is now paramount, more than ever.

Larry

From: Stacy.Ellwanger@state.sd.us [mailto:Stacy.Ellwanger@state.sd.us]
Sent: Tuesday, August 17, 2010 11:51 AM
To: Torres, RobertoJ
Cc: Donovan, Larry
Subject: NRC4

Please let me know what else I need to do.
Thanks
Stacy Ellwanger