



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAY 17 1985

U. S. Department of the Interior
Bureau of Mines
ATTN: Mr. Glenn C. Pritchard, Chief
2401 E. Street, N.W.
Washington, D. C. 20241

Dear Mr. Pritchard:

Based upon the information submitted by your letter dated December 15, 1983, we have concluded that your Coal Slurry Gamma Gauge using both gamma and neutron sources is acceptable for licensing purposes as two custom devices in accordance with the conditions of the attached certificates of registration.

If you should have any questions, please contact me at (301) 427-9026.

Kindest regards,

Sterling W. Bell

Sterling W. Bell
Material Licensing Branch
Division of Fuel Cycle and
Material Safety
Washington, D. C. 20555

Enclosure:
As stated (2)

cc: W. Evans,

Pittsburgh Research Center

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REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICES

NO: NR-590-D-107-S

DATE:

MAY 17 1985

PAGE:

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DEVICE TYPE: Coal Slurry Neutron Gauge

MODEL: N-101

MANUFACTURER/DISTRIBUTOR:

Science Applications, Inc.
10401 Roselle Street
San Diego, CA 92121

SEALED SOURCE MODEL DESIGNATION:

Amersham Corporation
Model CVN-series (Cf-252)

ISOTOPE:

Californium-252

MAXIMUM ACTIVITY:

up to (10.74 millicuries)
(20 micrograms)

LEAK TEST FREQUENCY: 6 months

PRINCIPAL USE: (H) General Neutron Application

CUSTOM DEVICE: X YES

CUSTOM USER:

U.S. Department of the Interior
Bureau of Mines
Pittsburgh Research Center
Cochrans Mill Road
Post Office Box 18070
Pittsburg, PA 15236

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SAFETY EVALUATION OF DEVICE

NO: NR-590-D-107-S

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DEVICE TYPE: Coal Slurry Neutron Gauge

DESCRIPTION:

Each source housing is used in combination with one or more detectors as an industrial process line gauge for liquid-slurry density or level measurement. The source holder is a lead-filled steel housing which is welded to, or integral with, a steel rectangular box. The source is screwed into the lead shield using loc-tite threads and then the shaft is padlocked at the surface of the housing and a manual shutter mechanism is contained in the rectangular box. The sources are manufactured/encapsulated by Amersham Corporation. The Cf-252 neutron source encapsulation is their X.1 capsule. They are rugged industrial sources and are doubly encapsulated in welded stainless steel capsules.

LABELING:

This label includes the name of the manufacturer (Science Applications, Inc.), name of device, type of isotope, the number and strength of each source type, the dated of the last source wipe, and the standard label of radiation sources (which contains the words "CAUTION-RADIOACTIVE MATERIAL"). And the labels are wired to the source holder rods.

DIAGRAM:

See Attachment 1.

CONDITIONS OF NORMAL USE:

The coal density sensor will normally be used in research and industrial environments as part of a device designed to measure slurry density and concentration of coal, rock and water by neutron and gamma activation techniques.

PROTOTYPE TESTING:

The 6" and 18" sensor gauges have been installed and used at the Hydrotransport Research Facility of the Pittsburgh Mining Technology Center since 1982 using online field testing methods with no incident related to radiation safety or failure of containment integrity. The 12" sensor has been tested since March 1984 at the Saskatoon Research Council facility in Canada with the same results.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: NR-590-D-107-S

DATED:

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DEVICE TYPE: Coal Slurry Neutron Gauge

EXTERNAL RADIATION LEVELS:

The manufacturer reported the following dose rates in mRem/hour for 3ug Cf-252 source:

<u>Surface gauge 6" sensor</u>	<u>at 1 ft</u>	<u>at 3 ft</u>
5.0-16.0	1.5-7.0	0.7-1.0

Dose rates in mRem/hour for 20mg Cf-252 source:

<u>Surface gauge 18" sensor</u>	<u>at 1 ft</u>	<u>at 3 ft</u>
2.0-15.0	Not reported	0.4-0.9

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- o The device will be leaked at 6 month intervals using techniques capable of detecting 0.005 microcurie of removable contamination.
- o Handling, storage, use, transfer, and disposal: To be determined by the licensing authority.
- o Use of the custom device should only be used by the specific licensee referred to in this document.
- o This registration sheet and the information contained within the references shall not be changed or transferred without the written consent of the NRC.

SAFETY ANALYSIS SUMMARY:

Based on our review of the information and test data cited below, we conclude that these coal slurry neutron gauges containing Amersham source capsule Models CVN.3, X.1 and CVN.4, X.1 and CVN.5, X.1 and CVN.6, X.1 meet ANSI Classification C64544 and are acceptable for licensing purposes. Furthermore, we conclude that these devices would be expected to maintain their containment integrity for normal conditions of use and accidental conditions which might occur during uses specified in this certificate.

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DEVICE TYPE: Coal Slurry Neutron Gauge

REFERENCES:

The following supporting documents are hereby incorporated by reference and are made a part of this registry document

- o U.S. Department of the Interior, Bureau of Mines, application dated February 28, 1983, and enclosures thereto (Control No. 14568).
- o Science Applications, Inc., letter dated March 23, 1984, enclosures thereto.
- o U.S. Department of the Interior, Bureau of Mines, letter dated September 10, 1984, and enclosures thereto.

ISSUING AGENCY:

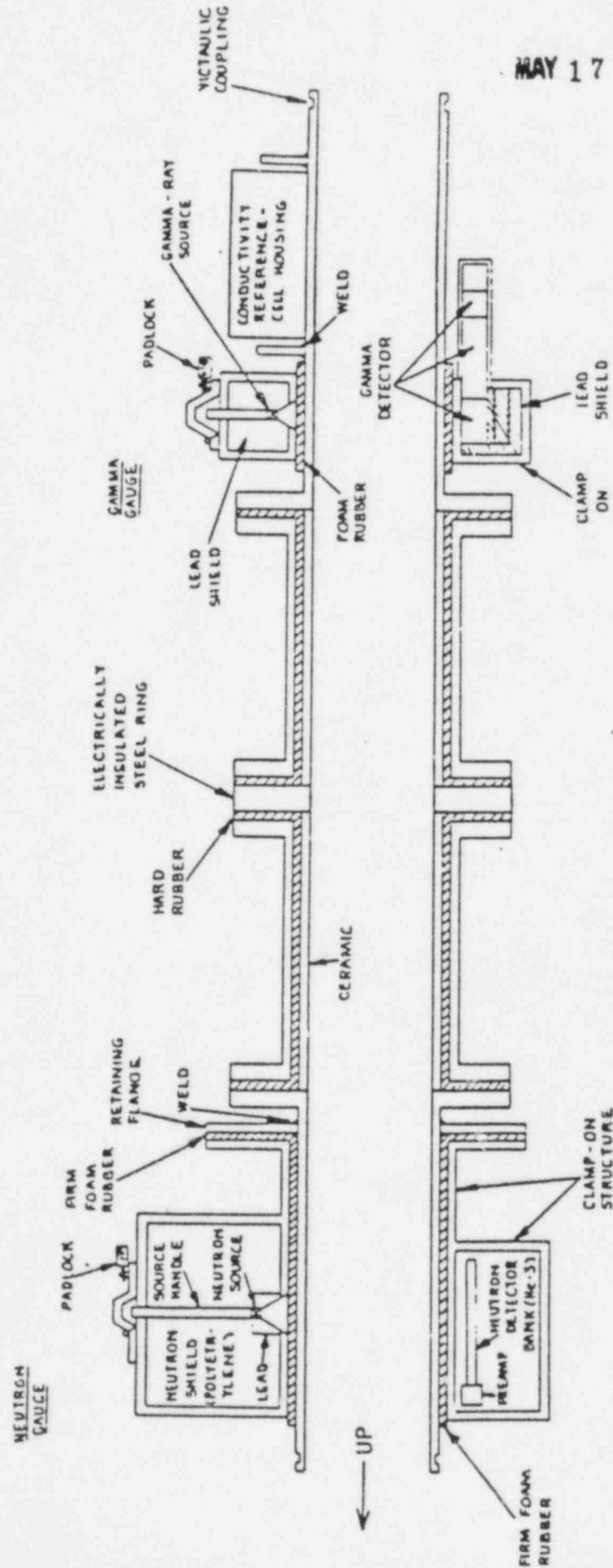
U.S. Nuclear Regulatory Commission

Date: 14 May 1985

Reviewer: Stacy W. Bell

Date: _____

Concurrence: _____



MAY 17 1985

Coal Slurry Concentration Sensor.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICES

NO. NR-590-D-106-S

DATE:

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MAY 17 1985

DEVICE TYPE: Coal Slurry Gamma Gauge

MODEL: G-101,

MANUFACTURER/DISTRIBUTOR:

Science Applications, Inc.
10401 Roselle Street
San Diego, CA 92121

SEALED SOURCE MODEL DESIGNATION:

Amersham Corporation model
CDC-800 series [Cs-137]

ISOTOPE:

Cesium-137

MAXIMUM ACTIVITY:

up to 20 millicuries

LEAK TEST FREQUENCY: 6 months

PRINCIPAL USE: (D) Gamma Gauges,

CUSTOM DEVICE: ☒ YES

CUSTOM USER:

U.S. Department of the Interior
Bureau of Mines
Pittsburgh Research Center
Cochrans Mill Road
Post Office Box 18070
Pittsburgh, PA 15236

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DEVICE TYPE: Coal Slurry Gamma Gauge

DESCRIPTION:

Each source housing is used in combination with one or more detectors as an industrial process line gauge for liquid-slurry density or level measurement. The source holder is a lead-filled steel housing which is welded to, or integral with, a steel rectangular box. The source is screwed into the lead shield using loc-tite threads and then the shaft is padlocked at the surface of the housing and a manual shutter mechanism is contained in the rectangular box. The sources are manufactured/encapsulated by Amersham Corporation. The Cs-137 gamma source encapsulation is their X.8 capsule. They are rugged industrial sources and are doubly incapsulated in welded stainless steel capsules.

LABELING:

This label includes the name of the gauge manufacturer (Science Applications, Inc.), name of device, type of isotope Cs-137, the number and strength of each source type, the date of the last source wipe, and the standard label for radiation sources (which contains the words "CAUTION - RADIOACTIVE MATERIAL"). And the labels are wired to the source holder rods.

DIAGRAM:

See Attachment 1.

CONDITIONS OF NORMAL USE:

The coal density sensor will normally be used in research and industrial environments as part of a device designed to measure slurry density and concentration of coal, rock and water by neutron and gamma activation techniques.

PROTOTYPE TESTING:

The 6" and 18" sensor gauges have been installed and used at the Hydrotransport Research Facility of the Pittsburgh Mining Technology Center since 1982 using online field testing methods with no incident related to radiation safety or failure of containment integrity. The 12" sensor has been tested since March 1984 at the Saskatoon Research Council facility in Canada with the same results.

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SAFETY EVALUATION OF DEVICE

NO. NR-590-D-106-S

DATE:

MAY 17 1985

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DEVICE TYPE: Coal Slurry Gamma Gauge

EXTERNAL RADIATION LEVELS:

The manufacturer reported the following dose rates in mRem/hour for 3 mCi Cs-137 source:

<u>Surface Gamma gauge 6" sensor</u>	<u>at 1 ft</u>	<u>at 3 ft</u>
3.0 - 10.0	0.5-1.0	Not reported

Dose rates in mRem/hour for 20 mCi Cs-137 source:

<u>Surface Gamma gauge 18" sensor</u>	<u>at 1 ft</u>	<u>at 3 ft</u>
0.02 2.7	Not reported	0.03-0.05

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- o The device will be leaked at 6-month intervals using techniques capable of detecting 0.005 microcurie of removable contamination.
- o Handling, storage, use, transfer, and disposal: To be determined by the licensing authority.
- o Use of the custom device should only be used by the specific licensee referred to in this document.
- o This registration sheet and the information contained within the references shall not be changed or transferred without the written consent of the NRC.

SAFETY ANALYSIS SUMMARY:

Based on our review of the information and test data cited below, we conclude that these coal slurry gamma gauges containing Amersham source capsule models CDC.801, X.8 and CDC.803, X.8 and CDC.804, X.8 and CDC.805, X.8 meet ANSI Classification C 64444 and are acceptable for licensing purposes. Furthermore, we conclude that these devices would be expected to maintain their containment integrity for normal conditions of use and accidental conditions which might occur during uses specified in this certificate.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICES

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DEVICE TYPE: Coal Slurry Gamma Gauge

REFERENCES:

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ISSUING AGENCY:

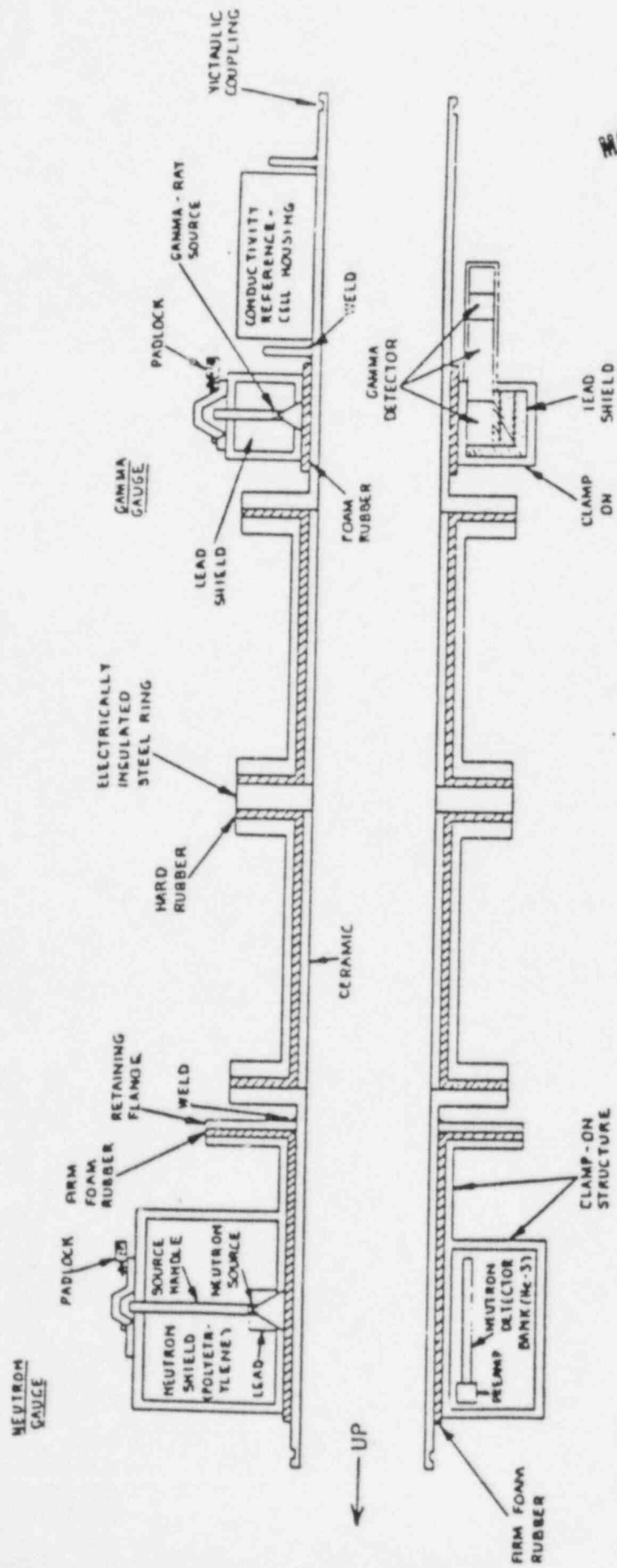
U.S. Nuclear Regulatory Commission

Date: 13 May 1985

Reviewer: Stacy W. Bell

Date: _____

Concurrence: _____



Coal Slurry Concentration Sensor.