## REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES SAFETY EVALUATION OF DEVICE

NO: NR-633-D-102-S

AUG 1 5 1983 DATE:

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DEVICE TYPE: Density Gauge

MODEL: D.822

MANUFACTURER:

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Tatabanyai Szenbanyak Haldex International Cooperation Bureau, Hungary 1114

SEALED SOURCE MODEL DESIGNATION: Amersham Corporation Model CDC.810

ISOTOPE: Cesium-137

MAXIMUM ACTIVITY: 230 millicuries

LEAK TEST FREQUENCY: 6 months

PRINCIPAL USE: (D) Gamma Gauge

CUSTOM DEVICE: X YES NO

CUSTOM USER:

Island Creek/Tata Coal Recovery Company P.O. Box 11430 Lexington, KY 40575

8403020137 840209 PDR FOIA HAMMITT84-74 PDR

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### DEVICE TYPE: Density Gauge

#### DESCRIPTION:

The device consists of two components: a steel source housing containing Cesium-137 and an aluminum electronic housing containing the scintillation detector and associated electronics. These components are secured, directly opposite each other, to a pivot arm so that they will move in unison. The radiation beam is collimated at the source housing and then again at the electronic housing to prevent unnecessary radiation scatter. The electronic housing also has an attenuator to compensate for variation in pipe thickness. The unit has three tilt positions: the measuring position, the protective position, and the calibration position. At each position, a fastening device holds the device rigidly in place. A hand crank is used to move from one position to another after releasing of the fastening device. The device is designed so that a person cannot put his hand or body into the beam path. The source housing has a hasp and lock to prohibit unauthorized access to the source. Additionally, a metal cabinet with trifold doors is assembled over the device and pipe system. The cabinet is locked, thus, further preventing unauthorized persons from gaining access to any component of the device.

## LABELING:

The metal cabinet is labeled with the words, "Caution-Radioactive Material" and a trefoil symbol. The source housing is labeled with the following: trefoil symbol, manufacturer's name and logo, model number of gauge and the exposure rate at one foot from the source housing; isotope, activity and date of assay of the source, source model number, and scrial number, source isotope, classification and source manufacturer.

#### DIAGRAM:

See Attachments 1 and 2.

#### CONDITIONS OF NORMAL USE:

The device will be used in ambient industrial environments to give continuous density measurements of coal and ore pulp slurries. These readings will be used by a micro-processor to determine if the density of the slurry should be altered. An ambient industrial environment consists of:

- o Humidity ranging from 25% to 100%
- o Temperatures ranging from -5°C to 50°C
- o Vibration will be approximately 45 hertz.

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DEVICE TYPE: Density Gauge

#### PROTOTYPE TESTING:

The source manufacturer, Amersham Corporation, claims an ANSI N542 performance classification of C64444. Haldex International tested the source housing to the requirement of ANSI N538. The housing obtained an ANSI designation of 44-665-665-R2. The device manufacturer also tested the source housing to external pressures of 7.3 lbs/in<sup>2</sup> to 29.5 lbs/in<sup>2</sup>, impact of a 5 kilogram weight from a height of 1 meter and puncture test using a 1 kilogram projectile dropped from a height of 1 meter. The manufacturer claims that the devices have been in use in Hungary, Poland, Turkey, and Austria for 12 years with no reports of loss of containment integrity.

#### EXTERNAL RADIATION LEVELS:

The manufacturer supplied the attached dose rate. diagrams, and isodose curve for the device. Additionally, the manufacturer states that during the normal operation or storage, and in case of accident it is unlikely that any person who could be around the device will receive an external radiation dose or dose commitment in excess of the following organ doses:

- Whole body; head and trunk; active bloodforming organs; gonads; or lens of eye ..... 0.5 rem
- Hands and forearms; feet and ankles; localized areas of skin averaged over areas no larger than 1 square centimeter ..... 7.5 rems
- Other organs ..... 3.0 rems

#### QUALITY ASSURANCE AND CONTROL:

The central workshop of Coal Mines Tatabanya makes the mechanical parts for the source housing. The QA Department has the responsibility to ensure uniformity in construction. This is accomplished by visual inspections, and mechanical testing of parts. Haldex International assembles all mechanical and electrical units to form a complete gauge. The gauge is then tested to operation without the source. The completed gauge is sent to the Department of Radiochemistry University of Chemical Engineering, Veszprem. The source is then installed and dosimetric tests are performed. Any final adjustments to the microprocessor measuring program are made at this time. If the unit functions in accordance to a given technological condition, it is shipped to the user. This program may be supplemented by initial onsite installation and testing for up to two weeks to ensure proper function of both mechanical and electronic units.

## REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES SAFETY EVALUATION OF DEVICES

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DEVICE TYPE: Density Gauge

# LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- o The device shall be distributed to Island Creek/Tata Coal Recovery Company in Lexington, Kentucky.
- o The device shall be installed and initially tested for proper operation of the source exposure mechanism, safety warning components, labels, external radiation levels (source exposed, source shielded) and leak testing of the radioactive source by the device manufacturer.
- o The device shall be leak tested at six month intervals using techniques capable of detecting 0.005 microcuries of removable contamination.
- o Handling, storage, use, transfer, and disposal: To be determined by the licensing authority.
- 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 the information and test data contained in the references listed below, and that the device will be operated by persons trained in radiation safety, and in the use of the equipment, the claimed ANS N542 Classification of C64444 exceeds the ANSI recommended performance classification for the intended use of the source,we conclude that the device is acceptable for custom licensing to Island Creek/Tata Coal Recovery Company. Also, the source housing is manufactured such that if the lead shielding was to melt, as in a fire, the source would not float nor would the lead shielding flow from the unit.

#### **REFERENCES:**

The following supporting documents .or the Model D.822 density gauge are hereby incorporated by reference and are made a part of this registry document:

o Island Creek/Tata Coal Recovery Company application dated December 1, 1982, and letters dated March 10, 1983 and July 14, 1983, with enclosures thereto.

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ISSUING AGENCY: 194.5.	Nuclear Regulatory Commission
Date:	Reviewer: Den Daggitt
All( · · int)	Concurrence: Asile MI. Thomas 12.
Date.	



Model D.822 Density Gauge

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10	Driving screw
9:	Supporting structure
8	Swinging frame
7	Colibrating absorbent
6	Lead shielding
5	Source-housing
4	Detectur
3	Collimator of the detector
2	Cosing
9	Clomp

Model D.8<sup>2</sup> Density Gauge In metal cabinet

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The exposure values measured

on the surface of the covering case, on the surface of the inner parts and at a distance of 1 foot from the gauge are shown in the figure.



The gauge contained a sealed Cs-137 source of the activity 214 mCi. The exposure rate values given in mR/hr. have been determined using an ionization chamber.

Model D.822 Density Gauge



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