FORM NRC-313 I (6-78)
10 CFR 30

U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE
INDUSTRIAL

1. APPLICATION FOR: *(Check and/or complete as appropriate)*

X	a. NEW LICENSE
	b. AMENDMENT TO LICENSE NUMBER
	c. RENEWAL OF LICENSE NUMBER

See attached instructions for details.

Completed applications are filed in duplicate with the Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety, and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555 or applications may be filed in person at the Commission's office at 1717 H Street, NW, Washington, D. C. or 7915 Eastern Avenue, Silver Spring, Maryland.

2. APPLICANT'S NAME *(Institution, firm, person, etc.)*
INTERLAKE, INC.
TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION
312 933-5000

3. NAME OF PERSON TO BE CONTACTED REGARDING THIS APPLICATION
J. Zbos
TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION
312 933-5000 5077

4. APPLICANT'S MAILING ADDRESS *(Include Zip Code)*
10730 Burley Avenue
Chicago, Illinois 60617

5. STREET ADDRESS WHERE LICENSED MATERIAL WILL BE USED *(Include Zip Code)*
10730 Burley Avenue
Chicago, Illinois 60617

(IF MORE SPACE IS NEEDED FOR ANY ITEM, USE ADDITIONAL PROPERLY KEYED PAGES.)

6. INDIVIDUAL(S) WHO WILL USE OR DIRECTLY SUPERVISE THE USE OF LICENSED MATERIAL
(See Items 16 and 17 for required training and experience of each individual named below)

	FULL NAME	TITLE
a.	J. Zbos	Assistant Blast Furnace Superintendent
b.		
c.		

7. RADIATION PROTECTION OFFICER
Robert J. Oblon

Attach a resume of person's training and experience as outlined in Items 16 and 17 and describe his responsibilities under Item 15.

8. LICENSED MATERIAL

LINE NO.	A ELEMENT AND MASS NUMBER	B CHEMICAL AND/OR PHYSICAL FORM	C NAME OF MANUFACTURER AND MODEL NUMBER *(If Sealed Source)*	D MAXIMUM NUMBER OF MILLICURIES AND/OR SEALED SOURCES AND MAXIMUM ACTIVITY PER SOURCE WHICH WILL BE POSSESSED AT ANY ONE TIME
(1)	Cesium - 137	Sealed Source	Kay-Ray 7700-G	2 each 1,000 mCi
(2)	Americium-241	Sealed Source	Kay-Ray 7700-F	2 each 500 mCi
(3)				
(4)				

	E DESCRIBE USE OF LICENSED MATERIAL
(1)	Measure Material Density
(2)	Measurement of Moisture in Coke
(3)	
(4)	

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CONTROL NO. 7 9287

9. STORAGE OF SEALED SOURCES

LINE NO.	CONTAINER AND/OR DEVICE IN WHICH EACH SEALED SOURCE WILL BE STORED OR USED. A.	NAME OF MANUFACTURER B.	MODEL NUMBER C.
(1)	Source Housing	Kay-Ray, Inc.	7051
(2)	Source Housing	Kay-Ray, Inc.	7100
(3)			
(4)			

10. RADIATION DETECTION INSTRUMENTS

LINE NO.	TYPE OF INSTRUMENT A	MANUFACTURER'S NAME B	MODEL NUMBER C	NUMBER AVAILABLE D	RADIATION DETECTED (alpha, beta, gamma, neutron) E	SENSITIVITY RANGE (milliroentgens/hour or counts/minute) F
(1)	G.M. Tube Survey	Victoreen	#491	2	Alpha, Beta Gamma	0 - 100 mr/hr
(2)						
(3)						
(4)						

11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

☒ a. CALIBRATED BY SERVICE COMPANY 6-month Interval

NAME, ADDRESS, AND FREQUENCY

Victoreen, Inc.
10101 Woodland Avenue
Cleveland, Ohio 44104

☐ b. CALIBRATED BY APPLICANT

Attach a separate sheet describing method, frequency and standards used for calibrating instruments.

12. PERSONNEL MONITORING DEVICES

TYPE (Check and/or complete as appropriate.) A	SUPPLIER (Service Company) B	EXCHANGE FREQUENCY C
☐ (1) FILM BADGE ☐ (2) THERMOLUMINESCENCE DOSIMETER (TLD) ☐ (3) OTHER (Specify): _____	Personnel monitoring devices not necessary for supporting documentation. See attached response to Item 15-VI	☐ MONTHLY ☐ QUARTERLY ☐ OTHER (Specify):

13. FACILITIES AND EQUIPMENT (Check were appropriate and attach annotated sketch(es) and description(s).

- ☐ a. LABORATORY FACILITIES, PLANT FACILITIES, FUME HOODS (Include filtration, if any), ETC.
- ☐ b. STORAGE FACILITIES, CONTAINERS, SPECIAL SHIELDING (fixed and/or temporary), ETC.
- ☐ c. REMOTE HANDLING TOOLS OR EQUIPMENT, ETC. NA
- ☐ d. RESPIRATORY PROTECTIVE EQUIPMENT, ETC.

14. WASTE DISPOSAL

a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED

b. IF COMMERCIAL WASTE DISPOSAL SERVICE IS NOT EMPLOYED, SUBMIT A DETAILED DESCRIPTION OF METHODS WHICH WILL BE USED FOR DISPOSING OF RADIOACTIVE WASTES AND ESTIMATES OF THE TYPE AND AMOUNT OF ACTIVITY INVOLVED. IF THE APPLICATION IS FOR SEALED SOURCES AND DEVICES AND THEY WILL BE RETURNED TO THE MANUFACTURER, SO STATE.

Sealed sources and devices will be returned to manufacturer for disposal.

INFORMATION REQUIRED FOR ITEMS 15, 16 AND 17

Describe in detail the information required for Items 15, 16 and 17. Begin each item on a separate page and key to the application as follows:

15. RADIATION PROTECTION PROGRAM. Describe the radiation protection program as appropriate for the material to be used including the duties and responsibilities of the Radiation Protection Officer, control measures, bioassay procedures *(if needed)*, day-to-day general safety instruction to be followed, etc. If the application is for sealed source's also submit leak testing procedures, or if leak testing will be performed using a leak test kit, specify manufacturer and model number of the leak test kit.

16. FORMAL TRAINING IN RADIATION SAFETY. Attach a resume for each individual named in Items 6 and 7. Describe individual's formal training in the following areas where applicable. Include the name of person or institution providing the training, duration of training, when training was received, etc.

    a. Principles and practices of radiation protection.

    b. Radioactivity measurement standardization and monitoring techniques and instruments.

    c. Mathematics and calculations basic to the use and measurement of radioactivity.

    d. Biological effects of radiation.

17. EXPERIENCE. Attach a resume for each individual named in Items 6 and 7. Describe individual's work experience with radiation, including where experience was obtained. Work experience or on-the-job training should be commensurate with the proposed use. Include list of radioisotopes and maximum activity of each used.

18. CERTIFICATE

(This item must be completed by applicant)

The applicant and any official executing this certificate on behalf of the applicant named in Item 2, certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Part 30, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

WARNING.–18 U.S.C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

a. LICENSE FEE REQUIRED *(See Section 170.31, 10 CFR 170)*	b. CERTIFYING OFFICIAL *(Signature)* F K Armour
$110.00	c. NAME *(Type or print)* F. K. Armour
(1) LICENSE FEE CATEGORY: 3.L	d. TITLE Vice President - Engrg. & Research
(2) LICENSE FEE ENCLOSED: $ 110.00	e. DATE

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(869116)

15. This addendum describes the procedures to be followed as part of our radiation safety program. This addendum is sectioned as follows:

I. Source Locations.

II. Radiation Survey - source housing maintenance.

III. Control Measures.

IV. Leak Testing.

V. Procedure to be followed if source housing is damaged.

VI. Worst case personnel radiation exposure calculation.

VII. Notice to Employees.

15-I The enclosed sketches show the location of the source heads on the hoppers as well as the source locations in relation to other building areas.

15-II Initial radiation survey, wipe test, installation, servicing, maintenance, relocation and repair of the source holder will be performed by Kay-Ray. The initial radiation survey will be used to confirm the calculations shown in Section 15-VI of this item.

15-III If maintenance is required within the hopper vessel a lock-out procedure will be employed to assure that the source head controls have been locked in the store position before employee hopper entry. The radiation protection officer will hold the gauge lockout keys. A chain barrier will be erected at all hopper entrances and will not be removed until the gauge source heads have been locked in the store position. All hopper entrance will be posted with a sign bearing the following words: "Positively no entrance to hopper until Kay-Ray gauge heads are locked out by radiation protection officer".

15-IV Kay-Ray will perform the leak testing on the source holder. The leak test kit used by Kay-Ray is either the General Radioisotope products WT-4 kit, or Kay-Ray, Inc. Model A kit, which have been approved by the NRC for use in the source wiping of Kay-Ray source holders. We wish to have our license worded to allow a 3 year source wipe interval on the device listed. An extension has been granted to Kay-Ray allowing a three-year interval for source wiping and we wish to have our license reflect this extended test period.

15-V The following procedure will be implemented in the event of damage to the source housing:

1) Immediately evacuate the room containing the gauges.

2) Inform the Radiation Protection Officer (Ext. 2715).

3) Notify Kay-Ray (312-259-5600).

4) Inform by phone or telegram the regional NRC office of the accident.

5) Limit access to stock house until a radiation survey and source wipe can be performed by qualified personnel or a representative of Kay-Ray.

15-VI The attached calculation indicates a worst case operator exposure of 3.0 millirems per year per cesium source. This exposure is based on the nearest operator location to the source housing and is less than 500 millirems per year which is well below the limits set in 10 CFR 20 for personel monitoring equipment. The calculated radition exposure rate one will receive at the detector is approximately 0.5 millirems per hour or less. These low levels drop off according to the inverse square law and result in negligible operator exposure a few feet from the detector. These radiation exposures will be varified at the time of start-up. This will include the effects of radiation scattering if applicable. These provisions will be taken to verify that no one will receive a worst case exposure of 500 millirems per year at the detector side. The procedure for performing the above calculations, as supplied by Kay-Ray, Inc. has been included for reference.

D (minimum distance from gauge) = 10 feet

T (maximum time at minimum distance) = 4 hours

K (MR/HR at 10 feet) = .003

S (millicuries) = 1000

X = worst case exposure MR/YR

X = (K) (S) (T) (.25) = 3.0 millirems/year

15-VII Employees authorized to perform maintenance work within the hopper will be instructed in the following:

1) The location of the source heads.

2) The gauge source head lockout procedure.

3) The emergency procedure in the event of source head damage.

4) Not to perform work on or damage the source heads.

16-I The individual named in item #6 has 5 years experience in the operation and safety procedures of the Kay-Ray moisture gauging system previously installed at the Interlake stock-house. At the time of reinstallation of the Kay-Ray coke moisture gauging system a review of the specific training necessary for the safe operation of the system will be implemented.

16-II The individual named in item #7 has had the following formal training in the use or radioactive materials:

1. Indiana University
   B.A. Physics - 1971
   Purdue University - 1978
   Nuclear Reactor Engineering
   Total of 10 credit hours

   Course training in ionizing radiation and radioactivity control including:

   A. Radioactive decay

   B. Attenuation of particle and photon radiation

   C. Methods of detection of Alpha, Beta and Gamma radiation (including energy dependence)

   D. Mathematics and calculations basic to use and measurement of radioactivity.

2. American Iron and Steel Institute Basic Radiation Safety in the Steel Industry.
   Pittsburgh, Pennsylvania - 1978
   20 Classroom hours

   Course training including:

   A. Physics of Radiation

   B. Shielding Methods

   C. Attenuation of Radiation

   D. Radiation Detection Devices and Methods (including energy dependence)

   E. Leak Test Methods

   F. Radiation Survey Techniques

   G. Mathematics and Calculations Basic to Use and Measurement of Radioactivity

   H. Biological Effect of Ionizing Radiation

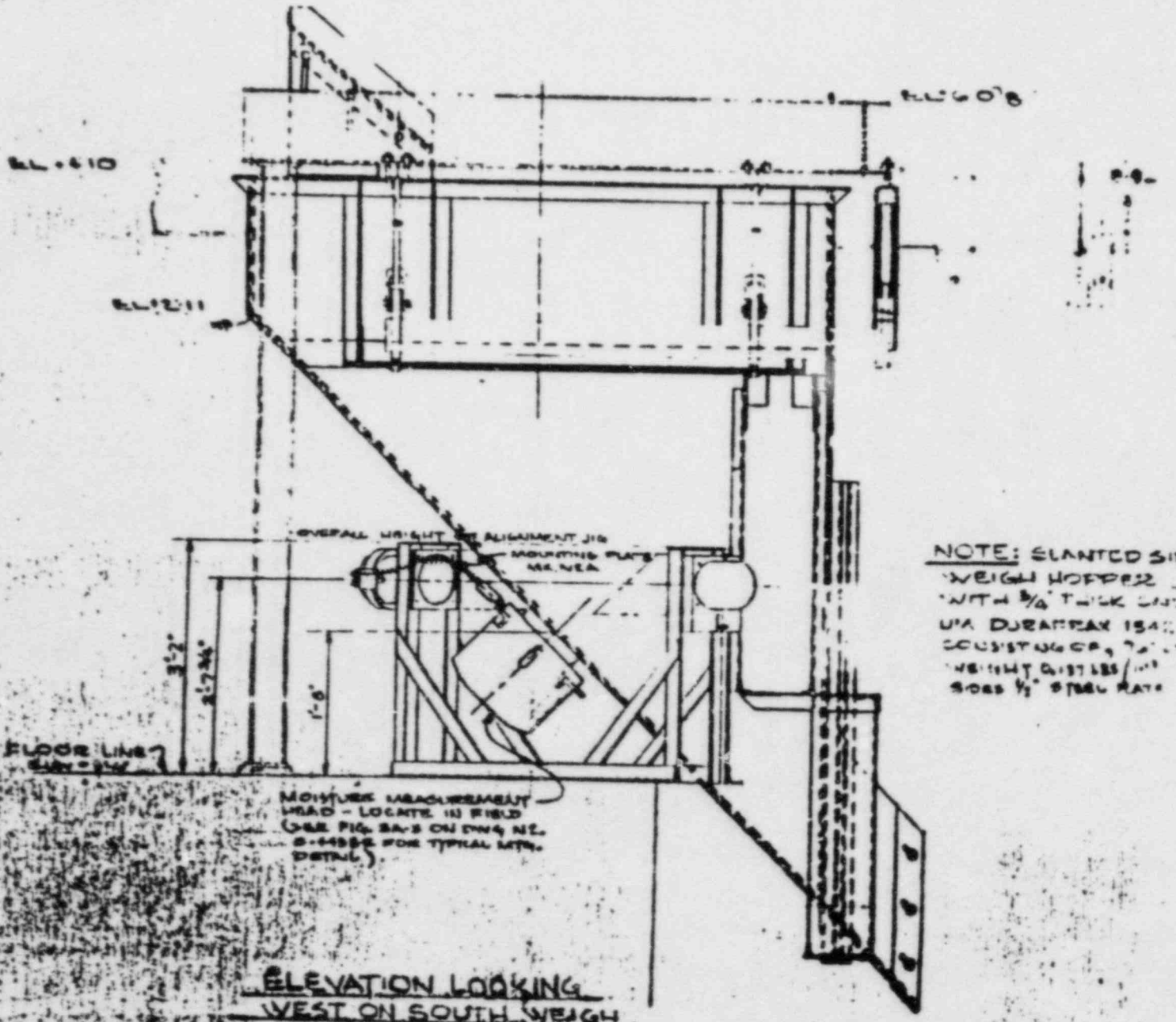
17-I The individual named in item 6 has had 5 years experience in the operation and safety procedures of the Kay-Ray coke moisture gauging system previously installed at the Interlake stock house.

17-II The individual named in item 7 has been responsible for the radiation protection program at Interlake, Inc. since June of 1976. He has been responsible for radiation safety in the use of sealed source thickness gauges containing the following by-product material.

1. Cesium - 137

2. Americium -241

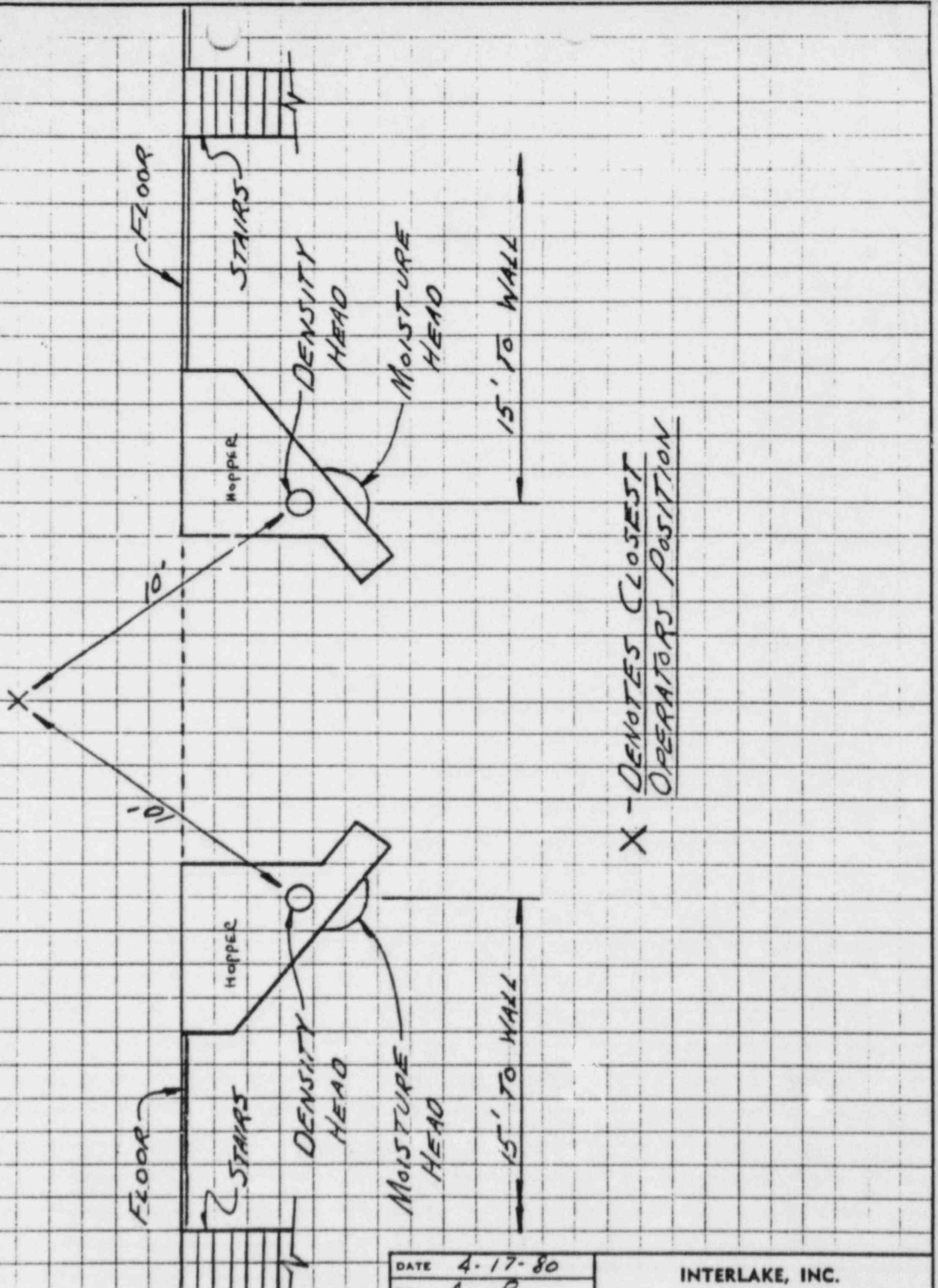
3. Strontium - 90
   As well as X-Ray thickness gauges



NOTE: SLANTED SIDES OF WEIGH HOPPERS ARE WITH 3/4" THICK LINERS OF UHA DURAFRAX 154 CONSISTING OF [illegible] WEIGHT 0.137 LBS/IN³ BOLTED TO STEEL PLATE

ELEVATION LOOKING WEST ON SOUTH WEIGH HOPPER

REVISIONS



DATE 4-17-80	INTERLAKE, INC.
DR. A. L. B.	LOCATION CHI. COKE PLANT
APP.	SKETCH NO. 41780
CHARGE SYMBOLS	

DESCRIPTION CHICAGO KAY-RAY COKE MOISTURE GAUGE

S-2267-C PRINTED IN U.S.A.

CONTROL NO. 79287

PROCEDURE FOR CALCULATION OF WORST CASE RADIATION EXPOSURE TO OPERATING PERSONNEL

Step 1. From the sketch drawn for item 15-I showing relationship of gauge to the operating area, note the minimum distance and maximum time that any single person will be in the vicinity of the gauge. Define this distance as D in feet and T in hours per day. If D is greater than 20 feet, use the 20 ft. value in the table.

Step 2. From the attached find the table corresponding to the model number of the measurement head that is to be used in your application.

Step 3. Round down to the next lower value of D found in Step 1 and note the normalized value of K.

Step 4. Use the formula below to calculate X - the worst case operator exposure per year.

$$X = K \times S \times T \times .25$$

Where X = worst case exposure in mR/year

K = figure from Table 1

S = Source size in millicuries that is used in the source head in your application. This factor corrects X for the activity in mc supplied with the respective source head.

T = Hours/day

.25 = Normalizing factor which converts the mR/hr figure to a yearly figure. This factor assumes a 40 hour week, 50 weeks per year, and 1000 mc source in each respective source head.

The Kay-Ray equipment supplied in your application has been specified to provide less than 500 mR/year exposure to any operating personnel. If this number is exceeded in your calculations, notify Kay-Ray where a review of your calculations will be made.

Example Calculation:

Suppose your application required a 7062 source housing with a 100 mc source. An operator stands within 5.75 feet of the gauge for a worse case average of 7 hours per day.

Following the step by step procedure above, the worst case exposure for this operator in mR/year is:

Step 1. D = 5.75
T = 7

Step 2. Choose table corresponding to 7062 source head.

Worst Case Radiation Procedure (continued)

Step 3. Round down to next lower value of D or 5 feet. The corresponding value of K from the table is .59

Therefore: D = 5
K = .59

Step 4. The value of S is 100 mc in this example.

Therefore: $X = K \times S \times T \times .25 = .59 \times 100 \times 7 \times .25$

$X = 103.25$ mR/year

Place this value of X in the space provided in Item 15-VI. Supply a copy of these calculations including the table supplied by Kay-Ray.

VALU OF D AND K FOR KAY-RAY IRCE HOLDER

GAMMA SOURCE HEADS

KR Model No.	7056	7050B	7051B	7062		
	7057	7060B	7061B	7062P	7063	7063P
(ft.)	K (mr/hr)	K (mr/hr)	K (mr/hr)	K (mr/hr)	K (mr/hr)	K (mr/hr)
0	0.63	12.5	3.0	500	50	15.0
1	0.05	0.59	0.17	11.22	2.3	0.82
2	0.02	0.18	0.06	3.31	0.74	0.26
3	0.009	0.09	0.03	1.56	0.34	0.12
4	0.006	0.05	0.02	0.90	0.20	0.07
5	0.004	0.03	0.01	0.59	0.14	0.05
6	0.003	0.02	0.008	0.41	0.09	0.03
7	0.002	0.02	0.006	0.31	0.08	0.03
8	0.002	0.01	0.005	0.24	0.06	0.02
9	0.001	0.01	0.004	0.19	0.06	0.02
10	0.001	0.009	0.003	0.15	0.03	0.01
11	0.0008	0.008	0.002	0.13	0.03	0.01
12	0.0007	0.006	0.002	0.11	0.02	0.009
13	0.0006	0.005	0.002	0.09	0.02	0.008
14	0.0005	0.005	0.002	0.08	0.02	0.007
15	0.0005	0.004	0.001	0.07	0.01	0.006
16	0.0004	0.004	0.001	0.06	0.01	0.005
17	0.0004	0.003	0.001	0.05	0.01	0.004
18	0.0003	0.003	0.001	0.05	0.01	0.004
19	0.0003	0.003	0.0009	0.04	0.01	0.004
20	0.0003	0.002	0.0008	0.04	0.008	0.003

KR Model No.	7064	7064P	7065	7067 7067P	7068 7069
D (ft.)	K (mr/hr)	K (mr/hr)	K (mr/hr)	K (mr/hr)	K (mr/hr)
0	15	3.25	120	5	7.5
1	1.02	0.22	5.62	0.48	0.38
2	0.36	0.08	1.77	0.17	0.12
3	0.18	0.04	0.85	0.08	0.06
4	0.12	0.03	0.50	0.05	0.03
5	0.06	0.01	0.33	0.03	0.02
6	0.05	0.01	0.23	0.02	0.01
7	0.04	0.007	0.17	0.02	0.01
8	0.03	0.006	0.13	0.01	0.009
9	0.02	0.005	0.11	0.01	0.007
10	0.02	0.004	0.09	0.009	0.006
11	0.01	0.003	0.07	0.007	0.005
12	0.01	0.003	0.06	0.006	0.004
13	0.01	0.003	0.05	0.006	0.003
14	0.01	0.002	0.04	0.005	0.003
15	0.006	0.002	0.04	0.004	0.003
16	0.006	0.002	0.03	0.004	0.002
17	0.006	0.001	0.03	0.003	0.002
18	0.006	0.001	0.03	0.003	0.002
19	0.005	0.001	0.02	0.002	0.002
20	0.005	0.001	0.02	0.002	0.001