17

3386

United States Department of the Interior

FISH AND WILDLIFE SERVICE
DENVER ENGINEERING CENTER
3900 S. WADSWORTH BLVD.
WEST POINT BUILDING
LAKEWOOD, CO 80235

IN REPLY REFER TO:

DEC

DEC 10 1979

United States Nuclear Regulatory Commission
Division of Fuel Cycle & Material Safety
Washington, DC 20555

Gentlemen:

Subject: Application Control Number 00980, License for Portable Gauging Devices

The additional information, as requested in your letter of November 15, 1979, is submitted to update our license application of August 17, 1979.

Reference form NRC-313 1(1-79), item 12, Personnel Monitoring Devices, section C: the exchange frequency of the badges is monthly.

In compliance with paragraph 2 of your November 15, 1979 letter we have enclosed two copies of our revised Radiation Safety Program.

Sincerely,

for JAMES A. LUNDEEN
Chief, Denver Engineering Center

Enclosure (2 copies)

COPIES SENT TO OFF. OF
INSPECTION AND ENFORCEMENT

8001300085

Item #15

3366

RADIATION SAFETY PROGRAM

A. SAFETY PROCEDURES

1. Do no operate or attempt to operate a gauge unless you have been authorized to do so.

2. Do not attempt to repair, modify or open the sealed source under any circumstanes.

3. Wear a film badge at all times while operating or transporting a gauge.

4. Established operating procedures shall be followed when using gauge. See enclosure number 1 for step-by-step procedures.

5. Keep unauthorized persons away from the gauge.

6. Keep the gauge in the "SAFE" or storage position when not in use.

7. Be sure that the gauge is locked within an authorized enclosure (e.g. closet, cabinet, vehicle, etc.) when it is not in use. Security against the theft of a radioisotope is of utmost importance and must not be neglected. The storage enclosure should be plainly labeled with a radiation warning sign of the approved type. See enclosure number 4 for examples of warning signs.

8. Gauge(s) may only be transported by authorized personnel in approved vehicles. The gauge(s) may not be transported on the front or rear seats of any vehicle. If a pickup truck is used the gauge(s) must be locked in an enclosure (e.g. cabinet, shipping case, etc.) and the containers securely fastened (e.g. chained, bolted, etc.) to the bed of the truck in order to prevent loss or theft. The vehicle must be plainly labeled with radiation warning signs of the approved type. See enclosure number 4 for examples of warning signs.

9. Insure that the gauge is leak tested at six (6) month intervals, in accordance with the instructions in the Troxler Electronic Test Kit, Model 3880.

10. Gauge(s) shall not be left unattended while on worksite or outside of secure storage area.

11. No repairs are authorized to be made by user personnel. Any apparent malfunctions of the gauge(s) shall be brought to the attention of the Radiation Safety Officers so that arrangements may be made with Troxler trained personnel to make any necessary repairs.

12. When in doubt, ASK!

B. ACCIDENTS AND INCIDENTS

1. In case a gauge is lost or stolen, or involved in an accident which might cause physical damage to the source, the operator must IMMEDIATELY notify his Radiation Protection Officer (RPO).

2. The Radiation Protection Officer will immediately notify the following authority who will provide instructions and assistance in accordance with the circumstances of the incident:

United States Nuclear Regulatory Commission
Office of Inspection and Enforcement
USNRC
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76012

Phone: (817) 334-2841 day/night
FTS: 334-2841

3. In the event of the possibility of damage to the source or source control mechanism, the operator will keep unauthorized persons at least ten feet from the gauge and prevent removal of the gauge from off the site until authorization by the RPO or appropriate authority.

4. If the gauge is lost or stolen immediately notify the local police or other law enforcement agency within whose jurisdiction the incident occurred.

C. DUTIES OF RADIATION PROTECTION OFFICER

1. The Radiation Protection Officer shall coordinate the safe use of the Nuclear Gauging devices and ensure compliance with the Requirements of Title 10, CFR, Ports 19, 20, 30, & 71 and applicable DOT Regulations.

2. To assure that byproduct materials possessed under the license conform to the materials listed on the license.

3. To assure that use of the devices, particularly in the field, is only by individuals authorized by the license.

4. To assure that all users wear personnel monitoring equipment, such as film badges, when required.

5. To assure that gauges are properly secured against unauthorized removal at all times when they are not in use.

6. To serve as a point of contact and give assistance in case of emergency (gauge damage in the field, fire, theft, etc.). To assure that proper authorities, for example, NRC, police, State etc., are promptly notified.

7. To assure that the terms and conditions of the license, such as periodic leak tests, with a Troxler Model No. 3880 Leak Test Kit, are met and that the required records, such as personnel exposure records, leak test records, etc., are periodically reviewed for compliance with Nuclear Regulatory Commission Regulations, Requirements, and License conditions.

Enclosures:

1. Operating Instruction - Troxler Model #3411

2. Storage Area Diagram

3. Potential Locations for Use of Gauge(s)

4. Warning Labels

A. DAILY STANDARD COUNT

The calibration of this instrument is made in terms of a ratio to a count made on a Reference Standard which is supplied with the instrument. For this reason, measurements made with the instrument can be no more accurate than the accuracy of the reference counts. The operator should therefore use care to establish a set of reference counts for moisture and density. A log should be kept of these counts throughout the life of the instrument since this will establish a norm for the rate of change per unit time and allow the user to determine when a defect may be occuring either in the procedure or the instrument.

In general, a sudden shift of more than 1% density standard count or 2% moisture standard count, as compared to the average of the previous four sets, would indicate some abnormality in gauge operation or procedure.

The Reference Standard should be placed on a dry, flat surface well away from any building or other large structure and not closer than thirty feet to another nuclear gauge. The surface can be asphalt or concrete paving, compacted aggregate or similar surface with not more than 15 PCF (240 kg/m^3) moisture. Sites not to be used are truck beds or tailgates, table tops or similar structures of low mass.

Turn the PWR/TIME switch to the SLOW postion and locate the instrument on the Reference Standard as shown in figure 2-1. Make certain that the standard and the gauge base are clean and do not have soil or other material in the seating area which would prevent good surface contact. The base should be firmly seated within the raised edges of the standard and firmly pulled against the metal butt plate on the end of the standard.

Remove the lock from the trigger and make certain that the handle is indexed in the standard or safe position.

Do not proceed unless gauge power has been on for at least 10 minutes. This time is to allow stabilization of the regulators and detectors.

A set of standard counts can now be accumulated. This is accomplished by:

1) depressing and holding down the key labeled STANDARD,

2) depressing the MEASURE key and then releasing it,

3) releasing the STANDARD key.

The STANDARD and MEASURE keys are interlocked to prevent accidental initiation of a standard count.

After four minutes, the ERR symbol will disappear and the moisture and density standard counts can be displayed by depressing MS and DS respectively. These counts should be recorded, but they will remain in the memory unless the power is switched OFF.

If the counts deviate more than the values previously stated from prior standard counts, check for gauge seating and positioning before taking another set.

If an instability is suspected, four or five sets may be run in the field. If the highest and lowest counts are different by more than 25 for density or 12 for moisture, the gauge should be returned to the laboratory and a complete stability check run as explained in Section IX-D.

B. SITE PREPARATION

1. Embankment or Subgrade

Using the scraper plate supplied with the instrument, carefully scrape the surface to a smooth condition, removing all dried and loose material. If the scraping action dislodges surface stones, remove them, fill the voids with fine material and lightly tamp the surface.

Place the scraper plate in the middle of the site and drive the drill rod into the soil using a four pound hammer. Placing one foot on the plate will prevent it from slipping or otherwise damaging the site by allowing the drill rod to move from side to side. The rod should be driven into the soil at least two inches further than the depth of measurement.

CAUTION:

WHEN DRIVING THE ROD INTO SOIL, BASE MATERIAL OR HOT ASPHALT, REMEMBER THAT YOU ARE DRIVING A STEEL PIN WITH A LOT OF FORCE. THIS PIN MAY WORK HARDEN OVER A PERIOD OF TIME AND PRODUCE METAL CHIPS WHICH COULD CAUSE INJURY TO THE OPERATOR OR BYSTANDERS. THE USE OF SAFETY GLASSES IS STONGLY ADVISED.

In most cases, the rod can be withdrawn simply by pulling upward on the rod cap. If required, the scraper plate can be lifted up and used to lightly tap and pull the rod from the soil. Care should be used to prevent damage to the hole.

If a light mark is scribed around the scraper plate, it will be easier to position the gauge over the hole. The size of the plate and guide location matches the base of the gauge.

Place the instrument over the site so that the source rod lines up with the hole. Depress the trigger and push the handle down to the properly indexed position at the desired depth. Pull the gauge towards the operator to seat the source rod against the side of the hole.

2. Base or Subbase

3333

In most cases, the site preparation is the same as for embankment with the exception that more filling will be necessary for surface voids. Graded sand or other material may be necessary in order to obtain a filled surface.

Situations may occur in which it is impossible to drive the drill rod into the material without destroying the surface. In this case, it will be necessary to use the backscatter geometry.

Under backscatter conditions, site preparation must be more thorough and all voids filled as closely as possible to the same or similar density as the compacted material. The gauge must not rock on its base when seated.

When the source rod in indexed into the backscatter position, be carefull not to bypass the detent and force the source rod tip on or into the material.

3. Asphalt Paving

When using a nuclear instrument for compaction control of asphalt paving, the Control Strip Method outlined under section VII is recommended; however, there may be a time when direct density measurements are desired. If the compacted lift is two or more inches thick, the direct transmission geometry is recommended. If a thinner wear layer or blanket is involved, the backscatter geometry is more appropriate.

In both cases, and paricularly backscatter, site preparation consists of filling the surface voids with the minimum amount of graded sand required to produce a smooth condition. It is important not to elevate the gauge above the surface by applying too much filler material. An easy way of accomplishing proper seating is to put a handful of sand in the surface and slide the scraper plate or gauge base back and forth on the site to remove excess material.

While the paving is still hot or even within a few days after installation, it is not difficult to drive the drill rod into the paving. After curing, it may become necessary to drill the hole or use backscatter methods.

C. MEASUREMENT

With the gauge properly seated on the prepared site, turn PWR/TIME to NORM and depress MEASURE. The ERR symbol will appear for one minute. Then the timing period expires, depress MC and DC to display the moisture count and density count respectively. Depressing MS and DS will display the standard count which were previously taken and stored.

Set the DEPTH switch to the same depth which was used to take the measurement, set the MOISTURE CORRECTION switches to "+00".

The processor is now ready to process the count data. If your instrument was shipped within the U.S., it is set up to display in U.S. Customary Units (PCF). If it was shipped outside the U.S., it should be set up to display SI Units (kg/m^3). If the results appear in the wrong units for your use, release the four thumbscrews which retain the electronic package. Behind the front panel on the lower right side there is a slide switch labeled SI and PCF. Place the switch in the desired mode. Replace the electronic assembly.

Wet Density (WD), Dry Density (DD), Moisture Content (M) and Percent Moisture (%M) can now be computed and displayed by depressing the desired key. The moisture content has not been corrected for soil hydrogen, therefore DD, M and %M may be in error. Subsection D of this section explains the procedure for correction. If the measurement was made on asphalt paving or other materials where moisture was not a factor, one could have used the FAST timing of only 0.25 minutes. This is not recommended on soils where the higher precision of the longer period is needed to obtain accurate moistures.

If asphalt paving was involved, only WD applies for compaction control since DD would reduce the density by some value of M dependent on the asphalt content.

D. CORRECTIONS

Density Correction

1. One of the possible density errors which normally requires correction is automatically taken care of by the data processor in the 3411-B. Hydrogen in the measured material creates an error in the density measurement due to the high mass attenuation coefficient as compared to other elements found in soil. During the data processing, the true hydrogen density is evaluated prior to any corrections for moisture content. The hydrogen density is used to correct the WD for this possible error and significantly improves the density accuracy.

   If density corrections are still required on some materials, it will be necessary to manually apply the correction and perform the computation of DD and %M. Refer to Section V-E for the procedure to obtain the correction factor.

Moisture Correction

2. The 3411 has a "built-in" provision to allow the insertion of a "K" factor to correct for hydrogen in the measured material which is not contained in the free water removed during standard oven drying procedures. This correction factor as used with other types of equipment is a function of the dry density and is only valid for one value of dry density. The correction used in the 3411-B is independent of dry density and correctly adjusts the apparent moisture to a true moisture, regardless of the dry density.

There are two methods of arriving at the correction factor. The first and easiest method makes use of the data processor to arrive at the value of "K".

Assuming that the soil is a type which allows an accurate "fast dry" or if an accurately calibrated "Speedy Moisture" is available, a sample can be taken from under the gauge and a value of %M obtained while the count data is stored in the gauge memory.

Depress %M; if the displayed value is higher than the value obtained from the "fast dry", set the sign switch on "-". Use "+" if the computed %M is lower than the "fast dry". Increment the MOISTURE CORRECTION switches beginning with 00 until the computed value is equal to the "fast dry" value, and record the final switch setting. Repeat this procedure for four or more sites and average the "K" values. This average can now be set up as the MOISTURE CORRECTION constant and used for all future tests on this soil.

An easy way to set the MOISTURE CORRECTION switches is to depress and hold down the %M key while turning the correction switches. This places the processor in a continuous calculate mode. If Error 40 appears while adjusting the switches, release and depress the key again. Error 40 occurs if the processor attempted to read the switches at the instant the switch was beginning rotated between detents.

If "fast dry" methods are not available in the field, then four or more gauge %M measurements will have to be made with the MOISTURE CORRECTION switches set to "+" 00. Samples from each site should be taken to the laboratory for the oven dry. Care should be taken to keep the samples from drying out.

For each sample the K factor can be computed by:

$$K = \frac{\%M\ (True) - \%M\ (Gauge)}{\%M\ (Gauge) + 100} \times 1000$$

The final value of K will be the average of four or more samples rounded to an integer. The value will fall between -99 and +99.

This value is then set into the gauge MOISTURE CORRECTION switches and used for all measurements on the particular soil.

E. 3400 SENSITIVITY DATA

Refer to Section V, paragraph F.

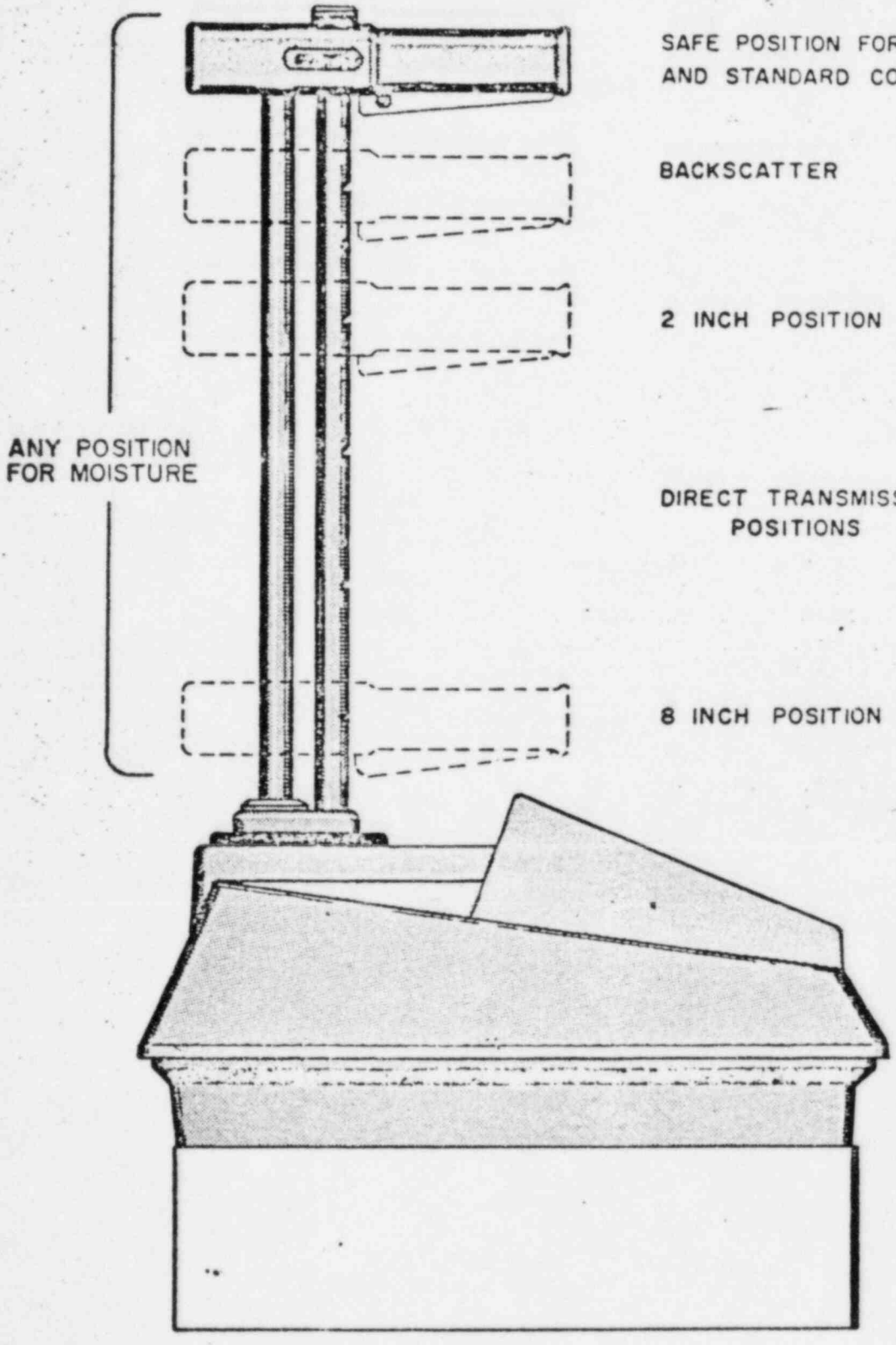
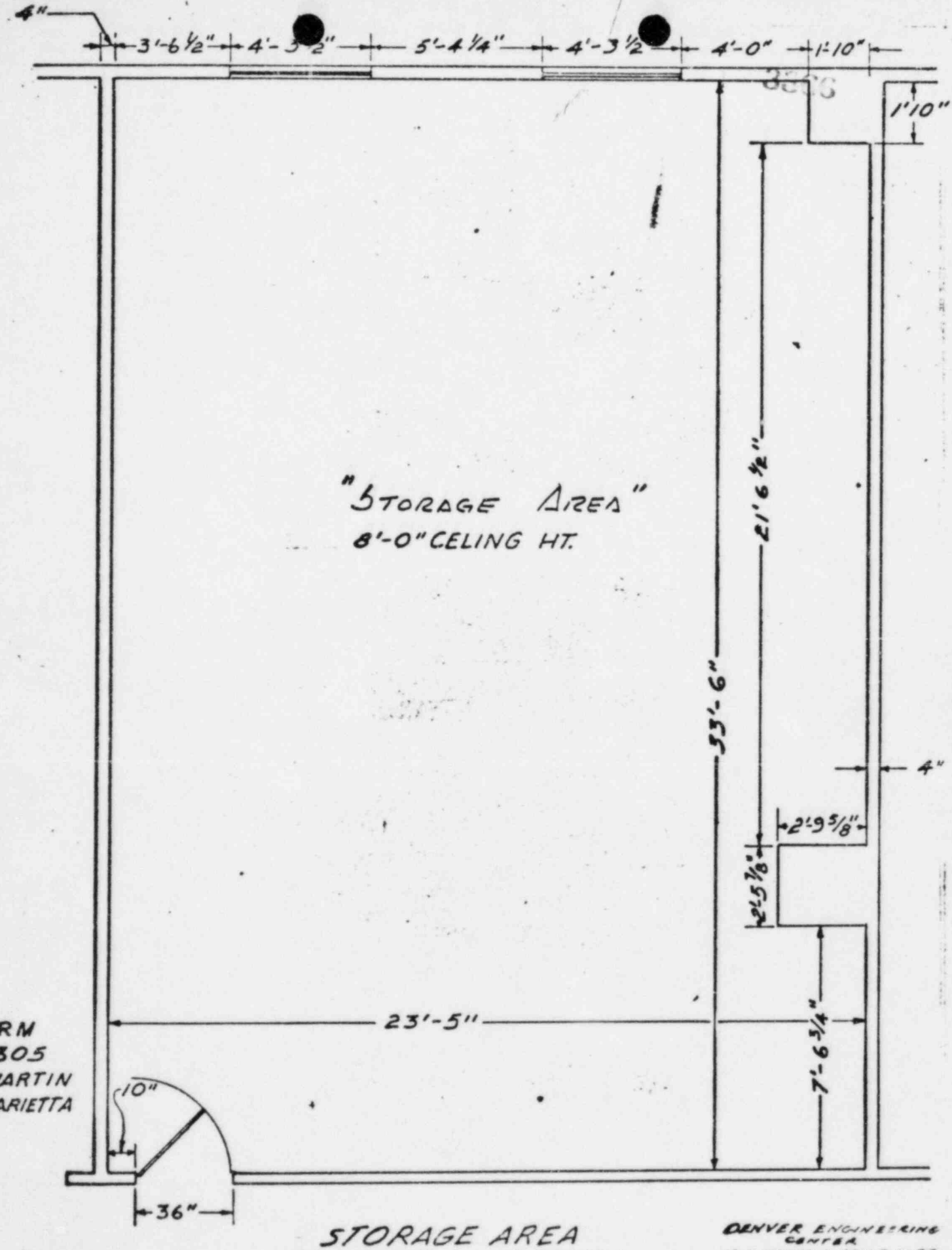


FIGURE 2-1

INDEX ROD POSITIONS



STORAGE AREA
3RD FLOOR NO ROOM No.
3900 S WADSWORTH BLVD. DEN., COLO. 80235

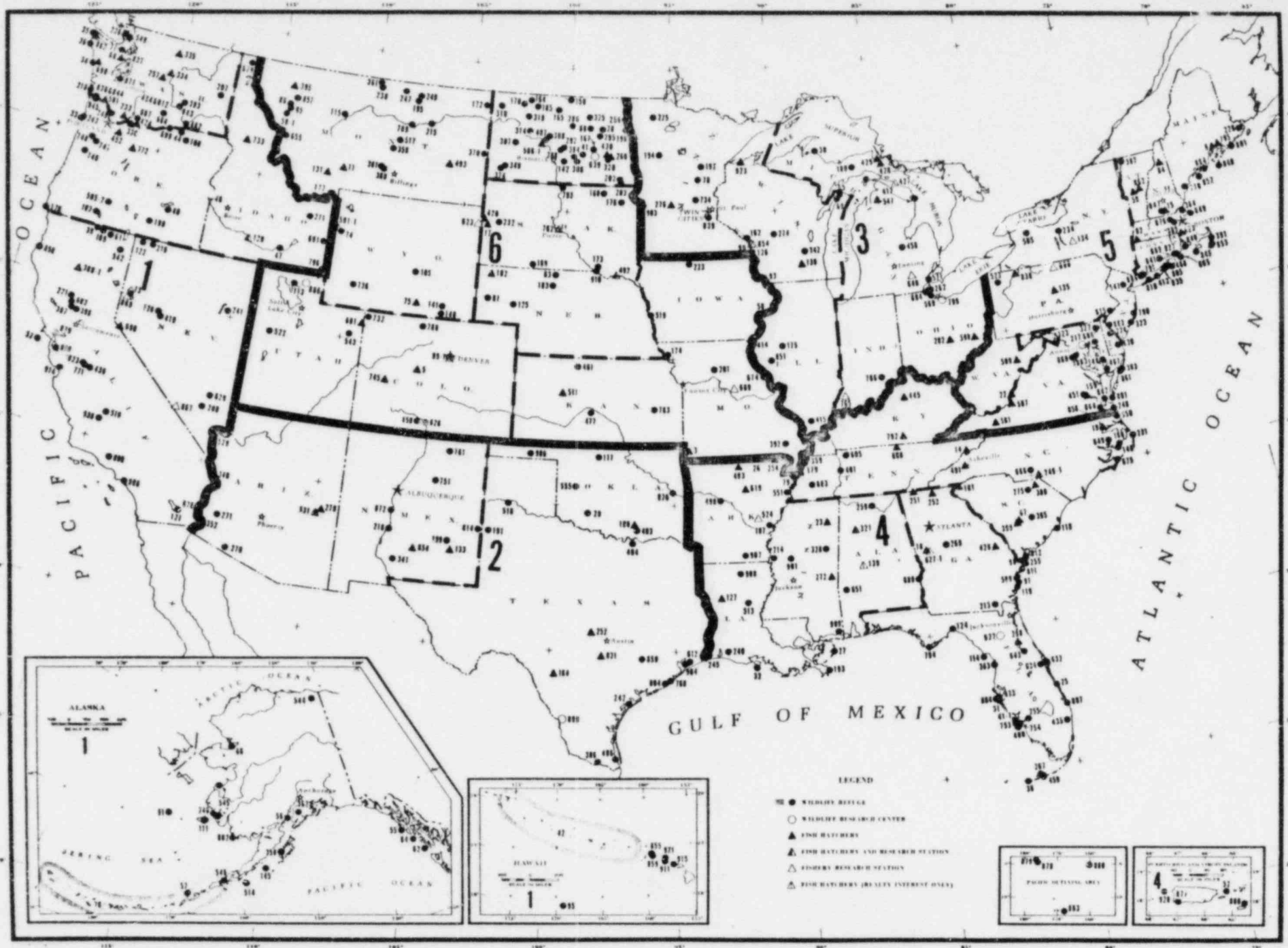
DENVER ENGINEERING CENTER
U.S. FISH & WILDLIFE

Enclosure 2 to
Radiation Safety Program

UNITED STATES
DEPARTMENT OF THE INTERIOR

NATIONAL FISH AND WILDLIFE MANAGEMENT AREAS

UNITED STATES
FISH AND WILDLIFE SERVICE



COMPILED IN THE DIVISION OF REALTY

WASHINGTON, D.C. SEPTEMBER 30, 1977

SCALE IN MILES

NOTE: SEE KEY TO REAL PROPERTY NUMBERS FOR UNIT NAME ON REVERSE SIDE

REGIONAL OFFICE
AREA OFFICE
REGIONAL BOUNDARY
AREA BOUNDARY

Enclosure 3 to
Radiation Safety Program

EMBLEM TAPE & LABEL CO. (303) 778-6777

Warning label for storage areas and vehicles.

Warning label for shipping containers.

Enclosure No. 4
Radiation Safety Program