



THE STANDARD OIL COMPANY

P. O. BOX 696, TOLEDO, OHIO 43694

June 7, 1982

United States
Nuclear Regulatory Commission
Region III
Material and License Section
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Sir:

Control #06413

Please find enclosed drawing (DWG #2-811-07) pertaining to the Coker I nuclear radiation level devices and a copy of our nuclear radiation gauging devices procedure I-D-8.10.

The radiation sources are located on the south sides of the two (2) coker drums at 60'-2", 70'-2" and 82'-2", accessible from stairs and fixed hand ladders. Under normal working conditions, no unauthorized personnel are required in these areas.

Radiation warning signs have been posted adjacent to each nuclear source. Monitoring of the nuclear source will be done by qualified control system or safety department authorized monitored personnel.

I trust the above information will suffice. If we can be of any further assistance, please advise.

Sincerely,

Roy A. Whitmore

RAW:slp

Enclosures

8509160006 850816
REG3 LIC30
34-07269-02 PDR

JUN 18 1982

NUCLEAR RADIATION
GAUGING DEVICES

AREA OR UNIT OF
RESPONSIBILITY:

JOB HAZARDS:

PROTECTIVE EQUIPMENT:

STATEMENT OF PROCEDURE:

PROCEDURE:

Radioactive materials are chemical elements which give off (emit) invisible particles and waves of energy called, nuclear radiation. This radiation is thrown out of the nucleus or core of a radioactive atom when it undergoes a structural change known as "decay." Uranium 238 and radium 226, extracted from mined ores, are natural "radioelements." Cobalt 60 and cesium 137, created by man-made methods, are called "radioisotopes."

The energy wave form of nuclear radiation known as "gamma ray" is used for many industrial purposes. Gamma rays, being similar to X-rays, pass through dense materials and, in passing, are absorbed by the material in proportion to its density and thickness. Nuclear radiation gauging devices utilize this property to measure specific densities and thicknesses of solids and liquids by external means.

Gamma rays also pass through and are absorbed by the human body with harmful effects. The extent of body damage depends on the amount of gamma radiation striking the body and the length of exposure to it. However, Toledo Refinery's nuclear radiation gauges will not present a radiation hazard to anyone if they follow the simple precautions noted in this procedure. These precautions adhere to the rules and regulations of the U.S. Atomic Energy Commission.

A. RADIATION UNITS AND PERMISSIBLE EXPOSURES

1. The roentgen (r) is the unit of quantity of radiation energy. But since the roentgen is a large amount, the milliroentgen (mr) or 0.001r is the common unit of measurement. The number of mr or r which strike the human body (dose) determine the harmful effects of gamma rays.
2. The curie (c) is the rate at which radioactive materials emit radiation. It also denotes the amount of a radioisotope which emits radiation at the same rate as one gram of radium 226. For example; 0.65 gram of cobalt 60 emits gamma rays at the same rate as one gram of radium 226. Nuclear gauging devices use millicurie (0.001c) amounts of radioactive materials up to 1000 in a single source.
3. The maximum permissible dose (MPD) is the quantity of radiation the human body can receive without any detectable harm during a fixed time interval.

One dose limit applies to monitored personnel - people who wear film badges to handle radiation sources. A lower dose limit applies to unmonitored personnel - all other people.

4. For monitored personnel, the MPD is 3 roentgens per 13 week quarter. The total accumulated dose at age n of an exposed person is not to exceed $5r(n-18)$. Monitored personnel may receive noncontinuous doses of 5.5 mr per hour and an infrequent dose of 12 r total during a year, if the total accumulated at age n does not exceed $5r(n-18)$. Continuous 40 hour weekly doses are not to exceed 2.5 mr per hour.
5. For unmonitored personnel the 13 week MPD is 1.25 r and the total accumulated dose at age n is $5r(n-18)$. Hourly doses are not to exceed 2.5 mr.

B. RADIATION PROTECTION PRINCIPLES

1. Radiation protection is based on three safety factors: shielding of sources, restricted exposures and distance limitations. The source holders of T.R.'s nuclear gauging devices are effectively shielded in accordance with A.E.C. regulations to prevent excessive stray radiation while they are in service. Special precautions are required to remove sources from service, and to store them.
2. Distance is the greatest single safety factor since radiation levels vary inversely as the squares of distances from sources. This relationship is shown by $R_a/R_b = D_b^2/D_a^2$, in which R_a is the radiation level at distance D_a and R_b is the level at distance D_b . Thus, if the r level at 2 feet from a source is 4, doubling the distance reduces the r level to 1. Safety lies in remaining at distances equal to or greater than specified safe working distances.
3. The total time a person is exposed to various r levels determines the dose he receives. Thus, a monitored person who is exposed to 10 mr per hour for 30 hours each week during a 13 week period, receives a total of 3900 mr. This exceeds his MPD by 900 mr. There is no cause for alarm, however, if his exposure is limited to an additional total of 1100 mr during the remaining 3 quarters. To keep doses within safe values, limit exposures to the minimum time required to work near or with sources.

C. SOURCES OF GAMMA RADIATION

1. Fixed nuclear gauging device sources are:
 - (a) Decokers I and II--2 on each coke drum.
 - (b) Crude-Vac. I--2 on bottoms boot of vacuum tower.
 - (c) Crude-Vac. II--1 on asphalt boot of vacuum tower.
 - (d) Kerosene Treater--2 on fuel oil analyzer line.
2. Portable nuclear gauging devices consist of two Penetron metal thickness gauges in the Engineering Inspection Dept.

D. SPECIFIC SAFETY REQUIREMENTS

1. Safe exposure for all personnel at specified distances from fixed nuclear gauging devices:
 - (a) Decoker I--20 continuous hours per week at 2 ft. distance from each cobalt 60 source thermowell in both coke drums at two south side deck levels. No time restrictions at 2 ft. from detector cells.
 - (b) Decoker II--40 continuous hours per week at 2 ft. distance from each cobalt 60 source thermowell in both coke drums at two south side deck levels.
 - (c) Crude-Vac. I--40 continuous hours per week at 2 ft. distance from either of two radium 226 thermowells in bottoms boot of vacuum tower.
 - (d) Crude-Vac. II--40 continuous hours per week at 2 ft. distance from the cesium 137 source strip holder on asphalt boot of vacuum tower at first deck level, and 20 continuous hours per week at second deck level.
 - (e) Kerosene Treater--40 continuous hours per week at 2 ft. distance from either of two cesium 137 source holders on fuel oil gravity analyzer line.
2. Safe exposures for monitored personnel using Penetron metal thickness gauges are 40 continuous hours per week at 1 ft. body distance from the end of gauge handles.
3. Radiation dosage film badges are required to monitor Control Systems and Engineering Inspection personnel who are authorized to service or use nuclear gauging devices. Biweekly dosage badges must be worn by these people to perform any work that involves exposure to nuclear sources.
4. Standard radiation warning signs must be posted adjacent to nuclear sources and remotely at all access points to these sources.
5. Entry into any vessel having a nuclear gauging device is not permitted until all attached sources have been removed and safely stored. Process supervision is responsible for obtaining removal of sources by qualified Control Systems personnel. The entry permit for the vessel must contain a notation by Process supervision that sources have been removed.
6. When radiographic work is to be done inside a vessel fitted with nuclear gauges, Eng. Insp. supervision will notify the Control Systems Dept. Gauge measuring cells should be removed from the vessel to prevent possible damage to cells by high radiation levels.
7. In removing rod-mounted nuclear sources from vessels, transfer them immediately from wells to their lead-shielded storage containers. Promptly cap and lock the containers. When reinstalling sources, do not remove storage container caps until ready to make the transfer.
8. Before removing any externally-mounted shielded source holders, inactivate sources by closing and locking emission slot shields. Keep shields locked at all times while sources are out of active service, and store as noted in item D-9.

9. In storing two or more shielded source containers in a common location, the site must be monitored with a survey meter to determine stray radiation levels. Locate storage sites remotely from normal working or traffic areas and post standard radiation warning signs at safe approach distances.
10. Radiation warnings are to be observed by all people who are not specifically authorized to service or use nuclear gauging devices (unmonitored personnel). Although it is safe to approach gauges to the limits specified in sec. D-1, tampering with sources can be hazardous. If it is necessary to perform assigned work at distances less than specified limits, consult the Safety Dept. before starting work.
11. Monitoring of nuclear sources will be done by the Control Systems Dept. or the Safety Dept. The Safety Department will maintain cumulative exposure records from film badge reports of all monitored personnel. All monitored personnel will also receive annual medical examinations. Individual exposure records are available upon request.

CONVERSATION RECORD

TIME

8:43am

DATE

June 3, 1982

TYPE

☐ VISIT

☐ CONFERENCE

☒ TELEPHONE

☐ INCOMING

☒ OUTGOING

ROUTING

NAME/SYMBOL

INT

Location of Visit/Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU

Roy Whitmore

ORGANIZATION (Office, dept., bureau, etc.)

The Standard Oil Comp
Toledo, Ohio

TELEPHONE NO.

419-693
0771

SUBJECT

Control No. 06413

SUMMARY

- ① submit simple diagram of coher & device explain access control
- ② submit copy of Accident prevention Procedure Manual
- ③ discuss lock-out procedures

Mr. Whitmore indicated that he would send requested info

ACTION REQUIRED

NAME OF PERSON DOCUMENTING CONVERSATION

Mike McCann

SIGNATURE

George M. McCann

DATE

06/03/82

ACTION TAKEN

SIGNATURE

TITLE

DATE

SEE

APERTURE

CARDS

*OVERSIZED DRAWINGS

(ADDITIONAL DOCUMENT PAGES FOLLOW)

- APERTURE CARD NO# 8509160007

AVAILABILITY PDR CF NOLD

NUMBERS OF PAGES. 1