ARCO Petroleum Products Company

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March 8, 1983

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U. S. Nuclear Regulatory Commission
Material Licensing Branch
Division of Fuel Cycle and Material Safety
Washington, D. C. 20555

Gentlemen:

In reply to your letter of January 31, 1983 (Control No. 11721) regarding renewal of our License No. 12-00140-04, we have the following information.

1. Applicant's correct name is Atlantic Richfield Company. ARCO Petroleum Products Company is a Division of Atlantic Richfield Company.

2. Attachment "A" gives a description of the duties and responsibilities of the Isotope Committee. Attachment "B" gives the qualifications of member S. Sichak.

3. a. Gas Chromatographs

| Brand | Chromatograph - Electron Capture Detector |
|---|---|
| Hewlett Packard | Model 5750 - Model 2-6195 |
| Perkin Elmer | Model Sigma 2B - Model 330-0119 |

b. Attachments "C" and "D" are manufacturers' recommended procedures for cleaning the detector cells, which will be followed. If cleaning does not correct the problem, the cells will be returned to the manufacturer.

4. Our calibrations will be made in the "Radiation Laboratory" shown in the floor plant attached to our June 10, 1982 Application for License Renewal. The outside door is locked and warning signs posted during exposure of the 10 mc cesium-137 source. The person calibrating does not leave the area while the source is exposed. Film badges are worn, and no detectable film badge readings have resulted from past calibrations.

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Radiation Safety Services, Evanston, Illinois, has applied for a NRC license. We will have calibrations done only by a licensed organization. Some of our instruments are ion chambers with high scales which we do not anticipate using, but we will have these instruments calibrated by a licensed organization at least every 6 months.

All survey instruments will be calibrated at least every 6 months.

5. Bioassays will be conducted for H-3, I-125 and I-131 in accordance with NRC Tritium Guide and Regulatory Guide 8.20 for Iodine. Our use of large quantities of tritium (over 100 mc) is very irregular. When we do handle over 100 mc, a urine sample is submitted to New England Nuclear for bioassay.

   Use of I-131 is also very irregular (we have never used I-125). When we use a quantity which Regulations Guide 8.20 indicates need for a bioassay, we will have this done by Ingalls Memorial Hospital, Harvey, Illinois, which holds NRC License 12-12767-01.

6. Our fume hoods are being modified to provide at least 100 feet per minute intake air velocity at any point on the open face.

   We have calculated the maximum amount of each isotope we have handled recently that could be released in one day's effluent from our smallest air flow hood in accordance with limits set by 10 CFR 20, Appendix B, Table II. It is extremely unlikely that any of these limits will be reached in one day, much less so averaged over 1 year. Our operations are not continuous, and may involve only one or two handlings per year, if any, of large amounts of isotopes.

7. Our handling of significant quantities of radioisotopes is very irregular, and usually occupies only one or two days at a time. When this handling occurs, we will make instrument surveys. Smear surveys will be conducted in accordance with Regulatory Guide 8.21, Table II.

1. Bellmaire
2. [illegible]
3. [illegible]

8. Radiation safety instructions include prohibitions against pipetting by mouth, smoking, drinking beverages and eating food in the laboratory areas where radioactive materials are handled. The instructions require the mandatory use of a fume hood for handling unpackaged concentrated radioactive materials. Plastic gloves and lab coats or coveralls will be worn during such use. Monitoring of hands and clothing will be conducted before leaving the laboratory area after such use.

9. We will follow procedures given in 10 CFR Part 20.205 for picking up, receiving and opening packages of radioactive material.

If you need more information, please contact me.

Yours very truly,

ARCO Petroleum Products Company

George A. Uhl

George A. Uhl
Radiation Protection Officer

GAU:msk

ATTACHMENT

Doc# 83067HTC0037

ATTACHMENT "A"

# ARCO HTC RADIOISOTOPE COMMITTEE

The Radioisotope Committee shall consist of four members, one of whom is the Radiological Safety Officer, and one of whom is the Plant Safety Supervisor. The agreement of at least three members (one of whom is the Radiological Safety Officer) is required for project approval. The membership of the Radioisotope Committee is subject to approval by the U.S. Nuclear Regulatory Commission and the Manager of the Technical Center.

Following is a list of the responsibilities of the Radioisotope Committee.

1. All uses of radioisotopes outside N-Bldg. not listed in Table 1 shall be submitted for approval. This includes other laboratories in the technical center, our refineries or chemical plants, and uses outside our company.

2. The purchase of a radioisotope not previously purchased is also subject to committee approval.

3. The committee shall consider, among other things, NRC or state licensing, qualifications of the user, safety features, destiny of radioactivity in effluents, products, etc.

4. The Committee shall approve or disapprove procedures set up by the Radiation Protection Officer for:

   a. Ordering and receiving radioisotopes

   b. Storage and inventory of radioisotopes

   c. Shipping radioisotopes

   d. Safety surveys

   e. Instrument calibration

   f. Film badge handling

   g. Radioactive waste disposal

   h. Operating procedures

   i. Training personnel

5. The Committee will keep minutes of each meeting, and will issue an annual report. All decisions of the committee will be stored in a permanent file.

## Table 1

## Approved Routine Uses

Heat exchanger leak tests (Anisole-$H^3$)

FCC tagged catalyst tests ($Sc^{46}$ or $Au^{198}$)

Coker fractionator solids ($Au^{198}$)

Liquid residence time tests ($C^{14}$)

Flow measurements using $H^3$ tagged compounds

Use of $C^{14}0$ by M.F.L. Johnson in L-Bldg. X

Nickel-63 Chromatography sources in L-Bldg.

GAU:msk

October 20, 1982

ATTACHMENT "B"

Name: Stephen Sichak, Sr.

Education: B.S. Chemistry, St. Louis University, St. Louis, MO

A.B. Microbiology, Indiana University, Bloomington, IN

Ionizing Radiation NIOSH, Cincinnati, OH

Affiliations: National Safety Council, Executive Committee, R&D Section

American Chemical Society, Division of Chemical Health & Safety

Publication: "The Laboratory Safety Deskbook:" A Guide to OSHA Standards

SS:b
02/10/83

ATTACHMENT "C" - Electron Capture Detector Model #2-6195 for
Hewlett Packard Model 5750 Gas Chromatograph

8-10 Performance.

a. General. Sensitivity, linearity, and freedom from noise and drift comprise the three major areas of EC DETECTOR performance. Various operating parameters and techniques play an important role in optimizing these characteristics and, in the interest of obtaining high quality data, they should not be overlooked.

b. Sensitivity. The detector response produced by a given quantity of compound varies markedly depending on the nature of the compound. General information on the relationship of response to the molecular structure and functional groups is given later in this section. In the most sensitive cases, concentrations as little as $1 \times 10^{-13}$ gram (0.1 picogram) per microliter can be determined with acceptable precision. To obtain this degree of sensitivity, all factors affecting detector response must be optimized. Some of the more critical points are discussed below:

(1) Cell Contamination.

(a) Condensed sample or liquid phase on the nickel foil will inhibit effective beta emission. The resultant decrease in electron density will reduce sensitivity drastically. Avoid this condition by never allowing the column temperature to exceed that of the detector and by using a well-conditioned column.

(b) An excessive amount of electron capturing contaminant will produce a high background signal requiring a large amount of adjustment to zero the baseline. As a consequence, little electron current flow remains from which a signal can be produced. Avoid this condition by not overloading the detector with large quantities of sample and by not allowing condensation to occur as mentioned above. Relatively speaking, samples of highly responsive compounds become too large at the $10^{-6}$ gram quantity (one microgram). Careful judgment will be required of the operator as to the appropriate amount of sample.

> NOTE: When a compound of unknown electron affinity is to be analyzed, it is advisable to start with more dilute solutions and then increase the concentration to the required working range.

(c) If cell contamination has occurred, it may be possible to clean the detector by running preheated carrier gas (or purge gas) through it overnight while heating to the maximum temperature. This remedy is often successful if the detector is normally operated at a lower temperature. If this action fails, then the contamination must be removed with solvent. The recommended procedure is listed below:

1 Cool the detector to room temperature or slightly above.

2 Remove the detector from the instrument and stand the block with the exit tube facing downwards into a 250 ml beaker.

3 Connect a funnel to the inlet tube

4 Pour about 50 mls of solvent through the cell three times, allowing the cell to drain each time. Hexane, methane, or benzene (chemically pure) can be used; but do not use any ester material (e.g.: acetates, butyrates, etc.), as some acid may be present due to degeneration in storage.

5 After draining is complete, dry the cell with a clean, dry gas and remount it on the instrument.

6 Pour the solvent down the sink drain and flush with a copious amount of water, as it may contain a trace of radioactive nickel.

(2) Choice of Gases.

(a) A 5 per cent methane in argon mixture used as a carrier gas and no purge gas provides maximum sensitivity. If large sample sizes are injected, then a purge gas (5 per cent methane in argon) must be used to prevent overloading of the cell.

(b) Since the FLAME DETECTOR will respond to methane, helium must be used as carrier when both detectors are operated simultaneously. With helium as carrier, a 10 per cent mixture of methane in argon is required as a purge gas for optimum performance. The 5 per cent mixture should only be used in an emergency since the optimum carrier gas flow (column efficiency) must be compromised and about a 25 per cent sacrifice in sensitivity is incurred.

(c) It is important that the gases (both carrier and purge) do not contain electron capturing contaminants. The result would be similar to that described in (1) (b) above. Also, the presence of moisture will cause interference and reduce sensitivity. Therefore, it is important to use MOISTURE TRAPS and to keep them regenerated.

(3) Purge to Carrier Flow Ratio. When helium is used as carrier, the ratio of its flowrate through the EC Detector to the purge gas flowrate is critical. Optimum sensitivity and linearity are obtained when this ratio is between 1.5 and 2.5 to 1 in favor of the purge gas. See note in 8-6 c. (2) for limits.

(4) Pulser and Detector Sensitivity Check.

(a) The sensitivity can be checked as follows: with the cell operating at normal flow (with a column) and a pulse interval of 5 microseconds, set the recorder at zero scale on 10 x 8. Switch the pulse interval slowly from "5" to "150" and back. The recorder pen should move stepwise to about the 50% level when the switch is in the "150" position and should return to the zero level at the "5" microseconds position. This indicates that the system is operating satisfactorily.

ATTACHMENT "D" - Cleaning Instructions for Model 330-0119 Electron Capture Detector for the Perkin Elmer Model Sigma 2B Gas Chromatograph.

## E) ECD Cleaning and Maintenance Procedure

### 1) Bake-Out Procedure

It is often possible to decontaminate the ECD by purging it with carrier gas using a flow rate of 50 to 100 $cm^3$/min. and raising the temperature to 400°C. These conditions should then be maintained until the detector is clean. Periodically, plot a graph of standing current setting versus frequency, as described in Section 6H,2 of these instructions. The plot should improve as cleaning progresses, but complete cleaning may require baking for several hours or even days, depending on the type and extent of contamination.

> **Important:** Never attempt to flush the detector cell assembly with acidic solvents, as this will result in the removal of radioactive material from the cell.

### 2) Wipe Test

The United States Nuclear Regulatory Commission requires that the detector be wipe tested at least once every six months, and that a record of the results of these tests be maintained for NRC inspection. The purpose of the wipe test is to ensure that removable radioactive contamination on the external parts of the cell remains at a safe level.

> **Important:** Until the results of the wipe test are known, assume that the cell is contaminated and handle it only with suitable protection. All equipment coming into contact with the cell should be considered contaminated and handled accordingly.

It is strongly recommended that the user become familiar with the NRC regulations covering the use of nickel-63, as well as any other national, state or local requirements.

Perform the wipe test as follows:

1) Switch the instrument off and allow the detector to cool.
2) Expose the detector by pulling the detector cover forward and downward. The cover may be detached completely if required.
3) Pull off the collector housing (Figure 10-5).

> **Warning:** DO NOT DISMANTLE THE CELL.

4) Refer to the instructions included with the wipe test kit (Part No. 009-1667) supplied with the detector, and wipe the external surfaces of the cell, as shown in Figure 10-5. Once the wipe test paper has been moistened and any part of the cell has been wiped, do not re-moisten the paper. Also, do not allow any of the wipe test solution to enter the cell.

5) Put the paper in the container provided in the wipe test kit. Include a data sheet stating that the wipe test was performed on a Perkin-Elmer electron capture detector cell, Part No. 330-0119, and give the date of the test. Return the container to either:

Nuclear Radiation Dev. Corp.
2937 Alt. Blvd.
Grand Island, N.Y. 14070

or

Nuclear Sources and Service
5711 Etheridge
Houston, Texas 77017

**Note:** The sensitivity of the wipe test is 0.0001 microcuries.

Request that a new wipe test kit be forwarded with the test results.

### 10B,6. Restrictor Assembly for the Oven Lid Opener

If the oven lid does not open properly, i.e., the lid will not rise when the oven requires cooling, it is most likely that the restrictor assembly has become plugged. A spare restrictor, Part Number 0330-1641, is supplied with the instrument.

To replace the restrictor, unscrew the nut that secures the restrictor using a 3/8-inch wrench (see Figure 10-5a). Using a 5/16-inch wrench, unscrew the restrictor and remove it. To install the new restrictor, reverse this procedure.

## ECD CLEANING PROCEDURE

If the ECD cell has been isolated as the cause of an ECD problem, you may want to try to "clean" off oxygen that may be trapped on the ECD foil. This oxygen might have gotten to the foil with the carrier gas or the ECD cell may have been heated without a carrier gas. This "cleaning" method uses hydrogen as a carrier gas through the heated ECD cell. The heated ECD cell causes the hydrogen carrier gas to bond with any oxygen that may be on the ECD foil and then be released as steam.

1. Set ECD current to "balance."
2. Remove ECD pulse head assembly.
3. Install an empty 6' or 12', 1/4" glass column onto a heated flash vaporizing injector (standard type). Use 1/4" adapters on injector and detector fittings.
4. Connect hydrogen as a carrier gas to the GC.
5. Set the carrier flow to 30cc/min. You will notice there is no or very little back-pressure on the back-pressure gauge. Make-up flow should be 0cc/min.
6. * Leak check the carrier system and stop any leaks.
7. Temperature settings:
   INJ = ambient
   OVEN = ambient
   ZONE 1 = 350° C.
8. Let zone 1 heat for 2 to 3 hours with carrier flow.
9. Reconnect original carrier gas.
10. Bake the cell overnight at 400° C. and then check for proper operation.

# ECD CLEANING PROCEDURE

If the ECD cell has been isolated as the cause of an ECD problem, you may want to try cleaning it, as a last resort, using the "steam clean" method outlined below.

1. Put ECD Current to "Balance."
2. Remove ECD pulse head assembly.
3. Install an empty 6' or 12', 1/4" glass column onto a flash vapor (standard type) heated injector. Use 1/4" Sigma adaptors on injector and detector fittings.
4. Set carrier flow to 30cc. You will notice there is no or very little back-pressure on the back-pressure gauge.
5. Set ECD makeup flow to get 60cc out of ECD vent.
6. Temperature settings:
   INJ = 250°C
   OVEN = 200°C
   ZONE 1 = 350°C
7. Using a large volume syringe (10cc LUR-LOK, part #990-5004) and a LUR-LOK syringe needle small enough to penetrate the septum cap, slowly inject 10cc of distilled water.
8. Make about 4-5, 10cc injections of distilled water. Hopefully enough steam will be generated to clean the cell to a point where it is useable.
9. Bake the cell overnight at 400°C and check for proper operation.

NOTE: Back-pressure will rise as the water is injected.