I-5(2)

Form AEC-591
(11-62)

UNITED STATES ATOMIC ENERGY COMMISSION
DIVISION OF COMPLIANCE

INSPECTION FINDINGS AND LICENSEE ACKNOWLEDGMENT

NOV 21 1963

1. LICENSEE	2. REGIONAL OFFICE
Industrial Reactor Laboratories, Inc. Plainsboro, New Jersey	U. S. Atomic Energy Commission Region I, Division of Compliance 376 Hudson Street New York, New York 10014
3. LICENSE NUMBER(S)	**4. DATE OF INSPECTION**
29-3686-2	11/5, 6, 7/63 (Reinspection)

5. INSPECTION FINDINGS

- [X] A. No Item of noncompliance was found.
- [ ] B. Rooms or areas were not properly posted to indicate the presence of a RADIATION AREA. 10 CFR 20.203(b) or 31.302
- [ ] C. Rooms or areas were not properly posted to indicate the presence of a HIGH RADIATION AREA. 10 CFR 20.203(c)(1) or 31.302
- [ ] D. Rooms or areas were not properly posted to indicate the presence of an AIRBORNE RADIOACTIVITY AREA. 10 CFR 20.203(d)
- [ ] E. Rooms or areas were not properly posted to indicate the presence of RADIOACTIVE MATERIAL. 10 CFR 20.203(e)
- [ ] F. Containers were not properly labeled to indicate the presence of RADIOACTIVE MATERIAL. 10 CFR 20.203(f)(1) or (f)(2)
- [ ] G. Storage containers were not properly labeled to show the quantity, date of measurement, or kind of radioactive material in the containers. 10 CFR 20.203(f)(4)
- [ ] H. A current copy of 10 CFR 20, a copy of the license, or a copy of the operating procedures was not properly posted or made available. 10 CFR 20.206(b)
- [ ] I. Form AEC-3 was not properly posted. 10 CFR 20.206(c)
- [ ] J. Records of the radiation exposure of individuals were not properly maintained. 10 CFR 20.401(a) or 31.203(b)
- [ ] K. Records of surveys or disposals were not properly maintained. 10 CFR 20.401(b) or 31.303(d)
- [ ] L. Records of receipt, transfer, disposal, export or inventory of licensed material were not properly maintained. 10 CFR 30.41, 40.61 or 70.51
- [ ] M. Records of leak tests were not maintained as prescribed in your license, or 10 CFR 31.105(c).
- [ ] N. Records of inventories were not maintained. 10 CFR 31.106
- [ ] O. Utilization logs were not maintained. 10 CFR 31.107

[redacted]
(AEC Compliance Inspector)

6. LICENSEE'S ACKNOWLEDGMENT

The AEC Compliance Inspector has explained and I understand the items of noncompliance listed above. The items of noncompliance will be corrected within the next 30 days.

(Date) *(Licensee Representative — Title or Position)*

COPIES: [ ] LICENSEE; [V] COMPLIANCE REGION; [ ] DIV. OF LIC. & REG.; [ ] DIV. OF COMPLIANCE

C-1

INSPECTOR: Ernest P. Resner

revised 8/14/64 AEC

BACK-UP FOR CLEAR 591

1. THE TRUSTEES OF COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK AND
INDUSTRIAL REACTOR LABORATORIES, INC.
Plainsboro, New Jersey

2. Date of Inspection: November 5, 6, 7, 1963

3. Type: Reinspection; Announced

4. 20 - 30 - 40 - 70

5. License Nos: 29-3686-2
31-6742-1
SNM-243
SUB-503

Persons Accompanying Inspector:

6. J. Roeder, Radiation Specialist (Supervisory)

Persons Contacted:

7. Mr. R. VanWyck, Manager, Technical Services
Mr. H. Doyle, Health Physics Supervisor
Mr. T. Weeks, Operations Manager
Mrs. L. Hofenmaier, Secretary
Mr. J. Perfine, Radiochemist

Management Interview

8. A summation was held with Mr. R. VanWyck at the conclusion of the inspection. While technical noncompliance was not observed during the inspection it was pointed out certain health physics procedures were less than optimum in that areas originally designated as shoe cover areas were left still marked that way after the need for such areas had been discontinued. Personnel were observed walking through these areas without shoe covers. It was pointed out that health physics coverage was not always available in that personnel had been conducting hazardous operations without a health physics staff member being present. VanWyck stated that he felt they had adequate personnel and perhaps too many.

DETAILS

Inspection History

9. The licensee was last inspected in February 1962. Results of the inspection conducted at that time were:

License No. 29-3682-2 - clear

License No. SNM-243 - clear

C-5305 - no activity under this license

31-6742-1

(a) Failure to leak test at six month intervals.

(b) Failure to report excessive contamination limits.

(c) Failure to properly label containers.

(d) Unauthorized incineration.

(e) Failure to report a class ___ incident

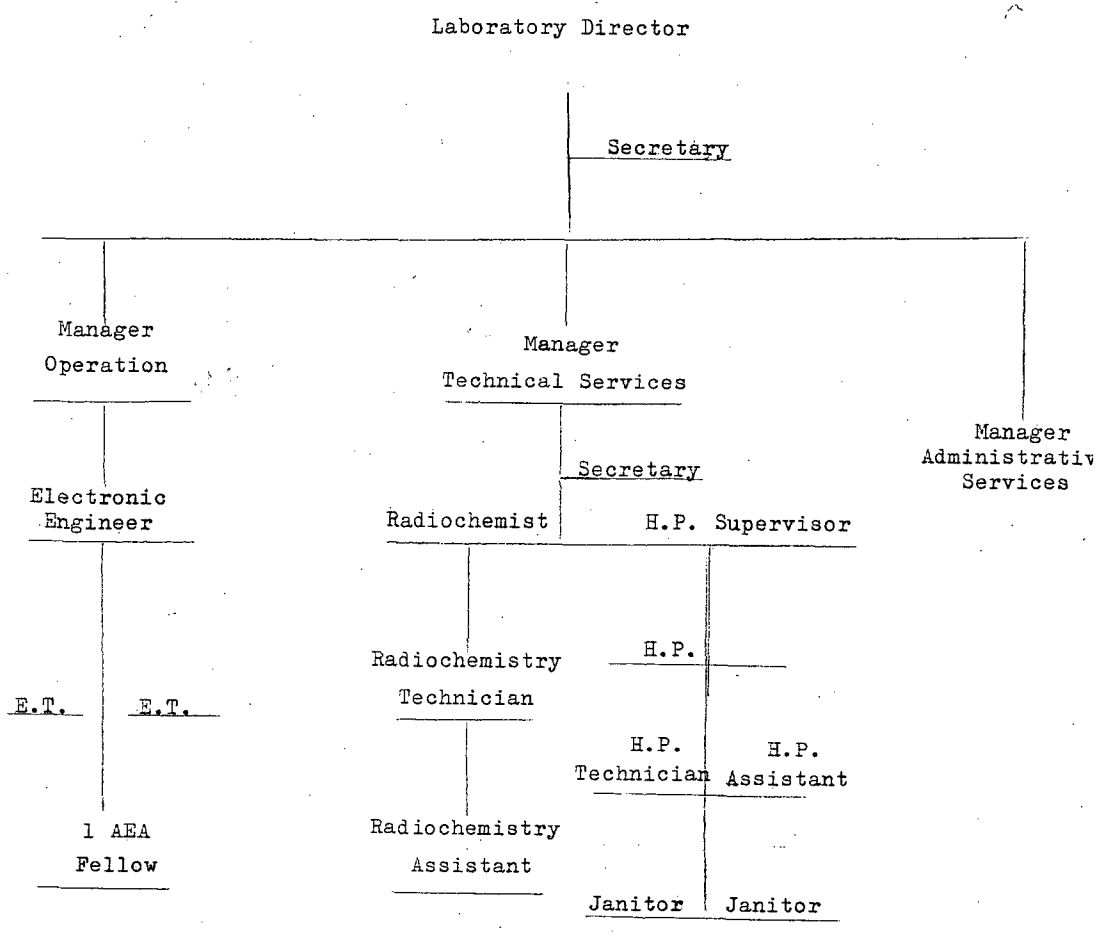
Organization and Administration

10. Since the last inspection in February 1962 the department originally known as the Radiological Services Department has been reclassified as the Technical Services Department. VanWyck stated this department now includes the Health Physics Divisions, the Radiochemistry Division, and the Electronic Instrument Section.

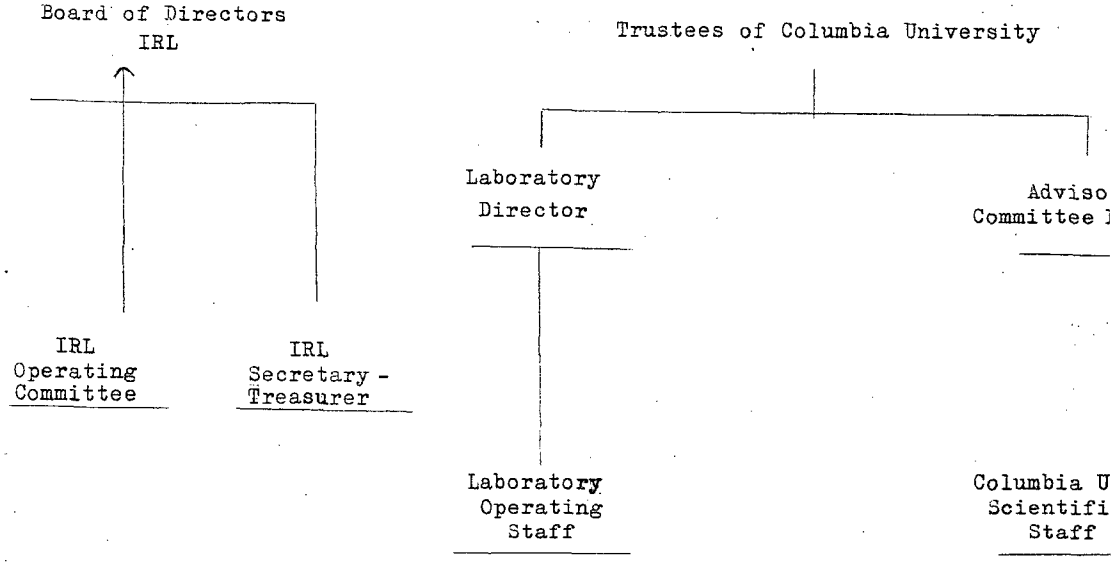
Mr. M. Doyle currently supervises the Health Physics Division ~~at~~ presently composed of an additional health physicist, one health physics technician, one health physics assistant, two janitorial personnel, and one ~~janitor~~ secretary. Plans are now in progress to add one health physics technician to the staff.

At the time of inspection, all offices and laboratory space owned by and/or assigned to the American Tobacco Co. was in the process of being turned over to Rutgers University. According to VanWyck, there are thirty-five collaborating company employees plus fifty IRL staff personnel currently working at IRL.

Present organizational channels are as follows:



VanWyck stated that the IRL Laboratory and Columbia University organizational arrangements were as follows:



Owner companies scientific staff

1. American Machine & Foundry
2. American Tobacco Company ---- Rutgers University
3. Atlas Chemical Co.
4. Continental Can Co., Inc.
5. Corning Glass Works
6. National Lead Co.
7. National Distillers
8. Radio Corp. of America
9. Socony-Mobil Oil Co., Inc.
10. U. S. Rubber Co.

RSO

VanWyck stated that he functions as RSO in addition to his primary duties as Manager, Technical Services. The Radiological Safety Manual described in the February 1962 inspection has been revised, and the current issue now authorized and in use is a February 1963 edition. In answer to the inspector's comment that the manual appeared less than optimum in that it was vague in detail, VanWyck stated that he is currently revising and upgrading the manual. He stated that he had not had time to accomplish this in the three months he had been with IRL.

VanWyck stated that his authority in radiological safety is full and complete stemming directly from the Laboratory Director. According to VanWyck, his approval is required for all new uses, techniques, and/or procedures involving radioactive materials. Additionally, his approval would be required on any design change in equipment and/or laboratory areas.

VanWyck stated that he has recourse to the services and opinions of a consultant at Columbia University should a difference of opinion arise between him and the Laboratory Director.

According to VanWyck, all personnel involved in using radioactive material are given copies of the Radiation Safety Manual, and all personnel are given an indoctrination lecture upon reporting at IRL. A three-hour health physics course is given to groups of IRL personnel at infrequent intervals. VanWyck stated a log is not kept of these lectures.

VanWyck stated a Radiation Emergency Team has been organized at IRL. The membership and functions of this team were stated to be:

Revised Aug., 1963

EMERGENCY EVACUATIONS OF FACILITY

I. Emergency Team

A. Membership

1. The Emergency Team consists of four members, the Head and Deputy Head of the Emergency Team, the Reactor Supervisor in Charge and the Health Physicist in Charge.

2. The Head of the Emergency Team is the Laboratory Director or, in his absence, the most senior individual present at the site who holds one of the following job titles:

1) Manager, Operations Division
2) Manager, Technical Services
3) Reactor Supervisor
4) Reactor Engineer
5) Health Physics Supervisor

Except as other specific seniority listings may be in effect from time to time, the order of job titles given above shall constitute the order of seniority of the individuals holding them.

3. The Deputy Head of the Emergency Team is the second most senior individual on the operating staff who is on the site, determined in the same manner as above. The Reactor Supervisor in Charge and Health Physicist in Charge are functional titles, assigned to named individuals by the Manager, Operations and the Manager, Technical Services, respectively. It is mandatory at all times, whether the reactor is operating or not, that these designations be made and that they be clearly made known to the individuals bearing these functional titles.

B. Criteria for Emergency Team Action

1. A facility evacuation is mandatory for the following situations:

1) High airborne radioactive contamination in the reactor building as indicated by alarm signals from

a) Both portable constant air monitors (or either one if the other is known to be inoperative), or
b) Any one portable constant air monitor in combination with any one ion chamber, i.e., Channels 1, 2, 3, 4, 5, or 8, or
c) The main ventilation exhaust Kanne ion chamber (Channel 6), when alarm is verified visually by Channel 6 panel indicator.

2) High airborne radioactivity in the holdup tank vent as indicated by an alarm signal from Channel 9, the holdup tank vent filter ion chamber.
3) High radiation levels as indicated by alarm signals from any two of the ion chambers, i.e., Channels 1, 2, 3, 4, 5 or 8.

2. A facility evacuation is not required but may be ordered by any one member of the Emergency Team for any of the following situations:

1) High radiation level indicated by any one ion chamber on the reactor remote monitoring system.
2) High airborne radioactivity indication on any one monitor.
3) High fission product activity in primary coolant system as indicated by fission product monitor.

VanWyck stated an emergency call list has been prepared and posted at the main switchboard. The inspector verified that such a list has been posted at the stated point.

APPENDIX A

EMERGENCY CALL LIST

Columbia-IRL Personnel:

1. R. W. Houston
2. T. C. Weeks
3. R. W. Van Wyck
4. R. T. Canfield
5. A. de St. Maurice
6. M. P. Doyle

(b)(6)

Columbia University:

1. John J. Hastings, Dir.-News Office — UNiversity 5-4000, Ext.886. Area Code 2
   or TEaneck 6-8173. Area Code 201

Industrial Reactor Laboratories, Inc.:

1. J. S. Hanks — PEnnington 7-0465
2. Bruce H. Shore, RCA Pub. Rel'ns. Rep. — WAlnut 4-2700 or ADams 3-6441
3. See also Appendix B.

New Jersey State Police — Private Line or WAlnut 4-0620

AEC New York Operations Office,
376 Hudson Street,
New York, 14, New York — YUkon 9-1000

New Jersey Dept. of Health
Radiological Health Program — EXport 2-2131, EXT. 8282 (Operator will furnish number of "on-duty" person after hours.)

IRL Insurance Brokers:
J. J. Black,
c/o Selzer & Mitchell,
2210 Packard Building,
Philadelphia, Pennsylvania — LOcust 4-4589 or (b)(6)

RSC

According to VanWyck, the committee originally designated the Radiological Safety and Isotope Committee is now known as the Radioisotope Committee. The functions of the committee were detailed in the inspection report of February 1962 and a review of the stated functions with VanWyck indicate that committee functions remain essentially the same. At the time of inspection VanWyck offered the following names as committee members:

Dr. R. V. Houston, Laboratory Director

Mr. R. VanWyck, Manager, Technical Services

Mr. J. R. Pelrine, Head, Radiochemistry Section

Mr. M. Doyle, Head, Health Physics Section

Mr. J. Hanks, Treasurer, IRL

According to VanWyck, the committee meets at regularly held formal meetings, and that written records are maintained of these meetings. Informal consultations are held on as necessary basis. VanWyck stated that the committee reviews and approves all new procedures, techniques, and uses of radioactive materials.

Health Physics Incidents

A review of the incident report file back to the last inspection in February 1962 was made by J. R. Roeder, Radiation Specialist (Supervisory, CO:I. Distribution of the incident report was noted to be:

2 - Manager, Technical Services

" , Laboratory Director

3 - Manager, Administrative Services

4 - Area Supervisor

10/28/63 - (1300) - Handling tool transported from Hot Cell 3 to Hot Cell 1 found contaminated to 25,000 dpm - last operating time in Cell 1 - 3 hours - cell and tool cleaned up.

Recommended Corrective Action -

Material removed Hot Cell 3 will be checked by health physics.

8/5/63 (1615) - Glass volumetric flask discovered unstopped and unlabeled on sink drain in RCA lab. Dose rate from flask 20 mr/hr at 2". Supervisor notified - flask stopped, labeled and shielded.

Recommended Corrective Action -

Administrative control to prevent recurrence.

3/21/63 (1000) -Floor contamination under Horizontal Beam Tube No. 3 (HBe) - work being done by Socony. Water also noted on wall above HB3. Water came from air - water check valve in vent line for HB2 - wall read approximately 200 mr/hr - contamination level on floor up to 7000 dpm. Area eventually cleaned up - traced to leaky air - water check valve - area ropped off and posted during and before clean ups - CAM a few feet from the area did not alarm.

Recommended Corrective Action -

Check valve will be checked for leakage.

3/19/63 (1630) -Slow ~~inoper~~evapo ration of Cs-137 solution in decontamination hood caused a rise from 500 cpm to 2500 cpm on CAM in 20 minutes. Filter removed and activity identified by RIDL as Cs-137. Low level activity detected on floor - area isolated and cleaned up by 1830. Bioassay samples taken from persons involved.

NOTE: Inspector's review of bioassay results showed 0.3 c/pm/liter for involved individuals.

Recommended Corrective Action -

No ~~inoper~~evapo ration of high level solutions without special precautions.

1/17/63 (1600) - No radiation incident.

12/19/62 (1345) -Reactor personnel gave contaminated tools in plastic bag to machine shop personnel. Tools contaminated up to 1000 dpm. South portal monitor alarmed as tools were carried through. Tools decontaminated.

Recommended Corrective Action -

Tools will be checked before transfer to a cold area - memo sent out on this subject.

11/1/62 (1045) -Spread of contamination around HB6 due to withdrawal of specimen attached to long aluminum wire both of which were highly contaminated. 10,000 dpm on table, 3,000 dpm on floor. Contaminants identified as Na-24, Cu-64, Zn-65. Area established as a "Double Shoe Cover Area" - area cleaned and decontaminated in a short time.

Recommended Corrective Action -

Future withdrawals will be in plastic bags.

7/18/62 (0900) -Contamination in RCA Laboratory from In-114 and Ge-71. 200 dpm in halls to 1,000 dpm on lab floor. Sink and hood 115,000 dpm, hot plate 100,000 dpm. Area cleaned and hot plate disposed of.

Recommended Corrective Action -

Greater care in hanlding procedures.

4/6/62 (1600) - Pool water leaked into pneumatic rabbit tube at reactor first level. Na-24 contaminant in water. Some water splashed on floor. Area isolated, posted and decontaminated.

Recommended Corrective Action -

Rectify water problem.

5/3/62 (1700)- Failure of valve to seat properly in the line form
5/4/62 (0830) HX to pool - leakage of water into section under repair - added pressure caused by DM being turned on overnight, forcing water past the valve and through an open section and open vent valve onto the pump

room floor. Water filled hot sump and overflowed into closed sump. Hot sump high levels water alarm was inoperative and approximately 2400 gallons of pool water was discharged to [redacted] berm from [redacted] cold sump before decaying in morning. Activity was determined to be 9×10^{-7} uc/cc.

Recommended Corrective Action -

Fixed valve and alarms.

All of the above incidents are internal problems in engineering and health physics. It again indicates that health physics control procedures are less than optimum even while being in technical compliance with regulations.

Facilities

According to VanWyck, there has been no significant changes in the facilities at IRL. A discussion with Mr. T. Weeks, Operations Manager, revealed that design changes to upgrade operational facilities in the hot cells had been accomplished. These changes were stated to be:

Installation of a stacked baryites concrete block wall 3' thick between Hot Cells 2 and 3.

Installation of a radiation level interlock - at levels above 50 mr/hr and less than 2 mr/hr the hot cells can not be entered.

Installation of magnahelic gages to give visual presentation of air pressures within the cells.

Installation of a one-ton hoist in Hot Cell No. 3.

Installation of a monorail hoist in Cells 1 and 2.

Installation of storage wells in Cells 1 and 2.

Removal of the air conditioning supply system to the hot cells to prevent positive pressures being produced.

Weeks stated they are planning to install an air monitoring system from each hot cell using a CAM. According to Weeks, the money for

this has been budgeted and installation will be accomplished in the near future. This system was requested by M. Doyle, Health Physicist. At the current inspection it was noted that the curiage of Co-60 utilized in the hot cells had been increased to 2000 c in Cell 2 and 5000 c in Cell 1. A review of survey records by the inspector indicated that dose rates up to 500 mr/hr at 1.5 inches from the floor above the hot cells had been measured with an ionization chamber. It was noted that the licensee has laid lead bricks on the floor above the hot cell and reduced the radiation levels to less than 5 mr/hr. According to T. Weeks the excessive levels are caused by beaming through the air conditioning ducts. The area above the hot cells is known as the "penthouse" and is not normally occupied, and never occupied without health physics authorization according to Doyle. This entire area contains the ventilation filters and exhaust duct work from the laboratories. The inspector noted that the area immediately above the hot cells is roped off, and marked by CRA signs with standard symbol.

Weeks stated that he is planning to again increase the curiage of Co-60 in the hot cells and felt that it would be appropriate to fill in the air conditioning ducts which penetrate the overhead of the hot cells with shielding material. He stated this would be a relatively simple operation to accomplish and Mr. Doyle stated that he strongly urged that it be done.

Handling Procedures (Hot Cells)

According to Weeks, only Cell 3 is used for "hot" work and it is this cell to which irradiated specimens removed from the reactor are transported to be decanned and prepared for use. The aluminum cans on the irradiated specimens become activated and are removed by dropped through an opening in the hot cell to an area under the hot cell. The cans drop via a tube to a 55-gallon drum. The drop system is completely sealed by plastic to the drum. Doyle stated this had been done to prevent any activity leaking should irradiated

material other than aluminum cans be dropped. According to Doyle, dose rates up to 1.5 r/hr at one meter have been measured from the 55-gallon drum, although this dose rate diminishes very quickly because of the short half-life of the aluminum. According to Doyle there have been no accidents with this system to date. According to Weeks the present scope of work is approximately 100 mc per week being handled in the hot cell.

Handling Procedures (Laboratories)

According to Doyle, all procedures involving the use of radioactive material by collaborating companies are first reviewed and approved when appropriate. Once a procedure has been approved, a member of the health physics department will monitor the operation on an as necessary basis to ensure that the approved procedures are followed. Local monitoring is carried out by individuals using radioactive material in accordance with the procedures approved by health physics.

The inspector visited all laboratories and discussed the work being carried out. In general, the inspector noted that the scope of activity was rather limited. Most laboratories use only trace amounts of radioisotopes, few have possession of millicurie amounts. All laboratory personnel were observed to be wearing laboratory coats and film badges. One operator using trace amounts of I-131 was observed to be wearing rubber gloves.

According to Doyle, all standard "good" practice is observed at IRL. Such things as pipetting by mouth, eating, drinking and smoking in laboratories are never allowed. All radioactive material not in use is kept in shielded storage containers, and "hot" material is handled and/or used inside hoods. Doyle stated that air flow in hoods is checked on a monthly basis and a visual inspection revealed that only one hood had not been checked within a one-month period.

According to Doyle, transportation of radioactive material from and to the reactor, and from and to IRL is strictly controlled by health physics,; however, upon the inspector pointing out that their written procedures did not provide for control of inter-laboratory transfers he stated that this would be corrected in the manual currently being revised.

VanWyck stated that the laboratory maintains a file listing the training and qualifications of all individuals handling radio-active material. A summary is maintained on file which shows the person's name, badge number, and whether the individual is authorized to work with supervision, without supervision, and also whether he has not been approved. A review of the licensee's current list showed that:

33 are approved to work without supervision

27 are approved to work with supervision

24 are not approved

Surveys and Survey Procedures

A review of the licensee's current Radiation Safety Manual indicates that specific procedures for carrying out dose rate, air activity, and contamination surveys are not outlined in any way. Primary emphasis on radiation control has been placed on the laboratory and reactor operating personnel. However, the IRL health physics staff does carry out surveys on a scheduled basis. According to Doyle the following survey plan is in effect:

Contamination Surveys

(1) Daily swipe survey at 0730 hours - forty-four (44) swipes are taken throughout the entire facility with particular emphasis on access areas and passageways.

(2) Daily swipe survey at 14 stations, one swipe at each station, covers entire dome and pumproom.

(3) Daily swipe survey at 7 stations, one swipe at each station, covers all hot cells and high level lab.

(4) Daily swipe survey, spot check, 5 stations, covers strategic locations in facilities, corridors and lobby.

(5) Daily swipe survey - 12 stations, covers thorofares and floors.

(6) Daily swipe survey in laboratories, 6 swipes per lab, one lab per day.

(7) Monthly swipe survey is 35 stations, one swipe per survey, covers entire facility.

Special swipe surveys are made in an as necessary basis.

Air Activity Surveys

(1) An air activity sampling program is carried out on a routine weekly basis. Twenty-one air sampling stations are included. These stations sample air from laboratories, water dome, hot cells, etc., on a continual basis. Filters from these stations are removed on a weekly basis and a gross beta activity determination made, if high activity is found the samples are programmed for a radionuclide identification on the RIDL.

(2) One constant air monitor at the gate house is operated primarily for environmental estimations. To date, Doyle stated this station has seen only fallout and reactor-produced activities have not been idenfified. The filter from this unit pulled and analyzed on a weekly basis.

(3) The filter on a constant air monitor at the reactor operating area is evaluated during reactor shutdown on weekends.

(4) Other air sampling is carried out as follows:

5 CAMS - one in laboratory wing corridor
one on main floor of reactor
one on the floor of reactor
one in high level laboratory

According to Doyle a sensitivity of 5×10^{-10} uc/cc for short-lived particulate activity is attained by these units.

Doyle stated that grab air sampling is carried out on as necessary basis.

Dose Rate Surveys

According to Doyle the following dose rate surveys are carried out on schedule basis:

(1) Daily dose rate surveys at main floor in reactor building whenever the reactor is critical (a map showing the dose rates in this area is kept posted in the reactor control room).

(2) Daily dose rate surveys in laboratory wing at the end of each day, anything above 2.5 mr/hr is tagged.

(3) Other areas are surveyed for dose rates upon request, and/or on an as necessary basis.

General

The results of all surveys conducted by health physics are recorded in the counting room records, the health physics log, and/or, other journals and ledgers where and when appropriate. These records were renewed by the inspector and discrepancies were not noted.

Environmental Surveys

Air Samples

One CAM is located at the gate house and as previously noted under "Surveys" the filter from this unit is evaluated on a weekly basis. Analysis is for LLC only. Records show that average activity has been established to be 5.8×10^{-12} uc/cc with Ce-141, Ru-103, Zn-65, Nb-95 and Ce-144 as significant isotopes.

Water Samples

According to Doyle, daily water samples are obtained at a stream which is east of the site about 0.5 miles distance. One sample is obtained upstream and the other downstream. These samples are measured for gross beta-gamma activity, with a procedure

calling for a gamma spectogram on high activity samples. To date, Doyle stated they have never had to gamma scan these samples.

Rain Samples

Doyle stated the IRL program calls for an analysis of each atmospheric precipitative, analysis is for gross beta-gamma and a gamma scan. Doyle stated they did not use an ion exchange process for precipitation samples but only evaporated 500 ml to 2 ml for sample preparation.

Berm

According to Doyle a 500 ml sample is obtained from the Berm once each week. This sample is checked for gross beta-gamma activity, and according to Doyle has never exceeded 1×10^{-8} uc/cc. Doyle stated that this activity had been determined to originate primarily from fallout. Gamma scan on large volume sample reduced to 2 ml.

Clear Waste Water

This waste is clean waste discharged to berm area and does not include "hot" waste. Sampling from this discharge line is continuous and a weekly sample (500 ml) is analyzed from the integrated weekly sample. According to Doyle, significant activity from this point has never been detected.

Vegetation

Doyle stated that vegetation samples are collected on site and offsite semi-annually. Samples are dried, ashed, and measured for gross beta- gamma activity plus a radionuclide scan of samples should the activity be high enough to permit this procedure. No significant activity noted to date.

Potable Water

According to Doyle, the facility's potable water is checked for contamination twice each month.

Complete records are kept of data accumulated by the environmental survey program. These records were spot checked by the inspector with no discrepancies noted.

Dose Rate

These environmental radiation level monitors are located 800 feet distance from the reactor dome at a 120° angle from each other. These units are set to alarm at one mr/hr with audio and visual readout in the health physics office.

Personnel Monitoring

Film Badges

At the time of the inspection the licensee was employing the services of the Atomic Film Badge Corp. for film badge services. Doyle stated that the service is on a monthly basis and that wrist and finger badges are available for use. Upon question, Doyle stated that IRL had an arrangement whereby they would be notified by phone upon excessive film badge exposures. Neither Doyle nor VanWyck knew the radiation level at which telephonic notification was required. Doyle stated that Mrs. Hofenmaier handled the routine film badge program but she was also unaware of this level.

Mrs. Hofenmaier stated that she handled the submission of exposed film to the contractor and the recording of film badge results. Upon request she produced film badge reports back to February 1962. A review of these reports indicated that the licensee has been operating well within the 1250 mrem quarterly limit. The licensee maintains a modified AEC Form 4 5 which satisfies Commission requirements.

Upon question, Doyle stated the film badges are located in three locations. One in the IRL staff wing, one in the participating company wing, and one in the lobby adjacent to the receptionist. Doyle stated that except for visitors they do not have positive

control over film badges in that personnel are personally responsible for leaving the film badge in the racks when leaving the facility, and again, no positive control to ensure that laboratory personnel picked up their badges when going to work. Doyle stated that he and his staff informally check on laboratory workers to see if they are wearing monitoring devices.

Doyle stated that he had sent in "spiked" films to the contractor and had obtained good results. According to Doyle, NTA film is used in badges issued to all ~~Radiac~~ Reactor personnel plus any individual who will be using a neutron source, and/or be possibly subject to a neutron exposure. He stated that they do not use a beta-gamma exposure level as a ~~curtain~~ criteria for developing the NTA film, instead all NTA film that has been issued is sent for porcessing. Doyle stated thqt two control films are kept at each rack and these are sent in with each processing batch. Additionally, Doyle uses films for area monitoring, none of which reportedly have been significant.

The inspectors were issued a film badge and self-reading dosimeter upon arrival at IRL and Doyle stated this is routinely done. A review of the IRL procedure manual indicated that film badges are re-issued to visitors if their dosimeter indicates no exposure. According to Doyle this procedure is followed, and that the statement that a 50 mrem reading on the visitor's dosimeter would require an investigation. To date, this has not occurred.

Dosimeters

Staff

According to Doyle, two indirect reading pencil chambers are issued to each worker who is under the personnel monitoring program. The pencils are kept in the same badge rack where the worker's film badges are located. Responsibility of the wearing of these devices devolves upon the individual although the health physics staff informally checks at infrequent intervals to see if they are being worn. As in the case of film badges there is no positive control over these devices. Doyle stated that the pencils

are read and required each day prior to the arrival of laboratory personnel. Doyle explained that a health physics staff member comes in early specifically to do this and to carry out certain surveys. Doyle maintains records of dosimeter readings.

Visitors

According to Doyle, each visitor to IRL is issued a self-reading pocket dosimeter and the inspectors each received one upon arrival at IRL.

General

Upon question, Doyle stated that pencil chambers and dosimeters are not routinely checked for operational stability. He stated that leak tests, drift tests, etc., would be carried out when excessive readings were obtained on these devices. According to Doyle, calibration factors have not been established for these devices but added they are required to be within 20% accuracy.

Bioassay

A review of the bioassay procedures stipulated in the licensee's health physics manual was made and Doyle stated that these procedures are carried out as stated, that is, routine annual assays, and special assays upon suspected or known internal exposures. A review of the bioassay results back to February 1962 indicated that results were well within available limits, most results were noted to be around 0.3 dpm/liter.

Training Programs

According to Doyle, all records of training courses and lectures attended by laboratory personnel are recorded in the individual's personnel folder. According to Doyle, only the indoctrination lecture is given regularly to new personnel, the three-hour

lecture is given at specified intervals when sufficient personnel are available.

Doyle stated that the only additional training given at IRL is to reactor operators. He stated that he has given 3½ days of health physics lecture time to ~~light~~ licensed reactor operators since last July. — ?

Inventory

According to Doyle, the licensee maintains a running inventory on all radioisotopes. A log is maintained by the Manager, Technical Services, which shows procurements, receipts, and issues. Additionally, a physical inventory is conducted on a monthly basis by the radiochemist, Mr. J. R. Perline.

Perline stated that on a monthly basis he visits each laboratory and makes a sight inventory and then prepares a report. These reports include byproduct, source, and special nuclear materials. A sample report for the month of September is attached to these notes. A review of procurements and inventory records did not reveal any item of noncompliance.

Leak Testing

The inspector examined in detail the sealed source leak test records maintained by the licensee. Leak test records were cross checked against inventory records. In all cases, sealed sources have been leak tested within appropriate intervals. The licensee has followed the provisions of the license and the amendments thereto. No discrepancies were noted in that leak test intervals were correct, results are reported in units of microcuries.

Procurement

VanWyck stated that he personally approves all requests for procurement and they are reviewed by him for license compliance. Upon

question, Doyle stated that the receiving room personnel have been briefed on the handling of radioactive shipments, but this has been orally only, written instructions have not been issued.

The detailed procedures reported in the inspection report of February 1962 and reviewed with VanWyck who stated that these procedures are still in effect.

Waste Disposal

Liquid and Solid

The licensee maintains complete records of waste disposal. A review of these records indicate that the following amounts have been disposed of since the last inspection in February 1962.

To Berm	Vol.	Avg. Activity
1962	144,000 gallons	1.7×10^{-8} uc/cc
1963	108,000 gallons	5.5×10^{-9} uc/cc

(Up to Oct. 1963)

No significant radionuclide activity.

To Nuclear Science and Engineering

8/22/62 3,300 gallons sludge concentrate - this total covers entire amount for the year 1962 - total activity:

H-3	60 mc	Co-60	20 mc
C-14	5 mc	Zn-65	40 mc
Fe-55	1 mc	Ni-95	0.2 mc
Co-58	30 mc	Cr-57	5.0 mc
Fe-59	1 mc		

For the year 1963, sludge disposal has not transpired and as of October 30, 1963, Doyle stated there were 2650 gallons of sludge in the blowdown tank.

According to Doyle, all radioactive solid waste has been transferred to NEC and incineration has not been done.

The detailed waste disposal procedures and details of the waste disposal system as reported in the inspection report of February 1962 were determined to be essentially the same during the current inspection.

Airborne

The licensee has compiled complete records showing air activities at all points of interest for the following periods:

January 1, 1962 to June 30, 1962
June 30, 1962 to December 31, 1962
January 1, 1962 to June 30, 1963

These reports are appended to these notes.

Leaking Reactor Startup Sources

The licensee advised the Commission on 8/20/62 that the ORNL neutron source SB-be-2 (source no. 3) showed 0.71 uc of removable contamination upon removal from the reactor and that it was being investigated and that the source had been placed in storage. The Commission advised the licensee by letter on 10/4/62 that they would be advised should further information be required. On 10/5/62, CO:HQ requested CO:I to advise what inquiry would be made. On 10/17/62, this office contacted the Laboratory Director and determined that the source in question had been decontaminated down to .003 uc and that the contamination was due to ~~indirect~~ induced activity in the stainless steel cladding. It was also learned that the licensee had requested a clarification of leak test requirements on this type of source. On 10/19/62, the Commission advised the licensee by letter that the subject sources need not be removed from the reactor in order to carry out leak tests, but that in the event of contamination exceeding .005 uc, it would be necessary to submit additional information.

On 11/30/62, the licensee advised the Commission that another source SB-be-2 (source no. 2) showed contamination in excess of .005 uc and that it had been placed in storage to await action on their request for license amendments. On 1/4/63, the Commission again notified the licensee that if further information was required, they would be so informed. On 1/7/63, CO:HQ requested CO:I as to what action if any was planned in this matter. On 4/19/63, CO:I advised CO:HQ that the matter would be reviewed during the next regular inspection.

On 11/30/62, the licensee received amendment 14F(ii) to 31-6742-1 authorizing the licensee to use the subject sources with contamination up to 0.1xx uc.

On 10/30/63 the licensee advised the Commission that SB-be-2 (source no. 3) had been removed from the reactor after 8 months and found to have 0.15 uc of contamination which was subsequently decontaminated down to 0.021 uc.

During the current inspection the leak test procedures were reviewed with Mr. Perline and found to be adequate and in accordance with their stated procedures. The inspector determined that the licensee has not been in noncompliance with license conditions.

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SUB- 303 -

This license authorizes 600 lbs of Uranium. It was determined that this material is returned in storage. The material has not been used according to Van Wyck. It was noted to be stored with caution radioactive material type and standard symbol.