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San Francisco Operations Office

March 11, 1959

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NUCLEAR ENGINEERING COMPANY, INC., WALNUT CREEK, CALIFORNIA  
COMPLAINT OF ILLEGAL AND UNFAIR PRACTICES IN DISPOSAL OF  
RADIOACTIVE LIQUID WASTE

SYMBOL: 1:JCC

Reference is made to my memorandum to you dated February 6, 1959 regarding allegations of "illegal" and unfair practices in disposal of radioactive liquid waste by Isotopes Specialties Company,\* Burbank, California.

The allegations in the form of a complaint were made by Mr. Terry Hufft, General Manager, Nuclear Engineering Company, Inc.,\*\* Walnut Creek, California and are as follows:

- a. IE has transported large quantities of liquid waste in bulk form in single containers from Atomics International,\*\*\* Canoga Park, California.
- b. The liquid waste is being disposed of by flushing it down the sewer.
- c. This method of packaging and disposal places NRC in an unfavorable bidding position.

With reference to "a" supra, Mr. Hufft stated that ICC regulations with reference to packaging and transportation of liquid waste of this level require an outer container which meets ICC standards, with an inner container surrounded with sufficient absorbent material to completely absorb the amount of liquid in the inner container in the event of a leak, or a specially constructed tank truck approved by the Bureau of Explosives. (Mr. Hufft was apparently of the opinion that all AEC-licensed waste disposal services were required as a part of their license to comply with ICC regulations even though the shipment was intrastate.)

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\* Hereinafter referred to as IE  
\*\* " " " " HEC  
\*\*\* " " " " AI

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With reference to "b" supra, Mr. Hufft stated that in his opinion a waste disposal service is not authorized to dispose of mixed fission products by the sewer.

With reference to "c" supra, Mr. Hufft stated that his firm's license requires it to follow ICC regulations with reference to packaging and transportation of waste even though the shipment is intrastate and to dispose of it by burial at sea. He stated that his firm is placed in an untenable position in bidding against waste disposal services who are allowed to transport and dispose of liquid waste in the manner being used by IS.

He advised that his firm has received a letter from AI dated January 29, 1959 requesting a quotation for disposing of 6,000 gallons of liquid waste. The body of the letter, which was signed by L. E. Barryhill, Mayor, is quoted below:

"Please quote price per gallon for disposing of 6,000 gallons of liquid waste of 0.3 microcurie per cc mixed fission products. The material is located at the Santa Susana reactor site. It is in bulk storage tank."

"Please state whether you can accept the liquid in bulk and transfer to a tank truck or whether it must be contained in steel drums."

Mr. Hufft stated that to reduce this material to the permissible level to haul it by tank truck it would have to be diluted with water on a 30 to 1 ratio.

Mr. Hufft stated that his firm intends to submit a bid on removal by tank truck but that they will be bidding on an unequal basis with anyone bidding on removal in bulk in drums.

Mr. Jimmy C. Lang, Supervisor of Health Physics, Technical Service Group, Health Physics, AI, and Mr. Robert E. Alexander, Engineer, Health Engineering Staff of the Technical Services Group, were interviewed by Mr. S. L. Casalino and the writer, at which time they furnished the following technical information.

The liquid waste delivered to IS was comprised primarily of fuel element and irradiated slug washings. These washings took place in the hot cell which is tied into the SSE conduit to a common 10,000-gallon sump. The Vanowen facility accumulated 603 gallons of similar liquid waste. The waste of both facilities was

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analyzed and then pumped into 50-gallon drums (a total of 148 drums). The results of the analysis were as follows:

$1 \times 10^{-6}$ microcuries/cubic centimeters cesium	
$4 \times 10^{-6}$ " " " ruthenium	
$1 \times 10^{-6}$ " " " zirconium-niobium	

2. Integrated gamma count of  $8.4 \times 10^{-6}$  microcuries/cubic centimeters.

3. Gamma beta activity is  $2.3 \times 10^{-6}$  microcuries/cubic centimeters.

The above liquid waste was picked up by IS on August 15, 1958.

Mr. Long presented the discussion of AI's liquid waste contract by stating company's philosophy regarding the release of radioactive materials to the environment. The feeling among the radiation safety people is that no radioactive materials should be released via stack, burial or the sanitary sewer. Mr. Long indicated that this philosophy is not altogether attractive since there is also the fear of criticism by local health departments or homeowners associations. Until the early part of August 1958, all liquid waste at AI was solidified and delivered to the Navy for burial at sea. Since that time this company has felt it more prudent to contract with a licensed waste disposal company for the pick-up of its waste.

With regard to the previously mentioned 6,000 gallons of waste on which AI is seeking bids, the concentration is considerably higher than that picked up by IS ( $3 \times 10^{-1}$  microcuries/cubic centimeters as compared with  $1 \times 10^{-6}$  microcuries/cubic centimeters).

Mr. Phillip Gill, Vice President, and Mr. Richard Donelson, Engineer (in charge of waste disposal), IS, were interviewed jointly, at which time they furnished the following information.

Mr. Donelson stated that thirty (30) drums of liquid waste collected from AI were treated (by passage through an ion exchange resin) and then disposed of down the sanitary sewer. He advised that the remaining drums of waste are in storage. The data which he presented are as follows:

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- a. Waste received from AI analyzed at  $1 \times 10^{-5}$  microcuries/cubic centimeters;
- b. Reduced to  $1.8 \times 10^{-5}$  by ion exchange column;
- c. Committed the thirty barrels of waste, over a two-month period, with a total of 850,000 gallons.
- d. Calculation: thirty drums averaging  $1.8 \times 10^{-6}$  microcuries/cubic centimeters  
 $(30) (55) (3.785 \times 10^3) = 6.25 \times 10^6$  cubic centimeters  
 $(1.8) (6.25) = 11.25$  microcuries (Total)  
 two months water consumption at IS =  
 $120,000$  cubic feet =  $3.4 \times 10^9$  cubic centimeters  
 Average concentration to sewer =  
 $3 \times 10^{-9}$  microcuries/cubic centimeters

Mr. Gill stated that in their attempt to comply with 10 CFR 20 they became confused with the various sections concerned with waste disposal. Mr. Gill pointed out that 20.103 allows a licensee to dispose of mixed fission product waste with concentrations of  $1 \times 10^{-7}$  microcuries/cubic centimeters into water which could be used for drinking water. However, 20.103(d) states that provisions of 20.103 are not applicable to sanitary sewerage systems.

Section 20.303 addresses itself only to Appendix "B," Table I, which excludes mixed beta or gamma emitters of undetermined mixtures.

Mr. Gill stated that he could not see the logic of allowing fission products to be disposed of into a lake while excluding them from a sanitary sewer. He further said that IS attempted to comply by (a) keeping the concentrations of the liquid waste below the  $1 \times 10^{-7}$  by ion exchange treatment and dilution; (b) not dumping more than ten times the quantity of material in Appendix "B" by averaging the normal dilution over a two-month period; and (c) not exceeding the one curie/year gross quantity by disposing none of their own active waste via the sanitary sewer.

License No. 4-520-3 dated September 27, 1956 was in effect at the time the liquid waste was transported (August 19, 1958). This license authorizes:

1. Collection of byproduct and source material from AEC-licensed users.
2. Preparation for disposal (includes storage).
3. Disposal of byproduct and source material. See No. 11 for condition of disposal."

Item 11 regarding the condition of disposal states:

- "11. The licensee shall notify the Isotopes Extension, AEC, of the location of the disposal site at least ten days prior to each disposal event."

Item 13 of the license states:

- "13. Service to be performed in accordance with Application No. 4-530-3 and related correspondence which includes:
  - (a) Authorization No. 37823;
  - (b) Letter A. M. Goldstein to J. H. Machurek dated October 13, 1955;
  - (c) Letter A. M. Goldstein to J. H. Machurek dated November 28, 1955;
  - (d) Letter A. M. Goldstein to L. R. Rogers dated August 23, 1956;
  - (e) Letter A. M. Goldstein to L. R. Rogers dated September 13, 1956."

Review of the referenced material plus all other material in the license file located in the Inspection Division, SAE, discloses that packaging of liquid waste to be transported by the licensee when picked up at the customers and the transportation to his storage facility is not specifically covered. However, the letter dated October 13, 1955 referred to above states that it would limit radiation emanating from the containers picked up by them to "levels set by the ICC." Review of the material did not indicate any method of disposal other than at sea.



The licensee's file contains a copy of Administrative Procedures dated December 2, 1957. Items of these procedures are the procedures for waste disposal. Item 4 of the procedures is attached as Exhibit A.

The file contains a letter dated December 23, 1957 from Mr. James J. Ritch, Assistant Chief, Byproduct Licensing, Isotopes Extension, Division of Civilian Application, numbered Paragraph 5, which states:

"You will recall during our conversation of December 16, 1957, we discussed portions (i.e., 4a(2), 4b(4), etc.) of your administrative procedures dated December 2, 1957, in relation to various portions of "Standards for Protection Against Radiation" (10 CFR 20) and Interstate Commerce Commission's (ICC) regulations regarding the transportation of radioactive material. As previously pointed out during our discussion, all licensees shall comply with the provisions of 10 CFR 20 unless specified otherwise under the conditions of their licenses. Also in the event transportation of radioactive materials will not be in compliance with ICC regulations, a waiver to this effect should be obtained from the appropriate agency such as ICC and/or Bureau of Explosives.

A Byproduct and Source Material License No. 4-580-6 (Decket No. 27-7) authorizing Isotopes Specialties Company, Inc. to "receive, possess, package and dispose of waste byproduct and source material in the Pacific Ocean" was issued August 21, 1953 and terminates License No. 4-580-3. This license was in effect at the time of the disposal of the thirty drums of waste.

The license states that "This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to the provisions of 10 CFR Part 20, "Standards for Protection Against Radiation," and all other applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to the following conditions:"

Eight conditions are made a part of the license. Condition 4 references the application dated December 2, 1957 "and attachments thereto." Condition 5 refers to a copy of Administrative Procedures dated December 2, 1957 attached to the application. Condition 6

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provides for notification prior to each disposal and appears to only contemplate disposal at sea. Conditions 4 through 6 are quoted below:

- "4. The licensee shall receive, possess, package, and dispose of the byproduct and source material in accordance with procedures described in his application dated December 2, 1957, and attachments thereto, except as provided otherwise in this license."
- "5. A copy of the administrative procedures, attached to the application dated December 2, 1957, shall be supplied to each of the licensee's employees who are involved in the receipt, possession, packaging and disposal of the byproduct and source materials."
- "6. The licensee shall notify the Chief, Isotopes Branch, Division of Licensing and Regulation, Atomic Energy Commission, by letter deposited in the United States mail properly stamped and addressed, at least 20 days prior to each disposal, of the proposed date for disposal, the proposed disposal location in latitude and longitude, the total number of containers, the total activity of the byproduct material in millicuries, and/or total weight of source material, and the most hazardous radioisotope in each container."

Item 4 of the Administrative Procedures dated December 2, 1957 sets out the procedures for waste disposal (see Exhibit "A" previously introduced).

From a review of Exhibit "A," it may be noted that Item 4a(2) discusses disposal of liquid waste of Isotopes Specialties Company by the sewer but that this method of disposal is not discussed under Item 4b, which discusses waste received from customers.

Mr. Gill stated that Item 4b(1), (2) and (3) of the Administrative Procedures was intended to apply to waste delivered to his plant by customers and that Item 4b(4) through (9) was intended to apply to waste picked up at the customers and transported by IS.

Mr. Gill stated that his firm had rented a truck with driver from Barton Truck and Transfer Company, 5333 Southern Avenue, South Gate, California, to haul the liquid waste and that a health

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physicist from his firm had accompanied the shipments. He exhibited form Shipping Order and Freight Bill numbered 26313 and 16401, both dated August 19, 1958 covering the shipment.

He stated that he did not know whether or not ICC regulations with reference to packaging required an inner and outer container with sufficient absorbent material to completely absorb the amount of liquid in the inner container to transport radioactive liquid waste in the concentration of that hauled from AI on August 19, 1958. He advised that he had inquired of local ICC officials regarding permissible concentrations for transport in single drums but had never been able to get an answer.

Mr. Gill pointed out the first sentence, Item 4b(4), which states "waste material is to be packaged according to ICC regulations, if possible." He said that in his opinion he felt that this provision would permit his firm to haul the liquid waste in bulk in single containers since it would not be practical to place the 55-gallon drums surrounded with the necessary absorbent material in an outer container.

Mr. Caselina prepared the technical data set out in this memorandum and has reviewed the memorandum and concurs therein.

Enclosure:

Item 4 of Administrative Procedures  
dated December 2, 1957

cc: E. D. Johnson, Assistant Director,  
Investigations, Division of  
Inspection, Headquarters



- b. C-14, S-35, and H-3 in less than curie quantities may be stored in properly posted storage cabinets or drawers or refrigerator in C-14 lab. Residues or intermediates containing these nuclides may be temporarily stored on bench tops pending further processing or disposal. Multi-curie quantities of tritium or tritiated materials which are volatile shall be conceivably exchange with moisture in the atmosphere, and shall be stored in sealed ampules or break seals which shall be immediately labeled and stored in the tritium hood. Quantities of tritium gas exceeding fifty curies will be stored as the metal hydride or other suitable metal hydride in a sealed container.
- c. Sealed sources may be stored in shipping or use areas in suitable marked containers with sufficient shielding so that radiation 1 foot from container is not more than 6 mR/hr.
- d. Millicurie quantities of sealed sources frequently used may be stored in auxiliary properly marked shields in hood or on bench in Hot Lab. Bottles containing solutions must be capped immediately after each use. Shielding must be such that background is not increased by more than 6 mR/hr at 1 foot from shield.
- e. Sub microcurie level sources used for instrument calibration or other purposes may be stored near place of use out of Hot area.
- f. Outgoing radioactive shipments may be left at shipping table from time of packing until time of pickup but not more than 48 hours. Incoming radioactive shipments may be left at shipping table from time of receipt until convenient time for transfer but not more than 48 hours.

#### 4. Waste Disposal

##### a. Isotopes Specialties Company Waste

- (1) All solid waste materials shall be stored in cement-lined 55-gallon drums. No small containers (boxes, bottles, cans) which will cause voids in the drums when subsequently filled with cement are to be placed in the drums. Such containers must first be broken or cut. Wastes contaminated with isotopes having half-lives under 30 days are to be segregated when feasible from those having half-lives over 30 days. Running records of the quantities of each isotope placed in drums shall be kept. No single drum is to contain more than 2 curies of radium or polonium or more than 1 curie of other long-lived isotopes except by special approval of a member of the Isotope Committee. When drums are full they are to be marked with the totals involved and are to be stored in the waste storage pit. The information is also to be entered in the waste log.
- (2) Liquids which do not contain over 10  $\mu$ c. of radioisotope (except alpha emitters and Sr-90) may be disposed of via the sewer line with adequate flushing. Disposal of larger quantities and disposal of liquids containing alpha emitters or Sr-90 via the sewer may only be done with prior approval of a member of the Isotope Committee, who will consider each case and determine that it is within the limits established in the Federal Register.

b. Waste received from Customers

- (1) Waste received is to be transferred to concrete shield or to concrete-lined drums in the waste storage pit within 48 hours. No small containers which will cause voids when the drums are subsequently filled with cement are to be placed in the drums. Each transfer is to be recorded in the waste log.
- (2) When a package is received, it is to be monitored for possible leakage and compliance with I.C.C. regulations. Deviations are to be brought to the attention of a member of the Isotope Committee.
- (3) A standard receipt form is to be made out in duplicate by the person receiving the package, one copy being sent to the customer and one copy being filed. The customer's assay of the contents will be used unless some discrepancy is suspected.

In addition to the above items, the following procedures apply to the pick up of waste by Isotopes Specialties Company personnel in the Los Angeles area:

- (4) Waste material is to be packaged according to I.C.C. regulations, if possible. Otherwise, the container shall be a 55-gallon drum with top locked in place by proper locking ring. Material inside drums shall be packed so that vehicle accidents which might result in movement of drums would have a minimum tendency to cause shifting of shielding within drums or breakage of glass or similar containers. Furthermore, if glass or other breakable containers are placed within drums, sufficient absorbent material shall be placed around the containers to absorb any leakage.
- (5) The "Radioactive Material" signs must be posted on the truck when transporting radioactive material.
- (6) Proper dose rate and detection-type instruments must be carried in the truck when transporting waste.
- (7) Containers must be monitored before loading. Any significant surface contamination must be cleaned, and no drum is to have a dose rate exceeding 200 mr/hr at surface or 10 mr/hr at one meter, as stated in I.C.C. regulations. (Additional shielding may be used to comply with these limits.) In addition, the truck shall be loaded so that the dose rate to the driver does not exceed tolerance limits.
- (8) Containers are to be securely lashed to the truck during transit.
- (9) The driver is to be familiar with the emergency procedures in Section IX.

c. Preparation for Disposal of Waste Drums

- (1) Interstices in waste material in concrete lined drums are to be poured full of a thin cement slurry. The slurry is to be vibrated (by hand) during filling in order to prevent voids which might cause collapse of the drum when subjected to deep sea pressure. A cinched copper tube is to run from center of drum to surface to help equalize pressures.

- (2) After the inner drum slurry has set up, the space up to the top of the 55-gallon drum is to be poured with normal concrete.
- (3) After a proper curing period (10 days) the drum cap is to be secured with a proper locking ring. Each drum must then be weighed and is not to be disposed of at sea unless it weighs at least 700 pounds.
- (4) Each drum must be identified on top and side by a scribed metal tag welded to the drum or by stamping or engraving the drum itself. The following information is to be included in the identification:
  - Caution - Radioactive Material
  - Isotopes Specialties Company,
  - Burbank, California, U.S.A.
  - Date
  - Most hazardous isotope and quantity of activity contained.
  - Standard radiation symbol.
- (5) Drums are to be painted yellow with red or magenta radiation symbol and the words, "Caution - Radioactive Material", stenciled on top and sides.
- (6) Sealed drums are to be monitored immediately prior to disposal. Any external contamination shall be cleaned. A member of the Isotope Committee shall be notified if the dose rate at the surface of any drum exceeds 200 mr/hr or that at one meter exceeds 10 mr/hr.

d. Disposal of Drums at Sea

- (1) Prior to any disposal event, a site shall be selected and discussed with the U.S. Coast Guard. The site shall be in water at least 1000 fathoms deep and outside of normal shipping lanes. At least ten (10) days prior to disposal, the U.S. Coast Guard, the A.E.C., and the State of California are to be notified of the time and place of disposal.
- (2) All arrangements for handling equipment, transporting vehicles from Isotopes Specialties Company to the pier, and vessels for the sea journey should be completed at least a day before the disposal event in order to insure efficient and fast movement of drums.
- (3) A member of Isotopes Specialties Company, who is familiar with the emergency procedures in section IX, together with proper instrumentation for measuring dose rates and detecting contamination, shall accompany each transfer of drums to the pier and shall accompany the disposal crew on the sea journey.
- (4) "Radioactive Material" signs must be posted on the transporting vehicle and on the disposal vessel at all times while hauling waste drums.
- (5) Drums must be securely blocked or lashed to the transporting vehicle and to the disposal barge, except that if a hopper-type vessel, such as a cargo scow, is used, drums need not be lashed down.

- (6) Drums are to be loaded in the transporting vehicle so that radiation does not exceed 100 mR/hr at the driver's location or at nearest approach. (Auxiliary shielding may be used.) Drums are to be placed in the disposal vessel so that same will not exceed 100 mR/hr in locations occupied during transport to the disposal site.
- (7) Following completion of transporting drums to the pier, the transporting vehicle must be surveyed and any detectable contamination (as measured with portable G.M. and/or Saxon meter) must be removed. In the same manner, the disposal vessel shall be surveyed following disposal and any contamination removed.
- (8) Film badges, dosimeters, and gloves are to be worn by all persons handling drums directly. No one other than Isotopes Specialties Company personnel are to so handle the drums directly. Film badges will be supplied other personnel engaged in transporting and disposing of drums and a record of their radiation exposure will be supplied.
- (9) A summary record of the amount and type of radioactivity disposed of at a given site will be made and recorded in the waste disposal log. This record is to be available to all state and federal agencies upon request.

#### Sale

- a. Orders will be accepted from A.E.C. authorized customers. Copy of authorization or statement by customer to effect that he possesses valid authorization # \_\_\_\_\_ covering goods ordered, must be in ISC files before shipment except as noted in 5b, 5c, and 5d below.
- b. Contractor operated A.E.C. facilities need not have authorization.
- c. Foreign shipments may be made on our own A.E.C. authorization to non-listed countries with approval by U.S. Department of Commerce and subject to regulations of consignee country. Isotopes 3 to 23 only are authorized for foreign shipments.
- d. Orders may be filled without specific license for quantities of isotopes granted general A.E.C. license as published in Federal Register.
- e. All shipments shall conform with I.C. specifications.
- f. Canned tracers shall have radioactive content and radiation level noted on label.

#### 6. Safety Procedures

##### a. General

- (1) All personnel working in the plant, other than in the office area shall wear film badges. These badges shall be processed weekly and results available to worker and to the Isotope Committee.
- (2) Plant visitors, other than office visitors, shall register and wear film badges.
- (3) All personnel regularly employed in other than the office area shall read N.B.S. Handbook 59 and these procedures, and shall be instructed to ask the Radiological Safety Officer any questions raised.

