Remarks Prepared for Paul C. Aebersold
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General Manager to Oak Ridge Operations
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OUTLINE OF ISOTOPE PRODUCTION AND LICENSING

1. New affiliation with Division of Civilian Application.

   1.1 As Isotopes Extension, carry on essentially same functions.
   1.2 Even more than in past can encourage usage and simplify licensing.

2. Growth in number and types of users:

   Chart 1 - Present breakdown of users by category.
   Chart 2 - Rapid growth industrial users.

3. Increase in distribution.

   3.1 12,611 shipments from ORNL during 1955

   Increase of around 6% over preceding year - Chart 3 (Increase in Radioisotope Shipments).

   3.2 Secondary suppliers make more shipments than ORNL

   Estimated 50,000 shipments per year to ultimate users.

4. New radioisotope licensing procedures became effective February 10.

   4.1 Significantly alter past procedure for authorization.

   4.2 Enables users to accommodate more easily radioisotope needs

      4.21 Multiple radioisotopes and uses on one application

      4.22 License for possession limit rather than procurement limit. Any number of purchases during valid period of license as long as possession limit not exceeded.

      4.23 Longer expiration dates, less frequent renewal.

      4.24 Original license ammended as additional needs develop.

      4.25 Any person with valid license for byproduct material also has general license to export such materials with atomic

number 3 to 83, inclusive. Excludes "Subgroup A Countries" listed by U. S. Department of Commerce.

4.26 Quantities of radioisotopes and specific items in Schedules A and B, Sections 30.71 and 30.72 may be purchased, used (within certain limits), transferred, imported, exported (with exception of tritium and Polonium 210) without specific license.

5. Urgent need for increased production for certain radioisotopes.

5.1 Production of certain radioisotopes inadequate to meet immediate civilian needs.

5.11 Is deterring development of potentially vast irradiation industry.

5.12 Cobalt 60 is good example. Substantially increased production necessary to satisfy immediate requirements for medical therapy and development of irradiation industry.

5.2 Obligation of production facilities for future civilian application requirements is essential.

6. Radioisotope pricing and marketing.

6.1 Prices in general recover full costs - in general do not deter use.

6.2 For new items and those with great market potential:

6.21 Pricing at full cost at outset discourages potential market.

6.22 Projected pricing permits research and development, establishment of volume sales and ultimately full cost recovery.

6.3 Prices of rare isotope-labeled compounds are sufficiently high to deter use for research. High cost not assignable to cost of radioisotope, but to labor in synthesis.

6.4 Cost of radioisotopes is small fraction of cost of most research programs. (Not greater than 10-15 percent). Research programs requiring significant outlay for radioisotopes should be supported by research contracts.

6.5 Most medical uses of radioisotopes not deterred by radioisotope prices; cost of isotope small compared to total cost of medical service. Exception may be use of radioiodine to treat thyroid cancer, teletherapy units.

7. Need for increased training. Acute lack of persons trained in isotope techniques; problems can be eased through:

7.1 Stimulation of institutions to offer special instruction in radioisotope techniques similar to ORINS course.

7.2 Courses should be tailored to meet needs of industry, medicine and others.

7.3 AEC encouragement and support can be given by:

7.31 Making radioisotopes available for training at reduced cost.

7.32 Loaning or supporting cost of necessary equipment.

7.33 Supplying educational literature available from AEC free of charge.

7.34 Providing technical assistance in setting up curricula.

7.35 Establishment of a "traveling radioisotope work shop."

7.36 Supplying isotope kits to high schools and junior colleges at nominal charge.

8. Additions to radioisotope production and service in 1955.

8.1 Gamma irradiation facility at Idaho Falls.

8.11 Utilizes "cooling" fuel elements from the MTR to produce a field of 10,000,000 r/hr.

8.12 Similar facility at Argonne uses up to 12 of MTR fuel elements, equivalent to 70,000 curies of gamma activity.

8.2 Savannah River now aiding production of high specific activity Co 60 to produce about 100,000 curies in 1956.

8.21 Despite this production, have 100,000 curie backlog.

8.3 Research reactor being built at ORNL.

8.31 Will have a neutron flux of about 3.3×10^{13} $n/cm^2/sec$.

8.32 Will be able to better produce many radioisotopes.

8.4 New Iodine 131 processing plant now operating at ORNL.

8.41 Design capacity of 25 curies per week, ten times former output.

8.5 Multi-kilocurie fission product pilot plant at ORNL expected to go into operation in 1957.

8.51 Design to separate 200,000 curies of Cesium 137/year from reactor wastes; other long lived fission products.

8.6 New 10,000 curie loading cell at ORNL loads high activity sources into teletherapy equipment and other gamma irradiation devices.

8.61 Industrial firms encapsulate all but the very large gamma ray sources.

8.7 BNL develops processes for certain new radioisotopes.

8.71 Fluorine 18 now procured; only isotope of fluorine for tracer use.

8.72 Iodine 132 available; more useful in some applications than I 131.

8.73 Iodine 133 and pure Arsenic 77 available if sufficient demand.

8.8 Tritium up to 2 liters (approximately 5,000 curies) obtainable by individual applicant.

8.9 Helium 3 and Polonium 210 obtainable in any quantity available.

9. Radioisotope Research Support Program.

9.1 Radioisotopes for biomedical research available at 20% of cost.

9.11 Previously applied only to medical research.

9.12 Extended to agriculture and biomedicine including research in therapy and diagnosis.

9.13 Expenditure comparatively small.

10. Radiation Safety Standards.

10.1 Absence of clearly defined radiation safety standards has deterred some industrial uses, complicated supervision by AEC.

10.2 Standards now published as proposed rule making provide a comprehensive system for the control of radiation hazards; should not hamper wide utilization.

11. Kinds of Applications.
Radioisotopes useful as sources for ionization, analysis, and tracing. Considerable expansion in types of use and refinement of techniques.

11.1 In biological and medical research: New knowledge about metabolism of iron and calcium compounds, proteins, hormones, cholesterols, nucleic and citric acids, red blood cells, anticancer agents, carcinogens, and radiation damage.

11.2 In medical diagnosis: Significant developments in determining blood volume, body water, cardiac output, peripheral vascular disorders, thyroid disorders, delineation of organs, pernicious anemia, and location and extent of malignancies.

11.3 In medical therapy: Wider use in treatment of hyperthyroidism, heart disorders, cancerous conditions, and ophthalmic disorders.

11.4 In plant studies: Significant developments in metabolism and translocation of mineral nutrients in plants, uptake of fertilizers, soil fertility, action of growth regulators and herbicides, plant diseases and funcacides, radiation effects and genetics, soil moisture distribution, root growth, and photosynthesis.

11.5 In animal studies: Significant developments in micronutrients, use of organic metabolites, physiological availability of diet additives, biochemistry of body processes, animal diseases, radiation effects, reproduction and genetics.

11.6 In insect studies: Significant developments in sterilization, insecticides, migration, hibernation, and bee culture.

11.7 In industry: Important developments in radiography, gaging, luminescence, ion tube operation, activation of chemical reactions, sterilization of food stuffs, radioisotope batteries, wear studies, pipeline movement of petroleum products, oil well studies and treatement, leak location and pipeline tracing, and a multitude of smaller uses.

11.8 In physical and chemical research: Important new information in atom exchange, aging of precipitates, surface reactions, diffusion, vapor pressure, thermodynamic properties, and many basic researches.

12. Trends in Use.

12.1 Recent growth in industrial uses is striking.

12.11 Large increase expected in industrial use of ^{60}Co, Cs 137, H3 and Sr 90.

12.12 Industrial use of fission products and reactor fuel elements now started, may grow rapidly.

12.2 Recent developments in low-level radiation counting hold much promise for all fields of application.

12.21 Tracer tests possible while processing consumer products.

13. Industrial participation already extensive business in:

13.1 Isotope compounds and pharmaceuticals

13.2 Processed cyclotron radioisotopes

13.3 Teletherapy units and medical applicators

13.4 Radiography exposure devices

13.5 Thickness and density gages