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Federal Regulation of Atomic Energy Activities

Paul C. Aebersold and Gerald L. Hutton***

THE ATOMIC ENERGY ACT OF 1954[1] expressly recognizes in Section One that atomic energy is capable of application for peaceful purposes as well as military uses. The Act also provides that United States policy is to direct the development, use, and control of atomic energy so as to make the maximum contribution to the general welfare, promote world peace, improve the general welfare, increase the standard of living, and strengthen free competition in private enterprise. These objectives are subject at all times to the paramount objective of maximum contribution to the common defense and security.

The Atomic Energy Act of 1954 also stresses the necessity of regulating the processing and utilization of source, byproduct, and special nuclear material, and facilities for the production and utilization of atomic energy. Such regulation is deemed necessary in the national interest to assure the common defense and security and protect the health and safety of the public.

The Atomic Energy Act of 1946,[2] of course, permitted some participation by private individuals, firms, and organizations in the peaceful applications of atomic energy. The production and distribution of radioisotopes[3] for industrial, medical, research, and other useful purposes was initiated in the early part of 1946, the first shipment being made on August 2, 1946. The 1946 Act also permitted private individuals to own, possess, and use source material. The Atomic Energy Act of 1954, however, is broader in scope than the earlier statute, permitting private individuals and organizations not only to own, possess, and use byproduct material[4] and source material,[5] but also to own and

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1 Public Law 703—83rd Congress, Chapter 1073, 2nd Session, HR 9757 (68 Stat. 919).

2 Public Law 585—79th Congress (60 Stat. 755).

3 A "radioisotope" may be defined as a form of an element with identical chemical properties as the stable form, but having a different atomic weight and exhibiting the property of radioactivity.

4 "Byproduct material" is defined in Section 11 *e* of the Atomic Energy Act of 1954 as ". . . any radioactive material (except special nuclear material)

(Continued on next page)

operate production facilities[6] and utilization facilities[7] and possess and use special nuclear material.[8] In accordance with Section 25 of the Act, a Division of Civilian Application was established with primary responsibilities of encouraging and assisting in the development of peaceful uses of atomic energy and regulating the atomic energy industry thus developed.

Tremendous strides have been made in the past few years in harnessing the atom for the benefit of mankind. Byproduct material or reactor-produced radioisotopes, for example, are widely used in industry,[9] medicine,[10] agriculture,[11] and other fields. As of October 31, 1957, a total of 4,353 industrial firms,

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yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material."

[5] "Source material" is defined in Section 11 *s* of the Atomic Energy Act of 1954 as "(1) uranium, thorium, or any other material which is determined by the Commission pursuant to provisions of Section 61 to be source material; or (2) ores containing one or more of the foregoing materials in such concentration as the Commission may by regulation determine from time to time."

[6] "Production facility" is defined in Section 11 *p* of the Atomic Energy Act of 1954 as:

"(1) any equipment or device determined by rule of the Commission to be capable of the production of special nuclear material in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public; (2) any important component part especially designed for such equipment or device as determined by the Commission."

[7] "Utilization facility" is defined in Section 11 *v* of the Atomic Energy Act of 1954 as:

"(1) any equipment or device, except an atomic weapon, determined by rule of the Commission to be capable of making use of special nuclear material in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public, or peculiarly adapted for making use of atomic energy in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public; or (2) any important component part especially designed for such equipment or device as determined by the Commission."

[8] "Special nuclear material" is defined in Section 11 *t* of the Atomic Energy Act of 1954 as:

"(1) plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the Commission, pursuant to the provisions of Section 51, determines to be special nuclear material, but does not include source material; or (2) any material artificially enriched by any of the foregoing, but does not include source material."

[9] See: Aebersold, Paul C., Importance of Isotopes in Technology and Industry, 14 International Conference on the Peaceful Uses of Atomic Energy, U. N., 3 (1955). Also, Uses of Isotopes in Industry and in Physical and Chemical Research, USAEC (1956). Bradford, John R., Radioisotopes in Industry, Reinhold Publishing Corp. (1953). Weber, George, How Isotopes Work for Refiners, The Oil and Gas Journal, p. 91 (September 23, 1957).

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medical institutions, physicians, research groups, and individuals were licensed by the Atomic Energy Commission to use by-product radioisotopes. 1,726 of this number were industrial firms utilizing radioisotopes for industrial radiography, process control, static elimination, product research and a wide variety of other uses. 1,839 of this total were medical institutions and physicians utilizing radioactive materials for medical research, diagnosis, and therapy.

Conservative estimates indicate that 1,000,000 patients per year receive Iodine 131 for diagnostic or therapeutic purposes. Commission surveys show an annual saving to industry of one-half billion dollars.[12] It is expected, therefore, that the rapidly growing radioisotope program will continue to expand.

In addition to the increasing acceptance of radioisotopes as a valuable research instrument and practical tool, many private and public organizations are undertaking the design, construction and operation of nuclear reactors for research purposes, testing of materials, medical research and therapy, and the generation of power, and otherwise engaging in the development of the civilian application program. As a result of these activities, increasing quantities of special nuclear materials are being distributed to industry. Privately owned reactors, of course, will generate additional quantities of special nuclear materials, fission products, and radioisotopes.

Ionizing radiation, with all of its benefits to mankind, can also prove injurious to humans, animals, and certain types of materials, if requisite care is not exercised. This fact has been amply demonstrated in the substantial number of radiation injuries which have resulted from x-ray machines and radium during the past fifty years.[13] It is to be noted that x-ray ma-

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(Continued from preceding page)

[10] See: Andrews, Gould A., Brucer, Marshall, Anderson, Elizabeth B., Radioisotopes in Medicine, Oak Ridge Institute of Nuclear Studies, USAEC—ORO—125 (1953). Also, Radioactive Isotopes and Nuclear Radiations in Medicine, 10 International Conference on the Peaceful Uses of Atomic Energy, U. N. (1956). Hahn, Paul F., Therapeutic Use of Artificial Radioisotopes, John Wiley and Sons, Inc. (1956).

[11] See: A Conference on Radioactive Isotopes in Agriculture, TID-7512, USAEC (1956).

[12] See: Libby, Willard F., Radioisotopes, Nucleonics, p. 118 (September, 1957). Commissioner Libby forecasts that the economic value of radioisotopes within the next ten years may be measured in tens of billions of dollars.

[13] See: Martland, H. S., 15 Occurrence of Malignancy in Radioactive Persons, Am. J. Cancer, 2435 (1931). Evans, R. D. Radium Poisoning: A Review of Present Knowledge. 23 Am. J. Pub. Health, 1017 (1933).

chines and naturally occurring radiations such as radium are not subject to control by the Atomic Energy Commission.

This earlier experience with radium and x-ray has served to emphasize to us the dangers associated with radioactive materials and other radiation emitters. The necessity for radiation safety control is best evidenced by the x-ray and radium incidents.

As noted above, possession and use of byproduct material, source material, special nuclear material, and production and utilization facilities are subject to the regulatory control of the U. S. Atomic Energy Commission. This paper deals primarily with regulations and other control measures of the U. S. Atomic Energy Commission. It should be noted, however, that possession, use, transfer, import, and export of nuclear materials and facilities are also subject to regulatory control in varying degrees by several Federal agencies.[14]

The Food and Drug Administration, pursuant to the Federal Food, Drug, and Cosmetic Act, is concerned with the use of radioactive materials in pharmaceuticals or therapeutic devices.[15] The Food and Drug Administration considers radioisotopes designed for medical use to be "new drugs" within the meaning of the Federal Food, Drug, and Cosmetic Act, thereby requiring an "effective new drug application" prior to interstate commercial distribution. Effective new drug applications are outstanding for several radioisotopes, the balance of radioisotopes being considered in the investigational stage.

Conventional drug products, when sterilized by radiation, are considered to be new drugs. The safety of foods subjected to ionizing radiation must also be demonstrated to the satisfaction of the Food and Drug Administration. Legislation was introduced in the last Congress to strengthen the authority of the Administration with regard to "devices" employing radioactivity.

Depending upon the particular mode of transportation, shipments of radioactive materials may also be subject to regulations of the Interstate Commerce Commission,[16] Civil Aeronautics

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[14] See: Hutton, Gerald L., Public Control of Radiation Emitters, Public Health Reports, December, 1954.

[15] See: Holland, A. H., Atoms, Apples, and Aspirin, A Forum Report, Commercial and International Developments in Atomic Energy, 7, Atomic Industrial Forum (1955). Also, Title 21, Code of Federal Regulations.

[16] See Title 49, CFR, 71-90.

Board,[17] Coast Guard[18] or Post Office.[19] A number of other Federal Agencies also exercise limited regulatory authority in this field. Although radioactive materials have been shipped for many years by one means of transportation or another, the first step to regulate such transportation was taken by the Post Office Department in 1936, which issued an order excluding radioactive materials from the mails. This order was relaxed at a later date.

Regulations of the Interstate Commerce Commission are of particular interest inasmuch as transportation rules of other agencies follow those of the ICC generally. These regulations cover transportation of explosives and other dangerous articles, in interstate commerce, by common carriers by rail freight, rail express, rail baggage, highway or water. Radioactive materials are categorized as a "Class 'D' Poison." It is possible that some of these regulations will be substantively revised in the near future.

With the advent of atomic electric power the Federal Power Commission acquires a regulatory interest in atomic energy. Other Federal agencies which may become involved in one or more aspects of the nuclear energy program are the Department of Labor, Department of Interior, State Department, Maritime Administration, U. S. Public Health Service, Department of Commerce, Federal Trade Commission, and the Department of Agriculture.

Controls of the Atomic Energy Commission

The general approach to regulatory control of materials and facilities by the AEC is to *license* their use pursuant to pertinent licensing regulations, to subject such materials and facilities to radiation safety standards having the force of law, and to conduct a comprehensive program of inspection to determine compliance with Commission regulations and licensing conditions.

Section 161 (b) of the Atomic Energy Act of 1954 authorizes the Commission in performance of its functions to:

> "(b) establish by rule, regulation, or order, such standards and instructions to govern the possession and use of special nuclear materials, source material, and byproduct material as the Commission may deem necessary or desirable to promote the common defense and security or to protect health or to minimize danger to life or property."

[17] See Title 14, CFR, 49.

[18] See Title 46, CFR, 146.

[19] See Part 1, U. S. Postal Guide (1951).

Licensing by the AEC

The Commission's licensing regulations contain certain features in common which may be summarized briefly as follows:

a. The applicant for a license must be suitably trained and experienced, or have personnel on his staff with such qualifications, to possess and use the material or operate the facility safely for the purpose stated in the license.
b. The applicant must also have adequate facilities, equipment and operating procedures as necessary for protection of personnel and the public.
c. The location of the proposed use must be consistent with sound radiation safety considerations.
d. Use of the material or facility is limited to that stated in the pertinent license.
e. Licensed materials or facilities may be transferred only to other duly licensed or exempted persons.

A license may be *specific* or *general*. A *specific license* is issued to a named person or firm in response to an application filed by or on behalf of such person or firm. A *general license* is issued by publication in the Federal Register.[20] Any person within the scope of such license may use the materials specified within the terms and limitations of such a general license.

Byproduct Material (Radioisotopes)

Section 81 of the Atomic Energy Act of 1954 provides in part that:

> "No person may transfer or receive in interstate commerce, manufacture, produce, transfer, acquire, own, possess, import, or export any byproduct material, except to the extent authorized by this section or by Section 82. The Commission is authorized to issue general or specific licenses to applicants seeking to use byproduct material for research or development purposes, for medical therapy, industrial uses, agricultural uses, or such other useful applications as may be developed . . .
>
> "Licensees of the Commission may distribute byproduct material only to applicants therefor who are licensed by the Commission to receive such byproduct material . . ."

Section 81 provides further that the Commission shall not distribute byproduct material to, and shall recall distributed by-

[20] The Federal Register is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at $1.50 per month or $15.00 per year payable in advance.

product material from, any licensee not equipped to observe or failing to observe Commission safety standards or using materials in violation of law or regulation, or otherwise than as stated in the application, or as approved by the Commission. The Commission may also issue exemptions from licensing requirements.

Section 82 of the Act authorizes the foreign distribution of byproduct material. Thus, the export of byproduct material is subject to Commission control.

The basic licensing regulation for byproduct material is Part 30 of Title 10, Code of Federal Regulations, "Licensing of Byproduct Material." Applications for specific licenses are filed on "Application for Byproduct Material License," Form AEC-313. If the radioisotope is to be used in humans, additional information is required on Supplement "A" to Form AEC-313. If the material is to be used as a "sealed source" Supplement "B" to Form AEC-313 is also completed.

A specific license for byproduct material may be limited in scope or relatively broad, covering a number of isotopes and/or a number of uses.

Certain small quantities of materials and specific items containing byproduct material are placed under general license. See Section 30.21, "General License," 30.71, "Schedule A" and 30.72, "Schedule B." Radioisotopes of atomic numbers 3 to 83, inclusive, may be exported under general license, except to areas or destinations listed in Sub-group A, Sec. 371.3, "Comprehensive Export Schedule," U. S. Department of Commerce.

Source Material

Section 62 of the Atomic Energy Act of 1954 provides:

> "Sec. 62. License for Transfers Required.—Unless authorized by a general or specific license issued by the Commission, which the Commission is hereby authorized to issue, no person may transfer or receive in interstate commerce, transfer, deliver, receive possession of or title to, or import into or export from the United States any source material after removal from its place of deposit in nature, except that licenses shall not be required for quantities of source material which, in the opinion of the Commission, are unimportant."

The basic licensing regulation for source material is Part 40 of Title 10, "Control of Source Material." Source material is natural uranium or thorium and may be in the form of raw ore as it comes from the earth, as concentrates of uranium or thorium,

salts, compounds, alloys or the refined uranium or thorium metal itself. Source material is defined in § 40.2 (a) of 10 CFR 40 as ". . . any material, except fissionable material, which contains by weight one-twentieth of one per cent (0.05%) or more of (1) uranium, (2) thorium, or (3) any combination thereof."

The regulation in 10 CFR 40 contains restrictions on transfers of source material and includes provisions for general licenses, as well as specific licenses.

During the period January 1, 1957, through June 30, 1957, the Commission issued, or renewed, 1,055 source material licenses. These included 336 to producers, 21 to processors, 71 to distributors, 208 to consumers, and 419 to exporters.

Special Nuclear Material

Section 52 of the Atomic Energy Act of 1954 provides that:

> "All rights, title, and interest in or to any special nuclear material within or under the jurisdiction of the United States, now or hereafter produced, shall be the property of the United States and shall be administered and controlled by the Commission as agent of and on behalf of the United States by virtue of this Act . . ."

Section 53 of the Act authorizes the Commission to issue licenses for possession of special nuclear material. The Commission is directed to establish by rule minimum criteria for issuance of special nuclear material licenses. § 53 (e) provides that:

> "e. Each license issued pursuant to this section shall contain and be subject to the following conditions—
>
> "(1) title to all special nuclear material shall at all times be in the United States;
>
> "(2) no right to the special nuclear material shall be conferred by the license except as defined by the license;
>
> "(3) neither the license nor any right under the license shall be assigned or otherwise transferred in violation of the provisions of this Act;
>
> "(4) all special nuclear material shall be subject to the right of recapture or control reserved by section 108 and to all other provisions of this Act;
>
> "(5) no special nuclear material may be used in any utilization or production facility except in accordance with the provisions of this Act;
>
> "(6) special nuclear material shall be distributed only on terms, as may be established by rule of the Commission, such that no user will be permitted to construct an atomic weapon;

"(7) special nuclear material shall be distributed only pursuant to such safety standards as may be established by rule of the Commission to protect health and to minimize danger to life or property; and

"(8) except to the extent that the indemnification and limitation of liability provisions of section 170 apply, the licensee will hold the United States and the Commission harmless from any damages resulting from the use or possession of special nuclear material by the licensee."

The current definition of special nuclear material encompasses Uranium 235, which is produced in gaseous diffusion plants, Uranium 233, which is produced by irradiation of thorium in a nuclear reactor, and plutonium, which results from irradiation of Uranium 238 in a nuclear reactor.

Licenses are issued to qualified applicants authorizing possession and use of special nuclear material. Attention is invited to Part 70 of Title 10, Code of Federal Regulations, "Special Nuclear Material," which establishes procedures and criteria for issuance of licenses to receive, possess, use, and transfer special nuclear material and sets forth terms and conditions upon which licenses will be issued.

A total of 94 licenses for possession and use of special nuclear material had been issued as of June 30, 1957, primarily for research and development purposes. This figure does not include material for production and utilization facilities.

Nuclear Facilities

"Production facilities" and "utilization facilities" are licensed by the Commission pursuant to Section 103 or 104 of the Atomic Energy Act of 1954. Regulations pertaining to licensing of such facilities are set forth in Part 50 of Title 10, Code of Federal Regulations, "Licensing of Production and Utilization Facilities."

In general, such facilities include nuclear reactors (defined as an apparatus other than an atomic weapon designed or used to sustain nuclear fission in a self-supporting chain reaction), facilities designed or used for processing of irradiated materials and facilities designed or used for the separation of the isotopes of uranium or plutonium (other than laboratory scale facilities designed for experimental or analytical purposes).

A "Class 103 license," corresponding to Section 103 of the Act, is issued for a production or utilization facility that is of a type which the Commission has determined to be sufficiently de-

veloped to be of practical value for industrial or commercial purposes. Up to the present time no "Class 103 licenses" have been issued.

A "Class 104 license" is issued in respect to facilities to be used in medical therapy or research and development, including research and development activities leading to the demonstration of the practical value of such facilities for industrial or commercial purposes.

A "power excursion" or other accident resulting in release of the fission products in a nuclear reactor could prove hazardous to the public health and safety. In reviewing an application for a construction permit or facility license, particular attention is devoted to evaluation of the applicant's "hazards summary report." This detailed report is prepared by the applicant and describes in detail the reactor and the proposed operating procedures. It also includes a critical review of the possible series of events or incidents such as power excursions which might result in release of radioactive materials and a statement of the steps taken to prevent such accidents. Adequacy of these counter measures to prevent accidents, to contain the fission products from the reactor, or to otherwise minimize the adverse results thereof is evaluated.

At such time as it appears to the Commission's satisfaction that a facility of the type proposed can be constructed and operated at the proposed site without undue risk to public health and safety, a construction permit is issued, subject to providing an opportunity for hearing or, after a hearing has been held, as required by Section 189a, as amended. It is to be noted that the Atomic Energy Act of 1954 was amended in September, 1957, to require public hearings in some cases irrespective of whether interested parties have expressed a desire to intervene. Inspections are made as construction progresses with primary attention to those features designed to protect against nuclear incidents.

The construction permit may be converted to an operating license if the Commission determines that the facility can be operated safely and that the final design and construction are such that the health and safety of the public will not be jeopardized. A final construction inspection is made prior to issuance of the license to assure that the reactor has been constructed in accordance with conditions of the construction permit and can be safely operated. Hazards evaluation begins with design of the

facility and is continued through the construction period to completion of the reactor.

With the exception of export license cases, the Commission will direct a hearing or publish a notice in the Federal Register at least 15 days in advance of taking action on issuance of a construction permit or facility license.

As of June 30, 1957, the Commission had issued 25 construction permits or facility operating licenses. These included 4 for developmental power reactors, 14 for research reactors, and 7 for critical experiment facilities.

In addition to licensed reactors, of course, the Commission, through its contractors, also operates a substantial number of reactors. As of June 30, 1957, 24 nuclear reactors had been operated in the United States and dismantled, 84 were operating or were licensed to operate, 66 were being built, and 93 were being planned.

Indemnity Legislation and Regulation

On September 2, 1957, the Atomic Energy Act of 1954 was amended (Public Law 256, 85th Congress) to provide a means for protecting the public from financial loss that might arise from a nuclear incident. The Commission on September 11, 1957, issued a regulation (10 CFR 140) to implement the indemnity provisions of the amendment.

This regulation requires each reactor licensee to maintain financial protection of $150,000 per thousand kilowatts of thermal capacity authorized by his license. $250,000 is established as a minimum amount of financial protection required for each nuclear reactor. It is expected that this temporary regulation will be replaced at an early date by more definitive regulations.

Operator's License

The Commission, in addition to being concerned with facility design, is also interested in operation of the reactor. Regulations in Part 55 of Title 10, Code of Federal Regulations, "Operators' Licenses," contain minimum criteria for issuance of licenses to individuals who manipulate the controls of production and utilization facilities. Unless specifically waived, a written examination, physical examination, and operating test are required prior

to issuance of such license. As of June 30, 1957, reactor operators' licenses had been issued to 54 persons.

Radiation Safety Standards

In addition to obtaining necessary licenses, licensees must comply with the Commission's regulation, "Standards for Protection Against Radiation," 10 CFR 20. This regulation, developed over a period of five years, was published in the Federal Register January 29, 1957, to become effective 30 days thereafter. The standards set forth in this regulation include limits of exposure of workers to external radiation and limits for concentration of radioactive materials which may be discharged into air and water and disposal of radioactive wastes. Certain precautionary procedures and administrative controls are also established by this regulation.

Other provisions of this regulation provide for radiation surveys, labeling and posting requirements, storage of radioactive materials, and instruction of personnel.

These standards were amended on May 14, 1957, to provide for reports of theft or loss of licensed materials and other incidents or potentially serious accidents involving licensed material. Timely notice of such events will permit the AEC to see that appropriate steps are taken to protect against further hazard to life or property.

The permissible limits set by this regulation are based upon recommendations of the National Committee on Radiation Protection, as published in Handbooks 52 and 59 of the National Bureau of Standards. It is to be noted, however, that the NCRP has recently revised its recommendations, to limit cumulative exposure.[21] These recommendations are being reviewed by the AEC with the view of possibly amending 10 CFR 20.

The Commission on September 21, 1957, published in the Federal Register a notice of proposed rule making entitled "Regulations to Protect Against Accidental Conditions of Criticality in the Shipment of Special Nuclear Material," 10 CFR 71. Under this proposed rule, where special nuclear material is to be transported, prior Commission approval of proposed shipping procedures must be obtained for shipments in excess of certain quantities specified in the proposed rule.

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[21] See: Taylor, Lauriston S., Current Situation with Regard to Permissible Radiation Exposure Levels, 69 Radiology, (1) 6 (July, 1957).

The basic philosophy which has prevailed in drafting Commission regulations has been succinctly stated by Mr. William Mitchell,[22] former General Counsel of the Commission:

> "In drafting all the regulations certain basic considerations have prevailed. Regulations have the force of law; thus, they must to the greatest extent feasible be simple, concise, and unambiguous. They should not be written for the health physicist but for members of the industry, the general public, and the courts which may be called upon to enforce or interpret them. It is essential that they be understandable to people untrained in the field. Further, each requirement imposed must be justified by genuine and substantial considerations of health and safety and not by notions of desirable practice or good housekeeping. Material which is in the nature of a suggestion or advice, while it may be published elsewhere, should not be included in regulations, and matters which cannot be treated with precision and definiteness should be left for individual solution in specific cases by appropriate provisions in licenses and the issuance of appropriate ad hoc orders."

AEC Inspection Program

An important aspect of any regulatory program is the follow-up or inspection procedures employed by an Agency to determine if compliance with regulatory requirements is being achieved. The AEC has a well-developed inspection program employing a modest staff of experienced radiation specialists who visit facilities of licensees to observe procedures and equipment and gather factual data regarding compliance with pertinent AEC regulations and license conditions. Significant deficiencies or noncompliance incidents have been observed in only a small number of cases. Inspection of production and utilization facilities is accomplished directly by reactor specialists in the Division of Inspection, Washington. Other licensees are inspected by personnel assigned to field office inspection units. For a further discussion of AEC inspection activities, see remarks of Curtis A. Nelson, Director of the Division of Inspection of the AEC, at

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[22] Mitchell, William, Some Administrative and Legal Problems Related to the Widespread Use of High Level Radiation Sources, Legal, Administrative, Health and Safety Aspects of Large-Scale Use of Nuclear Energy, International Conference on the Peaceful Uses of Atomic Energy, U. N., Vol. 13, P. 28 (1956). For a discussion of the Commission's regulatory program, see also: Price, Harold R., The Civilian Application Program. A Forum Report on Commercial and International Developments in Atomic Energy, Number 7, P. 202, Atomic Industrial Forum; Lowenstein, Robert, Legal Aspects of Control, Health Physics Conference June 13-15, 1955, sponsored by Ohio State University.

meeting of September 27-29 discussing commercial and international development in atomic energy.[23]

Failure to comply with applicable statutory or regulatory requirements may result in revocation, suspension, or modification of pertinent licenses, recall of nuclear material, withholding of future materials or an injunction prohibiting further violations. Willful violations may be punished by fine, imprisonment, or both.

In retrospect, it appears that AEC controls have proved effective in maintaining a high degree of radiation safety. Such control measures are under continuing review to determine those areas in which restrictions may be lifted or made more stringent. "Radiation incidents" in Commission facilities and facilities of Commission licensees have been held to a minimum. Regulations of other Federal agencies, particularly those pertaining to transportation of radioactive materials, are also being scrutinized and evaluated from the viewpoint of assuring radiation safety and yet imposing the minimum of interference with the rapidly growing atomic energy industry.

[23] A Forum Report, Number 7, Atomic Industrial Forum, Inc., P. 208. Also, 34 Texas L. R., (6) 862-866 (1956).