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A Bibliography of Unclassified Literature

TO: F. L. Culler

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INTRODUCTION

This bibliography of the unclassified literature on radioactive waste treatment and disposal has been compiled from references published in the Nuclear Science Abstracts, Volume 4, No. 1 (January 15, 1950) through Volume 11, No. 10 (May 31, 1957). The 304 references have been categorized as to subject matter, and brief abstracts have been included where needed to show pertinent information not indicated by either the document title or category.

A bibliography compiled from abstracts of classified reports covering the same period has been assembled and will be published as CF 57-8-117.

References

1.00 GENERAL REVIEW, CONFERENCES, MEETINGS AND VISITS

Rep.

1. Waste Disposal. Final Report for Period July 1, 1944 to Sept. 15, 1944. University of Chicago Report CN-2049 (Nov. 17, 1944).
   The programs on decontamination of nonmetal wastes; waste neutralization with 50% NaOH; Al precipitation in the coating removal waste; stability of metal waste at elevated temperatures; and settling characteristics of Hanford wastes have been completed and results are summarized.

2. Minutes of Conference on Liquid Waste Disposal, August 23-25, 1948. Report ORNL-163 (Nov. 2, 1948).
   Ion exchange, scavenger, and evaporation techniques employed in waste treatment are reviewed. Studies of rare earth separation from waste are reported.

3. Waste Materials in the United States Atomic Energy Program. Abel Wolman and Arthur E. Gorman. Report WASH-8 (Jan. 12, 1950).
   A review of the problem of disposal of waste containing radioactive materials is presented.

4. Decontamination and Disposal of Radioactive Wastes, paper 14 of Health Physics Insurance Seminar; February 6-10, 1950.
   Methods of decontaminating structural materials and body are discussed. The general methods of disposal of radioactive materials by dilution with water or air, concentration, storage, and burial on land or at sea are discussed.

5. Liquid Waste Disposal Research Quarterly Report for January, February, and March 1950. Mound Report AECD-4147 (April 1, 1950).

6. Conference on Waste Processing, Held at Brookhaven National Laboratory, March 27-28, 1950. Section 2. Evaporation. Report BNL-59.
   A process involving evaporation and deentrainment for concentrating large volumes of slightly contaminated liquid wastes of low solid content.

7. "Observations on the Removal of Radioactive Materials from Waste Solutions." Conrad P. Straub. Sewage and Ind. Wastes 23, 188-93 (February, 1951).

8. Notes on a Series of Lectures on Health Physics Presented to the Personnel of Phillips Petroleum Company; April 4-20, 1951. Charles D. Cagle. ORNL Report CF 51-4-173 (Nov. 8, 1951)
   These notes on a series of lectures on health physics include a brief history of work in the field of waste disposal problems.

9. "Radioactive Waste Disposal." J. F. Newell and C. W. Christenson. Sewage and Ind. Wastes 23, 861-8 (July, 1951).
   Methods of handling radioactive wastes include storage, evaporation, ion exchange, adsorption agents, chemical coagulation, biological methods, and combinations of these methods. Their merits are discussed.

10. Complete Radioactive Effluent Control for a Radiochemical Laboratory. Walton A. Rodger. Argonne Report AECD-3078 (Sept., 1951).

The historical approach of bulk storage or disposal by dilution into watercourses is giving way to a program of waste volume reduction in which the effluvia released are at or near natural background. The processes discussed are gas filtration, incineration, evaporation, ion exchange, and drying.

11. The Treatment of Radioactive Wastes, p. 400-409 of The Role of Engineering in Nuclear Energy Development; Third Annual Oak Ridge Summer Symposium; August 27 to September 7, 1951. ORNL Report TID-5031 (December, 1951).

The following problems of radioactive-waste treatment and disposal are considered: (1) the objective of waste control, (2) the characteristics of the radioactive wastes, (3) the control of radioactive-waste disposal, (4) the general procedures for disposal, (5) the types of radioactive wastes, (6) the processes used for waste concentration, and (7) the method of final disposal.

12. Environmental Problems of Radioactive Waste Materials, p. 353-399 of The Role of Engineering in Nuclear Energy Development; Third Annual Oak Ridge Summer Symposium, August 27 to September 7, 1951. Roy J. Morton. ORNL Report TID-5031 (December, 1951).

The potential health hazards from radioactive wastes are considered. The essentials of waste disposal in general are briefly reviewed, while the problem of radioactive wastes is considered more specifically.

13. Disposal of Radioactive Wastes. (An Introduction for Designers of Non-AEC Laboratories). E. C. Pitzer. Report KAPL-703 (Nov. 1, 1951).

A report is presented on the method of disposing of radioactive waste and the topics considered are the amount of radioactivity in the normal environment, the amount of activity that might safely be discharged in industrial wastes, waste disposal procedures and waste disposal problems that would be encountered in typical hypothetical research projects.

14. Disposal of Radioactive Liquid and Solid Wastes. Robert H. Simon. Knolls Report AECU-1837 (December 28, 1951).

15. Sanitary Engineering Conference Held at South District Filtration Plant, City of Chicago. Division of Reactor Development, AEC Report WASH-129, (September 11, 1952).

The results of radioactive waste-disposal operating and research activities at various AEC and contractor installations are presented and reviewed.

16. Radioactive Waste Disposal and Control Programs at Brookhaven National Laboratory. Lee Gemmell. Report BNL-1937 (1954).

17. "Survey of Radioactive-Waste Disposal Practices." H. S. Miller, F. Fahnoe, and W. R. Peterson. Nucleonics 12, No. 1, 68 (January, 1954).

A summary of answers to a questionaire sent to 1,027 users of radioisotopes concerning waste disposal practices, problems, and costs.

18. "Atomic Energy Industry." J. H. Hayner. Ind. Eng. Chem. 44, 472-5 (March, 1952).
The planned programs of research and development bearing on handling of waste products by the nuclear energy industry are described.

19. Air Cleaning Seminar, Ames Laboratory, September 15-17, 1952. Report WASH-149 (March, 1954).
Topics discussed include the removal of soluble gases and particulates from air streams; the performance of reverse jet cloth filters; dissolver off-gas filtration; solid waste disposal by incineration using tangential overfire air; the Argonne incinerator program; and the performance of the Los Alamos incinerator effluent collector.

20. "Radioactive Wastes. Treatment, Use, and Disposal." W. A. Rodger. Chem. Eng. Progress 50, 263-6 (May, 1954).

21. Waste Disposal--Decontamination and Decontamination Laundry Facilities. W. A. Clark. Livermore Research Laboratory Report LRL-120 (May, 1954).
This report describes the waste disposal, decontamination, and decontamination laundry facilities at the Livermore Research Laboratory.

22. Radioisotope Production and Process Development. A. F. Rupp. Report ORNL-2064 (May 3, 1956). Annual Report for 1955.

23. Study of Waste Facilities. H. W. Stivers. Report HW-37680 (June 30, 1955).
The vault and the cavern type of storage facilities could be economically supplemented with the present tanks or used separately to meet the demands of present and future intermediate level radioactive wastes.

24. "Radioactive Waste Disposal." Atomics 6, 232 (August, 1955).
A description is given of a rotary, continuous type vacuum filter to be used in conjunction with other devices for the removal of radioactive contaminated matter from biologically treated wastes.

25. Sanitary Engineering Conference, Baltimore, Maryland, April 15-16, 1954. Division of Reactor Development, AEC Report WASH-275 (August, 1955).
The results of radioactive waste-disposal operating and research activities at various AEC and contractor installations are presented and reviewed.

26. The Impact of Radioactive Waste Disposal on Chemical Processing. Conrad P. Straub and E. G. Struxness. ORNL Report CF 55-8-97 (August 15, 1955).
An attempt was made to bring to attention the need and desirability of reconsidering waste disposal practices now in use to produce less hazardous and toxic waste effluents.

27. "The Long-Term Aspect of Fission Product Disposal." E. Glueckauf. Atomics 6, 270-6, 281 (September, 1955).
From the standpoint of safety and economy, quantitative separation of Sr and Cs followed by ocean or desert disposal of the remaining bulk seems most feasible.

28. "Waste Disposal is Vital to Atomic Power Development." John M. Warde and Raymond M. Richardson. J. Metals 7, 1090-2 (October, 1955).
The problems of the disposal of liquid, gaseous, and solid radioactive wastes are discussed.

29. High-Level Contamination Control and Waste Disposal. R. F. Stearns. Report KAPL-1406 (Nov. 1, 1955).

30. "Radiation Protection in the Atomic Energy Industry. A Ten-Year Review." H. M. Parker. Radiology 65, 903-11 (December, 1955).

31. "Disposal of Radioactive Waste." Bernard Manowitz. Consulting Engineer 6, No. 6, 36-41 (December, 1955).
Data are tabulated on the characteristics of significant fission products and the costs of various disposal processes.

32. Sanitary Engineering Aspects of the Atomic Energy Industry. A Seminar Sponsored by the AEC and the Public Health Service, Held at the Robert A. Taft Engineering Center, Cincinnati, Ohio, December 6-9, 1955. Report TID-7517 Part 1.

33. "Radioactive Waste Disposal for the Small Isotope User." Herman Cember. Am. Ind. Hyg. Assoc. Quart. 17, 89-91 (March, 1956).

34. A Survey of Radioactive Waste Disposal. Fritz A. Hedman. Chemical and Radiological Labs., Army Chemical Center, Md. Report CRLR-648 (March 1, 1956).

35. Disposal of Radioactive Wastes in the U.S. Atomic Energy Program. Abel Wolman. A. E. Gorman, and J. A. Lieberman. Division of Reactor Development AEC Report WASH-408 (May 17, 1956).
Recent research and development projects for disposal of high-level wastes are listed.

36. Report on Waste Disposal System at the Chalk River Plant of Atomic Energy of Canada Limited. C. A. Mawson. Report CRB-658 (July, 1956).
Methods now in use and new methods proposed and on test for disposal of waste are discussed.

37. "The Management of Power Reactor Wastes." G. Hoyt Whipple. Am. Ind. Hyg. Assoc. Quart. 17, 420-5 (December, 1956).

2.00 RADIOLOGICAL HEALTH AND HAZARDS

2.10 General

38. Meteorological Factors in Atmospheric Pollution Problems. Maynard E. Smith. Brookhaven Report AECU-1213.

39. Maximum Allowable Concentrations of Fission Products in the Air as a Function of Exposure Time and Time After Detonation. Robert L. Harvey. Chemical and Radiological Labs., Army Chemical Center Report CRLIR-81 (January 16, 1952).

40. Contamination of Plumbing by Low-Level Radioisotope Wastes: Final Report. Albert P. Talboys. Johns Hopkins Univ. Report NYO-4010; JHUX-7 (May 1, 1952).

41. "Hazards Anticipated From Fission Product Use." P. J. Valaer. Occupational Health 12, 105 (July, 1952).

42. Experiments on the Uptake of Iodine 131 Vapour by Grass. A. C. Chamberlain and R. C. Chadwick. Report AERE HP/R 993 (August 6, 1952).

43. "Estimation of Curie Content of Packaged Radioactive Wastes." Frederick B. Oleson. Arch. Ind. Health 12, 383-7 (October, 1955).

44. Report of the Committee on Disposal and Dispersal of Atomic Wastes. p. 99-108 of The Biological Effects of Atomic Radiation: Summary Reports. National Academy of Sciences Report NP-6017 (1956).
No deleterious effect on the public has been found due to radioactive wastes. Conclusions are outlined regarding the status of waste disposal in the future.

45. Personnel Protection in the Radioactive Inhalation Program. G. Hoyt Whipple, J. N. Stannard, G. J. Miller, M. L. Ingram, and T. T. Mercer. University of Rochester Report UR-310 (February 4, 1955).

46. "Radioactivity in Stream Pollution." R. C. Palange, G. G. Robeck, and C. Henderson. Ind. Eng. Chem. 48, 1847-50 (October, 1956).

47. "Radioactive Waste and Health Protection Problems." A. N. Marei. Med. Radiol. 1, No. 4, 3-7 (July-August, 1956). (In Russian)

48. "Maximum Permissible Internal Dose of Radionuclides: Recent Changes in Values." K. Z. Morgan. Nuclear Sci. and Eng. 1, 477-500 (December, 1956).

2.20 Monitoring

49. Sensitivity of Liquid Waste Monitoring by the Evaporation Method. Frederick P. Cowan and John V. Nehemias. Brookhaven Report AECU-985.

50. Development of Equipment for Detection of Atmospheric Xenon. S. A. Kline. Univ. of Chicago Report CE-2674 (January 19, 1945).

51. Determination of Alpha Activity of Uranium in Mud. C. A. Kienberger, R. E. Greene, and C. E. Pepper. Report K-434 (July 15, 1949).

52. "Radioactivity Assay of Water and Industrial Wastes with Internal Proportional Counter." Lloyd R. Setter, Abraham S. Goldin, and John S. Nader. Anal. Chem. 26, 1304-6 (August, 1954).

53. "Proportional Liquid Sampler." John M. Ruddy. Nucleonics 13, No. 2, 48 (February, 1955).

54. Iodine Stack Monitor. B. M. Carmichael and D. G. Kerraker. Du Pont de Nemours and Co. Savannah River Report DP-129 (August, 1955).

55. Automation in the Beta Monitoring of Liquid Waste Streams. H. B. Rieck, Jr. and J. D. McCormack. Report HW-40460 (December 15, 1955).

56. Sewer Sampler. P. V. Henton. U.S. Patent No. 2,742,788 (April 24, 1956).

57. Monitoring the Liquid Wastes Discharged from the Idaho Chemical Processing Plant. William C. King. Report IDO-14378 (June 12, 1956).

See also abstract No. 292.

2.30 Ecological Studies

58. Radiological Sciences Department Research and Development Activities. Quarterly Progress Report April-June, 1955. H. M. Parker, Report HW-38198 (July 11, 1955).

Progress is reported in the radiobiological-ecological survey of the Columbia River.

See also abstracts Nos. 291, 292, 294, 296 and 298.

3.00 LIQUID WASTE

3.10 Origin and Characteristics and Processes

59. Proposal for Sampling of Site "W" Liquid and Solid Waste. A. A. Abbatiello, R. N. Drucker, W. M. Wallace, and J. L. Waters. Report K-226 (June 8, 1948).

A proposal for determining some of the physical properties of liquid and solid waste by means of a specially designed densitometer is presented.

60. Apparent Viscosity of Simulated Underground Metal Waste Slurries. A. W. Allen. Report HW-17775 (June 20, 1950).

61. Apparent Viscosity of Neutralized and Concentrated Raw Slurry - TBP HW-No. 4 Flowsheet. A. W. Allen. Report HW-18476 (August 15, 1950.)

62. Neutralization of Acidic Distillates with Limestone. H. L. Brandt and R. E. Burns. Report HW-19852 (December 27, 1950).

63. "Studies on Radioisotope Removal by Water Treatment Processes." Rolf Eliassen, Warren J. Kaufman, John B. Nesbitt, and Morton I. Goldman. J. Am. Water Works Assoc. 43., 615-37 (August, 1951).
Radiation sources, removal of radioisotopes from contaminated water by means of evaporation, chemical coagulation or carrier precipitation, ion exchange resins and clays, and biological adsorptive or assimilation processes are discussed.

64. "Wastes Containing Radioactive Isotopes." C. C. Ruchhoft, A. E. Gorman, and C. W. Christenson. Ind. Eng. Chem. 44, 545-9 (March, 1952).
Features of the design and operation of the chemical coagulation and filtration plant at Los Alamos are described.

65. Design and Performance of an Effluent Plant for Radioactive Wastes. J. A. Leary, R. A. Clark, and R. P. Hammond. Los Alamos Report AECU-2818 (January 20, 1954).

66. Experience of Handling Low Level Active Liquid Wastes at the Idaho Chemical Processing Plant. S. F. Fairbouree, D. G. Reid, and B. R. Kramer. Report IDO-14334 (June 17, 1955).

67. Radioactive Liquid Waste Control. John M. Ruddy. Report BNL-2409, (July 12, 1955).

68. "Heat Problems in the Disposal of High-Level Radioactive Wastes." E. A. Coppinger and R. E. Tomlinson. Chem. Eng. Progr. 52. 417-21 (Oct., 1956).

See also abstract No. 289.

3.20 Treatment for Disposal

3.21 Evaporation

69. Control of Foaming During Evaporation of Radiochemical Wastes. T. C. Runion. Report ORNL-722 (June 27, 1950).

70. Test of Steam Jacketed Falling Film Evaporator. G. R. Nelson, T. F. Furlong, and J. B. Robinson. M.I.T. Report AECU-3244 (June 28, 1950).

71. Concentration of Radioactive Liquid Waste by Evaporation. G. E. McCullough, Report KAPL-391 (Sept. 22, 1950). See also: Ind. Eng. Chem. 43, 1505 (1951).

72. Engineering Study of Evaporation for Concentrating Radioactive Liquid Wastes. Engineering Research Final Report. R. L. Bates and M. McEwen. Mound Report AECD-4150 (November 1, 1950).

73. Development of the Flow Sheet for the Mound Laboratory Liquid Waste Evaporation System. Engineering Research Final Report. G. W. Frink, R. L. Bates, and M. McEwen. Report MLM-532 (December 8, 1950).
The entire liquid waste handling system is grouped and discussed under the headings: collection, neutralization, evaporation and condensation, distillate storage, instrumentation, sampling, and shielding.

74. Design Calculations for the Waste System Evaporator Reboiler WL-300, and Ejector Exhaust Condenser WL-302. A. F. Arruzza. ORNL Report CF-51-10-138. (October 16, 1951).

75. Utilization of the Gross Fission Products. Progress Report No. 2 for the Period January 3, 1952 to January 14, 1953. E. L. Mincher and R. M. Lichenstein. General Electric Report GEL-67 (March 20, 1953).
Two methods of evaporating mixed-fission-product waste process solutions to dryness are discussed.

76. The Occurrence and Control of Radioactive Entrainment in Evaporative Systems. B. Manowitz, R. H. Bretton, and R. V. Horrigan. Report BNL-1639. (October, 1953).

77. Progress Report on Waste Processing Development Project. The Concentration of Waste. B. Manowitz, and R. Isler. Brookhaven Report AECD-3777. (December 1, 1953).
The concentration of dilute waste solutions to 60 to 70 per cent solids slurries in a batch slurry evaporator, removal of the residual water from the waste by evaporation, and fusion in the final waste container; accomplishment of the complete concentration and fusion cycle in one piece of equipment on a continuous basis are the two schemes discussed.

78. Preconcentration of High Activity Acid Waste for the Oak Ridge Chemical Processing Plant. J. L. Dodson. ORNL Report CF-54-5-89 (May 17, 1954).

79. "Vapor Compression Evaporation Handles Radioactive Waste Disposal." Bernard Manowitz, Powell Richards, and Robert Horrigan. Chem. Eng. 62, No. 3, 19406 (March, 1955).

80. Study of HRT-CP Waste Evaporator, Entrainment Separator, Condenser and Related Piping. W. L. Carter, P. S. Lindsey, and G. W. Gray. ORNL Report CF-55-11-143 (November 25, 1955).

See also abstracts Nos. 87, 290 and 298.

3.22 Calcination

81. Progress Report on Waste Development Project. Description of Calciner Pilot Plant. F. Hittman and B. Manowitz. Report BNL-323 (December, 1954).
This continuous calciner is a heated tube, auger-agitated concentrator which dehydrates and fuses the various aqueous waste salt solutions to an anhydrous free-flowing melt on a continuous basis.

82. "Concentrating Fission Products." L. P. Hatch and W. H. Regan, Jr. Nucleonics 13, No. 12, 27-9 (December 1955).
The design of a ball mill-kiln for concentrating fission products in Al_2O_3 produced from $Al(NO_3)_3$ content of waste is given.

83. "Balls Keep Solids Moving." Chem. Eng. 63, No. 3, 120, 122 (March 1956).
A ball mill-kiln for concentrating fission products in Al_2O_3 produced from the $Al(NO_3)_3$ content of waste is described.

3.23 Fixation

84. Preparation of Spherical Clay Particles Containing Radioactive Ions. George P. Simon and William S. Ginell. Report BNL-1105.

85. Disposal of Radioactive Wastes in Cement. Job 24-A. Vitro Report KLX-1377. (June 18, 1952).

86. Disposal of Radioactive Cations. W. S. Ginell. U.S. Patent 2,616,847. (November 4, 1952).

87. "Processes for High-Level Waste Disposal." Bernard Manowitz and L. P. Hatch. Nuclear Engineering, Part II, Chem. Eng. Progr. Symposium Ser. No. 12, 144-52 (1954).

This paper discusses two possible alternate methods of off-site waste disposal. One method involves evaporating the waste to dryness and fusing it into a melt--all within disposable containers. The other method involves the adsorption of fission product ions on montmorillonite clay and the fixation of the absorbed ions by heating the clay to high temperature.

88. Ultimate Disposal of Radioactive Wastes. L. P. Hatch, J. J. Martin, and W. S. Ginell. Report BNL-1781 (February, 1954).

Results are reported from laboratory experiments on the take-up of fission products on montmorillonite clay.

89. "Ultimate Disposal of Radioactive Wastes." W. S. Ginell, J. J. Martin, and L. P. Hatch. Nucleonics 12, No. 12, 14-18 (December, 1954).

A process for storing radioactive wastes is proposed employing the selective adsorption of fission-product cations on montmorillonite clay.

90. The Possibility of Self-Fixation of Highly Active Wastes. C. B. Amphlett. Great Britain Report AERE-C/R-1862 (February, 1956).

This report summarizes the uses of siliceous minerals to absorb activity either by ion exchange or by firing to produce mixed silicates.

91. The Temperature Distribution in a Heated Clay Block and Its Application to the Problem of Fission Product Disposal. C. B. Amphlett and D. T. Warren. Great Britain Report AERE-C/R-1861 (February, 1956).

92. Fixation of Activity in Solid Form by Absorptionoon Soils. Part I. Firing and Leaching Tests. C. B. Amphlett and D. T. Warren. Great Britain Report AERE-C/R-1686 (June, 1956).

93. "Ceramics--Versatile Nuclear Materials." Nucleonics 14, No. 6, 64-5 (June, 1956).

Ceramics have found use as refractory material for melting and casting nuclear fuel and as a medium for permanent waste disposal. See also abstract No. 303.

3.24 Precipitation and Scavenging

94. Factors Affecting the Precipitation of Tubanyl Peroxide From Gunk Solutions at Reduced Temperatures. Part I. Beta. K. B. Brown, D. H. Swanson, E. L. Wagner, and A. J. Miller. Tennessee Eastman Corporation Report AECD-4165 (March 6, 1945).

95. Separation of Tuballoy (Uranium) from Gunk Solutions by Sulfite Precipitation. A. D. Ryon and E. C. Armstrong. Tennessee Eastman Corporation Report AECD-4151 (April 18, 1945).

96. High Temperature Hydrogenation-Hydrofluorination of Uranyl Ammonium Phosphate to Uranium Tetrafluoride. H. A. Bernhardt, W. Davis, Jr., J. R. Flanary, and R. J. Heus. C and CCC Report K-425 (July 15, 1949).

97. Quarterly Report for Liquid Waste Disposal Research (for) July 1, 1949 to September 30, 1949. Report MLM-380 (October 1, 1949).
Processes for the decontamination of Hanford second cycle wastes proceeded along two lines: precipitation and adsorption.

98. Liquid Waste Disposal Research Quarterly Report for October, November, December 1949. Report MLM-406 (January 1, 1950).
The work on decontamination procedures was devoted to the precipitation of radioactive elements rather than to their removal from the waste solutions.

99. Research on Reactor Waste Disposal. C. S. Lowe, M. McEwen, F. C. Mead, Jr. E. Orban. Mound Report AECD-4066 (December 15, 1950).
Laboratory work on second decontamination cycle wastes centered around FeS precipitation, ferrous ferrocyanide precipitation, and performed adsorbent methods. Good results were obtained by passing the same original solution through an activated C column and subsequently through an activated alumina column impregnated with ferrous Fe. On a continuous basis of processing second cycle crib wastes, a possible method exists in a treatment consisting of silica gel adsorption, activated alumina adsorption, metallic Fe scrub, ferrous ferrocyanide precipitation, neutralization and filtration. Decontamination of "fresh" first cycle wastes is best accomplished by repeated scavenging with FeS.

100. Decontamination of Liquid Wastes by Iron Sulfide, Iron Hydroxide, and Calcium Phosphate Precipiations. (Final Report). C. S. Lowe, L. L. Bentz, J. R. Heiks, F. C. Mead, Jr., E. L. Murphy, E. Orban, F. Reichel, C. E. Shoemaker, and T. C. Tesdahl. Mound Report AECD-3632; MLM-662(rev.) (December 28, 1953).

101. "Filtration-Precipitation Separation of Barium-140 from Lanthanum-140." R. W. Perkins. Anal. Chem. 29, 152-3 (January, 1957).

102. "Volume Reduction of Radioactive Waste by Carrier Precipitation." R. E. Burns and M. J. Stedwell. Chem. Eng. Progr. 53, 93F-5F (February, 1957).

See also abstract No. 290.

3.25 Electrolytic and Ion Exchange

103. Studies on the Decontamination of Waste Solutions by Ion Exchange Methods. W. A. Bain. Kellex Report M-4497 (June 3, 1949).

104. Separation of Copper, Iron, Nickel and Uranyl Ions by Ion Exchange Columns. H. L. Bench, R. H. Capps, M. R. Skidmore, H. B. Weisblatt, and R. H. Winget. Report K-447 (July 20, 1949).

105. Progress Report; Fourth Quarter, 1950; Development of Laboratory Disposal Unit; Job-24A. Report KLX-1330 (January 30, 1951).
Work on the development of a laboratory ion-exchange unit for the decontamination of radioactive-waste solutions has been started.

106. Summary Progress Report for May 1951 on Development of Laboratory Waste Disposal Unit; Job 24-A. Report KLX-1349 (June 15, 1951).

107. Progress Report; Second Quarter, 1951; Development of Laboratory Waste Disposal Unit; Job 24-A. Report KLX-1352 (July 16, 1951).
Brief statements are made concerning the status of various phases of the program to develop a laboratory waste-disposal unit using ion exchange resins.

108. Development of Laboratory Waste Disposal Unit; Summary Progress Report; July 1951; Job 24-A. Report KLX-1354 (August 6, 1951).
Brief note is made that waste-disposal resins may be dyed with acid-base indicators which will indicate approaching ionic saturation of the resin before the effluent becomes acidic, and thus give warning of conditions under which active, volatile, acidic anions can exist.

109. Decontamination of Dilute Low Activity Wastes by Ion Exchange. Progress Report for Third Quarter, 1951. Report KLX-1363 (December 14, 1951).

110. Interim Summary Development of Laboratory Waste Disposal Unit; Job 24; Period September 1, 1950--March 1, 1952. Report KLX-1374 (June 6, 1952).
A laboratory scale unit has been developed toadsorb and concentrate dilute low activity solutions with ion exchange resins. The unit permits safe and efficient disposal of radioisotopes from such solutions.

111. Quarterly Progress Report for October 1--December 31, 1952, Unclassified Section. Report BNL-219.
Progress is reported on waste disposal by use of montmorillonite clays.

112. Ultimate Disposal of Radioactive Wastes. L. P. Hatch, Report BNL-1345 (January, 1953).
The problem is attacked, speculatively, from the standpoint of electrical power, assuming that in the future a certain percentage of the electrical power of the world will be supplied by nuclear reactors.

113. "Concentration of Radioactive Aqueous Wastes. Electromigration Through Ion-Exchange Membranes." W. R. Walters, D. W. Weiser, and L. J. Marek. Ind. Eng. Chem. 47, 61-7 (January, 1955).

114. "Cation Exchange Removal of Radioactivity from Wastes." H. Gladys Swope and Elaine Anderson. Ind. Eng. Chem. 47, 78-83 (January, 1955).

115. Removal of Radioactive Contaminants from Water by Ion Exchange Slurry. William J. Lacy, Don C. Lindsten. ORNL Report CF 55-1-200 (Jan. 25, 1955).

116. Preliminary Laboratory Evaluation of an Electrodialytic Method for the Treatment of Radioactive Waters. M. S. Seal and M. A. Pecsok. Report CF-55-5-171 (May 18, 1955).

An electrodialytic method using ion exchange membranes is described which has been used for the decontamination of radioactive wastes and for the concentration of radioelements contained in low-level radioactive waters.

117. Diban--Ion Exchange Waste Disposal Scheme. Part I. I. R. Higgins and R. G. Wymer. Report ORNL-1984 (November 28, 1955).

118. "An Anion--Exchanger Process for Gram-Scale Separation of Americium from Rare Earths." J. S. Coleman, R. A. Penneman, T. K. Keenan, L. E. Lamar, D. E. Armstrong, and L. B. Asprey. J. Inorg. and Nuclear Chem. 3, 327-8 (1956).

See also abstracts No. 283, 293, 297, and 303.
See also abstracts listed under Kellex and Vitro progress reports.

3.26 Co-Precipitation and Co-Crystallization

119. Studies on the Removal of Radioisotopes from Liquid Wastes by Coagulation. Robert A. Lauderdale, Jr. Report ORNL-932 (January 23, 1951).

Work completed to date on the removal of radioisotopes from water using a calcium phosphate floc as a carrier is reported.

120. The Use of Sequential Factorial Designs in the Establishment of Optimum Conditions for a Decontamination Process. M. K. Barnett, P. M. Hamilton, and F. C. Mead, Jr. Report MLM-921 (January 11, 1954).

121. A Study of the Removal of Radioactive Particulate Matter from Water by Coagulation. Nathan C. Burbank, Jr., Robert A. Lauderdale, and Rolf Eliassen. M.I.T. Report NYO-4440 (September 1, 1955).

122. The Removal of Fission Products from an Acid Aluminum Nitrate Solution by Co-Precipitation Methods. Herman L. Kriegar, Bernd Kahn, and Conrad P. Straub. Report ORNL-1966 (October 20, 1955).

See also abstract No. 294.

3.27 Biological Treatment

123. The Determination of Uranium in Plant (Ore Refinery) Sewer Water. O. J. Buckheim. Mallinckrodt Report NYO-5214 (January 8, 1948).

124. Sludge Sampling System. A. A. Abbatiello. Report K-316 (Dec. 9, 1948).
A clamshell-type sludge sampler was designed and built at K-25 and used at Hanford to obtain specimens of radioactive materials at predetermined depths from the metal waste tanks T-101, T-102, and T-103.

125. Uranium Content of Sewage Sludge; Oak Ridge Disposal Plant. L. J. Brady and C. D. Susano. Report Y-471 (August 10, 1949).

126. Adsorption and Assimilation of P^{32} by Bacterial Slimes; for November 15, 1948, to November 15, 1949; Final Report. George W. Reid. Johns Hopkins Univ. Report JHUX-4 (March 20, 1950).

127. Sludge Formation in Synthetic Metal Waste at 90°C. J. C. Barton, R. H Rainey, and W. R. Rossmassier, Jr. K-25 Report K-556 (Jan. 25, 1950).

128. "Studies on the Effect of Radioactive Phosphorus on the Biochemical Oxidation of Sewage." Werner H. Grune and Rolf Eliassen. Sewage and Ind. Wastes 23, 141-54 (February, 1951).

129. Physics, Instrumentation, and Health Physics, and Accelerator Project, p. 1-64 of Quarterly Progress Report; July 1--September 30, 1951. Report BNL-132.
A series of tests of the effectiveness of the filter beds in removing specific radioactive substances from the BNL sewage effluent were completed.

130. Effect of Radioactivity on the Biochemical Oxidation of Domestic Sewage; Final Report. William E. Dobbins, Gail P. Edwards, Werner N. Grune, and Richard Ehrenreich. New York Univ. Report NYO-1567 (October, 1951).

131. Application of Dropping Mercury Electrode to B.O.D. Determination. Arthur W. Busch and Clair N. Sawyer. M.I.T. Report NYO-4436 (May 27, 1952).

132. Effect of Beta Radiation Upon Biochemical Oxidation in Polluted Waters. Rolf T. Skrinde and Clair N. Sawyer. M.I.T. Report NYO-4438 (Sept. 30, 1952).

133. Progress Report from July 1, 1951-- August 30, 1952 (on) Treatment of Synthetic Laundry Waste on Trickling Filters. William E. Dobbins, Gail P. Edwards, and Richard Ehrenreich. New York Univ. Report NYO-4506 (November, 1952).

134. Trickling Filter Treatment of Radioactive Contaminated Laundry Wastes: Final Report. Ernest F. Gloyna and John C. Geyer. Johns Hopkins Univ. Report NYO-4514; JHUL-3 (December 15, 1952).
Rotary slime tubes, a trickling filter, and agitation flasks were used to study the effects of laundering aids on organisms.

135. Activated Sludge Treatment of a Mixture of Radioactive Laundry Waste and Sanitary Sewage. Leo M. Reading, Everett R. Mathews, C. W. Christenson, and J. F. Newell. Los Alamos Report AECU-2671 (1953?).

136. "Application of Biological Methods in the Treatment of Radioactive Wastes." C. C. Runchhoft and L. R. Setter. Sewage and Ind. Wastes 25, 48-60 (January 1953).

137. Radioactive Waste Removal in a Trickling Filter Sewage Plant. A. L. Biladeau. Report IDO-24010 (May 1953).

138. "Removal of Radioactive Iodine by Laboratory Trickling Filters." Melvin W. Carter. Sewage and Ind. Wastes 25, 560-5 (May 1953).

139. Removal of Radioisotopes by Sewage Treatment Processes; Progress Report No. 1, May 1, 1951 to March 31, 1952. Warren J. Kaufman, Gerhard Klein, and Harold B. Gotaas. Univ. of California Report AECU-2035 (April 15, 1952).

140. Concentration of Radioisotopes by Activated Sludge; Progress Report Covering Period April 1, 1952 to May 31, 1953. Warren J. Kaufman, Gerhard Klein, and Arnold E. Greenberg. Univ. of Calif. Report AECU-2665 (May 31, 1953).

141. Removal of Radioactivity from Laundry Wastes by Trickling Filters. Progress Report from September 1, 1952 to November 30, 1953. William E. Dobbins, Gail P. Edwards, Richard Ehrenreich, and Frederic A. Friedman. New York Univ. Report NYO-4567 (December 1953).

142. Removal of Radioisotopes by Sewage Treatment Processes. Progress Report No. 2 Covering the Period April 1, 1952 to May 31, 1953. Concentration of Radioisotopes by Activated Sludge. Warren J. Kaufman, Gerhard Klein, and Arnold E. Greenberg. Univ. of Calif. Report AECU-2730 (May 31, 1953).

143. Removal of Radioisotopes by Sewage Treatment Processes. Progress Report No. 3 Covering Period June 1, 1953 to May 31, 1954. Biological Treatment of Radioactive Wastes. Gerhard Klein, Arnold E. Greenberg, and Warren J. Kaufman. Univ. of Calif. Report AECU-2824 (June 30, 1954).

144. "Radioactive Effects on the B.O.D. of Sewage." Werner N. Grune. Sewage and Ind. Wastes 25. 882-97 (August 1953).
The effects of various concentrations of P^{32} and of I^{131} on both the first and second stages of biochemical oxidation of sewage were studied.

145. Oxidation Ponds--Radioactivity Uptake and Algae Concentration. E. W. Steel and E. F. Gloyna. Univ. of Texas Report AECU-2837 (Feb. 28, 1954).

146. "Removal of Radioactive Substances from Water by Biological Treatment Processes." G. E. Eden, G. H. J. Elkins, and G.A. Truesdale. Atomics 5, 133-42, 158 (May 1954).
The methods generally involve the use of an aerobic bacterial slime, supported on grains of sand to form a slow sand filter, or suspended as a flocculent sludge.

147. "The Use of Radioactive Isotopes in Tracing Sewage Flow." G. A. Truesdale, Atomics 5, 304-12 (November, 1954).
Experiments are described in which Rb^{86} was used to trace the flow of sewage through sedimentation tanks and percolating filters.

148. Removal of Radioactivity from Laundry Wastes by Trickling Filters. Final Report. William E. Dobbins, Gail P. Edwards, and Wladimir Gulevich. New York Univ. Report NYO-4641 (May, 1955).

149. Oxidation Ponds--Waste Treatment Studies, Radioisotope Uptake, and Algae Concentration. Technical Report No. 2. E. F. Gloyna, E. R. Herman, and W. R. Drynan. Univ. of Texas Report AECU-3113 (June 1, 1955).

150. "Concentration of Radioactivity in Oxidation Ponds." E. W. Steel and Ernest F. Gloyna. Sewage and Ind. Wastes 27, 941-56 (August, 1955).

151. "Effects of High Concentrations of Nitrogen on Activated Sludge." Robert L. Taylor, Everett R. Mathews, and C. W. Christenson. Sewage and Ind. Wastes 28, 177-82 (February, 1956).

152. The Effect of Radioactive Substances on Sludge Digestion. Final Report. R. H. Harmeson and J. C. Dietz. Univ. of Illinois Report AECU-3406 (January, 1957).

3.28 Others

153. Engineering Studies of Filter Bed Efficiency for the Treatment of Radioactive Wastes. Lee Gemmell. Report BNL-1187

154. Pyrohydrolysis of Precipitates Derived from Mock HL-45. H. A. Bernhardt, W. Davis, Jr., and M. R. Skidmore. Report K-292 (October 27, 1948).

3.30 Treatment Processes for Recovery of Constituents

3.31 Fission Products

155. The Preparation of Ruthenium Tracer from Waste Metal Solution. A. T. Gresky, Clinton Labs. Report MonT-223 (December 3, 1946).

156. Separation of Fission Products from Aluminum Waste Solutions by Ion Exchange. September 1947--September 1948. R. E. Blanco, I. R. Higgins, and A. H. Kibbey. Report ORNL-301 (Rev.) (August 14, 1956).

157. Separation of Cesium from Sodium by Means of Fullers Earth. H. L. Bench and H. B. Weisblatt. Report K-443 (July 15, 1949).

158. Removal of Ruthenium from Waste. G. A. Eaton, J. J. Finley, H. G. Hunter, F. Mills, and R. W. Vogel. Report K-570 (February 22, 1950).

159. Liquid Waste Disposal Research Quarterly Report for April, May and June 1950. Mound Report AECD-4148 (July 1, 1950).
Experiments have been carried out with both neutralized second-cycle wastes and pure isotopes which show that, in general, the presence of fluoride ion does not interfere with the removal of fission products from waste solutions.

160. Radioisotope Production and Process Development. Annual Report for 1954. A. F. Rupp. Report ORNL-1861 (May 19, 1955).
The separation and concentration of the main classes of long-lived radioisotopes found in process wastes were demonstrated on a semi-works scale, and the construction of a proposed pilot plant to produce kilocurie sources of certain long-lived fission products from process wastes is discussed.

161. "Chemical Operations with Fission Product Solutions." E. Gluechauf and T. V. Healy. Atomics 6, 370-9, 385 (December, 1955).

162. Treatment of Wastes Containing Radioactive Barium, Lanthanum, Strontium, and Yttrium, J. P. Hutchinson, E. H. Rex, E. R. Mathews, and C. W. Christenson. Los Alamos Report AECU-3359 (1956).

See also abstracts No. 263, 290, 291, and 298.

3.32 Uranium

163. Equipment Development and Semi-Works for Metal Recovery. Final Report--Problem Assignment No. TX2-3. R. B. Briggs. Clinton Labs. Report CN-3222 (September 24, 1945).
Tests were run on a semi-works scale to determine the feasibility of the metal recovery processes.

164. Recovery of Uranium from Hanford Waste by Precipitation as Uranium Tetrafluoride and Subsequent Fluorination. H. A. Bernhardt, S. Bernstein, and F. D. Rosen. Report K-416 (June 10, 1949).

165. Recovery of Uranium from Saline Solutions by Biological Slimes. Final Report. B. B. Ewing, W. R. Drynan, and E. F. Gloyna. Univ. of Texas Report ORO-148 (October 1, 1955).

3.33 Plutonium and Transplutonics

166. Laboratory Studies on the Removal of Plutonium from Laundry Wastes. John F. Newell, C. W. Christenson, H. L. Krieger, D. W. Moeller, E. R. Mathews, and C. C. Ruchhoft. Los Alamos Report AECU-1008; LADC-800.

167. Hydrogenation of Precipitates Derived from Synthetic Hanford Waste. H. A. Bernhardt, W. Davis, Jr., and R. J. Heus. Report K-383 (April 11, 1949).

168. "What Treatment for Radioactive Wastes?" John F. Newell and C. W. Christenson. Eng. News-Record 147, 37-8 (November, 1951).
Removal of Pu from Laboratory and Laundry waste waters is discussed.

3.34 Inert Chemicals

169. Separation of Nitrate and Aluminum from Radioactive Chemical Wastes. John B. Huff. Report IDO-14392 (November 1, 1956).

3.40 Disposal Methods

3.41 Tank Storage

170. Sampling of Site "W" Supernatant Liquor. A. A. Abbatiello, D. H. Stewart, and J. L. Waters. Report K-218 (May 20, 1948).

171. The Corrosion of Various Stainless Steels in Synthetic Waste Solutions. James L. English. Report ORNL-848 (February 12, 1951).

172. A Study of the Effect of Cooling Water Temperature on Heat Transfer by Natural Convection in First Cycle Waste Tanks WM-100, WM-101, and WM-102. W. L. Carter. ORNL Report CF-52-3-34 (March 7, 1952).

173. Health Physics Division Quarterly Progress Report for Period Ending October 30, 1952. Report ORNL-1420 (January 2, 1953).
Data are tabulated on the effectiveness of ground-water waste-storage pits.

174. Structural Evaluation of Underground Waste Storage Tanks. Edgar F. Smith Report HW-37519 (June 23, 1955).

175. Weldability Tests of Four High Strength Structural Steels. G. W. Riedeman. Report HW-37956 (August 9, 1955).
As part of a design program for HAPO waste storage tanks, a study was made of possible fabrication materials.

176. Production of Acidity in Stored Waste. L. L. Burger. Report HW-39658 (October 26, 1955).

See also abstracts 293 and 298.

3.42 Surface Disposal

177. Natural Tritium as a Tracer for Underground Water Movement--A Feasibility Report. H. G. Rieck. Report HW-30262 (November 2, 1953).

178. Adsorption and Retention of Cesium by Soils of the Hanford Project. J.R. McHenry. Report HW-31011 (March 2, 1954).

179. Health Physics Division Semiannual Progress Report for Period Ending July 31, 1954. Report ORNL-1763 (September 27, 1954).
Progress is reported in waste pit processes in the removal of suspended or colloidal radioactive material from water.

180. Health Physics Division Semiannual Progress Report for Period Ending January 31, 1955. Report ORNL-1860 (May 9, 1955).

Progress is reported in the exploration of fields for waste storage pits.

181. Evaluation of the Watertightness of an Asphalt, Tamped-Clay Pit Liner. K. E. Cowser, R. J. Morton, and T. W. Bendixen. ORNL Report CF-55-3-128. (March 23, 1955).

182. Purex Cooling Water Disposal Scope Study. J. P. Corley. Report HW-38468 (September 21, 1955).

Results are reported from a survey of various liquid waste disposal schemes. Recommendations are presented for the disposal of Purex waste cooling water by discharge to a natural depressed area.

183. Disposal of Highly Active Solutions. 1. Fission Product Disposal in Glass. R. W. Durham and L. C. Watson. 2. Waste Disposal into the Ground. C. A. Mawson. Chalk River Report UK/C/4/113 (Paper presented at Fourth UK-Canada Technical Conference, October 17-19, 1955).

184. "Ground-Disposal of Radioactive Wastes." Roy J. Morton and Edward G. Struxness. Am. J. Public Health 46, 156-63 (February, 1956).

See also abstract No. 293.

3.43 Subterranean Disposal

185. Disposal of Nuclear Power Reactor Wastes by Injection into Deep Wells. Preliminary Report. D. A. Pecsok. Report CF-54-10-64 (July, 1954).

Geographical, economic, chemical, and temperature considerations regarding subterranean disposal of liquid wastes are discussed in detail.

186. Underground Movement of Radioactive Wastes. Progress Report No. 1 covering period July 1, 1954 to June 30, 1955. Warren J. Kaufman, Richard G. Orcutt, and Gerhard Klein. Univ. of Calif Report AECU-3115 (August 1, 1955).

A preliminary investigation was made of several physical and chemical factors influencing the feasibility of high-level radioactive waste disposal by injection into isolated geological formations.

3.44 Rivers

187. Radioactive Fission Product Contamination in the Mud of White Oak Drainage System. J. S. Cheka and K. Z. Morgan. Clinton Labs. Report MonH-258 (March 20, 1947).

188. Water Activity Computations. T. H. J. Burnett. Report CF-48-1-175 (January 14, 1948).

The method used in calculating the activity released to the Clinch River from Oak Ridge installations is presented and discussed.

189. Radioactivity Levels of the Columbia River Below Richland, Washington for the Period January, February, March, 1956. H. V. Clukey. Report HW-45983 (October 9, 1956).

190. Radioactivity Levels of the Columbia River Below Richland, Washington for April, May, June, 1956. H. B. Clukey. Report HW-46094 (October 17, 1956).

191. A Study of the Fluoride Concentration in the Scioto River and Tributary Streams. H. L. Burkhardt, H. L. Caterson, B. Kalmon, and R. A. Manning. Goodyear Atomic Corporation Report GAT-184 (May 29, 1956).

192. "A System Which Continuously Records Water Level and Contamination." Ford Kalil and J. M. Garner, Jr., Nucleonics 14, No. 7. 56-60 (July, 1956).

3.45 Oceans

193. Disposal of Active Wastes at Sea. James E. Evans. DuPont Report DP-5 (April 10, 1952).

194. Quarterly Progress Report (for) July 1--September 30, 1954. Report BNL-314.
A test has shown that it is feasible to use active concentrate from the liquid waste evaporation plant in mixing concrete for sea disposal.

195. Report of the Committee on the Effects of Atomic Radiation on Oceanography and Fisheries. p. 71-84 of The Biological Effects of Atomic Radiation: Summary Reports. National Academy of Sciences Report NP-6017 (1956).
Radioactive contamination of the ocean due to nuclear weapons tests over or in the sea, the disposal of radioactive wastes from nuclear power plants in the sea, and the use of radioactive substances in increasing our understanding of the oceans and of the creatures that live in the sea are discussed.

196. "Fission Product Disposal from Windscale." P. V. Danckwerts. Nuclear Eng. 1, 25-7 (April, 1956).
Experiments were made on the dispersal effects of the tide and wind on bulk dumpings of fluorescein in the sea followed by investigations into concentration characteristics of silt, seaweed and fish, before the low activity effluent was discharged into the sea at Windscale.

197. "The Dispersal of Effluent in the Sea." J. Wright. Atomics 7, 274-9 (August, 1956).

See also abstract number 286.

3.46 General

198. Disposition of Radioactive Sources. C. C. Ruchhoft. Univ. of Mich. Lectures at the Inservice Training Course in Radiological Health. (Feb. 5-8, 1951.)
Criteria for handling and disposal of radioactive wastes in the form of solids, liquids, gases, and aeresols are given.

199. Reactor Science and Engineering Department, p. 106-114 of Quarterly Progress Report; October 1--December 31, 1950. Report BNL-93 (March 1951).
Brief summaries of studies on permanent disposal of radioactive wastes are presented.

See also abstracts number 280 and 282.

4.00 SOLID WASTES

4.10 Decontamination

200. Chapter 10--Decontamination, Radiological Defense, Vol. II. William H. Sullivan. Naval Radiological Defense Laboratory Report AD-206 (Y) (February 1, 1950).
Three basic procedures may be used for decontamination; (1) surface decontamination, (2) aging and sealing, and (3) disposal.

201. Decontamination of Crib Wastes (24-A3). Progress Report for Second Quarter, 1950 Covering Period April 1--June 30, 1950. Report KLX-1305 (July 12, 1950).

202. Decontamination of Crib Wastes (24-A3). Summary Progress Report (for) November, 1950. Report KLX-1326 (December 21, 1950).

203. Decontamination of Crib Wastes (24-A3). Progress Report for First Quarter, 1951. Report KLX-1339 (April 16, 1951).

204. Decontamination of Crib Wastes (24-A3). Summary Progress Report (for) February, 1951. Report KLX-1336 (March 7, 1951).

205. Evaluation of Reagent Decontamination. Quarterly Report for Period August 10, 1951--November 10, 1951. M. R. Bennett. Report CF-51-11-123 (November 21, 1951).

206. Decontamination: A Literature Search. Rosalie L. Curtis. Report Y-964 (May 19, 1953).
Seventy abstracts are presented on the removal of radioactive contaminants from various materials.

207. Decontamination of Liquid Wastes by Iron Sulfide, Iron Hydroxide, and Calcium Phosphate Precipitation. (Final Report). C. S. Lowe, L. L. Bentz, J. R. Heiks, F. C. Mead, Jr., E. L. Murphy, E. Orban, F. Reichel, C. E. Shoemaker, T. C. Tesdahl. Mound Report AECD-3632; MLM-662 (rev.) (December 28, 1953).

208. The Use of Sequential Factorial Designs in the Establishment of Optimum Conditions for a Decontamination Process. M. K. Barnett, P. M. Hamilton, and F. C. Mead, Jr. Report MLM-921 (January 11, 1954).

209. Waste Disposal--Decontamination and Decontamination Laundry Facilities. W. A. Clark. Livermore Research Lab. Report LRL-120 (May 1954).

210. Physicochemical Investigations into the Absorption and Removal of Radioisotopes from Textiles (Radiological Decontamination). Part I. Polyvalent Cations on Cotton. D. G. Stevenson. Great Britain Report AWRE-O-42/55 (November 7, 1955).

211. Decontamination and Waste Disposal in Indium Gamma Irradiation Facility. Lawrence C. Widdoes. Internuclear Company Report AECU-3339 (May 14, 1956).

4.20 Burial

212. Solid Waste Disposal at the Knolls Atomic Power Laboratory. R. E. Larson and R. H. Simon. Report KAPL-936 (June 15, 1953).

A comparison of baling and incineration showed that baling was a simpler operation, had a lower operating cost, and involved a much smaller capital investment. Baling is used to reduce the volume of the compressible wastes.

213. The Cooling of Underground Fission Wastes. J. K. Perring. Great Britain Report AERE-C/R-1294 (November 9, 1953).

A method suggested for the disposal of waste fission products involves their adsorption in clay and burial in deep bore-holes.

214. "How Hanford Discards 'Hot' Equipment." Nucleonics 13, No. 5, 32-3 (May, 1955).

Disposal of "hot" equipment at the Hanford Pu separations plant by burial in isolated areas is described and illustrated photographically.

4.30 Oceans

215. "Radioactive - Waste Disposal in the Ocean." Nat'l. Bur. Standards (U.S.) Handbook 58. (August, 1954).

216. "Ocean Disposal of Radioactive Waste." Nucleonics 12, No. 12, 54. (December, 1954).

4.40 Incineration

217. Removal of Submicron Aerosol Particles from a Moving Gas Stream by the Condensation Center Effect. P. J. Schauer. Mound Report AECD-2986; MLM-450 (rev.).

218. Pilot Plant Work on Solid Burnable Waste Disposal for Mound Laboratory. P. J. Schauer. Report MLM-232 (November 1, 1948).

219. Report on Design for Volume Production of Combustible Radioactive Wastes by Incineration. Arthur D. Little, Inc. Report ALI-C-57867 (June 30, 1950).

220. Behavior of Institutional Incinerators When Used to Burn Radioactive Wastes; Final Project Report (for) August 1, 1950--November 1, 1952. C. W. Kruse, P. V. Freese, A. Machis, and V. C. Behn. Johns Hopkins Univ. Report NYO-4517 (November 1, 1952).

This report deals with the development of methods and techniques for measuring the amounts of radioisotope on the stack wall, in ash, stack gas, and atmosphere during and after incineration in the conventional refuse-type destructor.

221. Development of the Flow Sheet for Incinerating Contaminated Combustible Waste. Engineering Research Final Report. M. McEwen, P. J. Schauer, and T. Aponyi. Report MLM-567 (May 15, 1951).

222. "Off-Site Disposal of Radioactive Incinerator Residues by Solid Fluxes." Richard C. Corey, Harry Perry, and Cecil H. Schwartz. Am. Ind. Hyg. Assoc. Quart. 12, 52-7 (June, 1951).

223. A Report on the Development and Operation of a Pilot Plant Incinerator for Contaminated Combustible Solid Wastes. F. N. Schell. Report KAPL-610 (October 1, 1951).

224. "Burning Radioactive Wastes in Institutional Incinerators." Alfred Machis and John C. Geyer. Am. Ind. Hyg. Assoc. Quart. 13, 199-205 (Dec., 1952).

225. Basic Operational Report of the Argonne Active Waste Incinerator. Donald C. Hampson, Edwin H. Hykan, and Walton A. Rodger. Report ANL-5067 (February 6, 1953).

226. "Open Field Burning of Low Level Radioactive Contaminated Combustible Wastes." W. B. Harris and M. S. Weinstein. Am. Ind. Hyg. Assoc. Quart. 17, 388-90 (December, 1956).

227. Reduction of Combustible, Low-Level Contaminated Wastes by Incineration. Louis B. Silverman and Richard K. Dickey. Univ. of California Report UCLA-368 (May 15, 1956).

See also Abstracts number 212 and 289.

5.00 GASEOUS WASTES

228. Argon Activity in Reactor Cooling Air. J. A. Lane. Report CF-49-11-180 (November 17, 1949).

229. Odorants for Use in "W" Stack Gases. Final Report on a Phase of Problem No. 390-ML-51-S. R. N. Lyon. Univ. of Chicago Report CE-2532 (December 14, 1944).

230. The Theoretical Ground-Level Dose-Rate from the Radioargon Emitted by The Brookhaven Reactor Stack. Philip H. Lowry. Report BNL-81 (July, 1950).

231. The Effect of the Speed of Emission of the Rise of a Plume of Stack Gases. M. L. Barad. Report HW-20008 (November 20, 1950).

232. Meteorological Factors in Atmospheric Polution Problems. Maynard E. Smith. Report BNL-1070 (April 26, 1951).

233. Atmoshperic Diffusion From a Point Source. C. S. Yih. Colorado Agriculture and Medical College Report NP-3525; Report No. 4; U-19167 (August, 1951).

234. "Atmoshperic Pollution." Louis C. McCabe. Ind. Eng. Chem. 43, No. 6, 105A-108A (June, 1951).

235. Semiannual Progress Report of Development Activities in the Health Physics Unit (for) July-December 1951. KAPL Staff. Report KAPL-679 (January, 1952). The efficiency of the health physics iodine scrubbers was investigated and data are included.

236. Evaluation of A Cottrell Electrostatic Precipitator on a Radiochemical Process Off-Gas System. J. C. Suddath. Report AECD-3295; ORNL-1082 (November 26, 1951).

237. "Storage of Radioactive Gases from Reactor Operation." Raymond L. Murray Nucleonics 10, No. 12, 52-3 (December, 1952).

238. Savannah River Plant Stack Gas Dispersion and Microclimate Survey. L. L. Falk, C. B. Cave, W. R. Chalker, J. A. Greene, and C. W. Thorngate. DuPont Report DP-19 (January, 1953).

239. Performance Characteristics of Wet Collectors. Melvin W. First, Glenn A. Johnson, Richard Dennis, Sheldon Friedlander, and Leslie Silverman. Harvard Univ. School of Public Health Report NYO-1587 (March 11, 1953).

240. Ground Level Concentrations in the Vicinity of a 185 Foot Stack. B. Shorr. Report HW-27781 (April 20, 1953).

241. "Safe Disposal of Contaminated Air from Radiochemical Laboratories." J. W. J. Fay. Chem. and Process Eng. 34, 133-6 (May, 1953).

242. "The Use of Averages in Air Pollution Meteorology." Irving A. Singer and Maynard E. Smith. Report BNL-1513 (May 15, 1953).

243. Diffusion of Stack Gases in Very Stable Atmospheres. Case II. M. L. Barad and B. Shorr. Report HW-28917 (August 10, 1953).

244. Design and Performance of an Effluent Plant for Radioactive Wastes. J. A. Leary, R. A. Clark, and R. P. Hammond. Los Alamos Report AECU-2818, (January 20, 1954).

245. Cloud Dosage Calculations. R. L. Waterfield. General Electric Co. ANP Project Report APEX-179 (April 5, 1954).
The dosage from a radioactive cloud formed by a sudden release of fission products from a stack is calculated by means of Sutton's diffusion equation (Proc. Roy. Soc. (London) 135, p. 143).

246. A Comparison of Computed and Measured Ground-Level Dose Rates from Radioargon Emitted by the Brookhaven Reactor Stack. Irving A. Singer. Report BNL-292 (May, 1954).

247. Report on Biological, Medical, and Biophysics Program. Part I, Quarterly Report on Biological and Medical Research Division. Part II. Semiannual Report of Radiological Physics Division. Report ANL-5288 (July, 1954).
Primary design requirements of an experimental meteorology stack are presented. Instruments for use in stack disposal studies are described.

248. "Design of Chimneys to Control Down-Wash of Gases." R. H. Sherlock and E. J. Lesher. Trans. Am. Soc. Mech. Engrs. 77, 1-9 (January, 1955).

249. The Extraction, Purification, and Industrial Uses of Krypton-85. E. J. Wilson, C. Evans, J. Chadwick, J. Eakins, and K. J. Taylor. Great Britain Report AERE-I/R-1653 (April 25, 1955).

250. Radioargon Effluent from the Stack of the Medical Research Reactor. M. A. Greenfield, A.Norman, and D. P. Gamble. Univ. of California Report UCLA-344 (September 26, 1955).

251. Fourth Atomic Energy Commission Air Cleaning Conference Held at Argonne National Laboratory, November 1955. Reactor Development Report TID-7513.
Air cleaning operations, equipment, and research projects at AEC and associated installations are described.

252. "Ground Level Contamination from Stack Effluents." P. B. Klevin, M. S. Weinstein, and W. B. Harris. Am. Ind. Hyg. Assoc. Quart. 17, 189-92. (June, 1956).

253. Dispersal Patterns and Effects of Fluorine Vent Gases. H. L. Burkhardt, H. L. Caterson, R. A. Manning, and B. Kalmon. Goodyear Report GAT-185, (June 29, 1956).

254. Measurement and Analysis of the Holdup of Gas Mixtures by Charcoal Adsorption Traps. W. E. Browning and C. C. Bolta. Report ORNL-2116 (August 10, 1956).

255. Principles and Processes for Removing Nitrogen Oxides from Gases. M. S. Peters. Univ. of Illinois Report COO-1015 (August 31, 1955).

256. "Liquid and Gaseous Effluent Disposal--1." F. R. Farmer. Atomics 8, 25-7 (January, 1957).
The article reviews the many aspects of the radioactive effluent problem at the Windscale Works of the U.K.A.E.A.

257. "Liquid and Gaseous Effluent Disposal--2." F. R. Farmer. Atomics 8, 46-50, 68 (February, 1957).

Aspects of the radioactive effluent disposal problem at the Windscale Works are reviewed.

See also abstract number 298.

6.00 ECONOMICS

258. A Survey of the Liquid Waste Storage Facilities at KAPL with Respect to Costs and Future Requirements. J. D. Evans and F. N. Schell. Report. KAPL-M-FNS-3 (November 28, 1951).

259. Permanent Methods of Radioactive Waste Disposal: An Economic Evaluation. A. C. Herrington, R. G. Shaver, and C. W. Sorenson. M.I.T. Engineering Practice School, Oak Ridge Report K-1005 (March 11, 1953).

260. Economic Requirements for Radioactive Waste Disposal in a Nuclear Power Economy. H. R. Zeitlin. Report CF-55-6-152 (June 9, 1955).

261. Processing Requirements, Buildup of Fission Product Activity, and Liquid Radiochemical Waste Volumes in a Predicted Nuclear Power Economy. H. R. Zeitlin, E. D. Arnold, and J. W. Ullmann. Report CF-56-1-162 (January 30, 1956).

262. Economics of Waste Disposal. H. R. Zeitlin, E. D. Arnold, and J. W. Ullmann. Nucleonics 15, No. 1, 58-62 (January, 1957).

This includes required processing capacity, buildup of fission products, and accumulation of liquid wastes.

7.00 COMMERCIAL UTILIZATION

263. Cooking with Hot Atoms. Robert V. Horrigan. Report BNL-1078.

A brief, nontechnical description is given of the AEC program for recovering radioactive fission products and developing industrial uses for them.

264. The Industrial Utilization of Fission Products. (Gross, Mixed, and Separated) A Prospectus for Management. Stanford Research Institute Report AECU-1269 (March, 1951).

265. Use of Kilocurie Radiation Sources. Bernard Manowitz. Brookhaven Report AECU-1597 (July 10, 1951).

Studies are now being made on possible applications of radioactive waste materials from reactors to determine whether their processing is justified.

266. Conference on Fission Product Utilization (Held on) February 18-19, 1952. Report BNL-171.

267. Quarterly Progress Report (on) Industrial Application of Gross Fission Products (for) April--June, 1952. Report KLX-1379 (July 31, 1952).

A program has been planned and work started on a study of the utilization by the food and drug industry of fission products as high-level radiation sources for product sterilization, pasteurization, and insect control.

268. Quarterly Progress Report (on) Industrial Application of Gross Fission Products (for) July 1, 1952--September 30, 1952; Job 24. Report KLX-1381 (October 24, 1952).

Commercial production packaging of typical foods and drugs having a sterilization, pasteurization, or insect control requirement has been observed.

269. Industrial Application of Gross Fission Products Quarterly Progress Report (for) October 1, 1952--December 31, 1952).

The initial and potential applications of fission product sources to industrial sterilization of foods and drugs will most likely be for products for which no satisfactory alternative method exists and which have a good market and profit margin.

270. "Use of Fission Products for Insect Control." Charles C. Hassett and Dale W. Jenkins. Nucleonics 10, No. 12, 42-6 (December, 1952).

271. Symposium on "Utilization of Radiation from Fission Products" Held at Harwell on February 23, and 24, 1953. G. N. Walton and J. Wright, eds. Report AERE-C/R-1231 (June, 1953).

272. Utilization of the Gross Fission Products; Progress Report. L. E. Brownell, L. C. Anderson, H. J. Gomberg, J. J. Martin, W. W. Meinke, R. B. Morrison, L. Thomassen, G. J. Van Wylen, E. T. Vincent, and R. A. Wolfe, Univ. of Michigan Report COO-124; Progress Report 4 (March, 1953).

273. Utilization of the Gross Fission Products, Progress Report No. 5. L. E. Brownell, L. C. Anderson, H. J. Gomberg, L. L. Kempe, J. J. Martin, W. W. Meinke, J. V. Nehemias, R. B. Morrison, L. Thomassen, G. J. Van Wylen, E. T. Vincent, and R. A. Wolfe. Univ. of Michigan Report COO-196 (September, 1953).

274. Utilization of the Gross Fission Products, Progress Report No. 6. L. E. Brownell, L. C. Anderson, H. J. Gomberg, L. L. Kempe, J. J. Martin, J. V. Nehemias, G. T. Van Wylen, and E. T. Vincent. Univ. of Michigan Report COO-198 (March, 1954).

275. Nuclear Reactors, Fission Products and Their Possibilities and Limitations for the Industrial Future of Radiation and Chemistry. Bernard Manowitz. Report BNL-1519 (July 2, 1953).

276. "Utilization of Radiation from Fission Products." G. N. Walton and J. Wright. Nature 172, 147-9 (July, 1953).

277. Utilization of Gross Fission Products. A Bibliography of Unclassified Report Literature. Gifford A. Young, comp. AEC Report TID-3046 (February, 1954).
All unclassified reports related to this program that have been issued up to January 1, 1954, by the cooperating establishments are abstracted in this bibliography of 92 references.

278. Utilization of Waste Fission Products in Chemical Reaction. W. A. Selke, A. Czikk, and J. Dempsey. Columbia Univ. Report NYO-3330 (March 1, 1954).

279. "Radiation Sterilization. VIII. Fission Product Kilocurie Source: Preparation, Radiation Intensity." J. W. Loeding, E. J. Petkus, G. Yasui, W. A. Rodger, I. G. Dillon, and L. Burris. Nucleonics 12, No. 5, 14-20 (May, 1954).

See also abstracts number 281 and 282.

8.00 PROGRESS REPORTS

Brookhaven

280. Reactor Science and Engineering Department; p. 105-10 of Quarterly Progress Report; July 1--September 30, 1950. Report BNL-82 (November, 1950).
Waste disposal problems are discussed.

281. Reactor Science and Engineering, p. 82-93 of Quarterly Progress Report; April 1--June 30, 1951. Report BNL-117 (August, 1951).
Utilization of high-activity wastes is discussed, and the effect of heat-treatment on the fixation of Ce^{144} and Cs^{134} in montmorillonite is related to the problem of permanent disposal of radioactive wastes. Meteorological and geological studies related to waste disposal are summarized.

282. Chemistry and Reactor Science and Engineering. p. 65-130 of Quarterly Progress Report; July 1--September 31, 1951. Report BNL-132.
The report of progress summarized work done in the fields of fission product utilization and concentration and permanent radioactive waste disposal.

283. Quarterly Progress Report for July 1--September 30, 1952. Report BNL-209 (February, 1953).
A clay column for decontamination of fission product waste stream was constructed.

284. Quarterly Progress Report (for) July 1--September 30, 1953. Report BNL-259.
A summary of waste disposal data for the period is included.

285. Quarterly Progress Report October 1--December 31, 1953. Report BNL-270.
A summary of waste disposal studies is presented.

California, University of

286. Radiation Chemistry and Health Chemistry. p. 48-61 of Medical and Health Physics Quarterly Report, April, May, and June 1953. Report UCRL-2345 (September 21, 1953).
Sno-Gel proved useful for solidifying active liquid wastes before incorporation in cement drums for disposal at sea.

Kellex Corporation

287. Progress Report; First Quarter, 1951; Development of Laboratory Disposal Unit. Report KLX-1340 (April 16, 1951).
A laboratory radioactive-waste disposal unit is illustrated.

288. Summary Progress Report; April 1951; Development of Laboratory Waste Disposal Unit; Job 24-A. Report KLX-1345 (May 15, 1951).

See also Vitro abstracts Number 299-302.

Knolls

289. Waste Disposal; Progress Report; September, October, November, 1951. KAPL Staff. Report KAPL-649.
Experimental work is reported on the pilot plant incinerator for contaminated combustible solids, and data are given on liquid-waste processing in 1951.

Mound

290. Liquid Waste Disposal Research Quarterly Report for April, May, and June 1950. Report AECD-4148 (July 1, 1950).
Experiments show that, in general, the presence of fluoride ion does not interfere with the removal of fission products from waste solutions. Activity can be reduced by precipitation with either ferrous sulfide or ferrous ferrocyanide. Upon subjection of the fresh reactor waste solutions to the adsorption, metal scrub, precipitation, and filteration scheme of processing, a reduction in activity was obtained. A small pilot model evaporator has been designed and constructed to obtain design data for a larger unit that is contemplated.

Oak Ridge National Laboratory

291. Health Physics Division Quarterly Progress Report for Period Ending October 20, 1951. Report ORNL-1174 (May 5, 1952).
Methods of removal of Ce^{137}, Cd^{115}, and I^{131} from liquid waste are discussed. Progress is reported in ecological studies.

292. Health Physics Division Quarterly Progress Report for Period Ending January 20, 1952. Report ORNL-1277 (June 12, 1952).

Preliminary results of a study of seasonal differences in the radioactivity in various tissues of fish and other aquatic animals in White Oak Lake indicate accumulation of radioactivity in bone, flesh, and other tissues of the fish is much greater during the warm months than during the winter season. Development and use of a column-type of water monitor is reported.

293. Health Physics Division Progress Report for Period January 30, 1952 to July 20, 1952. Report ORNL-1353 (October 6, 1952).

Better removals of I^{131} and Sr^{89} from tap water were obtained with a mixed resin bed than with either an anion or a cation bed alone. Data are presented from an evaluation of water purification equipment for the removal of fission products. Studies are described which are carried out in connection with the survey of chemical waste storage pits.

294. Health Physics Division Quarterly Progress Report for Period Ending January 20, 1953. Report ORNL-1488 (March 30, 1953).

Preliminary results of studies on the removal of Ba^{140}, La^{140}, Cr^{51}, Sr^{89}, Y^{91}, Sc^{45}, and W^{185} from water by means of coagulation and alum are tabulated. Preliminary results of a study of the uptake of Cs^{137} and Sr^{89} by fish from contaminated water at temperatures ranging from 4 to 29°C show the concentration of radioactivity in the fish increased with the temperature of the water. Among fish treated identically, a wide variation in radioactivity was found.

295. Health Physics Division Semiannual Progress Report for Period Ending July 31, 1953. K. Z. Morgan. Report ORNL-1596 (October 20, 1953).

Progress is reported in research on radioactive waste disposal.

296. Health Physics Division Semiannual Progress Report for Period Ending January 31, 1954. Report ORNL-1684 (April 20, 1954).

Progress is reported in waste processing pilot-scale experiments and ecological studies of White Oak Lake.

297. Health Physics Division Semiannual Progress Report for Period Ending July 31, 1955. Report ORNL-1942 (October 20, 1955).

Data are summarized on the exploration of new fields and the performance of old fields for waste storage pits and the cation-exchange capacity and exchange complex of rock materials from proposed waste-storage sites.

298. Health Physics Division Semiannual Progress Report for Period Ending July 31, 1956. Report ORNL-2151 (November 2, 1956).

Data are presented on the development of analytical procedures for the determination of Cs^{137} in fish muscle tissue, the design and performance of an aerosol entrainment well for use in studies of radioactive airosols produced by hot reactor wastes, the concentration and decontamination of radioactive wastes byevaporation and liquid storage, tracer studies on the movement of radioactive wastes by evaporation and liquid storage, tracer studies on the movement of radioactive liquid wastes through soil, and the improvement of methods for the chemical removal of fission products.

Vitro

299. Progress Report, Third Quarter, 1951: Development of Laboratory Waste Disposal Unit; Job 24-A. Report KLX-1364 (November 21, 1951).

300. Bi-Monthly Progress Report March--April, 1952; Development of Laboratory Waste Disposal Unit. Report KLX-1376 (June 26, 1952).

301. Quarterly Progress Report for April--June, 1952 on Development of Laboratory Waste Disposal Unit. Report KLX-1378 (July 26, 1952).
The design and performance characteristics of a laboratory radioactive waste disposal unit are given. Tests are reported on decontamination of various materials.

302. Survey on Waste Disposal; Development of Laboratory Waste Disposal Unit for January 1, 1953--February 28, 1953: Job 24A. Report KLX-1386. (March 18, 1953).
Results of a questionnaire survey on radioactive laboratory waste disposal problems are summarized.

Miscellaneous

303. Health Physics Division Semiannual Progress Report for Period Ending January 31, 1956. Report ORNL-2049 (May 3, 1956).
Data are presented on the separation of Cs^{137} from biological material investigations of waste-disposal pits for radioactive and chemical wastes, the disposal of radioactive waste material by fixation and fusing in an insoluble ceramic mass, factors affecting the ion exchange removal of radioactive ions from contaminated water, the use of solvent extraction procedures for the separation of fission products from waste solutions, and factors affecting the uptake of fission products by clay storage-pit linears.

304. Liquid Waste Disposal Research Quarterly Report for April 1, 1949 to June 30, 1949. Frank C. Mead, Jr. Report AECD-4149 (July 1, 1949).
Initial ion exchange experiments indicate that it is not practical to use ion exchange resins for the complete decontamination of crib wastes. Coprecipitation experiments for the removal of ruthenium as the sulfide or complex cyanide show some promise.