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May 27, 1994

Dr. John E. Till, Chairman
Technical Steering Panel
Hanford Environmental Dose
Reconstruction Project
Rt. 2, Box 122
Neeses, SC 29107

Mr. Michael R. Donnelly
Public Health Service
Centers for Disease Control and Prevention
2201 Sixth Avenue, Mail Stop RX- 22
Seattle, WA 98121

Dear Dr. Till and Mr. Donnelly:

RECONSTRUCTION OF RADIONUCLIDE CONCENTRATIONS IN THE COLUMBIA RIVER FROM HANFORD, WASHINGTON TO PORTLAND, OREGON FOR JANUARY 1950-JANUARY 1971

Enclosed is the report, *Reconstruction of Radionuclide Concentrations in the Columbia River from Hanford, Washington to Portland, Oregon for January 1950-January 1971* (PNWD-2225 HEDR). This report documents the mathematical modeling required to reconstruct the concentrations of radionuclides in the Columbia River. The computed database of water concentrations have been used by other HEDR Project tasks to estimate doses that individuals may have received from the Columbia River. This report fulfills Milestone 0404C.

Very truly yours,

W.T. Farris for DBS

Dillard B. Shipler, Manager
Hanford Environmental
Dose Reconstruction Project

DBS:prc

Enclosure

cc: MS Power (TSP)

PNWD-2225 HEDR
UC-000

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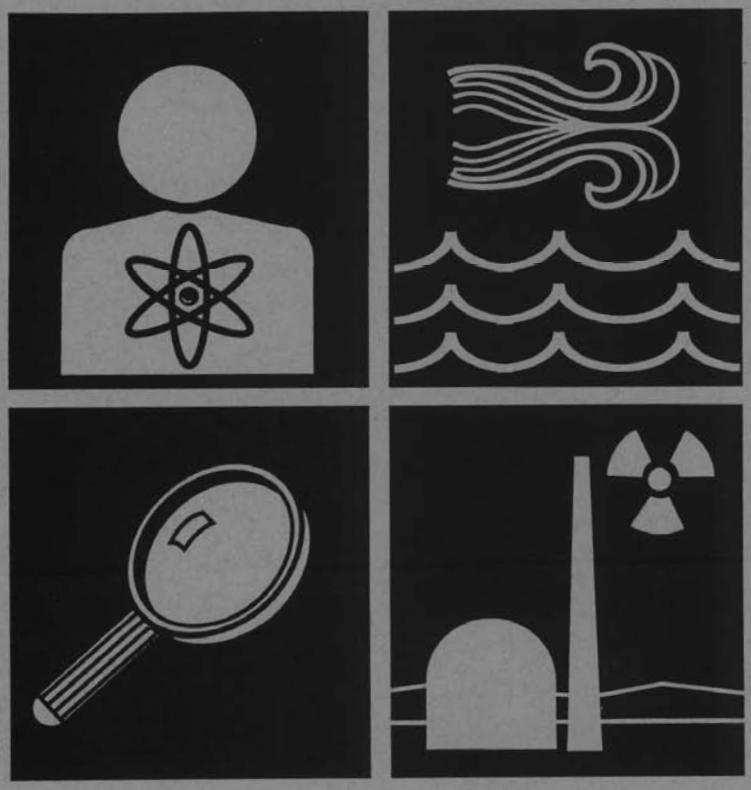
Reconstruction of Radionuclide Concentrations in the Columbia River from Hanford, Washington to Portland, Oregon January 1950 – January 1971

W. H. Walters
M. C. Richmond
B. G. Gilmore

May 1994



Prepared for the Technical Steering Panel
and the Centers for Disease Control and Prevention
under Contract 200-92-0503(CDC)/18620(BNW)

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Pacific Northwest Laboratories

PNWD-2225 HEDR

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PNWD-2225 HEDR
UC-000

Reconstruction of Radionuclide Concentrations in the Columbia River from Hanford, Washington to Portland, Oregon January 1950 - January 1971

Hanford Environmental Dose Reconstruction Project

W. H. Walters
M. C. Richmond[a]
B. G. Gilmore

May 1994

Prepared for the Technical Steering Panel and
the Centers for Disease Control and Prevention
under Contract 200-92-0503(CDC)/18620(BNW)

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(a) Washington State University, Department of Civil and Environmental Engineering

Reconstruction of Radionuclide Concentrations in the Columbia River from Hanford, Washington to Portland, Oregon January 1950 - January 1971

May 1994

This document has been reviewed and approved by the Technical Steering Panel.

May 22, 1994
Date

J. E. Till, Chair
Technical Steering Panel
Hanford Environmental
Dose Reconstruction Project

Preface

In 1987, the U.S. Department of Energy (DOE) directed the Pacific Northwest Laboratory, which is operated by Battelle Memorial Institute, to conduct the Hanford Environmental Dose Reconstruction (HEDR) Project. The DOE directive to begin project work followed a 1986 recommendation by the Hanford Health Effects Review Panel (HHERP). The HHERP was formed to consider the potential health implications of past releases of radioactive materials from the Hanford Site near Richland, Washington.

Members of a Technical Steering Panel (TSP) were selected to direct the HEDR Project work. The TSP consists of experts in the various technical fields relevant to HEDR Project work and representatives from the states of Washington, Oregon, and Idaho; Native American tribes; and the public. The technical members on the panel were selected by the vice presidents for research at major universities in Washington and Oregon. The state representatives were selected by the respective state governments. The Native American tribes and public representatives were selected by the other panel members.

A December 1990 Memorandum of Understanding between the Secretaries of the DOE and the U.S. Department of Health and Human Services (DHHS) transferred responsibility for managing the DOE's dose reconstruction and exposure assessment studies to the DHHS. This transfer resulted in the current contract between Battelle, Pacific Northwest Laboratories (BNW) and the Centers for Disease Control and Prevention (CDC), an agency of the DHHS.

The purpose of the HEDR Project is to estimate the radiation dose that individuals could have received as a result of radionuclide emissions since 1944 from the Hanford Site. The project work is conducted under several technical and administrative tasks, among which is the Surface Water Transport Task. The staff on this task provide computed monthly average radionuclide concentrations in river water for use in estimating doses that individuals may have received from the Columbia River.

12 This report documents the mathematical modeling required to reconstruct the concentrations of radionuclides for the Columbia River. The computed database of water concentrations will be used by other HEDR Project tasks to estimate doses that individuals may have received from the Columbia River. *Previously published documents that provide information in support of this report are:*

- *Heeb, C. M., and D. J. Bates. 1994. Radionuclide Releases to the Columbia River from Hanford Operations, 1944-1971. PNWD-2223 HEDR, Battelle, Pacific Northwest Laboratories, Richland, Washington.*

- *Richmond, M. C., and W. H. Walters. 1991. Estimates of Columbia River Radionuclide Concentrations: Data for Phase I Dose Calculations. PNL-7248 HEDR, Pacific Northwest Laboratory, Richland, Washington.*

- *Thiede, M. E., and J. P. Duncan. 1994. Database of Radionuclide Measurements in Columbia River Water, Fish, Waterfowl, Gamebirds, and Shellfish Downstream of Hanford's Single-Pass Production Reactors, 1960-1970. PNWD-2242 HEDR, Battelle, Pacific Northwest Laboratories, Richland, Washington.*

- *Walters, W. H., R. L. Dirkes, and B. A. Napier. 1992. Literature and Data Review for the Surface-Water Pathway: Columbia River and Adjacent Coastal Areas. PNWD-2034 HEDR, Battelle, Pacific Northwest Laboratories, Richland, Washington.*

This report is the final Surface Water Transport Task report and fulfills HEDR Milestone 0404C. It replaces the previous version dated January 1994. Appendix B is a record of the TSP comments and BNW responses that have been addressed in this final report. Changes made in response to the TSP comments are denoted by numbers in the left margin and italicized text.

Summary

Battelle, Pacific Northwest Laboratories conducted this study of the Columbia River for the Technical Steering Panel (TSP) and the Centers for Disease Control and Prevention as part of the Hanford Environmental Dose Reconstruction (HEDR) Project. The HEDR Project was established to estimate the radiation dose that individuals may have received from operations that began at the Hanford Site in 1944. The purpose of the study was to reconstruct concentrations of radionuclides in Columbia River water for estimating doses to humans from the river pathway.

Scope

5 *Radionuclide releases to the Columbia River resulted from the operation of eight single-pass production reactors. The first single-pass reactor began operation in 1944. The last single-pass reactor shut down in January 1971. Prior to 1950, reactor operations from 1944 through 1949 involved three reactors (100-B, 100-C, 100-F) until about November 1949 when 100-H Reactor came on line (Walters et al. 1992). During that same period the 100-B Reactor was down for over a year. Therefore, the contribution of radionuclides to the river and to dose was much less during the pre-1950 operational period.*

6 The length of river considered extends from Priest Rapids Dam near Hanford, Washington to river mile 100, just downstream of the Willamette River confluence at Portland, Oregon. The time frame spans a 21-year period from January 1950 through January 1971. The TSP approved this period for study because 1) the period of highest releases was from 1955-1965 when production was at its maximum, 2) five years were added to each end of the period of highest releases to ensure adequate coverage, and 3) the last of the single-pass production reactors was shut down in January 1971. Monthly average water concentrations were reconstructed at 12 locations for sodium-24, phosphorus-32, zinc-65, arsenic-76, and neptunium-239 based on the recommendations by Napier (1993). Concentrations for chromium-51 were computed for use in the transport model validation but not for use in dose estimates *because of its low contribution to dose (Napier 1993).*

Approach

A simple empirical model was used to conceptualize the behavior of the major variables involved in radionuclide transport in the Columbia River. Based on the empirical model results and conclusions reached in a literature review for the river pathway (Walters et al. 1992),[(a)] a one-dimensional unsteady flow model was recommended for use in computing water concentrations. The model selected, CHARIMA, was obtained from the Iowa Institute of Hydraulic Research at the

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(a) Memorandum (HEDR Project Document No. 07930172), "A Partial Listing of Columbia River, Usual and Accustomed, Tribal Fishing Sites in the HEDR Project Area Between Bonneville and Priest Rapids Dams (Primarily Zone Six) 8," from D. E. Walker (TSP) to W. A. Bishop (TSP), March 26, 1993.

University of Iowa (Holly et al. 1993). Modifications were made to the transport equation in CHARIMA to include a term for radionuclide decay. This version of the model is identified as WSU-CHARIMA.

6 Before the final water concentrations were computed, experimental testing with the computer model was carried out to determine if corrections for sediment uptake and release were feasible. The results of the testing indicated that corrections *for sediment effects were not feasible. However, the comparison of computed results with monitored data indicated that reasonably accurate estimates of historical concentrations were possible without sediment corrections at the 12 locations with one exception. The exception was at the Portland, Oregon location where the concentrations for zinc-65 are overestimated.* When the water concentration production runs were completed, a sensitivity analysis was performed on the estimated error in measured river discharges and hydraulic roughness coefficients.

Results

7 The results of the unsteady flow modeling indicated that the five radionuclides can be separated into two groups based on their transport characteristics. The first group, radionuclides with relatively short half-lives, sodium-24, arsenic-76, and neptunium-239, was sensitive to downstream travel time. After dams were constructed below the Snake River, transport velocities were significantly reduced, allowing more time for decay. Water concentrations for the three radionuclides at the downstream locations were much lower than they would have been under open channel conditions. The second group, consisting of phosphorus-32 and zinc-65, was not as much affected by dam construction because of their longer half-lives. *Very little decay occurs in phosphorus-32 and zinc-65 between Hanford and the downstream locations. The concentrations of these two radionuclides are affected more by dilution, primarily from the Snake River discharge.*

The level of validation attained for the hydraulics of the WSU-CHARIMA model demonstrated that the model is reliable for use in reconstructing water concentrations for the 21-year period from January 1950 to January 1971. Following completion of the initial radionuclide transport computations, it was evident from their comparison to historical measurements that the source term developed under the HEDR Project is representative of the monthly average releases. The comparison between computed and measured results indicate that reconstructions of water concentrations from Ringold to Bonneville Dam are representative estimates of the actual concentrations. Downstream of Bonneville Dam at Portland, Oregon, the reconstructed concentrations of zinc-65 are less representative. The concentrations for the other four radionuclides at Portland are representative for the level of radioactivity.

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Introduction

As part of the Hanford Environmental Dose Reconstruction (HEDR) Project, this report addresses the radioactivity in the Columbia River. The Columbia River received cooling-water effluent from the eight Hanford single-pass reactors and was the major pathway for waterborne radionuclides. The pathway began at the Hanford Site and continued downstream past the mouth of the Columbia River to the adjacent coastal and ocean areas. The objective of the HEDR Project's Surface-Water Transport Task is to provide monthly average radionuclide concentrations in river water at specific locations along the Columbia River. These concentrations will be used in final estimates of radiation doses that individuals may have received from the Columbia River pathway.

Under this task, a river hydraulic computer model was used to simulate transport of specific radionuclides from the Hanford reactors to Portland, Oregon. The model output consisted of monthly average water concentrations of radionuclides computed for 12 locations over 253 months (January 1950-January 1971). These water concentrations were forwarded to the staff of the Environmental Pathways and Dose Estimates Task for calculating dose estimates. The model used a source term input data file developed by the staff of the Source Terms Task. This data file provided monthly average releases from each of the eight *single-pass* reactors, from January 1950 through January 1971. *The ninth reactor, N Reactor, recirculated the cooling water within its core and so was not considered in the HEDR study.* The Environmental Monitoring Task staff provided historical river monitoring data for use in validating computed water concentrations. A description of this and other HEDR Project tasks is provided by Shipler (1993).

The purpose of this report is to document the mathematical modeling required to reconstruct concentrations of radionuclides in Columbia River water. Modeling was required because available monitoring data are limited. The historical reconstruction of water concentrations for the Surface Water Transport Task is limited to the length of the river from Priest Rapids Dam at river mile (RM) 400 to RM 100, just downstream of Portland, Oregon. The HEDR Project Technical Steering Panel (TSP) selected the 12 locations within that length of river where concentrations were to be reconstructed, based on the recommendations of D. E. Walker.[a] The hydraulic model was used to compute monthly average radionuclide concentrations in river water. The specific radionuclides considered are sodium-24, phosphorus-32, zinc-65, arsenic-76, and neptunium-239, determined by their relative contribution to dose for the river pathway (Napier 1993). To note is that the half-lives used in the calculation of the radionuclides in the Columbia River model are slightly different from the half-lives used in the calculations of the radionuclides released to the Columbia River. This is attributed mostly to rounding off to a different significant figure.

(a) Memorandum (HEDR Project Document No. 07930172), "A Partial Listing of Columbia River, Usual and Accustomed, Tribal Fishing Sites in the HEDR Project Area Between Bonneville and Priest Rapids Dams (Primarily Zone Six) 8," from D. E. Walker (TSP) to W. A. Bishop (TSP), March 26, 1993.

Previous Task Work

Before the hydraulic modeling effort, initial water concentrations were computed for the Hanford Reach for a 3-year period from 1964 through 1966 in support of preliminary dose estimates conducted by other HEDR tasks. Next, an extensive literature review of Hanford operations related to the Columbia River was completed (Walters et al. 1992). The literature review provided the basis for recommendations to the TSP for the final reconstruction of Columbia River water concentrations.

Preliminary Water Concentration Estimates

The preliminary work conducted under this task involved the computation of monthly average water concentrations of radionuclides for the Hanford Reach, from the reactors to McNary Dam (Richmond and Walters 1991). The radionuclides considered were phosphorus-32, zinc-65, arsenic-76, neptunium-239, and chromium-51. The time period was from January 1964 through December 1966.

The concentrations were computed by using a very simple empirical model based on historical river travel-time data that had been developed by Hanford Site contractors during the early 1960s. Monthly average source term data were obtained from Hanford reports. The only variables considered in the transport computations were dilution and the radioactive decay of each radionuclide. Dilution was controlled by the Columbia River hydrograph and tributary inflow from the Yakima, Snake, and Walla Walla rivers. Complete cross-sectional mixing of the combined reactor effluent plume from all discharging reactors was assumed.

Computed concentrations were compared with available monitoring data at the Ringold, Richland, Pasco, Finley, and McNary Reservoir locations. Based on this comparison, it was apparent that the computed values tended to correspond to the general trends of the available monitoring data. The results were submitted to Environmental Pathways and Dose Estimates staff for use in preliminary dose calculations.

Literature Review

An extensive literature review was conducted (Walters et al. 1992). The primary objective of this review was to locate and summarize the measured radionuclide concentrations in water, sediment, and biota for the surface-water pathway. The review provides a brief description of reactor operations, the historical river monitoring work, effluent water composition, and uncontrolled and accidental releases. Special studies of reactor effluent plume dispersion, shoreline radiation surveys, and downriver travel times that were conducted by Hanford Site contractors are discussed.

Based on an evaluation of the data and information found in Hanford and offsite literature, recommendations were proposed for determining surface-water concentrations for use in calculating dose estimates. The review report recommended that the empirical model used to calculate preliminary concentrations be extended downstream from McNary Dam to Bonneville Dam. The purpose was to evaluate the conceptual relationship between key variables such as river discharge (including

tributaries), downstream travel time, dilution, and radioactive decay. The results were to be compared with historically measured concentrations at specific river locations to test the potential for success with a more complex model.

For computing the water concentrations to be used in dose estimates, the report recommended that a one-dimensional unsteady flow hydraulic model be used to route effluent from the reactors to downstream locations. The report recommended that reactor source term data be used with the hydraulic routing model to reconstruct radionuclide concentrations because monitoring data were insufficient. At locations downstream of Pasco, Washington measurements were very limited or nonexistent, and before 1958, only gross beta measurements were available.

Using initial results from the model, the uptake and release of radionuclides by river sediment would be investigated to determine if an empirical correction procedure could be developed. If the procedure was feasible, the corrections were to be applied to the computed water concentrations where sediment effects are a significant factor. It was further recommended that correction factors for the effluent plume dispersion in the Hanford Reach be computed separately from the modeling results using available effluent plume monitoring data obtained by Hanford contractors.

TSP Recommendations

Recommendations for the river modeling were formulated by the TSP during a special public meeting held on September 4, 1992 to discuss the Columbia River pathway. The recommendations were itemized[a] and presented formally in the October 8-10, 1992 TSP meeting. These recommendations, which specified the scope of the modeling work, were in basic agreement with those in the literature review report.

13 The TSP recommended a one-dimensional unsteady flow model for the Columbia River from the Hanford reactors to the mouth of the river. Modeling was not recommended beyond the mouth of the Columbia River because monitoring data were considered to be sufficient for dose estimates involving coastal locations. Reconstructions of water concentrations were to be computed using a monthly average format *for the period of greatest radionuclide input to the river and for a few years before and after this period when effluent releases were increasing from or declining to low levels. This resulted in computations* for a 253-month time span (January 1950 through January 1971). The Demography Subcommittee was asked to provide a list of sites of particular interest and to suggest the intervals to be used in separating calculation points.

The TSP further recommended that the effects of the reactor effluent plume and sediment uptake and release on water concentrations were to be calculated separately from the one-dimensional model using the results from past field studies and monitoring data. It was determined that a complex effluent plume analysis was not needed because vertical mixing occurs rapidly in the near field of the reactor outfalls, and the results of in-stream field measurements were available.

(a) Memorandum (HEDR Project Document No. 11920015), "Recommendations for Further River Pathway Work, FY93," from P. C. Klingeman (TSP) to TSP Members and D. B. Shipler (BNW), September 28, 1992.

For the effects of sediment, a simple empirical approach was recommended using correction factors developed from experiments with the selected model and monitoring data. The need for sediment correction factors was to be determined based on the results of the computer experiments.

Report Organization

The following section of this report presents attainment of data quality objectives that were applied to the modeling results. The next section describes the Columbia River conceptual model work, followed by a discussion of the transport model and the computational approach that was used. Further sections detail the transport model validation procedures that were used and the transport model sensitivity tests that were conducted. The final section of this report presents the model results and conclusions.

Data Quality Objectives

14 The results of the computer modeling for this task produced new data output files of reconstructed radionuclide concentrations in Columbia River water. The data quality objectives for the reconstruction of radionuclide concentrations in the Columbia River are described in Shipler (1993). The following *two* data quality objectives were applied to the modeling results: *precision and representativeness.*

Precision

14 *The precision* objective is to quantify, to the extent possible, uncertainties in the computed water concentrations. The sources of uncertainty were identified as the source terms, the channel geometry database, river discharge data, and the selected channel roughness coefficient.

Variations in the source term input due to uncertainty produce a one-to-one variation in the computed concentrations at downstream locations because the transport equation is linear. Therefore, the uncertainty estimates are applied directly to the model output database and are not addressed in this task.

The measurements used to develop the channel geometry database were obtained from federal agency maps. The hydrographic surveying methods used involved triangulation measurements from an established baseline to measure horizontal distances and depth-sounding equipment to measure water depths. The horizontal measurements and depth soundings are usually accurate to within 1 foot. The channel geometry data used in the model are considered the best available and included almost 300 separate cross sections. Based on the experience of task staff, varying the cross-section measurements by 1 foot over the 300-mile length of river would produce very little, if any, measurable difference in radionuclide concentrations and would involve an extensive modeling effort to vary the channel geometry database.

14 For the other two sources *of uncertainty*, river discharge and channel roughness, error estimates were determined based on engineering judgment, and a sensitivity analysis was conducted. The results are presented in the Model Sensitivity Tests section of this report.

Representativeness

14 *The representativeness* objective is that the output be representative of the conditions existing in the Columbia River over the 253-month time period. To assess representativeness, the computed water concentrations were compared with historical monitoring results for chromium-51, which are available for an 11-year period (1960-1970). The results and discussion of this effort are presented in the WSU-CHARIMA Model Validation section of this report. Other comparisons were made for sodium-24, phosphorus-32, zinc-65, arsenic-76, and neptunium-239 and are discussed in the section titled WSU-CHARIMA Tests for Sediment Effects. The final results have undergone peer reviews to ensure representativeness.

Columbia River Conceptual Model

Before analyzing a complex engineering problem, a conceptual model is sometimes developed to assist in identifying the mathematical approach, and it can be an evolving understanding that develops during a study. Initially, a conceptual model can be a simple qualitative, graphical presentation or a set of quantitative data plots and sample calculations. Engineering studies involving river systems, particularly transport calculations (e.g., sediment or contaminant), have to address complex physical processes with numerous variables. If possible, preliminary calculations should be made using any available data to conceptualize the system's behavior.

The 1950-1971 time period specified for reconstruction of radionuclide concentrations in the Columbia River covers a period when several dams and reservoirs were constructed, and Hanford reactor operations were continually changing. The preliminary concentration estimates and literature review (Walters et al. 1992) conducted earlier in surface-water task work indicated that the key variables were downstream travel time, dilution, and radioactive decay. Other concerns were the effects of reactor effluent plume mixing in the Hanford Reach and the effect of sedimentation processes on radionuclide concentrations. Also, early efforts by Hanford contractors to predict water concentrations at points downstream of the Hanford Site had met with little success (Bogan 1956).

For the conceptual work, the empirical transport model used early in the HEDR Project was used again to compute monthly average water concentrations for specific locations between the Hanford reactors and Bonneville Dam. The model was named the Simplified Radionuclide Transport (SRT) Model to distinguish its use and results from the one-dimensional unsteady flow model used later. The time period used for the SRT model was January 1964 through December 1966.

The source term input data for the SRT model included phosphorus-32, zinc-65, arsenic-76, neptunium-239, and chromium-51. Because the final source term database was not yet available, monthly averaged radionuclide mass flow rates of reactor effluent were obtained from Owen (1967). The effluent release rates were based on samples collected before they entered the retention basins and were corrected for 4 hours of decay to account for the retention time. For the SRT model, the effluent releases from all reactors were combined into a source term for each radionuclide in the SRT model, and routing for all reactors began at the downstream boundary of the reactor area. Hydrologic input files for monthly average discharges were developed for the Columbia River at Priest Rapids Dam and for all major tributaries downstream to Bonneville Dam. Complete cross-sectional effluent mixing was assumed, and each radionuclide was routed separately for the 3-year period. Radionuclide decay was included in the computations. The monitoring data used for comparison to computed results was obtained from Richmond and Walters (1991).

SRT Model Results

For the SRT model, the river was divided into 12 segments between the Hanford reactors and Bonneville Dam based on hydroelectric dam and tributary confluence locations. Monthly average water concentrations and downstream travel times for the five radionuclides were computed for the 36-month period. Two sets of graphs were developed: 1) comparisons between the computed water

concentrations and historical monitoring data and 2) the downstream decrease in concentration of each radionuclide for high- and low-flow conditions.

Dilution and Travel-Time Effects

The higher monthly Columbia River discharges occurred from May through August, and June had the highest monthly flow for each year at all river modeling locations. Therefore, the potential for dilution was greatest during that time span, especially in June. Because velocity increases with discharge, shorter travel times occurred during these months, and the longest travel times occurred during the low-flow period. For the 3-year period, travel time to Richland varied from 6.6 to 14.6 hours. Travel time to Bonneville Dam varied from 79 to 296 hours.

The concentration of radionuclides with very short half-lives proved to be sensitive to the large differences in travel times to downstream locations; e.g., arsenic-76 (26.5 hours) and neptunium-239 (2.33 days). The higher concentrations at downstream locations (e.g., Bonneville Dam) occurred during higher discharges when faster flow velocities significantly reduced the amount of decay for these short half-life radionuclides at locations below McNary Dam. The other radionuclides, phosphorus-32 (14.3 days), chromium-51 (27.8 days), and zinc-65 (245 days) were much less affected by travel time because they have longer half-lives. The lower concentrations for these three longer half-life radionuclides occurred at all locations during high flows when dilution was maximized.

The interaction of dilution and the travel-time:radioactive-decay relationship for arsenic-76 is shown in Figure 1. For 1964, the lowest monthly average discharge occurred in March (61,220 cubic feet per second, cfs) and the highest occurred in June (388,300 cfs). At Ringold (RM 350), the dilution effect is obvious in Figure 1. At approximately RM 310, within McNary Reservoir, the two curves cross, at which point the higher monthly discharge produces increasingly higher concentrations at downstream locations. The same comparison is made in Figures 2 and 3 for phosphorus-32 and zinc-65, respectively. For both phosphorus-32 and zinc-65, which have much longer half-lives, the two curves are nearly parallel and show very little decrease in concentration except where the Snake River joins the Columbia River between RM 320 and 330. The dilution effects of the tributaries between the Snake River and Bonneville Dam were not discernible because of their extremely small discharge, compared to the much larger Snake River discharge.

Comparisons with Monitoring Data

The water concentrations for each month were graphed and compared to monitoring data collected for that month. For radionuclides with monitoring data that included several measurements for each month (phosphorus-32, chromium-51, and zinc-65), the mean, maximum, and minimum values were shown in the plots.

An initial comparison was made between SRT-computed concentrations of arsenic-76 and neptunium-239 and monitoring data for the Ringold location in Washington (Figures 4 and 5). This location is at RM 354 across from the reactor shoreline and not directly in the combined effluent

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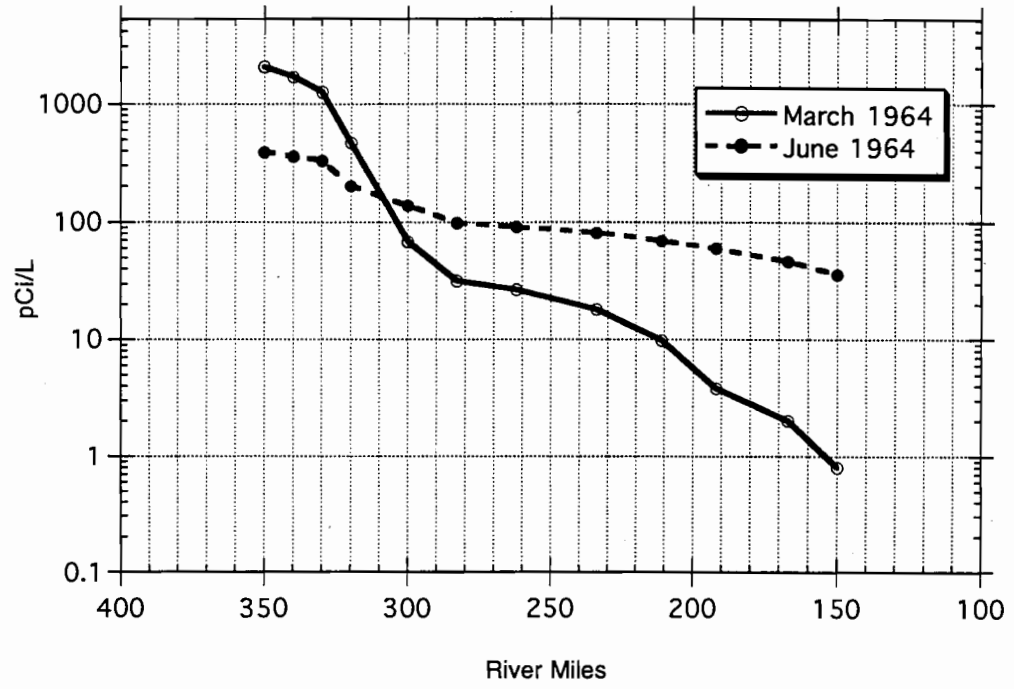

Figure 1. Effects of Downstream Travel Time on Arsenic-76. *March represents the lowest monthly average flow and June the highest monthly average flow.*

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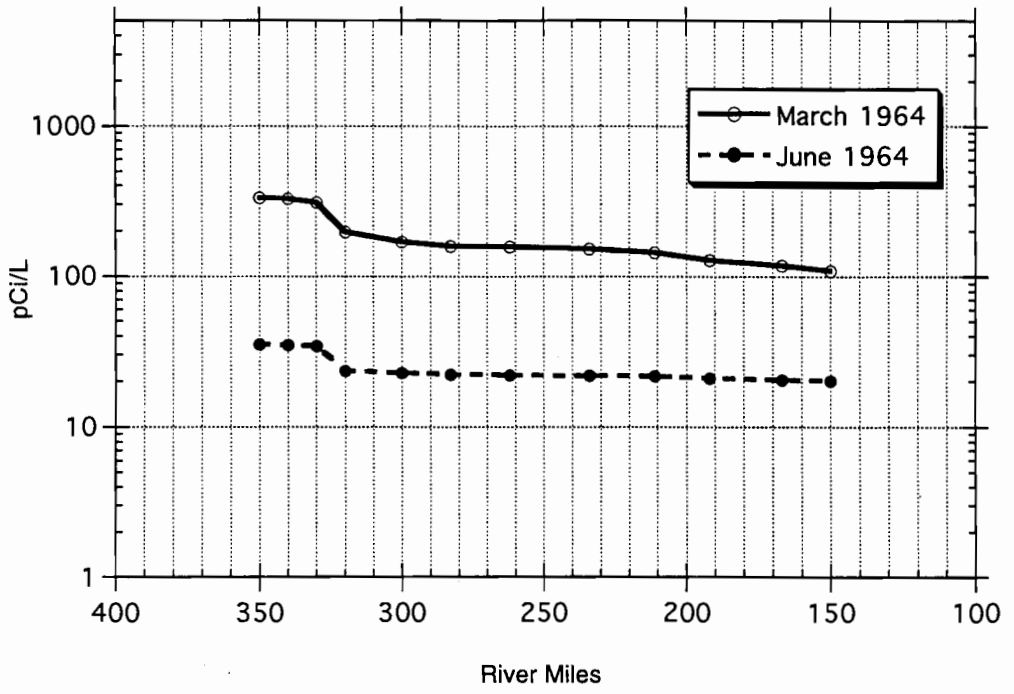

Figure 2. Effects of Downstream Travel Time on Phosphorus-32. *March represents the lowest monthly average flow and June the highest monthly average flow.*

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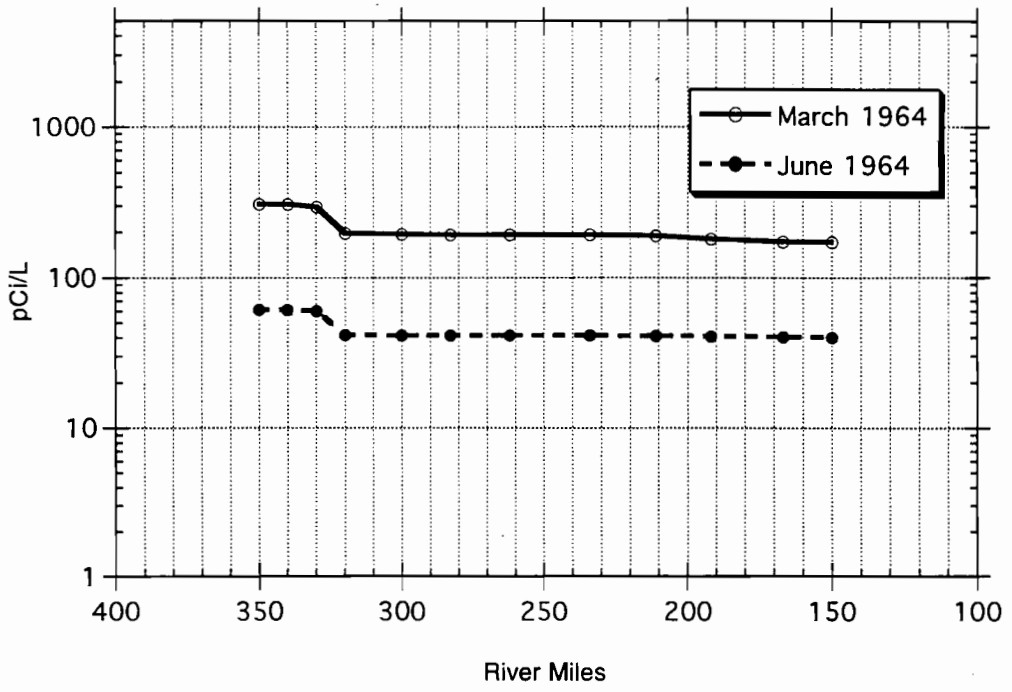

Figure 3. Effects of Downstream Travel Time on Zinc-65. *March represents the lowest monthly average flow and June the highest monthly average flow.*

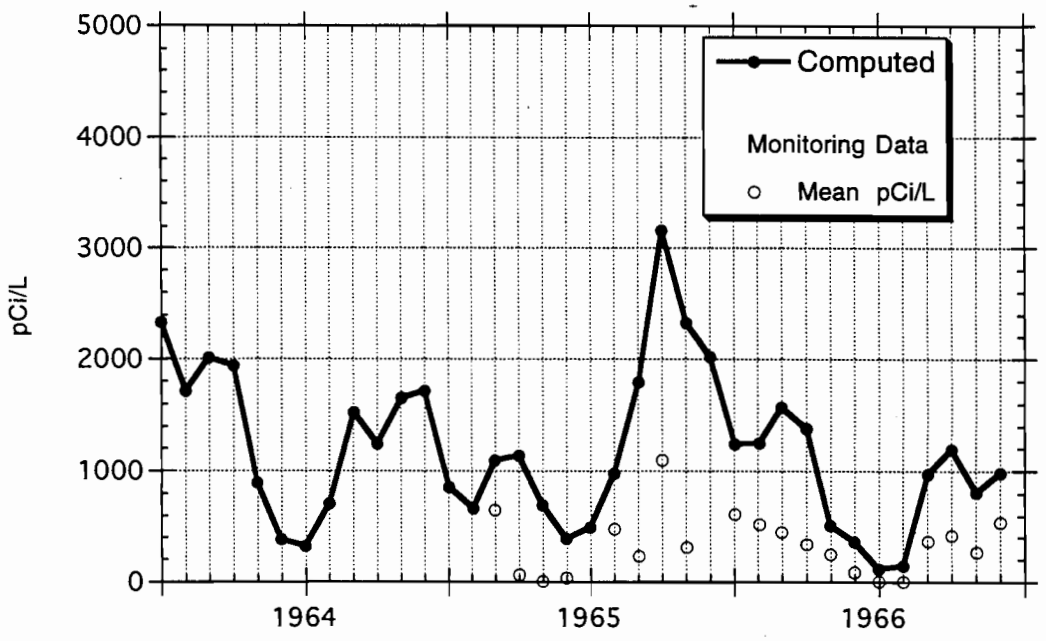

Figure 4. Concentrations of Arsenic-76 at Ringold for 1964-1966

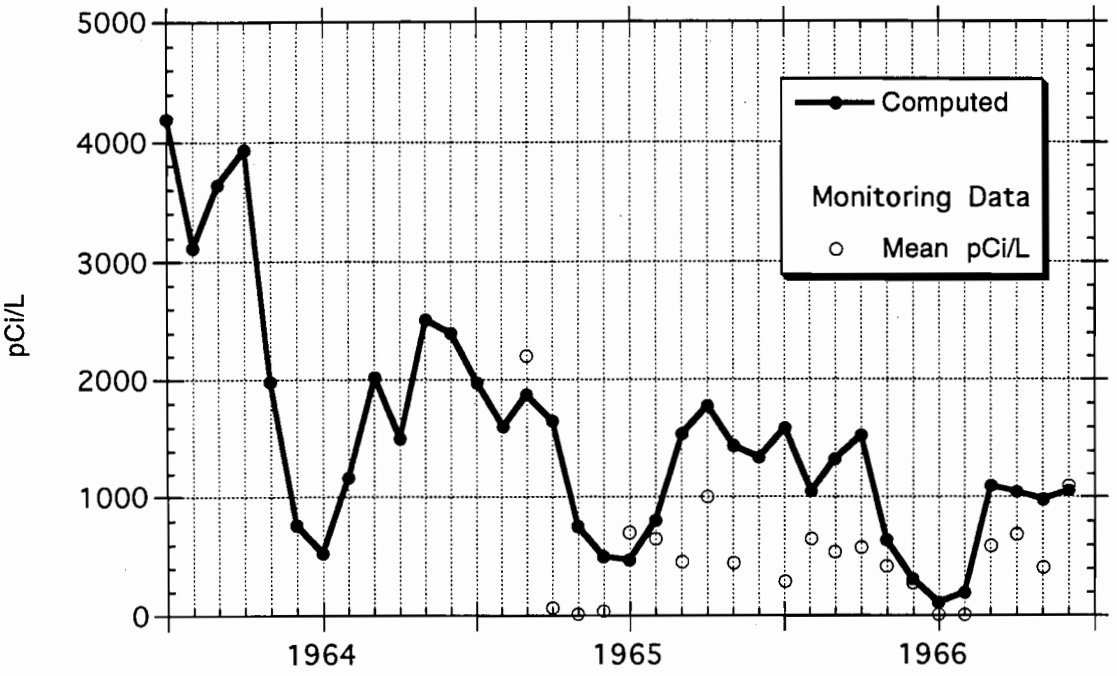

Figure 5. Concentrations of Neptunium-239 at Ringold for 1964-1966

plume from the reactors. At this point in the river, the plume was not fully mixed and was concentrated mostly along the opposite shoreline. Figures 4 and 5 show lower concentrations for the monitoring data compared to the computed value that represents fully-mixed conditions. Further downstream at the Richland, Washington location, the monitoring data and the computed results compared more closely with the monitoring data because more mixing had occurred by the time the plume reached Richland.

From Richland to Pasco, Washington the comparisons of SRT results with monitoring data matched reasonably well for all five radionuclides, with an apparent seasonal trend of higher measured concentrations, especially for zinc-65 at Richland (Figure 6). The higher concentrations occurred during the colder months, from November through March, which are months of minimum discharge. The same trend was apparent to a lesser extent for phosphorus-32, chromium-51, and neptunium-239 at Richland. At Pasco, the next monitoring station downstream of Richland, the trend persisted for only zinc-65.

Past studies by Hanford contractors, summarized in Walters et al. (1992), indicated that an increase in concentration occurs when radionuclides sorbed to deposited sediment are resuspended during the higher discharges. This process, coupled with the lack of complete mixing at Richland, particularly at the lower river discharges, could produce a seasonal trend of either higher or lower concentrations compared to computed averages. However, the higher measured concentrations at Richland occurred during the months of lower discharge, which suggests that reduced mixing may have an influence.

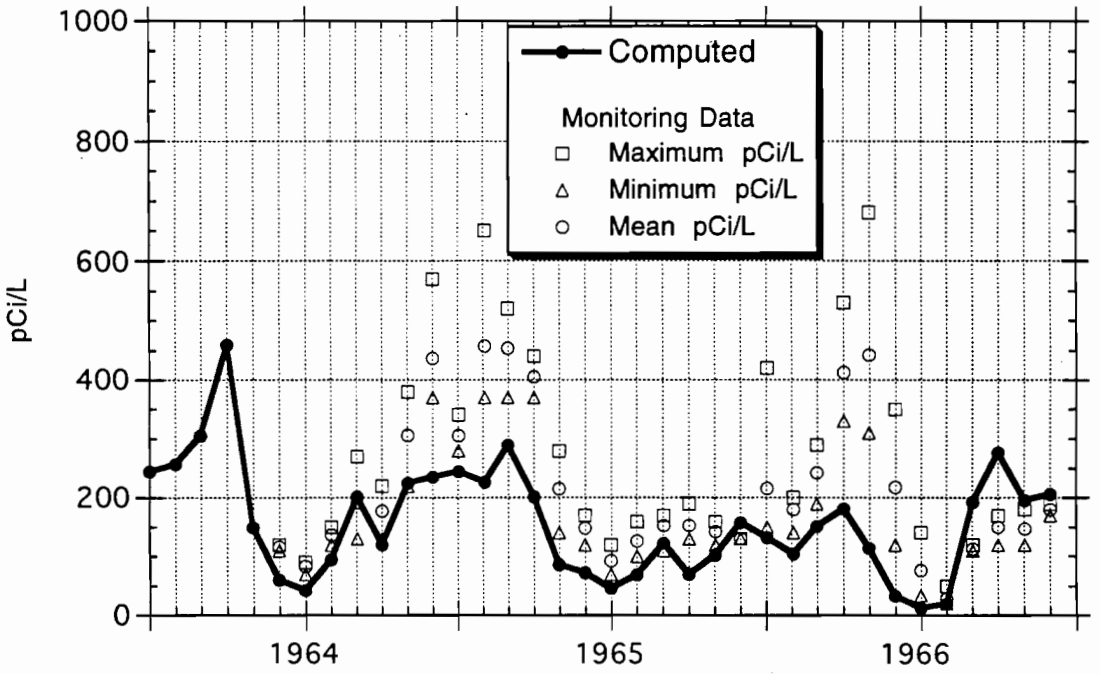

Figure 6. Concentrations of Zinc-65 at Richland, Washington for 1964-1966

This particular trend was not apparent downstream of Pasco, probably because of reservoir effects. The monitoring stations downstream of Pasco were all located in reservoirs, which were (in downstream order) McNary Dam, The Dalles, and Bonneville. For zinc-65, the overall trend was one of slightly lower concentrations for the monitoring data that occurred over much of the 3-year period, as shown in Figure 7 for the Bonneville Reservoir. However, there was a trend of higher concentrations during the high river discharge months, which would indicate the possible effect of resuspended sediment. For phosphorus-32 and chromium-51, the trend was one of consistently lower monitoring data concentrations throughout the 3-year period. Monitoring data below McNary Dam were not available for arsenic-76 and neptunium-239.

Conceptual Model Summary

The relatively short half-life of arsenic-76 (26.5 hours) caused it to be sensitive to downstream travel time. While the increased river discharge lowers the overall concentration, the higher transport velocities resulted in the higher concentrations occurring during the spring runoff season even though dilution is greatest at that time. Neptunium-239, with a half-life of 2.35 days, shows a trend similar to arsenic-76.

For the radionuclides with half-lives of 14 days or more (phosphorus-32, chromium-51, and zinc-65), dilution controls the change in concentration at all stations. As river discharge is increased

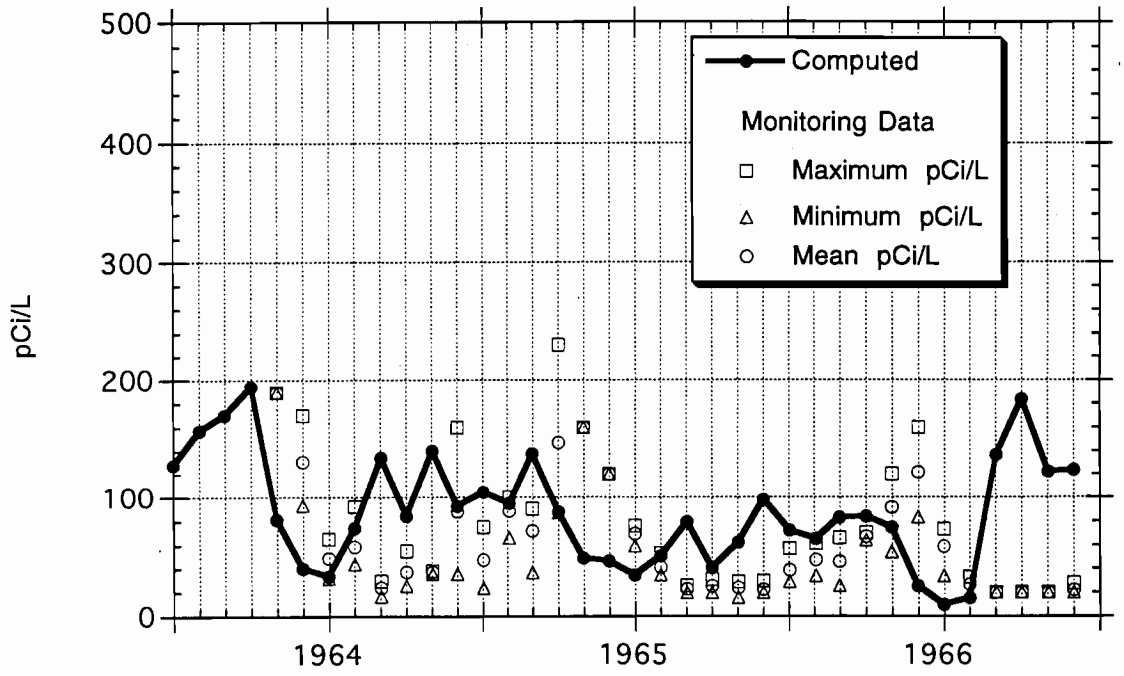

Figure 7. Concentrations of Zinc-65 at Bonneville Dam for 1964-1966

during spring runoff, the increased dilution of reactor effluent lowers radionuclide concentrations. A half-life of 14 days or more is long enough, compared to the downstream travel time for concentrations to be reduced primarily by dilution.

The dilution effects from the tributaries were not apparent in the data except for the Snake River, which has a discharge roughly equal to half of the upper Columbia River discharge. Although the tributaries do contribute to both dilution and travel time, monthly averaging of tributary and Columbia River flows distributes the inflow over the 30-day period and diminishes the tributary hydrograph effect.

Other physical processes that were apparent in the model results were the lack of complete mixing of the reactor effluent in the Hanford Reach and the uptake or release of radionuclides by river sediment. The distance necessary for complete mixing of the plume extended downstream, at least to Richland. Measured and computed data comparisons at Pasco indicated mixing was complete. Sediment uptake of radionuclides was indicated in the reservoir segments, where computed water concentrations were generally higher than instream measurements. At Richland, the higher measured concentrations occurred mostly during the low-flow period and cannot necessarily be related to sediment resuspension. Also, the model may be too simplified to correctly identify possible sediment effects. The sediment effects problem is addressed in a subsequent section of this report.

The results of the conceptual model testing work support the feasibility of using a one-dimensional unsteady flow transport model to reconstruct Columbia River water concentrations. The

results indicate that monitoring data exist at a sufficient number of river locations to test the credibility of reconstructed water concentrations. The effluent plume is fully mixed below Pasco, and corrections can be made to the results from the unsteady flow transport model. The effects of sediment are not well-defined and were evaluated in more detail under this task using the unsteady flow model before computing final water concentrations.

Columbia River Transport Model

As a result of the conceptual model study, the CHARIMA (Charriage des Rivieres Maillees) model was selected for the Columbia River transport work. The significance of the model name is sediment transport in looped river systems. CHARIMA was obtained from the Iowa Institute of Hydraulic Research (IIHR) at the University of Iowa and is documented in Holly et al. (1993). CHARIMA was selected because it fulfills the modeling requirements specified by the TSP. The model can accommodate tributary inflows, multiple channels within a river, the presence of dams and reservoirs, and has the capability to route contaminants to any specified location.

Description of CHARIMA Mathematics

CHARIMA is a one-dimensional, finite difference model that simulates unsteady flow (flood wave) hydraulics and nonuniform sediment transport in open channel (unimpounded) systems such as rivers and canals. The model has the capability to simulate the operation of dams and reservoirs and to input a constituent, such as a contaminant or heat, in the routing scheme. The governing equations are the water continuity and momentum equations used to compute unsteady (time-dependent) flow and the advection-dispersion equation that uses the results of the hydraulic computations to calculate the transport of radionuclides and compute water concentrations. The model applies an implicit finite-difference numerical solution method to solve the water continuity and momentum equations. The advection-dispersion equation is solved using a hybrid Eulerian-Lagrangian technique. For the Columbia River computations, the CHARIMA model was modified to allow for radionuclide decay. The modified model is, therefore, called WSU-CHARIMA to differentiate it from the acquired model version.

Unsteady Flow Hydraulic Model

The movement of a flood wave simulated by CHARIMA is calculated by solving the following pair of equations for unsteady open channel flow. The equation of water continuity (Equation 1) expresses the conservation of mass. The momentum equation (Equation 2) expresses momentum balance. As they are used in CHARIMA their form is as follows:

$$\frac{\partial A}{\partial t} + \frac{\partial Q}{\partial x} = 0 \qquad (1)$$

$$\frac{\partial Q}{\partial t} + \frac{\partial}{\partial x}\left(\alpha \frac{Q^2}{A}\right) + gA\frac{\partial y}{\partial x} + gA\frac{Q|Q|}{K^2} = 0 \qquad (2)$$

where A = cross-sectional area (ft^2)
t = time (sec)
Q = water discharge (ft^3/sec)
x = coordinate direction along the channel (ft)
α = momentum correction factor
g = gravitational acceleration (ft/sec^2)
y = water-surface elevation (ft)
K = conveyance (ft^3/sec).

The physical law represented by Equation (1) is that if a particular control volume or section of river is considered, the water flow into that section over a unit time period must equal the change in volume of water stored in that section plus the volume of water that is discharged from that section. This is the conservation of mass principle applied to a section of a river.

Equation (2) is derived from Newton's second law of motion, which states that the sum of forces acting on a body equals its "mass times acceleration." The basic forces acting in a river system are inertial forces and applied forces. The first and second terms in Equation (2) are local acceleration and convective acceleration, respectively. Local acceleration relates to the acceleration of the flow that is dependent on time. Where the flow velocity or discharge is changing with time, there are local or temporal inertia and acceleration effects. Convective acceleration consists of the changes in velocity that occur with a change in distance. That is, if the cross section of the flow is changed, the velocity is also changed, and thus acceleration forces, which vary with distance, are introduced. The third term in Equation (2) is the hydrostatic pressure due to the water depth. The last term in Equation (2) is the gravitational body force and frictional resistance forces. Gravitational force causes the water to flow, and frictional resistance forces tend to retard the flow. The resistance forces are determined by the channel bed form and channel surface roughness (e.g., cobbles, boulders). Resistance forces involve any geologic or human-made structural form that removes energy from the system.

Within the frictional resistance expression formulated in CHARIMA, a roughness coefficient is included and used in calibrating the model. This coefficient, called Strickler's k, is varied during calibration to obtain the best fit to measured hydraulic data (e.g., water depth or discharge) and then tested against an independent data set for validation. The use of this coefficient is described in a following section that discusses model validation.

Equations (1) and (2) constitute a system of nonlinear partial differential equations of the hyperbolic type, for which there is no complete analytic solution. The mathematical treatment of the equations is relatively difficult because they cannot be integrated in closed form except under very simplified conditions. The current method of solving these equations is by numerical integration using a finite difference scheme that converts partial differential equations into algebraic statements easily solved with a computer. The finite-difference scheme used in CHARIMA is based on the method proposed by Cunge et al. (1980).

Radionuclide Transport Model

A transport equation governing the time and space distribution of radionuclides in a river can be derived by applying the conservation of mass principle to a section of a river channel. This results in the following partial differential equation for the cross-sectional average concentration:

$$A\frac{\partial C}{\partial t} + Q\frac{\partial C}{\partial x} = \frac{\partial}{\partial x}\left(AD\frac{\partial C}{\partial x}\right) - \lambda AC \qquad (3)$$

where A = cross-sectional area of flow (ft^2)
C = radionuclide concentration (Ci/ft^3)
t = time (sec)
Q = river discharge (ft^3/sec)
x = coordinate direction along the channel (ft)
D = longitudinal dispersion coefficient (ft^2/sec)
λ = radionuclide decay rate (1/sec).

The physical meaning of each term is (from left to right): change in concentration with respect to time; advection of the concentration with the flow; mixing due to molecular diffusion, turbulent diffusion, and nonuniform velocity distribution in the channel; and decay of the radionuclide. It should be emphasized that the concentration appearing in the above equation is the average concentration taken over the entire depth and width of the river (complete mixing assumption). Thus, Equation (3) cannot be used to calculate the concentration distribution in a spreading plume. In the WSU-CHARIMA model, the full Equation (3) is solved using the method presented in Holly and Preissman (1977). A complete description of the computational details is provided in Holly et al. (1993).

Model Computational Procedure

Once the hydraulic model was validated, the channel geometry and roughness coefficient (Strickler's k) were not altered. The concentration for the release of an individual radionuclide was computed separately for each year. For example, the concentrations of sodium-24 and zinc-65 for 1950 were computed using two separate model runs. For each model run in a given year, the same time-varying discharges of the Columbia River and tributaries were used, while the source term input concentrations from the reactors were changed accordingly for the radionuclide being routed. The hydraulic computations are separated from the radionuclide transport computations. Thus, the hydraulic computation for a time step is completed first, and the resulting river stages and discharges are passed to the radionuclide transport model for computation of water concentrations at the specified locations. The computed stage, discharge, and radionuclide concentration at the specified river cross section are recorded in output files. The computations then proceed to the next time step, and the process is repeated until a full year is completed. A schematic of the computational process in WSU-CHARIMA is shown in Figure 8.

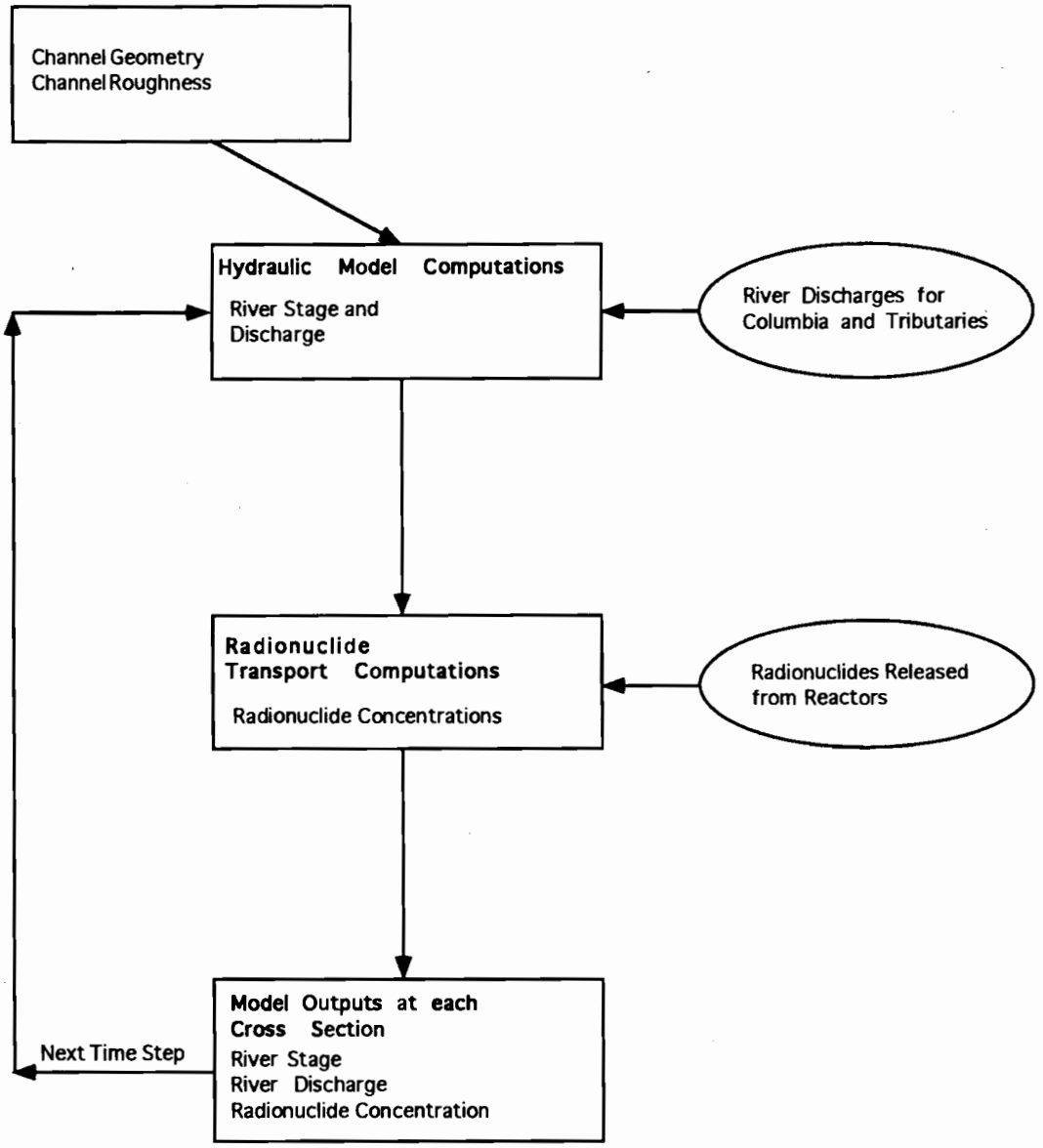

Figure 8. Computational Scheme for WSU-CHARIMA Model

WSU-CHARIMA Model Validation

21 The validation of the water concentrations computed by WSU-CHARIMA was accomplished in two stages. First, the unsteady flow hydraulic model, involving Equations (1) and (2), was validated. This ensured that the model would produce accurate discharge velocities, water-surface elevation, and water mass-balance calculations. The final stage of validation addressed the transport model (Equation 3). For this effort, a source term for chromium-51 was routed with WSU-CHARIMA to locations where *sufficient* monitoring data were available *(six locations). These locations extend from Richland, Washington to Portland, Oregon and were distributed along the river length representative of where the final water concentrations are to be computed for use in dose estimates.* Comparisons were made between the computed and measured results to determine the degree of transport model validation achieved.

Validation of a river hydraulic model that solves the unsteady flow equations (Equations 1 and 2) consists of three sequential steps: 1) geometrical features of the river are defined and computational points are determined, 2) trial computations are run for a series of steady flows (e.g., low, medium, and high), and 3) observed natural flood hydrographs or other gauge records are reproduced as closely as possible. These steps parallel the basic procedure outlined by Cunge et al. (1980) as the validation process that obtains a correct physical description of reality and avoids force-fitting a physical situation.

Definition of Geometric Features

During this step, an input data file of the Columbia River channel geometry was prepared and tested in WSU-CHARIMA. The file was developed from river cross-section surveys of channel width and bottom elevation measurements. The cross sections for the Hanford Reach to Pasco were surveyed by the U.S. Army Corps of Engineers. From Pasco to Portland, river navigation maps prepared by the National Oceanic and Atmospheric Administration (NOAA beg. 1982) were used to develop cross-section data. Cross sections were entered into the file at approximately every river mile. Because the channel bottom elevations are referenced to a common datum elevation such as the National Geodetic Vertical Datum (mean sea level), the channel slope is also defined in the file.

Before the cross sections were entered into the geometric data file, each was entered into a routine for hard-copy plotting to check for entry mistakes that may have occurred when the data were transferred from the river survey maps. Cross sections were then entered in the data file in segments of 10 to 15 miles and tested in the model using a constant discharge to see whether the computed water-surface profile was close to that expected for free-flowing conditions and whether it exhibited the correct behavior for a reservoir system where appropriate. This procedure also provided an opportunity to check whether a sufficient number of cross sections were being used and whether any model stability problems, such as those due to significant changes in channel slope, had occurred.

Steady Flow Testing

Steady flow testing uses trial computations for a series of steady flows in which the water-surface profiles and the corresponding steady discharges are known. The purpose of steady flow testing is to obtain coincidence of the computed and observed water levels for a particular discharge. Steady flow testing is not considered as validation of an unsteady flow model, but does reflect the overall hydraulic characteristics of a river channel. It provides an opportunity to test the simulation of Columbia River hydraulics under simplified conditions, to determine an initial channel roughness coefficient, and to finalize the geometric data file.

Reliable steady flow testing requires measured water-surface profiles for a segment of river that is long enough to include most channel irregularities such as meander loops, islands, and representative bed roughness (e.g., boulders). Although measured water-surface profiles are scarce for the Columbia River, profiles for the Hanford Reach were found for four discharges that occurred in 1943 (U.S. Army Corps of Engineers 1943). The discharges were 341,000 cfs (June 26, 1943), 252,000 cfs (July 27, 1943), 174,000 cfs (August 9, 1943), and 93,900 cfs (August 26, 1943). These profiles were developed by the U.S. Army Corps of Engineers, probably for the Manhattan Project effort during the 1940s.

The profiles for 1943 were used to determine an initial value of the roughness coefficient (Strickler's k) for the expected range of monthly discharges and to test the comparison of the computed profile with the measured profile. Values of Strickler's k of 20, 40, and 60 were run for each of the four discharges. The results for the highest and lowest discharges are shown in Figures 9 and 10, respectively. The best fit for Strickler's k is a value of 40. The physical significance of Strickler's k is that for values larger than about 40, the water surface is depressed and velocities are increased. The opposite is true for values lower than about 40; that is, the water surface is raised and velocities are slower. The water surface profile (k=40) parallels the measured profile a little more closely for the higher discharge (Figure 9). This is to be expected, because the measured low discharge is much more affected by irregularities in the channel bed, such as at Coyote Rapids at about RM 378 to 383. This is evident in Figure 10 by the localized difference between the computed profile (k=40) and the actual measurements. The effects of these irregularities become less relevant for the higher flows, as is the case under actual field conditions.

Validation of Unsteady Flow Hydraulics

According to Cunge et al. (1980), unsteady flow validation consists of adjusting model features to obtain coincidence between observed and computed time-dependent hydrographs of water stages (with elevations referenced to a gauge datum). Stage hydrographs are the most accurate because they are measured directly, while discharge hydrographs are developed from stage hydrographs and stage-discharge rating curves, which are based on several instream discharge measurements. However, discharge hydrographs can be used for unsteady flow validation if stage hydrographs are not available.

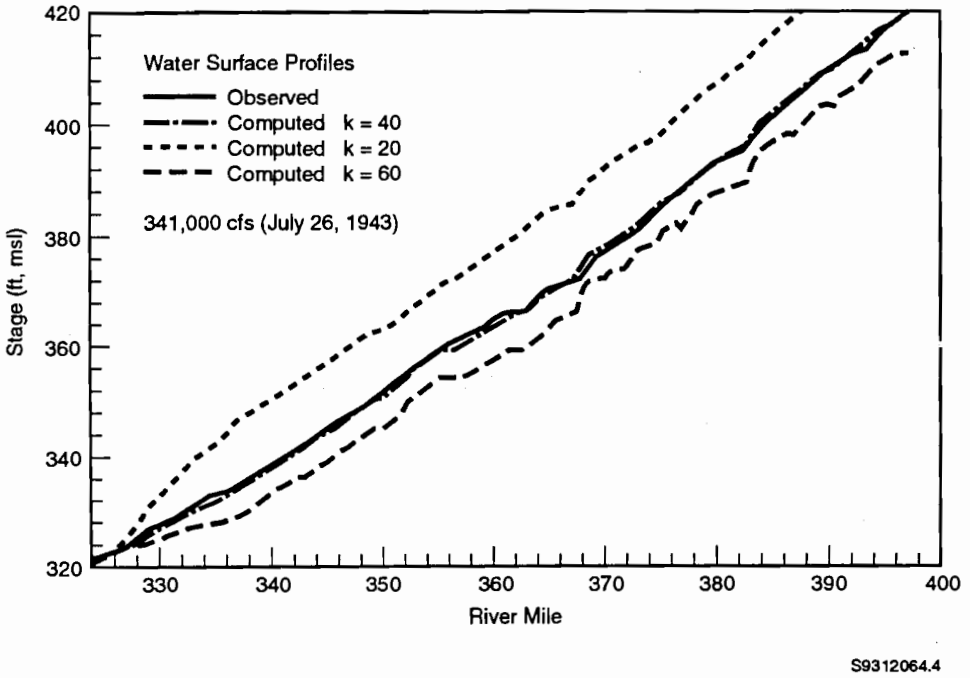

Figure 9. Steady Flow Test Results of Hanford Reach Hydraulics Using the June 26, 1943 Water-Surface Profile

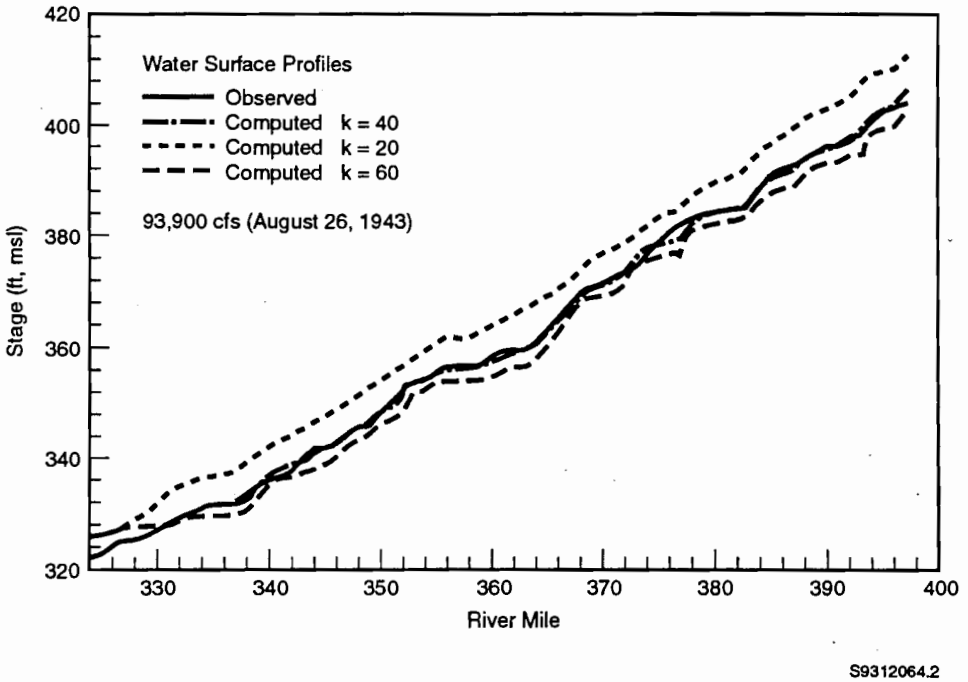

Figure 10. Steady Flow Test Results of Hanford Reach Hydraulics Using the August 26, 1943 Water-Surface Profile

The validation of WSU-CHARIMA hydraulics was accomplished in two steps. First, the hydraulics of the Hanford Reach from Priest Rapids to the 300 Area were validated, followed by the river length from the 300 Area to Bonneville Dam. Both river segments were treated separately and with different measured data sets.

22 Validation for the Hanford Reach used hourly stage data measured at three gauging stations. Stations recently established at the 100-B Reactor, 100-H Reactor, and the 300 Area provided continuous hourly stage readings of the hydropeaking releases from Priest Rapids Dam. *The hydropeaking releases from Priest Rapids Dam can cause as much as 8 feet of variation in water-surface elevation in a 24-hour period at upper Hanford Reach locations (e.g., 100-B Reactor). For a normal range of river discharges, from 50,000 cfs up to 500,000 cfs, the water surface can vary on the order of 25 feet at 100-B Reactor (Wood 1954).* Stage readings for the three stations were obtained from Westinghouse Hanford Company for May and October 1992.[(a)] Hourly discharge data were obtained from the Grant County Public Utility District.[(b)]

22 An input file of the hourly discharge data was prepared for a 300-hour period for May 1992 and routed from Priest Rapids Dam to the three downstream gauging stations. Hourly stages were computed and compared with the gauge measurements. Several computational runs were made, and the Strickler's k was adjusted to a final value of 35. This provided the best fit for all three gauges simultaneously. The results for the 100-B Reactor, 100-H Reactor, and the 300 Area are shown in Figures 11, 12, and 13, respectively. Based on visual inspection, the convergence of the computed and measured hydrograph peaks are within 4 hours, and the hydrograph shape is coincident. The water-surface elevation for all peaks at all stations is within 1 foot, and the timing of the peaks is extremely close. *The comparison can never be exact because gauge readings are affected by such phenomena as surface wave action because of wind, bankline irregularities causing water to "pile up," and transverse river slope in a channel bend. Error can be introduced in modeling because model computations assume a horizontal cross-sectional surface. Another possible source of error is the local variations in channel roughness which are usually represented by a single roughness coefficient.*

Validation was accomplished by computing the stages for the October 1992 time period using Strickler's k=35 and comparing the results to the measured stages. The results are shown in Figure 14 (100-B Reactor), Figure 15 (100-H Reactor), and Figure 16 (300 Area). For the 100-B and 100-H areas, the computed results are mostly within 1 foot of elevation and timing of the peaks is comparable to the May 1992 results. The 300 Area results show satisfactory comparison, with the peak elevations within 0.5 foot and closely matching peaks, but the lower stages are off by slightly more than 1 foot in some instances. This reflects an effect of reservoir operations in which McNary Reservoir was drawn down below the normal operating level. Each gauge is affected by river characteristics at their respective locations and the comparison between computed and measured data will never be perfect. Based on the validation results, a Strickler's k=35 was selected for the Hanford Reach from Priest Rapids to the 300 Area.

(a) Data file (HEDR Project Document No. 01940003), "Water-Surface Elevations of Columbia River at B, H, F, and 300 Area Reactors, May and October 1992," from W. McMahon (Westinghouse Hanford Company) to B. G. Gilmore (Battelle, Pacific Northwest Laboratories), April 1993.

(b) Data file (HEDR Project Document No. 0190004), "Daily Operations Summary 2 for Priest Rapids, March 1992-February 1993," from D. Lewis (Grant County Public Utility District) to B. G. Gilmore (Battelle, Pacific Northwest Laboratories), April 1993.

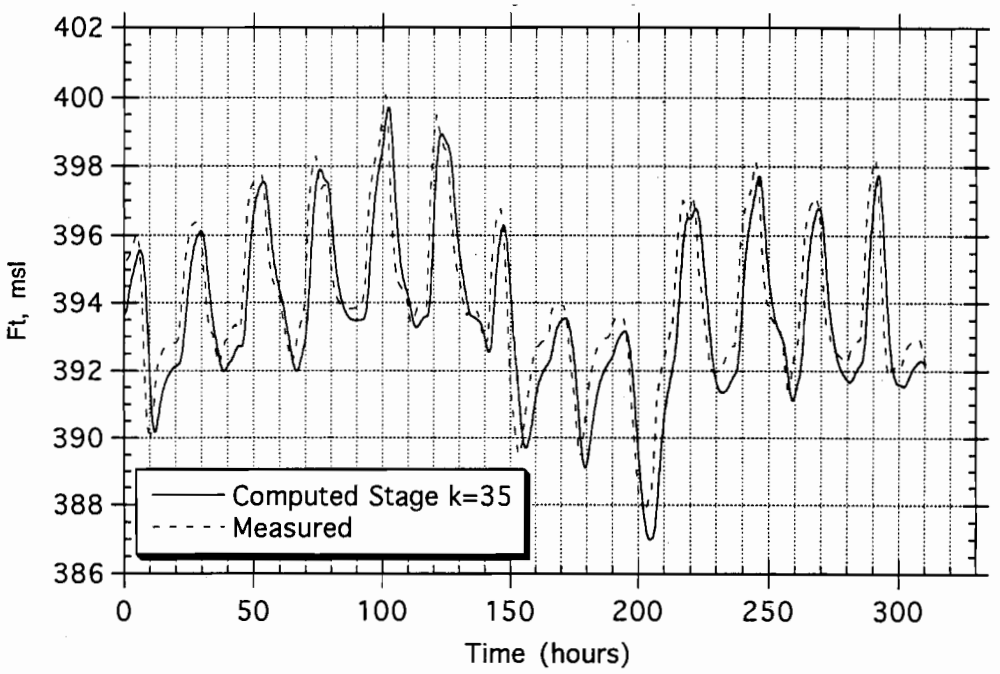

Figure 11. Unsteady Flow Calibration at 100-B Reactor, May 1992

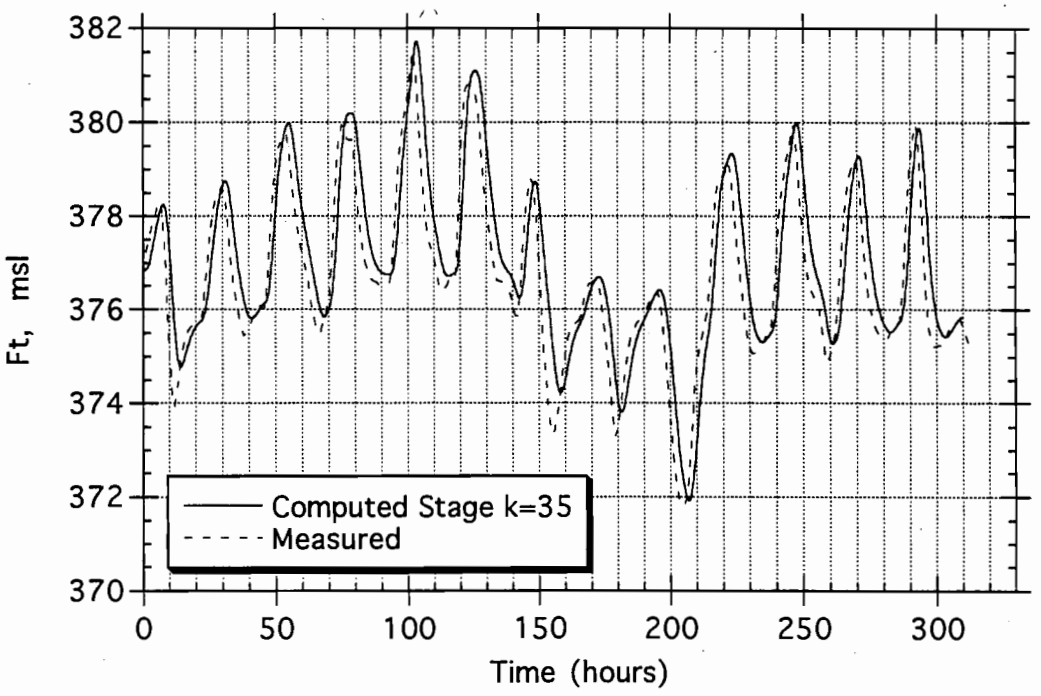

Figure 12. Unsteady Flow Calibration at 100-H Reactor, May 1992

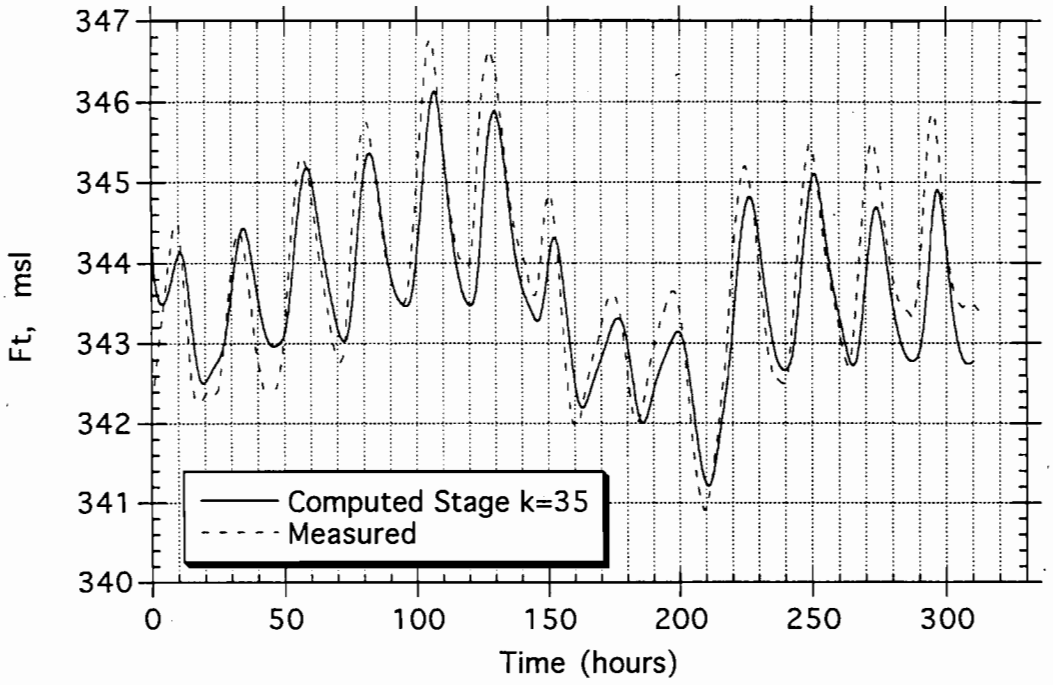

Figure 13. Unsteady Flow Calibration at the 300 Area, May 1992

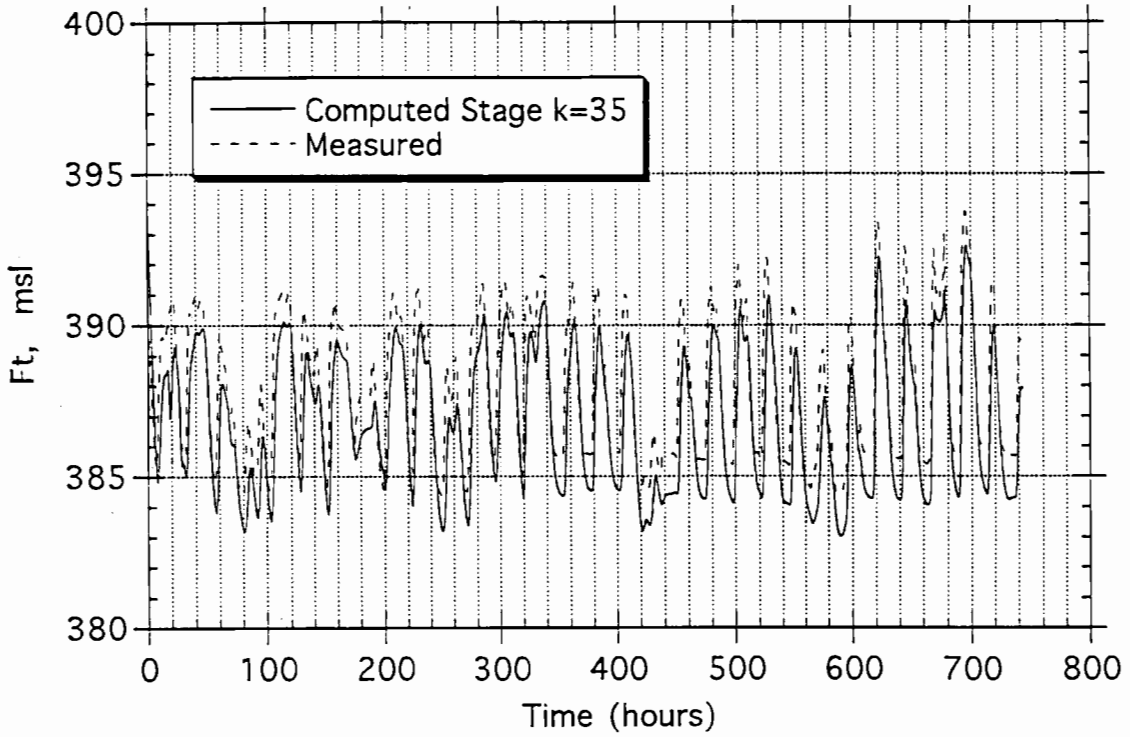

Figure 14. Unsteady Flow Validation at 100-B Reactor, October 1992

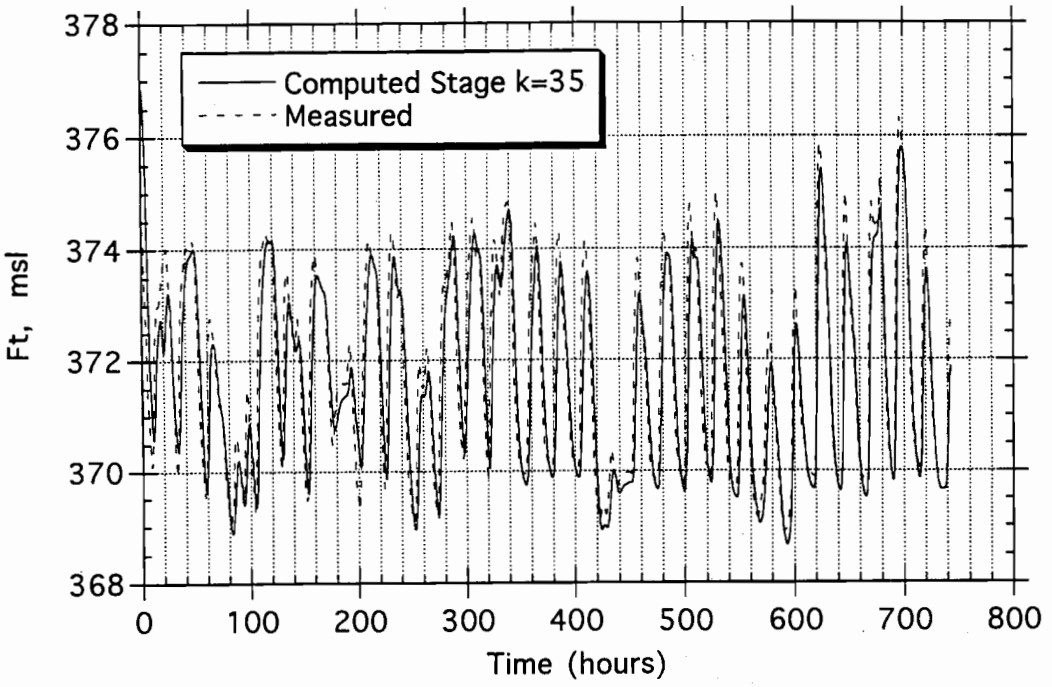

Figure 15. Unsteady Flow Validation at 100-H Reactor, October 1992

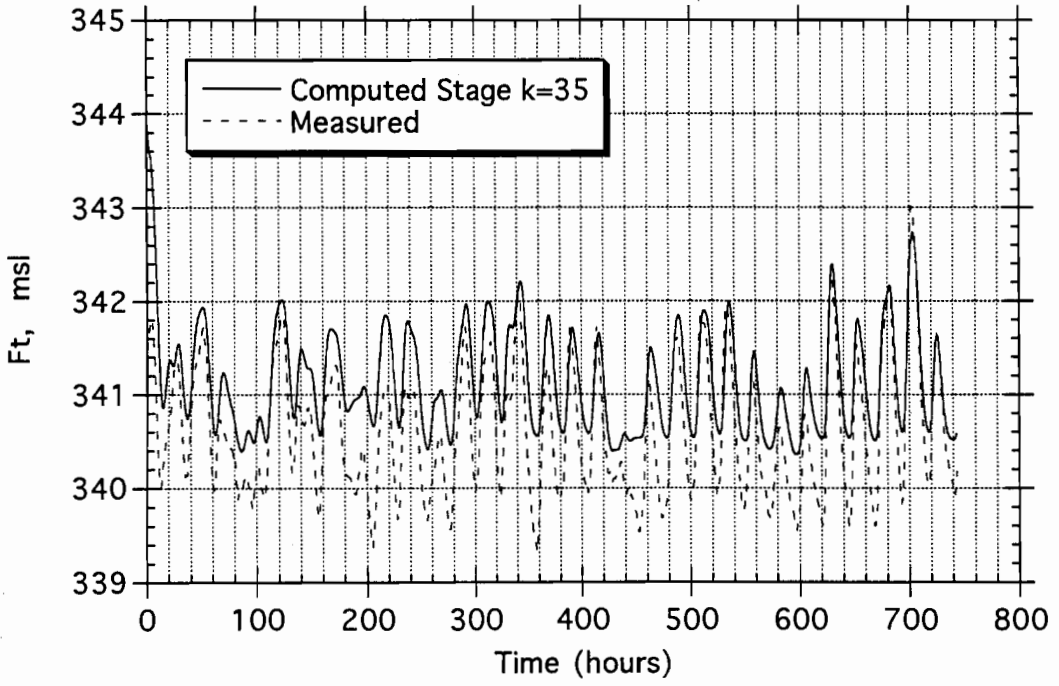

Figure 16. Unsteady Flow Validation at the 300 Area, October 1992

For validation purposes downstream of the 300 Area, two sets of independent river measurements were available: 1) a water-surface profile for the 1894 flood and 2) discharge hydrograph data at The Dalles, Oregon gauging station. Although the 1894 flood profile is a steady flow condition, a value for Strickler's k can be determined and tested for validation with a discharge hydrograph at The Dalles.

The 1894 flood is the largest on record for the Columbia River. The flood's water surface profile was determined by the U.S. Army Corps of Engineers by measuring high-water marks left by the flood (U.S. Army Corps of Engineers 1956). The profile extends from about Priest Rapids Dam (RM 400) to downstream of Portland, Oregon (RM 60).

As a first step in validation of the Columbia River hydraulics below the 300 Area, the 1894 flood profile was simulated using the flood discharges at Priest Rapids (800,000 cfs), the Yakima River (40,000 cfs), and the Snake River (410,000 cfs). Although the high-water mark measurements are based on field estimates, the overall slope of the flood's water surface is assumed to be reasonably accurate. The model should be able to reproduce this slope. A Strickler's k=50 was determined to be the value producing the closest computed profile. A reasonable comparison is all that is expected because of the method of field measurement. The results are shown in Figure 17. Both the computed and measured profiles compare very favorably until about RM 140, just below the Bonneville Dam area, which is strongly affected by backwater from the Willamette River and by Pacific Ocean tides. Neither of these processes was included in the simulations. Also, Bonneville Dam did not exist during the flood. However, the results upstream of the dam demonstrate the ability of WSU-CHARIMA to simulate accurate hydraulics for extremely high discharges.

Unsteady flow validation was conducted at The Dalles gauging station using upstream Columbia River and tributaries daily discharge hydrographs for 1964 obtained from the commercially-available Earth Info (1992) database. Daily discharge data for the Columbia River at Priest Rapids Dam, and all major tributaries between Priest Rapids Dam and The Dalles, were routed to The Dalles gauge. The discharge hydrograph was computed and compared to the published data as shown in Figure 18. Visual inspection showed that the computed hydrograph was closely coincident with the published data, indicating a satisfactory conservation of mass flow rate with closely matching peaks.

Based on the results from the Hanford Reach and The Dalles gauging stations, WSU-CHARIMA was determined to have reached a satisfactory level of validation. The close comparison with measured hourly and daily gauge data provided credibility that mass transport and travel time were being accurately simulated and that reasonably accurate monthly average radionuclide concentrations are possible. For the reach of river from Priest Rapids to RM 348 (near the 300 Area), a Strickler's k=35 was determined, and for the river below RM 348, a value of k=50 was determined.

34 *The Strickler's k values are only valid for open channel flow conditions; i.e., unimpounded river flow. For reservoir conditions, the operating level of the particular reservoir is set in the model at the dam and the model determines the extent of the backwater effect for any river discharge. The k-values are more important for the Hanford Reach and for the early time periods before dam construction.*

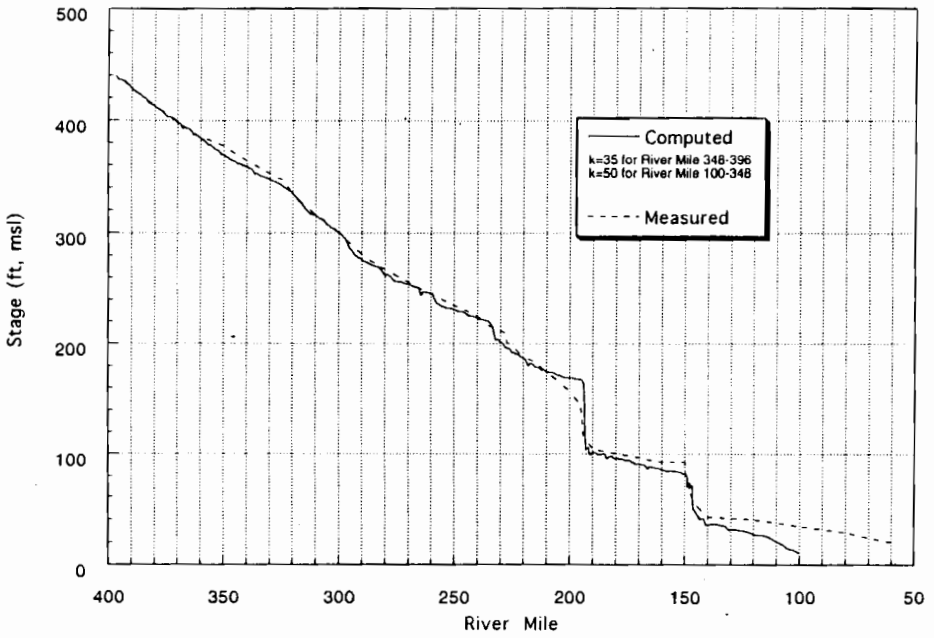

Figure 17. Steady Flow Test Results of the 1894 Flood Profile from Hanford, Washington to Portland, Oregon

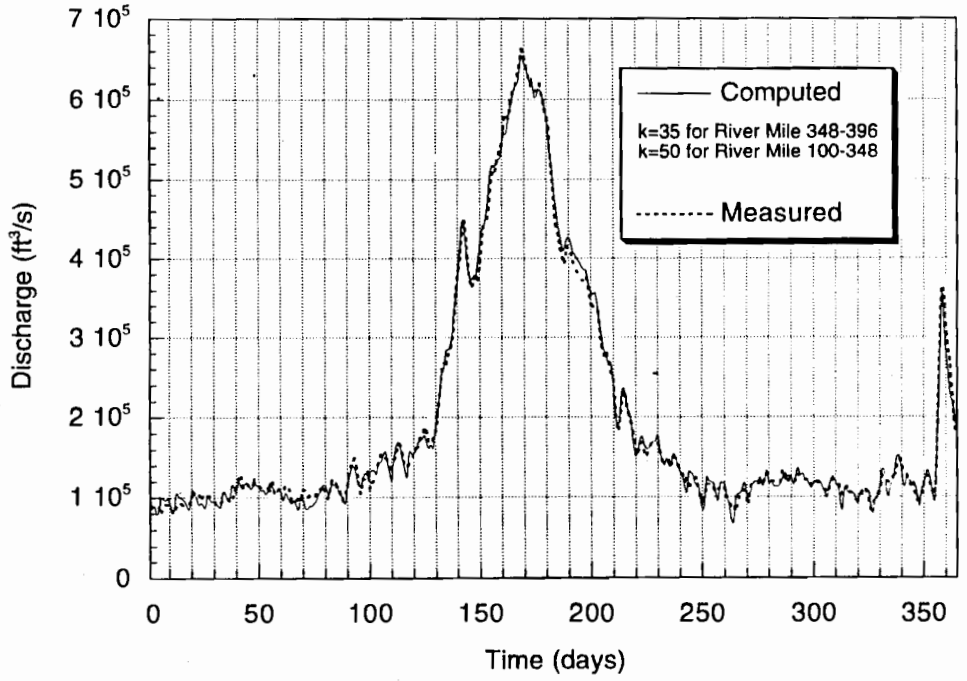

Figure 18. Unsteady Flow Calibration at The Dalles, Oregon Gauge for 1964

34 ***Hydraulic Simulations Below Bonneville Dam***

The validation of WSU-CHARIMA only applies to the length of the Columbia River from Hanford to Bonneville Dam, which includes 11 of the 12 locations selected for the reconstruction of water concentrations. The remaining location is at Portland, Oregon, approximately 46 river miles downstream of Bonneville Dam and is affected by Pacific Ocean tidal cycles. Based on TSP recommendations and discussions with the Environmental Transport Committee, the reconstruction of water concentrations at Portland could be accomplished by either extending the model, use of a simplified model (e.g., SRT model), or use of a simple extrapolation method. The choice of options was based on the scoping study by Napier (1993) that determined that dose levels at the Portland-Vancouver area were expected to be below the dose cutoff level of 100 mrem.

During the development of the river geometry datafile, the decision was made to extend WSU-CHARIMA to the Portland location and use a fixed downstream boundary condition for the water surface elevation. This was the most cost effective and accurate approach of computing water concentrations at Portland. In this approach the simulations would be continuous from Bonneville Dam to Portland for the required 253-month period and include decay and dilution.

The Columbia River, in the Portland vicinity, does not experience flow reversals but is significantly affected by the backwater effects from the tides which causes a reduction in flow velocity. Based on information derived from Columbia River flood profiles (U.S. Army Corps of Engineers 1966) and Earthinfo (1992), a fixed water surface elevation was selected for the downstream boundary. The elevation was set at 10 feet above mean sea level which is approximately 8.5 feet above the low water plane and 6.5 feet below flood stage. The representative river discharge for this tidal elevation is approximately 200,000 cfs at the Vancouver-Portland gauge.

Radionuclide Transport Model Validation

Following the validation of WSU-CHARIMA hydraulics, the model was modified to include radioactive decay in preparation for routing of the chromium-51 source term provided for model validation. Chromium-51 was selected for model validation because it 1) is not affected as much by sediment uptake and release as other radionuclides, 2) behaves similarly to a conservative tracer, 3) has a large monitoring database, and 4) has a decay time long enough to maintain easily measurable concentrations for the total length of the river. The data file of monthly average chromium-51 releases was routed from each reactor to downstream monitoring locations. The routing was for 1960 through 1970, the period when isotopic monitoring data were collected.

Because a large number of concentration profiles were produced, only typical examples of results are included here. Sampling stations at Richland, Pasco, McNary Dam, The Dalles, Bonneville Dam, and Portland were selected to represent the length of monitored river, and the years selected are those with the most complete set of monitoring data. Weekly composite sample results were selected for use in validation because they provide a more accurate representation of the range of monthly concentrations at river locations.

Results for the Richland station for 1967 are shown in Figure 19. The computed concentrations all fall within the range of monitored concentrations. Results for the Pasco and McNary Dam stations for 1965 are shown in Figures 20 and 21. All computed monthly average concentrations, except for January at McNary Reservoir (Figure 21), fall within the range of monthly monitored data. Results computed for stations at The Dalles and Bonneville for 1965 (Figures 22 and 23) show a tendency for higher computed concentrations from October through January. The validation results from Richland to Bonneville Dam show that the WSU-CHARIMA model can provide representative reconstructed water concentrations for that length of river. The results also provide a reasonable validation of the source term and historical monitoring data for chromium-51, since they are both independently developed or measured databases and were not used in the development and validation of WSU-CHARIMA hydraulics.

Water Concentrations Below Bonneville Dam

The Portland location presents a special problem for reconstruction of water concentrations because of the Pacific Ocean tidal effects and possible backwater effects from the Willamette River. Water level fluctuations due to tides extend upstream to Bonneville Dam (RM 146) and upstream about 26 miles on the Willamette River at Portland (McAnally et al. 1983). Another problem is the sparse amount of monitoring data compared to data available for upstream locations. Only

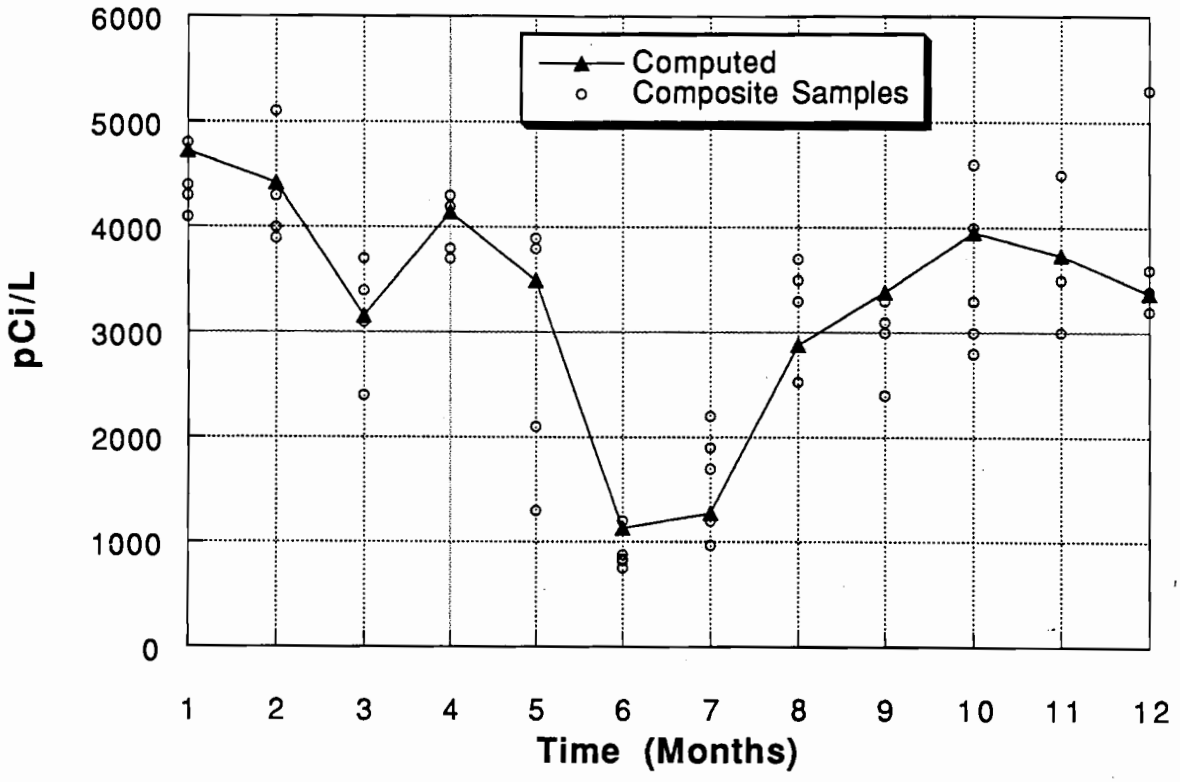

Figure 19. Comparison of WSU-CHARIMA Results with Composite Samples for Chromium-51 at Richland, Washington (1967)

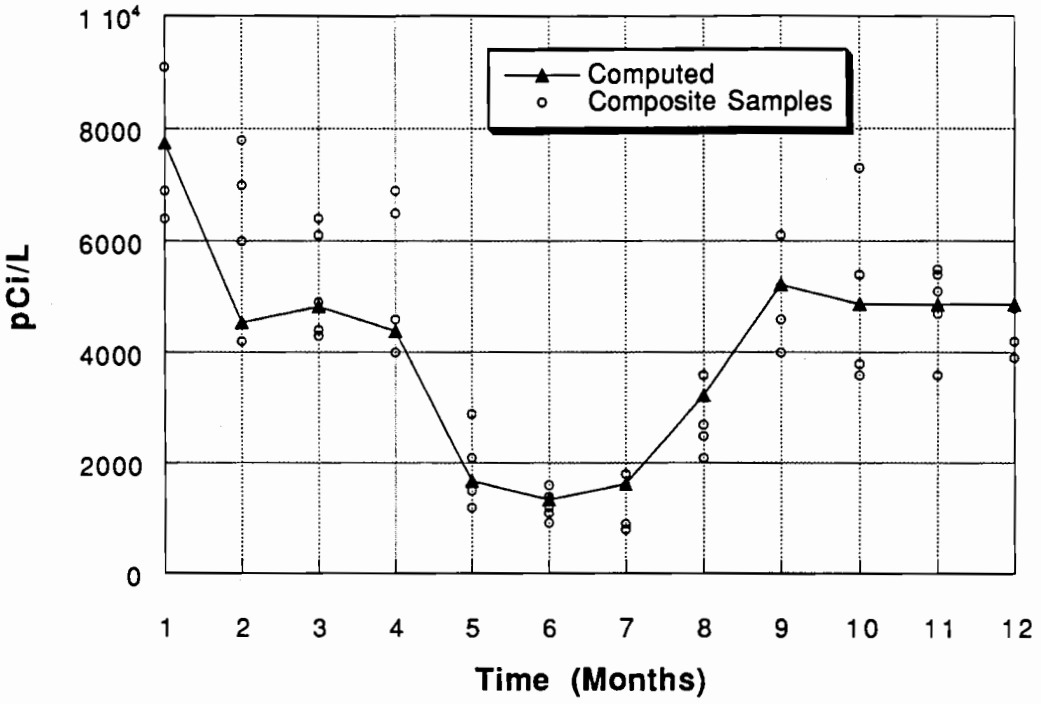

Figure 20. Comparison of WSU-CHARIMA Results with Composite Samples for Chromium-51 at Pasco, Washington (1965)

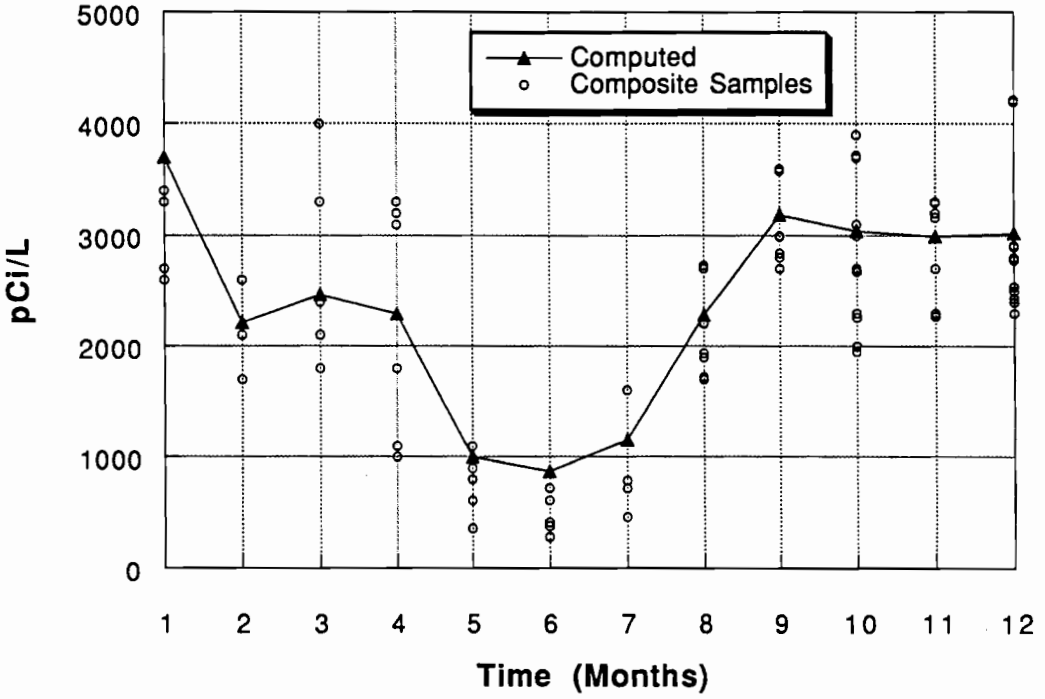

Figure 21. Comparison of WSU-CHARIMA Results with Composite Samples for Chromium-51 at McNary Dam (1965)

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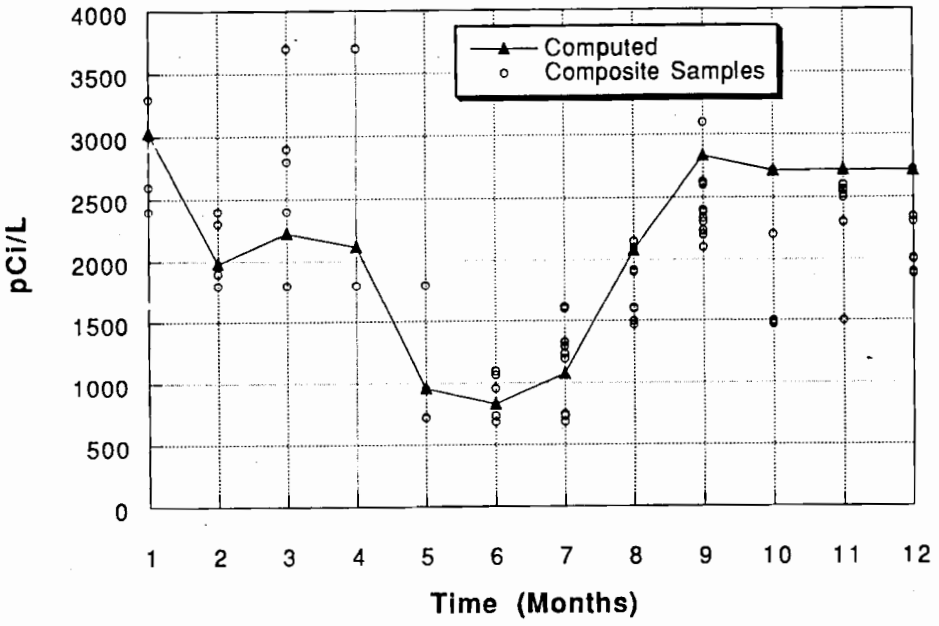

Figure 22. Comparison of WSU-CHARIMA Results with Composite Samples for Chromium-51 at The Dalles, Oregon (1965)

23

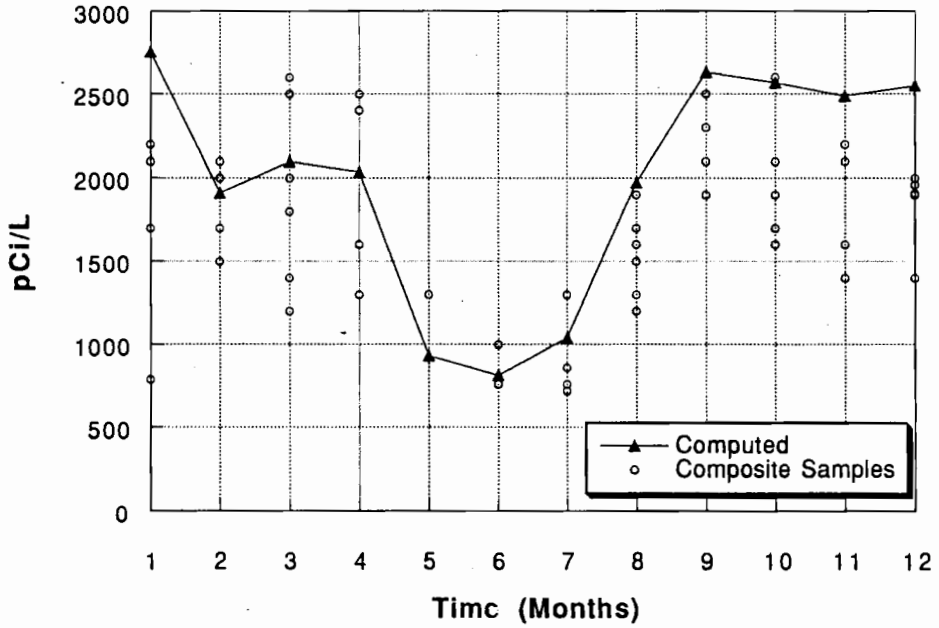

Figure 23. Comparison of WSU-CHARIMA Results with Composite Samples for Chromium-51 at Bonneville Dam (1965)

phosphorus-32, zinc-65, and neptunium-239 data are available for January 1960 to April 1964 at Portland. These are grab samples that were collected from one to three times per month.

21 *The monitoring data were collected at the Portland-Vancouver bridge, which is just upstream of the Willamette River confluence. However, because of tidal hydraulic conditions at this particular location, the effects of Willamette River discharge on the monitoring results is difficult to assess. Since this location is supposed to be representative of the river reach from Bonneville Dam to the river mouth, the Willamette River discharge was included in the model and is the largest river inflow for the 100 miles of river above the mouth.*

The modeling effort was originally planned to end at Bonneville Dam and to use monitoring data and empirical routing to estimate concentrations at RM 100 just below Portland. During the initial testing of WSU-CHARIMA, the decision was made to extend the channel geometry database to RM 100 and make comparisons with the available monitoring data as the most cost-effective approach. The results for chromium-51 are shown in Figure 24 for 1960 through 1964. The

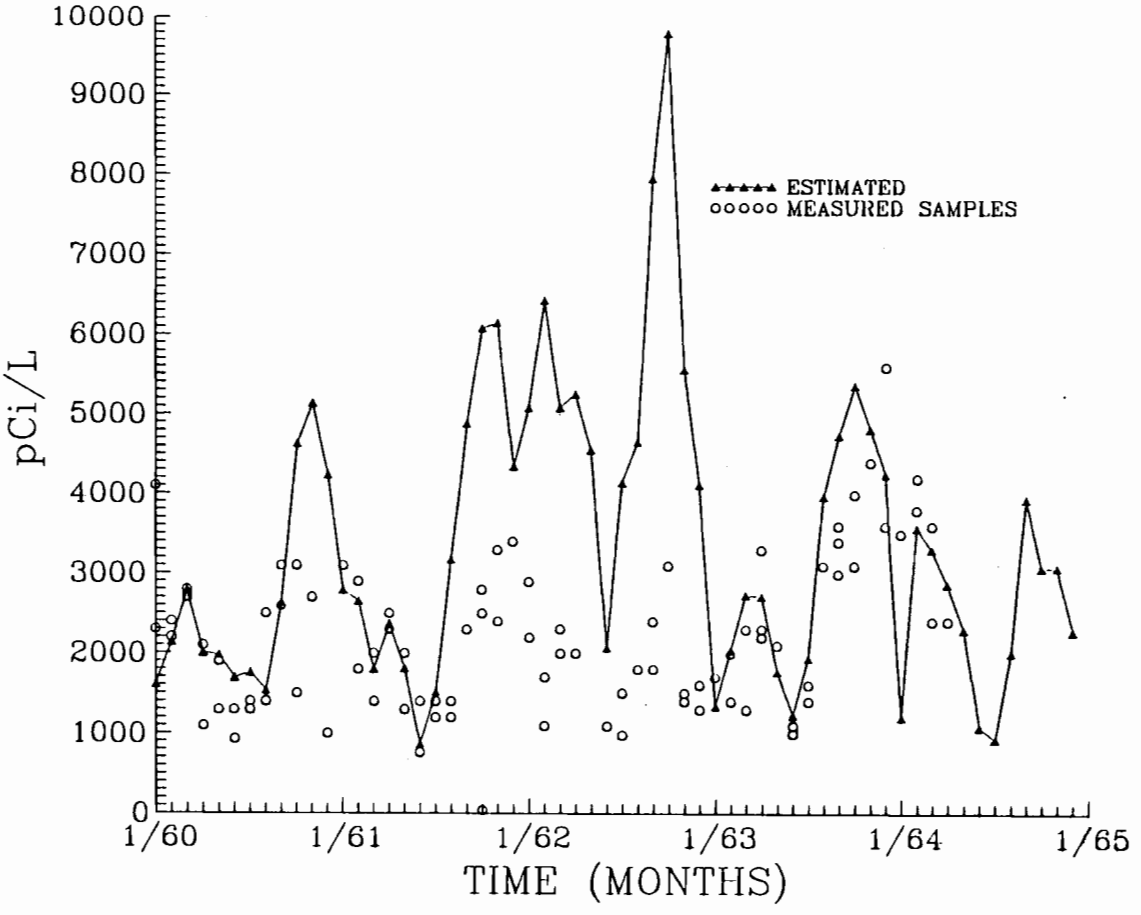

Figure 24. Comparison of WSU-CHARIMA Results with Grab Samples for Chromium-51 at Portland, Oregon (1960-1964)

computed concentrations fall within the range of the grab sample results, except for the fall-winter (low-flow) periods of 1960, 1961, and 1962. During the low-flow seasons, tidal effects are more dominant in the Bonneville Dam to Portland length of river and reduce the downstream flow velocity, providing the opportunity for incoming suspended sediment, with sorbed radionuclides, to deposit on the riverbed. Although chromium-51 does not easily attach to sediment, some sorption does occur when chromium-51 is reduced from the hexavalent to the trivalent state by reducing constituents in the sediment (Nelson et al. 1966). This apparently occurs mostly with clay particles, which are deposited more abundantly in the tidal reach of the river. It was pointed out by Nelson et al. (1966) that most of the chromium-51 tends to remain in solution, but the amount that does attach to sediment is tightly bonded.

Based on the comparison of computed and measured concentrations over the length of river from Priest Rapids Dam to Portland, validation of the transport model is considered to be successful. At Portland, the removal of a portion of the chromium-51 by sedimentation processes seems apparent, but the application of the model below Bonneville Dam remains the most practical method of reconstructing water concentrations at that location.

The comparison between measured and computed concentrations in Figures 19 through 23 (Richland to Bonneville Dam) show a much closer comparison for the months of May, June, and July. These are also the months of higher river flow. For the fall and winter months, when the flow is much lower, the measured data plots extend over a larger range of concentrations for each month. This was the apparent trend for the years from 1960 through 1970 when measured isotopic results were available.

Hydropeaking Effects on Water Concentrations

Because the monthly concentrations produced by WSU-CHARIMA are computed on a daily basis and averaged for each month, plots of daily concentrations of chromium-51 were developed for the Richland and The Dalles locations to examine the range of daily values (Figures 25 and 26). The plotted daily concentrations show significant fluctuations on approximately a weekly basis for the fall and winter months and very little variation for the summer months, especially June and July. An evaluation of the daily discharge data at Priest Rapids Dam indicates that the reason for the fluctuations is the hydropeaking operation of the dam which is based on weekly power demands. When more water is released to generate electrical power more dilution occurs and concentrations are reduced. When water is being temporarily stored less dilution occurs and concentrations are increased. For the summer months, the base river flow is extremely high and hydropeaking releases are not as dominant as at low flow. Both plots show a considerable reduction in daily concentrations for the summer months because of the much higher flows.

The difference in weekly concentrations can vary as much as 7000 pCi/L for chromium-51 for the fall and winter months. The weekly composite samples tend to reduce the variation but not completely. This is probably the reason for the wide variation in concentrations measured with the grab sampling method. Also, the pattern of concentrations produced by Priest Rapids Dam tends to persist at The Dalles even though McNary Dam is between the two locations. Below Bonneville Dam the hydropeaking effect is largely dampened because of tidal hydraulic conditions in that reach of river.

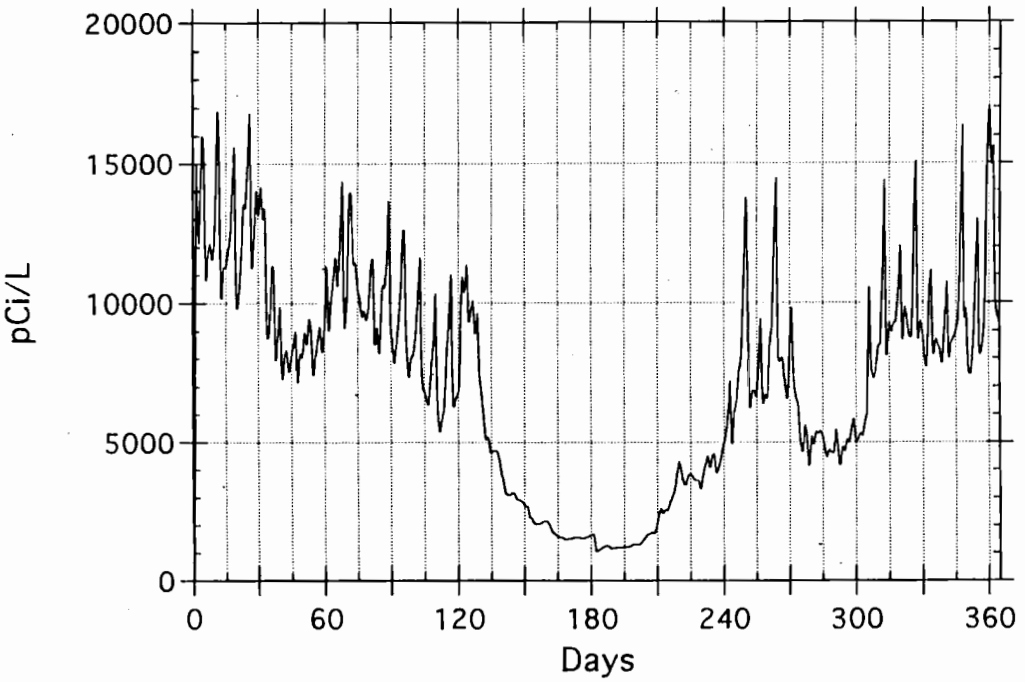

Figure 25. Concentration of Chromium-51 at Richland, Washington (1964)

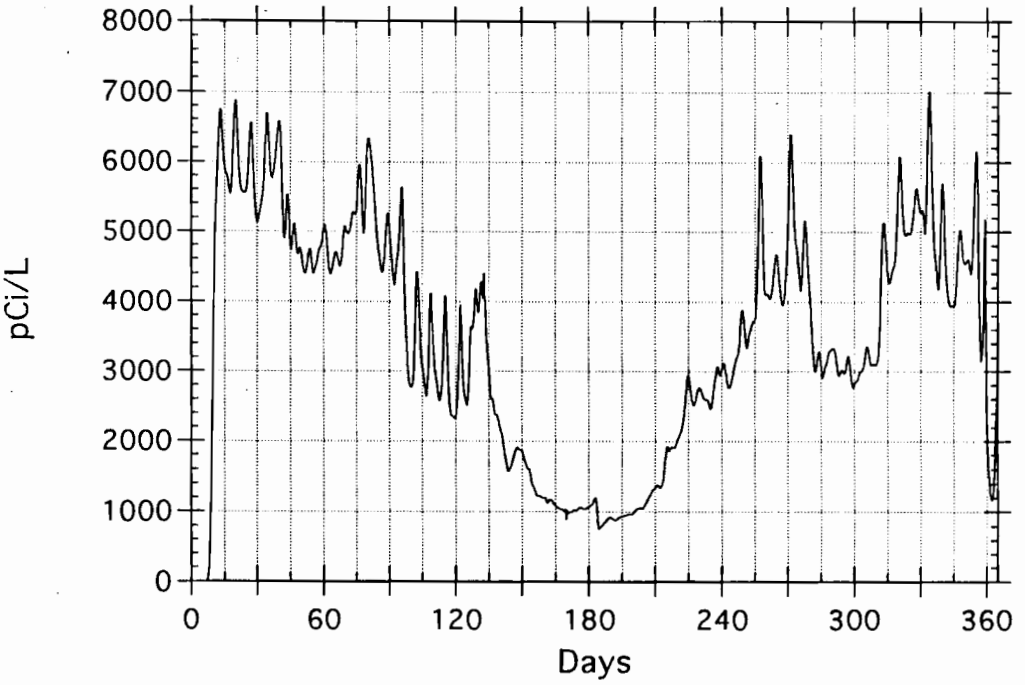

Figure 26. Concentration of Chromium-51 at The Dalles, Oregon (1964)

Concentration Corrections for Plume Effects

Because the WSU-CHARIMA model is based on the assumption of complete mixing of the reactor effluent, any necessary corrections to the computed concentrations will need to be applied outside of the model. This is consistent with the TSP recommendations.[a] The conceptual model results indicated that incomplete cross-sectional mixing had an effect on computed water concentrations at Ringold and Richland. The computed concentrations were high at Ringold and low at Richland compared to actual measurements. The literature review (Walters et al. 1992) stated that mixing was almost complete at Pasco, but that instream surveys were able to identify a plume at that location.

Based on an evaluation of instream field studies by Hanford contractors, the decision was made to develop the empirical correction factors using the results of Rostenbach (1956). Rostenbach conducted a field study on the extent of the reactor effluent plumes during 1954 and 1955. Cross-sectional measurements of gross beta concentrations, water temperature, and surface velocity measurements were obtained at specific locations from the reactors to McNary Dam. The study was conducted at that time because of the new reactors placed in operation in 1955 (100-KW and 100-KE) and the completion of McNary Dam in 1953. The overall study objective was to determine the mixing and dilution characteristics of the Hanford Reach and the McNary reservoir.

The reported data did show some discharge dependency, but it was not always consistent at a given location, and it was decided to base the factors on Rostenbach's results rather than attempt to produce discharge-dependent factors. Using the reported data, the ratio of the western (reactor) shore, eastern shore, and maximum concentrations were calculated and are presented in Table 1. These ratios are the correction factors used to multiply the average concentrations computed by WSU-CHARIMA to obtain more representative values at Ringold, Richland, and Pasco. For example, at Ringold the corrected estimate would be one-half of the computed average value for the eastern shore. This correction is made in the Columbia River Dosimetry model.

Table 1. Plume Correction Factors

Location	River Mile	Western Shore	Eastern Shore	Maximum
Ringold	356	1.2	0.5	1.3
Richland	339	1.1	0.6	1.2
Pasco	328	0.7	0.9	1.1

(a) Memorandum (HEDR Project Document No. 11920015), "Recommendations for Further River Pathway Work, FY93," from P. C. Klingeman (TSP) to TSP Members and D. B. Shipler (BNW), September 28, 1992.

WSU-CHARIMA Tests for Sediment Effects

The literature review (Walters et al. 1992) included a summary of reported information and data regarding the sorption of radionuclides to Columbia River sediment. The review stated that the process of radionuclide uptake by suspended sediment during the higher flows and the subsequent deposition during low flow reduced the amount of dissolved radionuclides in the water column. Radionuclide uptake by organic material was discussed but not considered to have much effect on water concentrations. The process of desorption was also considered to have the effect of increasing water column concentration during high flows by resuspension of deposited sediment.

Of the five radionuclides selected for river pathway dose estimates, only zinc-65 was found to have much information available in the reviewed reports. Chromium-51 was discussed in the reports, but for the HEDR Project was used only to validate the WSU-CHARIMA transport model.

The SRT modeling results indicated that a seasonal trend of higher measured concentrations (compared to computed concentrations) for zinc-65 had occurred at the Richland location. This trend was present from about November through March and was attributed to the lack of complete effluent mixing or the desorption of radionuclides from sediments due to the resuspension of riverbed material. However, desorption from sediments seemed to be unlikely because the November through March time period is characterized by lower flows. SRT modeling results for phosphorus-32 and neptunium-239 indicated a similar trend but to a much lesser extent. Downstream of McNary Dam the measured zinc-65 concentrations were less than the computed values, which could be attributed to sorption of radionuclides by sediment and deposition in slow-moving reservoir flow. Based on the SRT model results and the recommendation by the TSP, the WSU-CHARIMA model was used to explore the possible effects of sediment on water concentrations.

For the testing procedure, water concentrations were computed for the five radionuclides that were identified for use in dose estimates (sodium-24, phosphorus-32, zinc-65, arsenic-76, and neptunium-239) and compared to measured data. The model assumes that all the reactor effluent is in dissolved form in the river and completely mixed over any cross section. The measured data include the effects of sedimentation processes on water concentrations. Therefore, a comparison of computed and measured results provides an opportunity to identify the effect of sediment sorption or desorption on water concentrations.

Radionuclide concentrations were computed for locations where monitoring data are available for the 1960-1970 period. Graphs were prepared comparing the concentrations computed for each radionuclide to the monitoring results for the individual locations and years. Adjustments for the effluent plume effects at the Hanford Reach locations were not included.

Hanford to Bonneville Dam

26 For zinc-65, historical monitoring data were available for 8 years from 1963 through 1970. During this time span, only 1965 and 1966 showed any indication of a trend. Figure 27 shows the comparison at Richland for 1965. The greatest differences between computed and measured

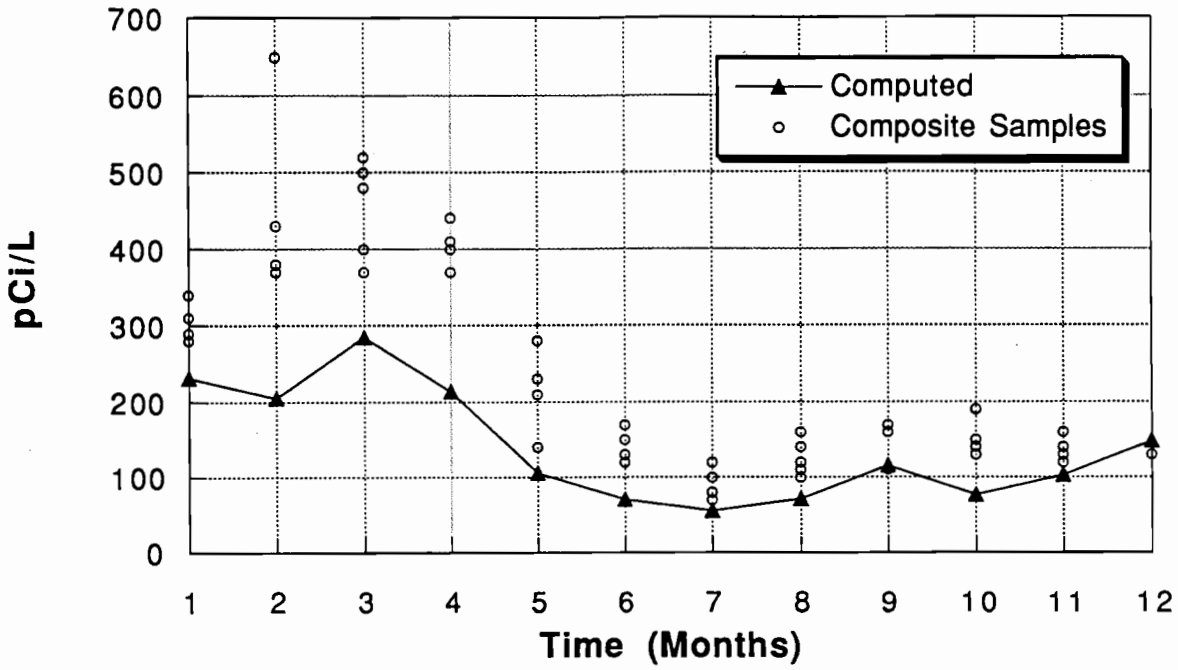

Figure 27. Comparison of Computed and Measured Water Concentrations of Zinc-65 at Richland, Washington (1965)

concentrations occur from February through May. A similar trend for Richland occurs in 1966. The other 6 years show a closer agreement between computed and measured concentrations with no consistent seasonal trend. *The concentrations at Richland were not corrected for plume effects which would increase the computed concentrations by 10 percent and would only account for small difference. Other sources of error would involve the accuracy of the estimated source term (monthly averaged releases), monitoring sampling and analysis, and the simplifications involved in numerical modeling.*

The comparison of computed to measured concentrations for phosphorus-32 was excellent at all locations and years where data were available. Certain years show higher computed concentrations at Richland and lower values below Pasco for the reservoir locations, but generally, the agreement between computed and measured concentrations for phosphorus-32 did not indicate a trend that could be related to sedimentation or any other process. The results for the Richland location for 1965 are shown in Figure 28.

Monitoring data (grab samples only) for the other three radionuclides, sodium-24, arsenic-76, and neptunium-239 are available for the Hanford Reach down to McNary Dam. None of the three radionuclides showed any identifiable trends that suggest their concentrations are affected by sedimentation processes. There is excellent agreement between the computed and measured data for neptunium-239 (Figure 29). The results for sodium-24 show slightly higher computed values for September through December (Figure 30). Only one computed value (January) is about three times

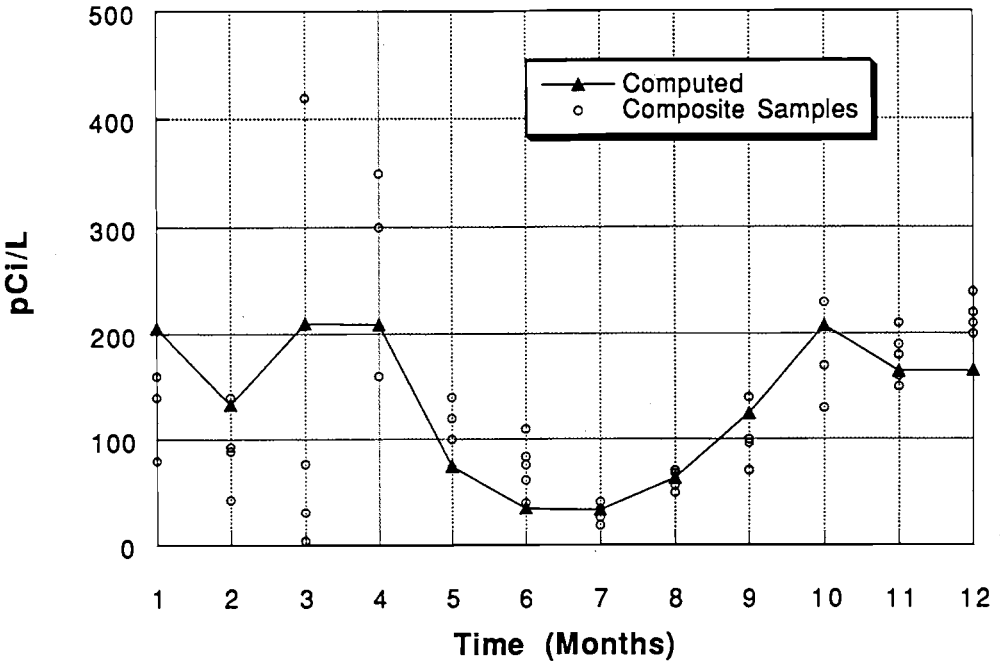

Figure 28. Comparison of Computed and Measured Water Concentrations of Phosphorus-32 at Richland, Washington (1965)

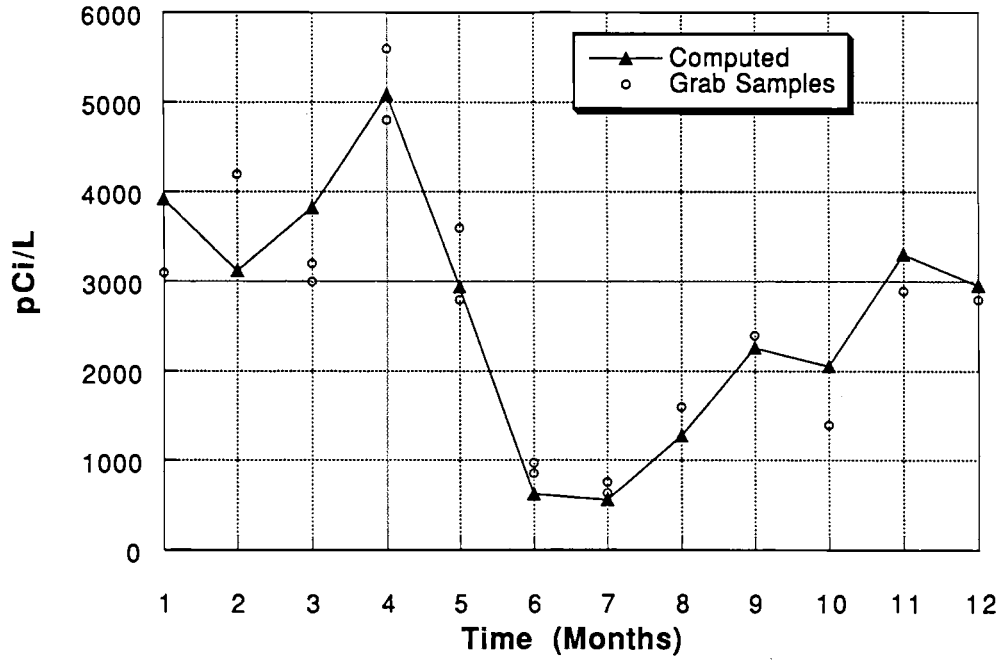

Figure 29. Comparison of Computed and Measured Water Concentrations of Neptunium-239 at Richland, Washington (1964)

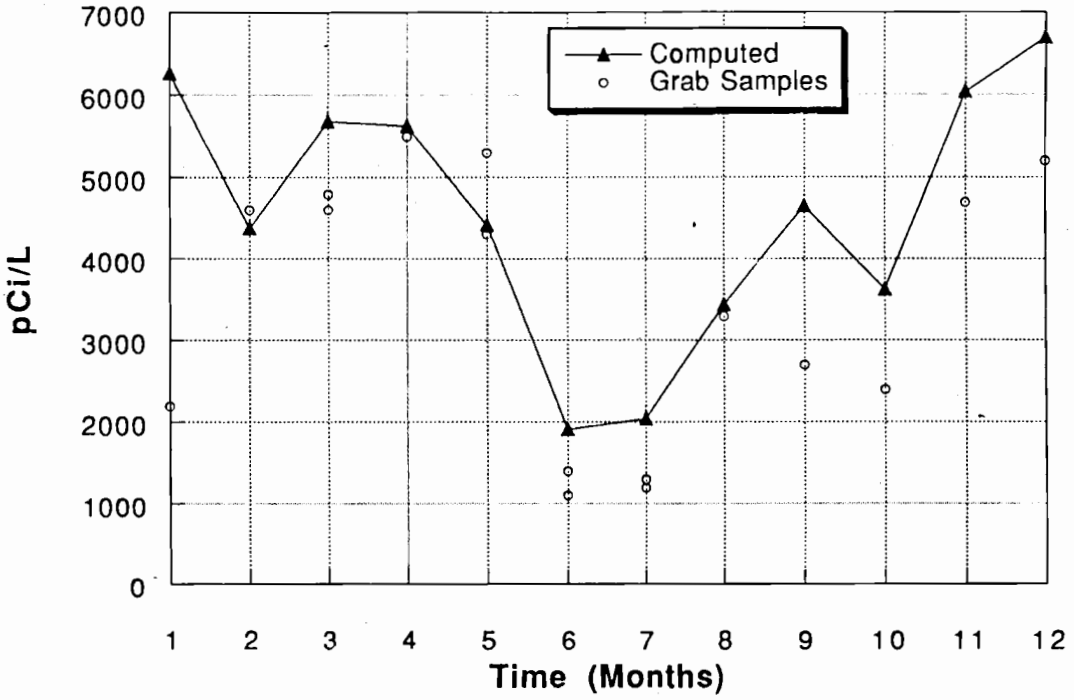

Figure 30. Comparison of Computed and Measured Water Concentrations of Sodium-24 at Richland, Washington (1964)

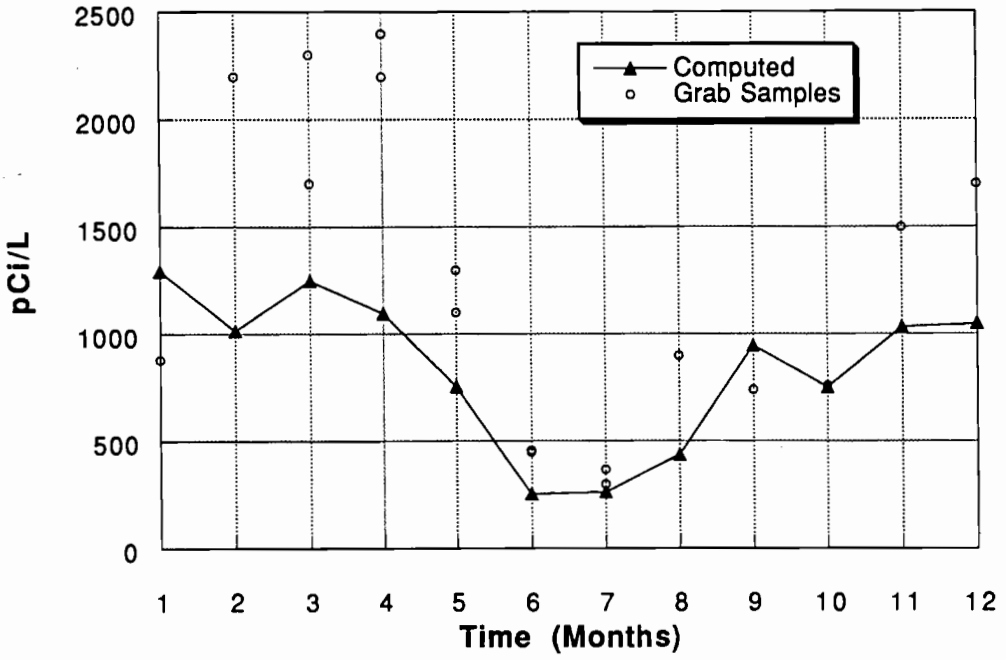

Figure 31. Comparison of Computed and Measured Water Concentrations of Arsenic-76 at Richland, Washington (1964)

higher than the measured data. Similar results were obtained for arsenic-76 (Figure 31), where the largest differences between computed and measured data occur in February, March, and April. The large differences between computed and measured data are at least partly due to the use of grab samples, for which only one or two data points are available for a given month.

Bonneville Dam to Portland

Comparisons between computed and measured results were made for the Vancouver-Portland area for phosphorus-32, zinc-65, and neptunium-239. The results for phosphorus-32 and neptunium-239 are shown in Figures 32 and 33. Because the sampling period at this location was short, the graphs were developed for the entire sampling period and include all grab sample data. The computed water concentrations for these two radionuclides generally fall within the range of the measured concentrations with the computed results showing a narrower range, especially for phosphorus-32.

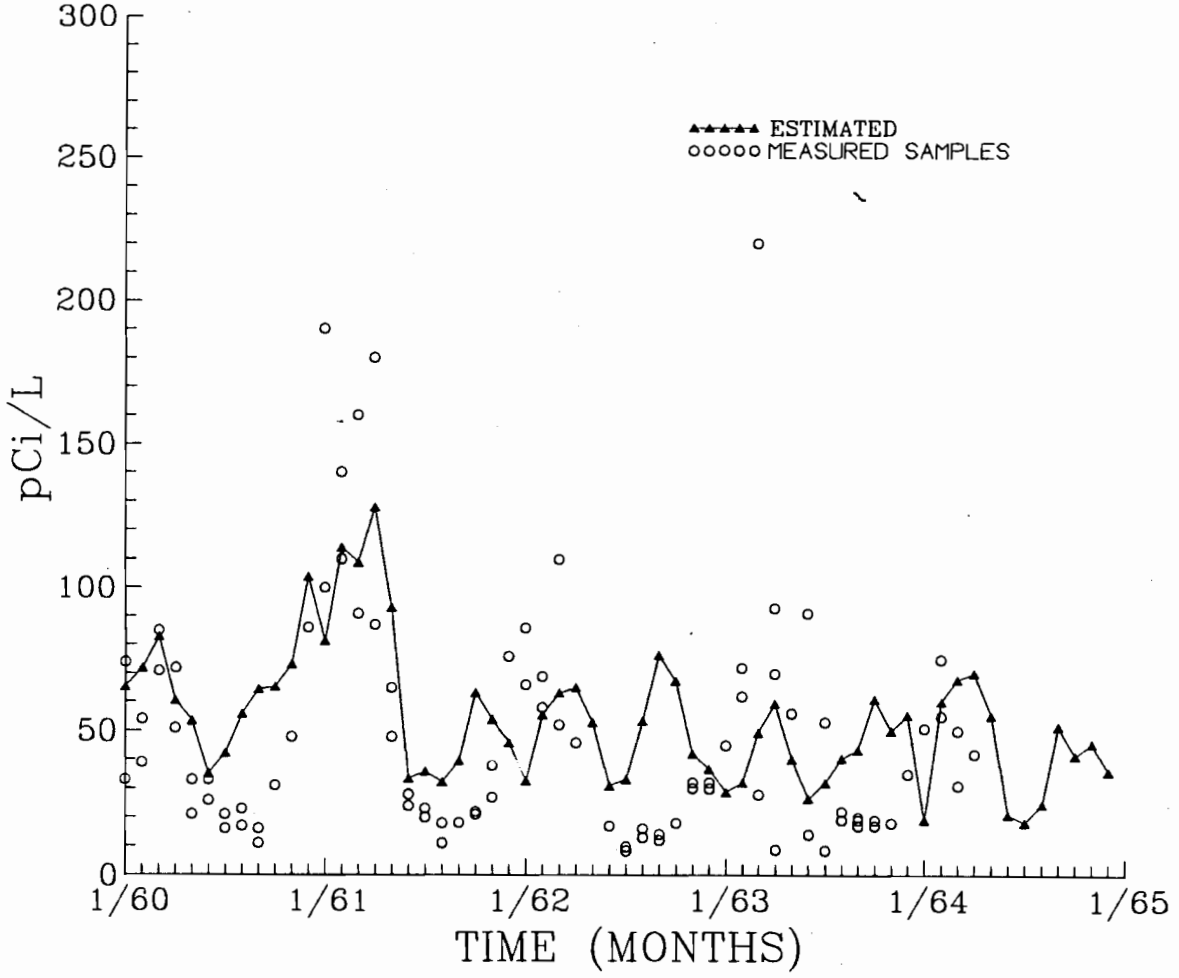

Figure 32. Comparison of Computed and Measured Water Concentrations of Phosphorus-32 at Portland, Oregon (1960-1964)

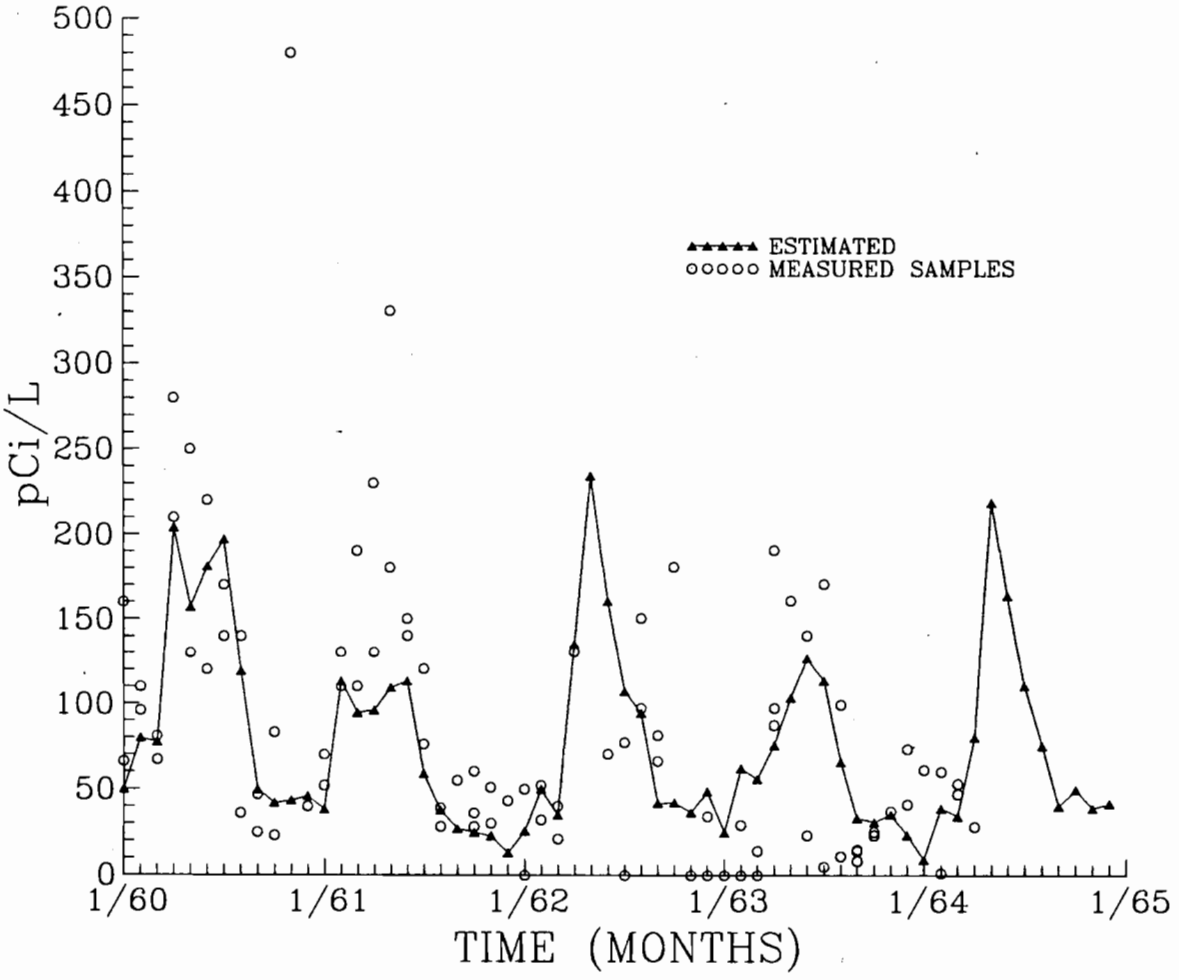

Figure 33. Comparison of Computed and Measured Water Concentrations of Neptunium-239 at Portland, Oregon (1960-1964)

27,28 The comparison for zinc-65 is shown in Figure 34. The computed concentrations were much higher than the sampling results, except for 1963 through April 1964. *The significant difference between computed and measured zinc-65 concentrations for 1960 through 1962 is due partly to sediment uptake and possibly to the simplified representation of tidal hydraulics in the Bonneville to Portland reach. The assumption is that sediment is the more dominant process. Early studies by Hanford contractors and the U.S. Geological Survey identified zinc-65 as one of the radionuclides that sorbs to sediment (Walters et al. 1992). It prefers the finer sediment sizes which are found in abundance in the tidal reach of the Columbia River (Bonneville Dam to the river mouth). Also, the 46-mile length of river from Bonneville Dam to Portland provides ample time and distance for a cumulative uptake of zinc-65 by sediment before reaching Portland. The tendency of increasing and decreasing measured concentrations does not always match up with the computed values. This is probably because of the simplified representation of tidal hydraulics where seasonal tide levels are not simulated in the model.*

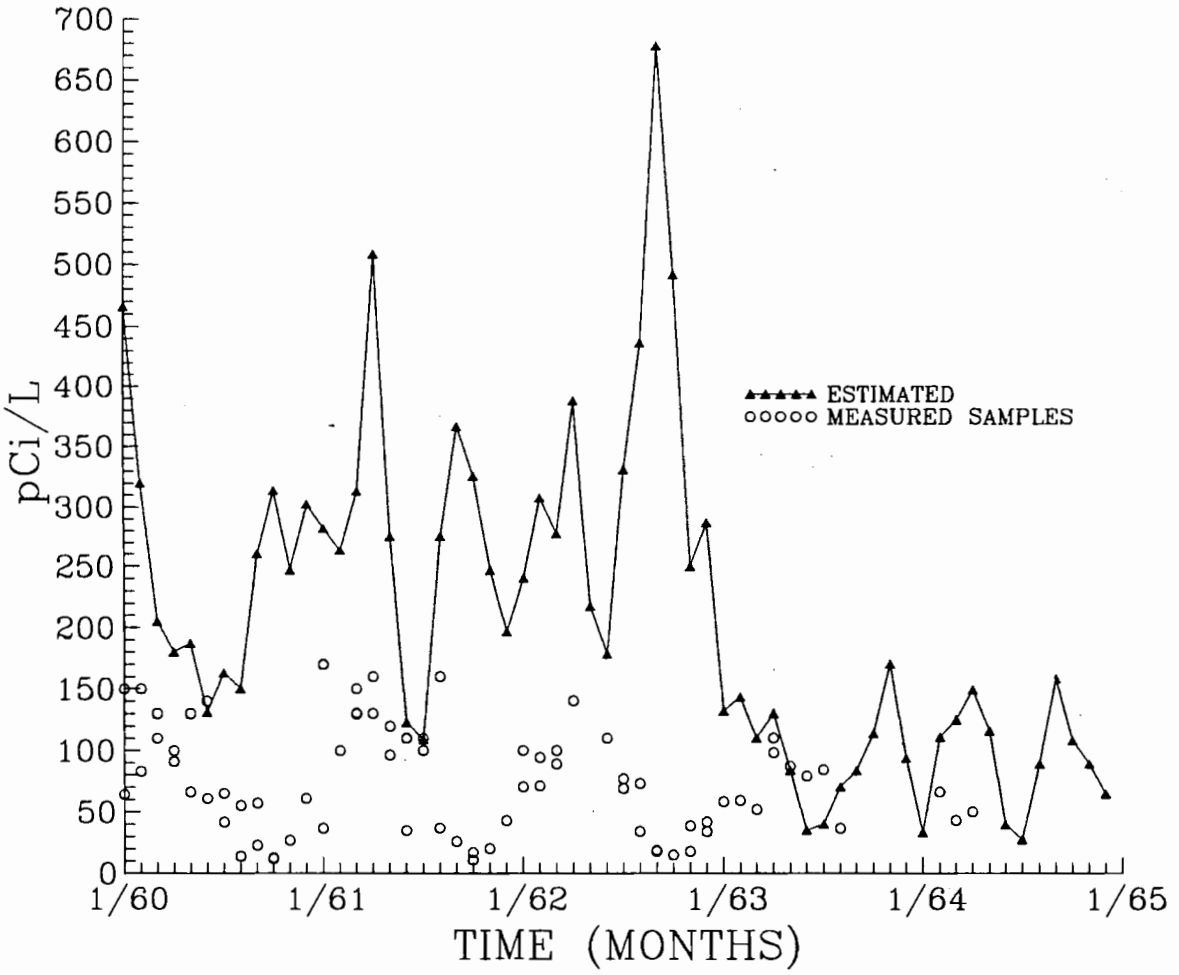

Figure 34. Comparison of Computed and Measured Water Concentrations of Zinc-65 at Portland, Oregon (1960-1964)

Summary of Test Results

The WSU-CHARIMA test results indicated that the process of sediment uptake and release is probably one of the factors contributing to the differences between computed and measured concentrations. At Portland, the results are complicated by the effects of tidal hydraulics. The results for all radionuclides were not consistent enough to provide a basis for empirical corrections. Correction factors developed from the data and applied uniformly at a location would introduce unnecessary error in many instances. However, the computed concentrations for zinc-65 at Portland should be used with the knowledge that the concentrations are overestimated.

The decision was made to reconstruct the water concentrations for the 21-year period without attempting to correct for sedimentation effects for the following reasons. The overall results for all five radionuclides showed that comparisons between computed and measured results were good, in

that the *monthly* increases and decreases in measured water concentrations were matched by the computed values. At locations above Bonneville Dam, the overall comparison is close.

At Portland, the computed concentrations for zinc-65 were several times higher than the measured concentrations, and the computed increases and decreases are not coincident with those measured. The modeling results are not considered to be accurate enough to correct for sediment uptake at Portland. The computed concentrations for phosphorus-32 and neptunium-239 were within the range of measured data.

Model Sensitivity Tests

31 The computed radionuclide concentrations from WSU-CHARIMA are affected by the hydraulic variables of river discharge, water-surface elevation, channel roughness, longitudinal dispersion, and channel geometry. The other key variable is the radionuclide source term. Only the sensitivity of discharge, roughness, and dispersion *were* considered in the testing.

For monthly average concentrations, any error in the source term produces a one-to-one variation in the radionuclide concentrations. For example, a 10-percent increase in the number of curies released will result in a 10-percent increase in the monthly average concentration. This is because the transport partial differential equation for the radionuclides is linear. Therefore, the source term uncertainties can be directly applied to the simulated radionuclide concentrations outside the WSU-CHARIMA model.

Sensitivity to the channel geometry (cross sections and slope) was not examined because the river surveys used were the best topographic data available to the project. It was judged that there was no rational basis for assigning an error estimate to this set of data, as previously discussed in the section on data quality objectives.

The sensitivity analysis of the hydraulic variables for the WSU-CHARIMA model used the concentrations computed at Richland and The Dalles for arsenic-76 and zinc-65. A 10-percent error was applied to the river discharge, and a 20-percent error was applied to the channel roughness. A dispersion coefficient of D=1000 ft/sec was used in the model and for sensitivity analysis; values of D=500 ft/sec and D= 2500 ft/sec were used for testing model sensitivity. In the following discussion and plots, the base case refers to the concentrations computed with the validated set of variables and parameters used in the WSU-CHARIMA model.

Sensitivity of Arsenic-76

For arsenic-76, the sensitivities to a 10-percent error in river discharge at Richland and The Dalles are shown in Figures 35 and 36, respectively. The total range of sensitivity is on the order of 150 pCi/L at Richland for a computed value of about 1300 pCi/L. At The Dalles, where the concentrations are much lower, the range is about 5 pCi/L for computed concentrations of 7 to 10 pCi/L. Another significant trend is that the 10-percent higher discharge at Richland resulted in lower concentrations, while at The Dalles, concentrations were increased. This is due to travel time effects as discussed in previous sections in this report. For the annual high-discharge months, approximately May through July, the error decreases by about one-half of the range.

The effects of a 20-percent error in river channel roughness on arsenic-76 at Richland and The Dalles are shown in Figures 37 and 38, respectively. At Richland, the maximum range is about 100 pCi/L for a computed concentration of 1300 pCi/L and at The Dalles, about 10 pCi/L for a concentration of about 50 pCi/L. The 20-percent higher roughness reduces discharge velocities and lengthens travel time, resulting in reduced concentrations at both locations. The opposite effect occurs for lower channel roughness because of increased velocities.

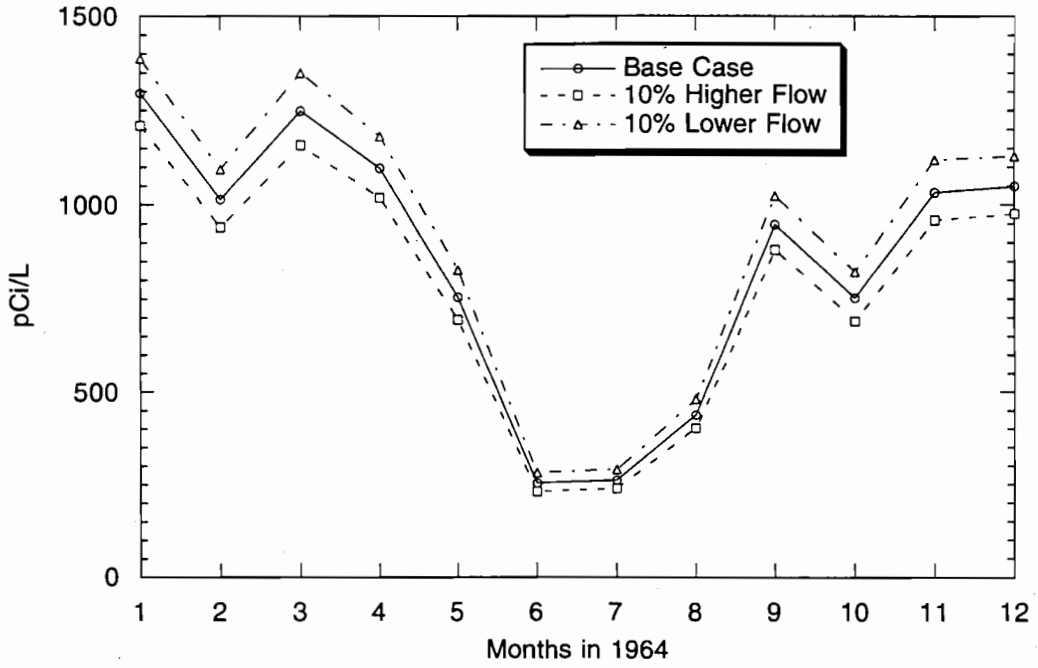

Figure 35. Sensitivity of Arsenic-76 to Changes in River Discharge at Richland, Washington

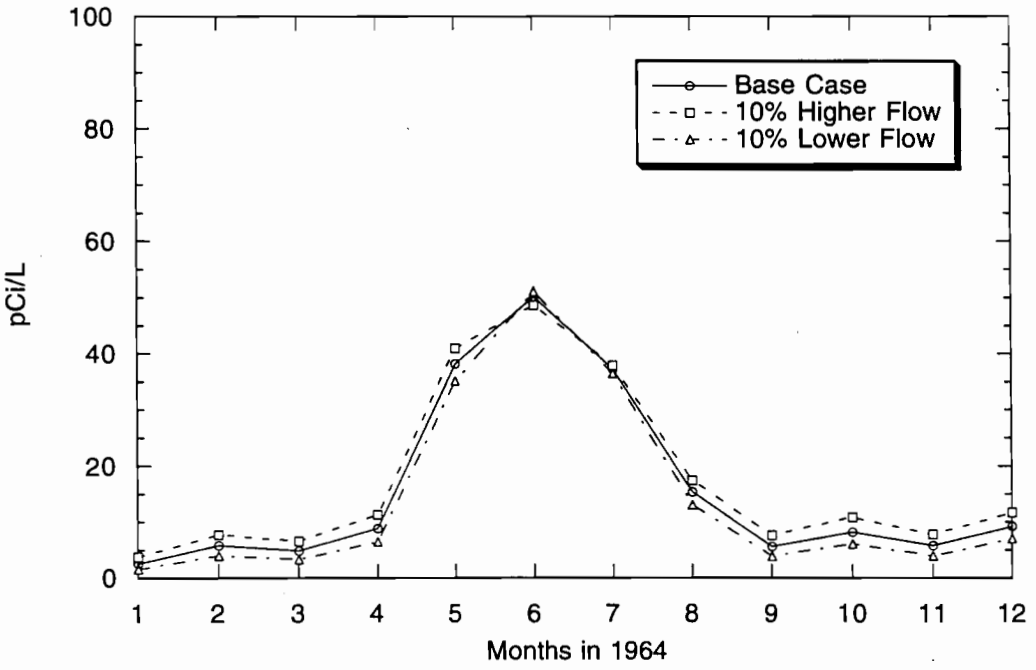

Figure 36. Sensitivity of Arsenic-76 to Changes in River Discharge at The Dalles, Oregon

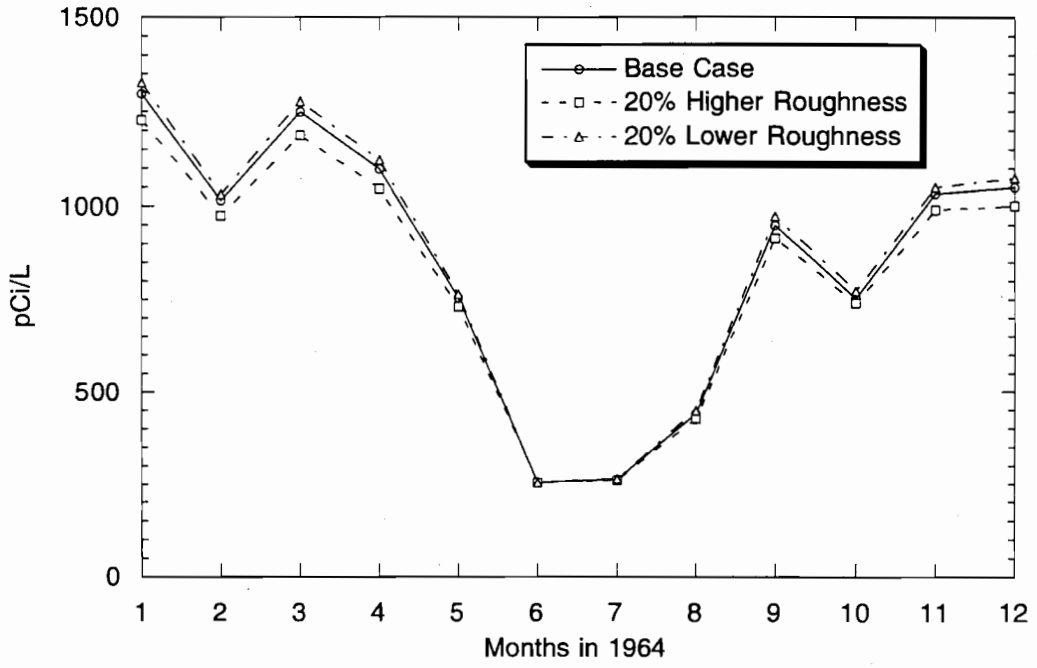

Figure 37. Sensitivity of Arsenic-76 to Changes in Channel Roughness at Richland, Washington

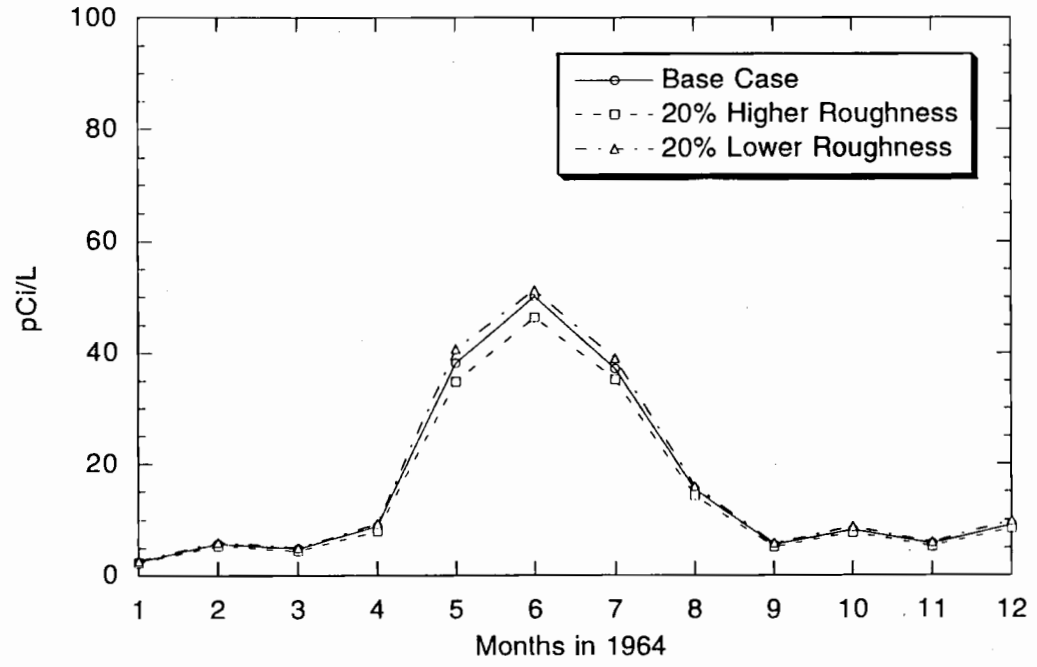

Figure 38. Sensitivity of Arsenic-76 to Changes in Channel Roughness at The Dalles, Oregon

Sensitivity of Zinc-65

The sensitivities of zinc-65 concentrations to a 10-percent error in discharge at Richland and The Dalles are shown in Figures 39 and 40, respectively. At Richland, the maximum error range is about 50 pCi/L for a concentration of 250 pCi/L. For the months of June and July, the error approaches zero. A similar trend occurs for The Dalles, where the maximum error range is about 40 pCi/L for a concentration of 160 pCi/L.

The sensitivity to a 20-percent error in channel roughness for zinc-65 at Richland and The Dalles is shown in Figures 41 and 42, respectively. The results indicate no perceptible change in concentration at both locations. This is because the half-life of zinc-65 is long enough to considerably reduce the travel time effect.

Longitudinal Dispersion

The transport calculations are subject to error in the longitudinal dispersion coefficient, in addition to the error propagated by the hydraulic computations. Because the reactor effluent concentrations did not vary in time when using a monthly average source term, it was expected that the simulations would not be very sensitive to the longitudinal dispersion coefficient. Simulations with coefficients of 500, 1000 (base-case value), and 2500 ft^2/sec were run, with no observed significant differences in the monthly-average concentrations. A typical result for chromium-51 is shown in Figure 43.

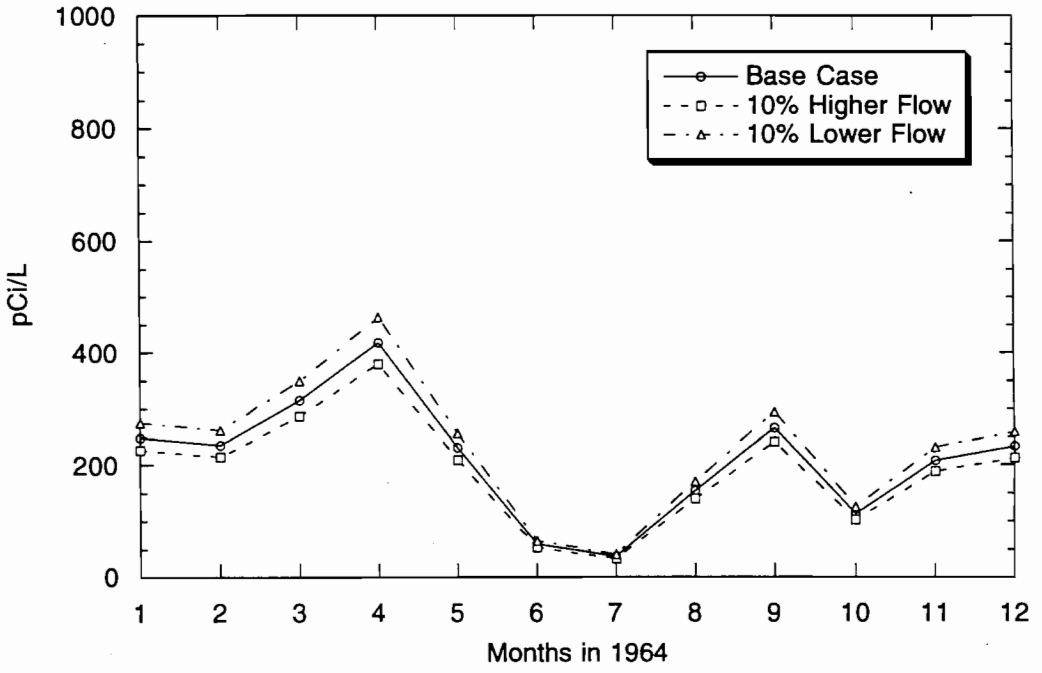

Figure 39. Sensitivity of Zinc-65 to Changes in River Discharge at Richland, Washington

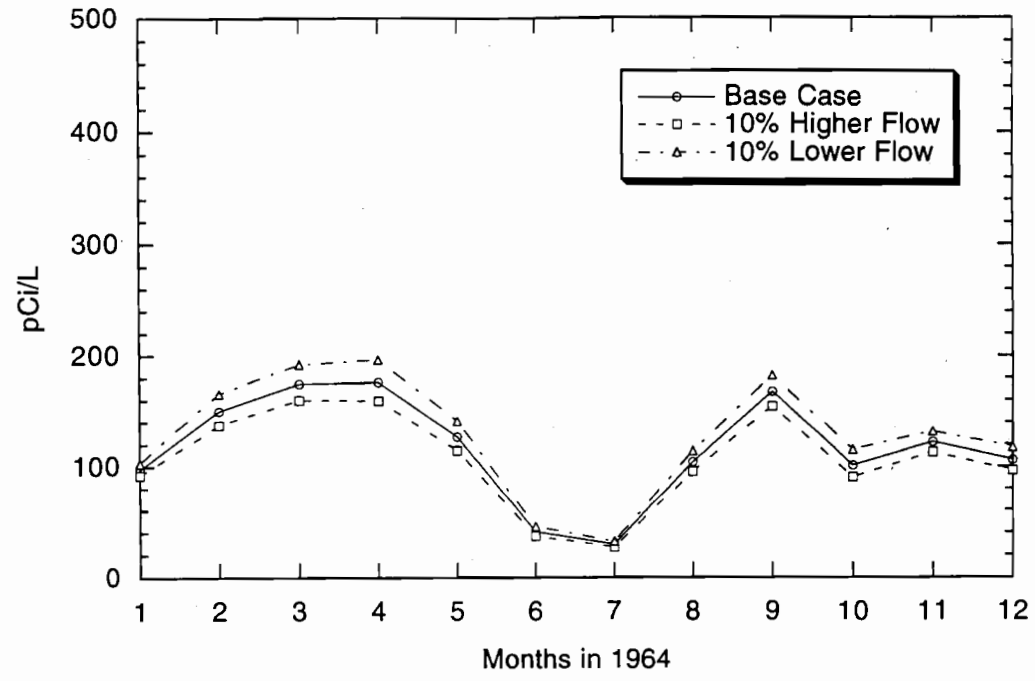

Figure 40. Sensitivity of Zinc-65 to Changes in River Discharge at The Dalles, Oregon

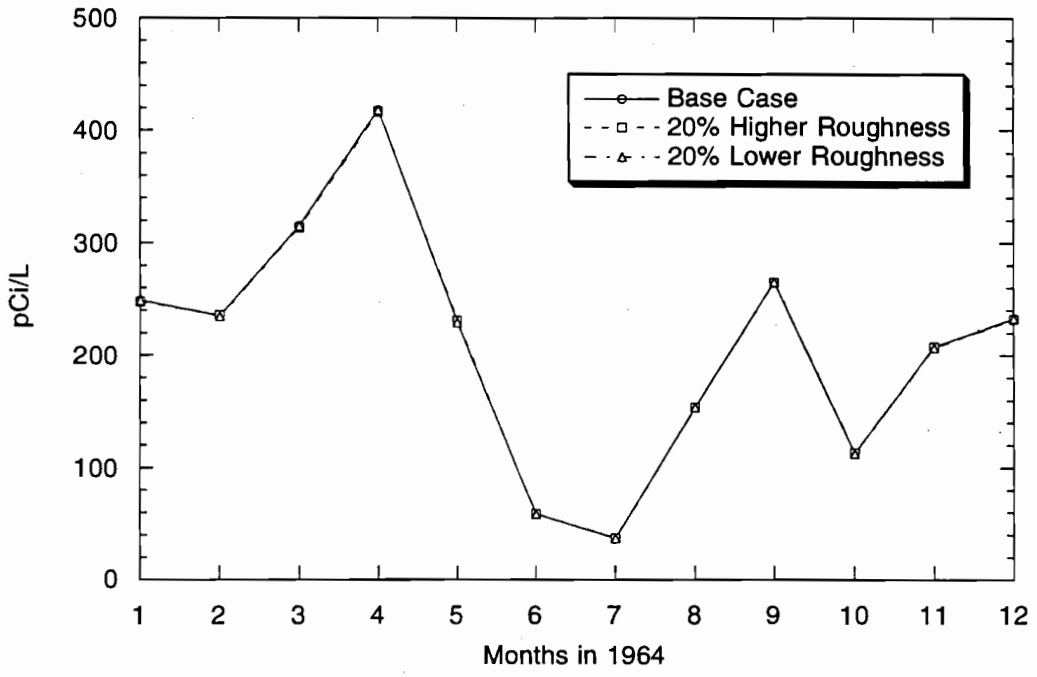

Figure 41. Sensitivity of Zinc-65 to Changes in Channel Roughness at Richland, Washington

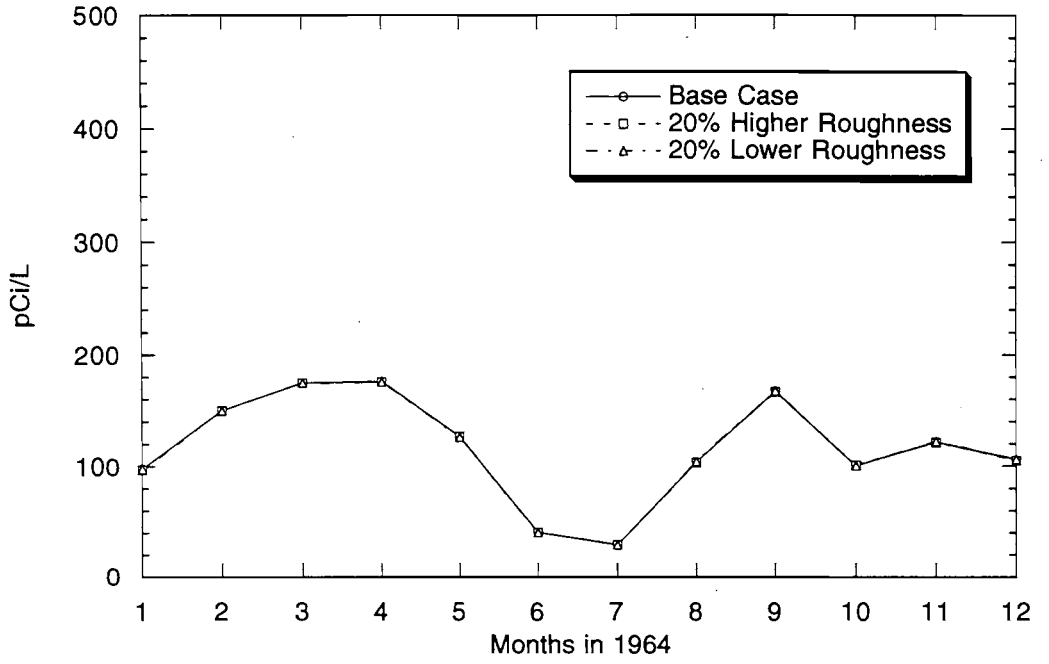

Figure 42. Sensitivity of Zinc-65 to Changes in Channel Roughness at The Dalles, Oregon

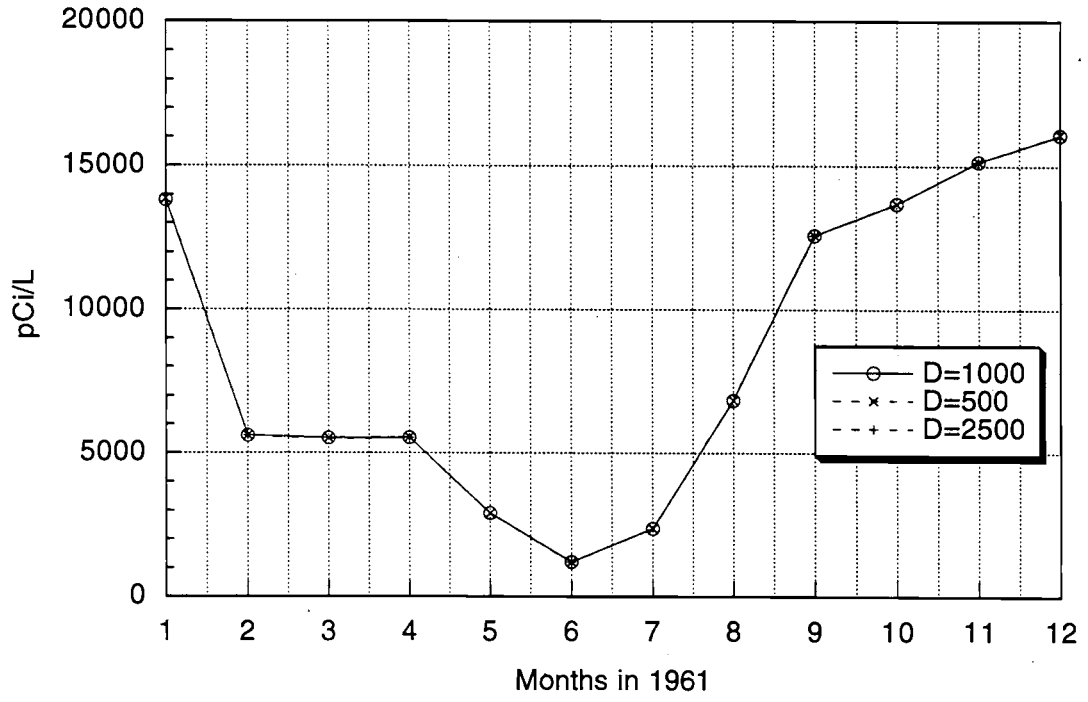

Figure 43. Sensitivity of Chromium-51 to Changes in the Longitudinal Dispersion Coefficient at Pasco, Washington

Model Results

Monthly average water concentrations were computed for sodium-24, arsenic-76, neptunium-239, phosphorus-32, and zinc-65 at 12 locations between the Hanford reactors and the Vancouver-Portland area. The data are provided in the appendix. The locations and their respective river miles are shown in Figure 44. The locations represent specific points where monthly average concentrations were computed. The computed concentrations represent uniform cross-sectional averages under fully mixed conditions in the river for the reactor effluent. An output data file for the 253-month period was prepared and forwarded to the Environmental Pathways and Dose Estimates task staff. The following subsections discuss the overall trends for each radionuclide as they occurred over the 300 miles of river simulations.

Sodium-24

The same general trend of monthly concentrations was apparent for the Hanford Reach locations as is shown for Richland in Figure 45. The maximum monthly concentration occurred in 1960. High annual concentrations, relative to the other years, occurred from late 1959 through 1964, indicating an increase in reactor operating power levels. The annual maximum concentrations tended to occur during the low-flow months, indicating that dilution was the primary control on concentration.

The concentrations in the Hanford Reach from just below the Snake River to Bonneville Dam were significantly affected by the construction of dams, which increased the travel time. The typical effects are shown in Figure 46 for The Dalles location. Before December 1953, when McNary Dam began operations, the higher concentrations occurred during low flow. After 1953, the annual maximum concentrations occurred during periods of high flow, indicating that travel time and decay factors were dominant. Beginning in 1954 and extending through 1970, the higher concentrations at any location occurred during high flows because of faster transport velocities that reduced the amount of radionuclide decay at downstream locations. The start of operations at John Day dam in 1968 and the shutdown of reactors further reduced concentrations to very low levels.

At Portland, the maximum yearly concentrations occurred during high river discharges, reflecting the strong control of travel time and decay (Figure 47). After 1953, concentrations during the months of low flow were near zero.

Arsenic-76

In the Hanford Reach, three peaks of arsenic-76 of approximately 4000 pCi/L occurred in 1957, 1958, and 1961 as shown at Richland (Figure 48), with the higher annual concentrations occurring from late 1956 to early 1961. All other peaks were below 3000 pCi/L for the 21-year period. The lower monthly concentrations occurred during the high-flow months, indicating dilution was the cause.

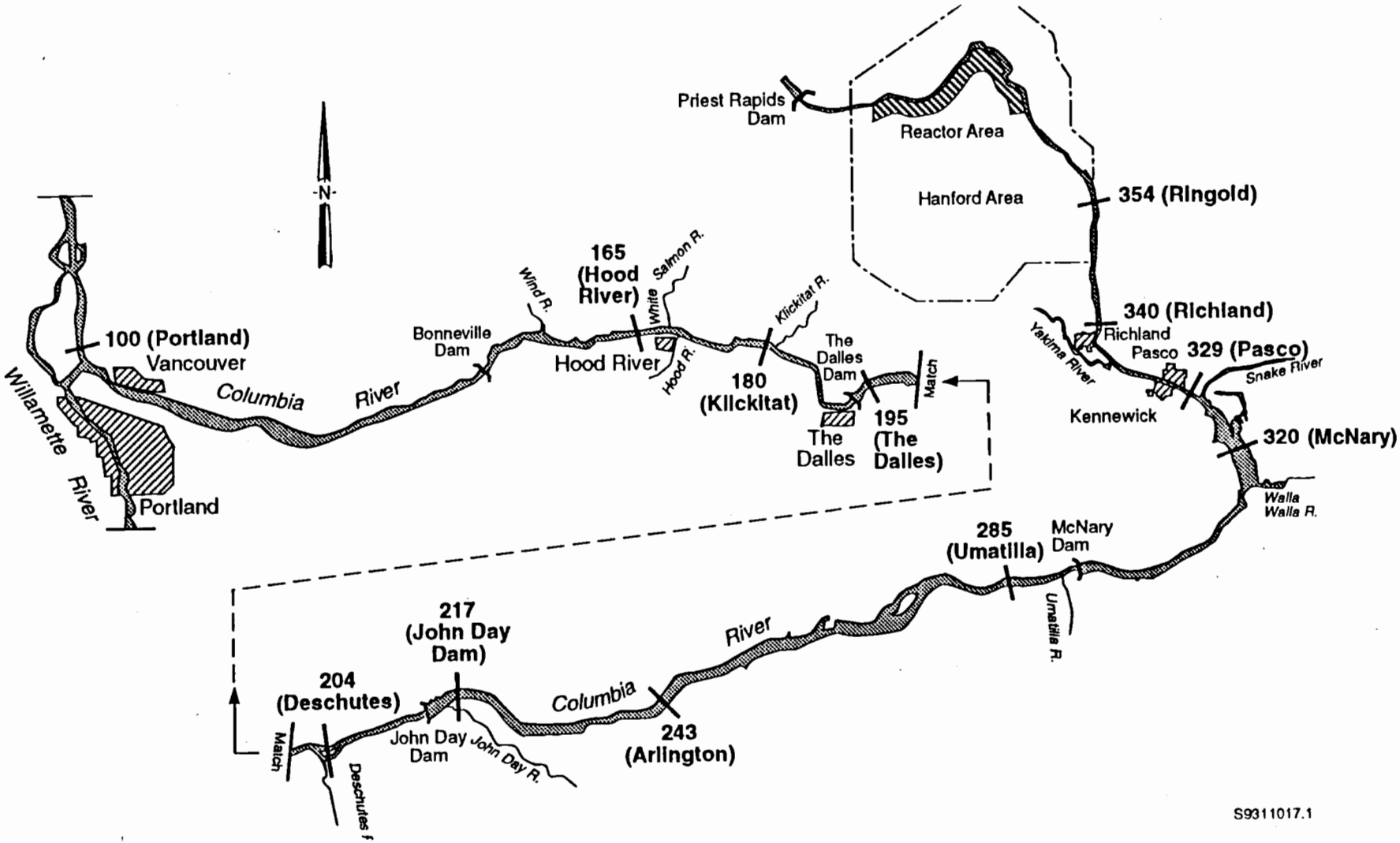

Figure 44. Locations of Computed Water Concentrations for the Columbia River

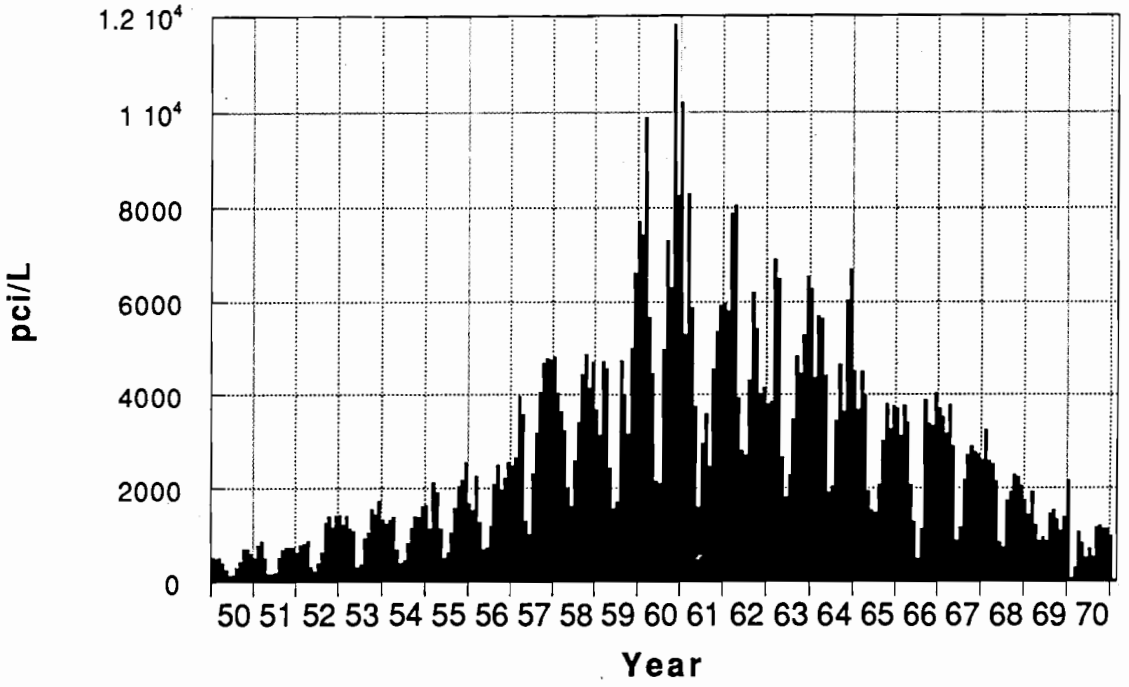

Figure 45. Computed Monthly Average Water Concentrations of Sodium-24 at Richland, Washington

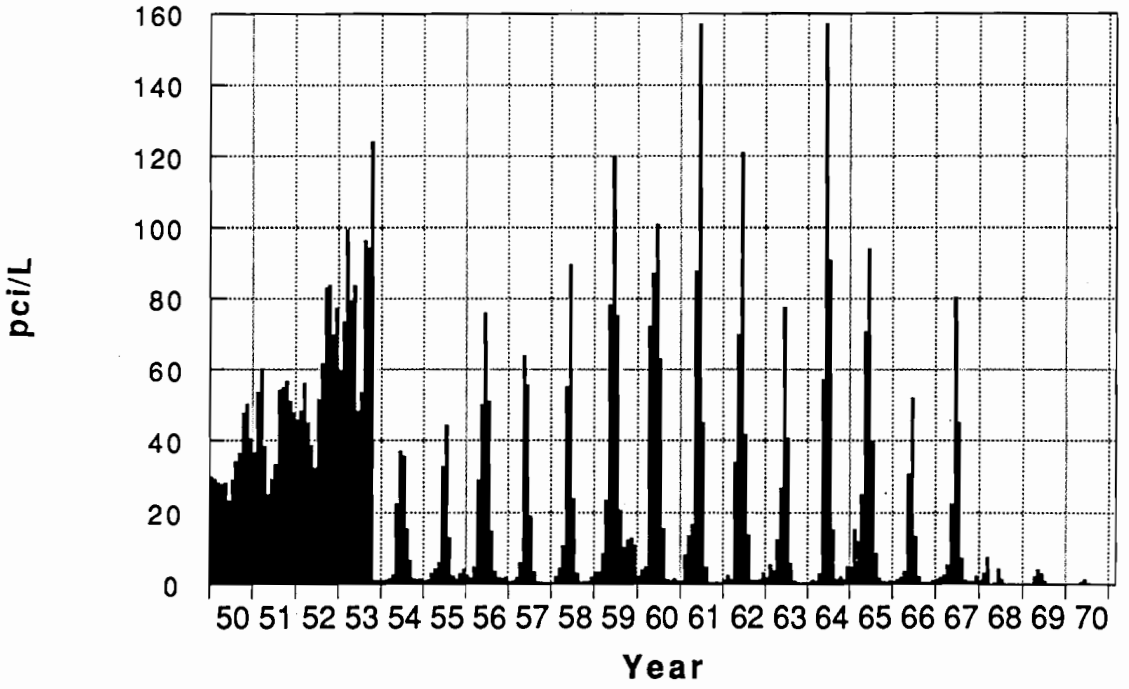

Figure 46. Computed Monthly Average Water Concentrations of Sodium-24 at The Dalles, Oregon

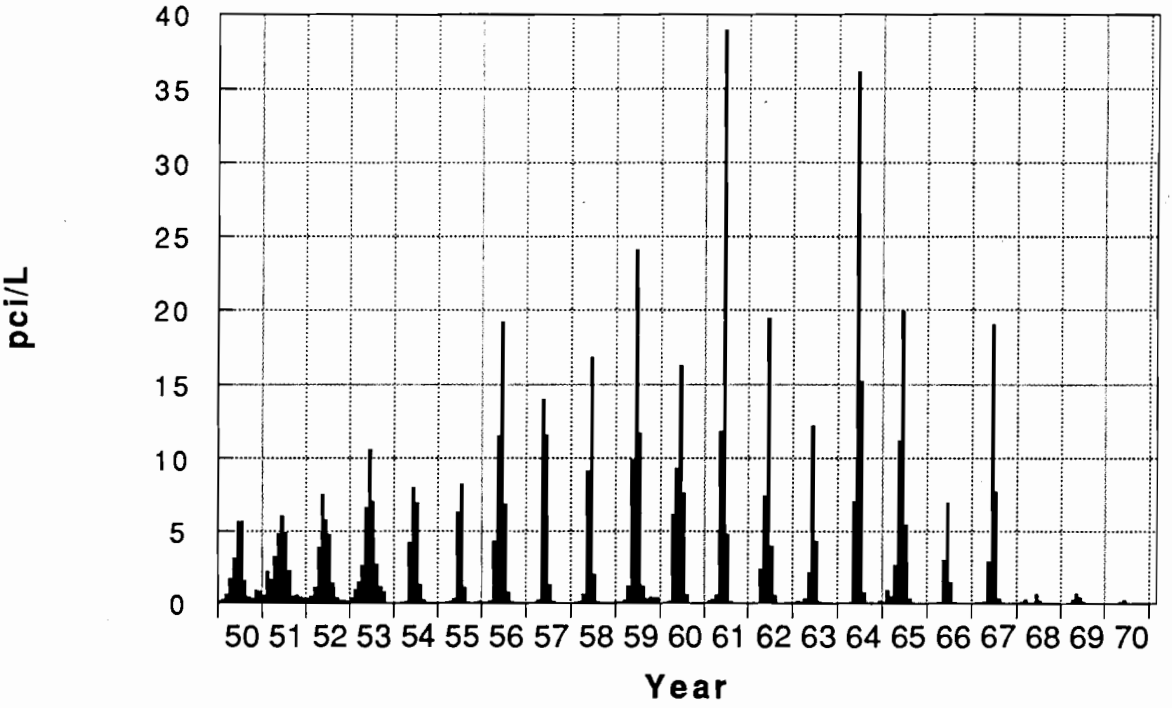

Figure 47. Computed Monthly Average Water Concentrations of Sodium-24 at Portland, Oregon

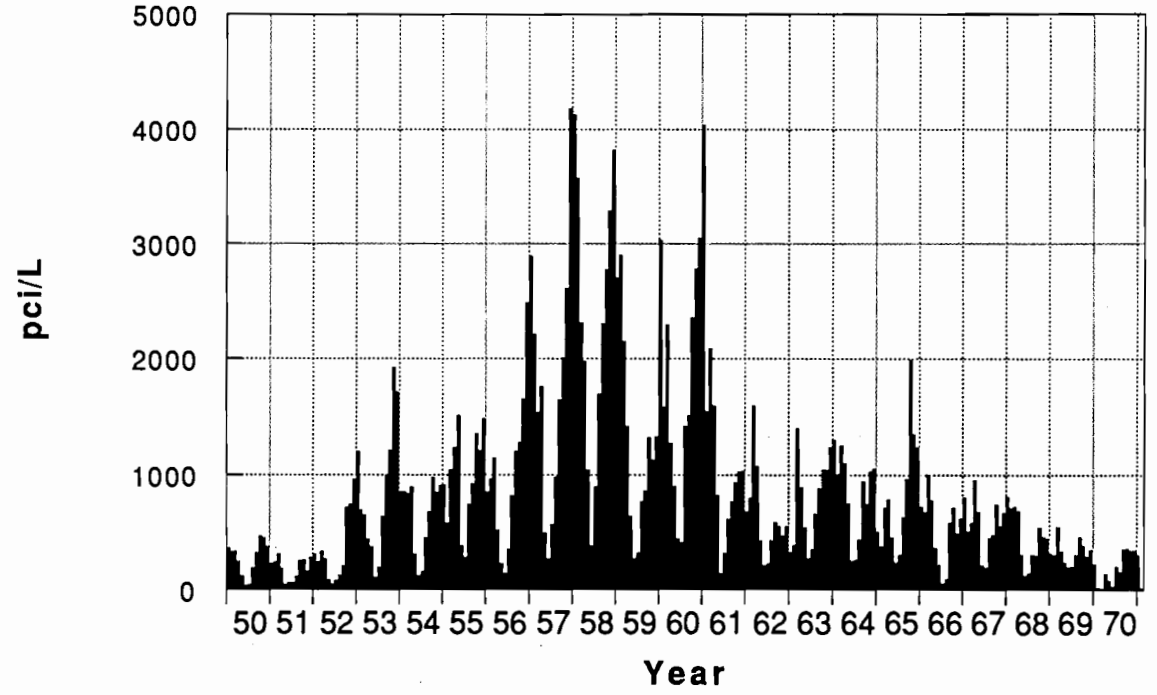

Figure 48. Computed Monthly Average Water Concentrations of Arsenic-76 at Richland, Washington

The highest concentrations for the Snake River to the Bonneville Dam reach occurred during 1953, before McNary Dam began operations, as shown for The Dalles (Figure 49). After 1953, the maximum concentrations for each year were greatly reduced. Also, before McNary Dam was built the higher annual concentrations occurred during the low-flow months, but after the dam was operating they occurred during the high-flow months. Therefore, dilution was dominant up to 1954, and afterward the travel time-decay relationship dominated.

At Portland, the trend was one of maximum annual concentrations that occurred during the high-flow months because of the reduced travel time (Figure 50). After 1953, concentrations during periods of low-flow were very near zero. The maximum concentration for this location occurred in 1958.

Neptunium-239

For the Hanford Reach, the higher annual concentrations occurred during the low-flow period, as shown for Richland in Figure 51. The higher annual concentrations occurred primarily from about 1955 to early 1961, with the maximum occurring in 1957.

For the Snake River to Bonneville Dam reach, the higher concentrations occurred from 1950 to December 1953, before McNary Dam began operations, as shown at The Dalles in Figure 52. At no other time during the 21-year period were the concentrations as high as for those initial 4 years. The maximum values for each year from 1950 to 1953 occur during low flow. After 1953, high concentrations occur in 1957, and from 1957 to 1971 the concentrations gradually decline, with no other significant trends.

At Portland, the high concentration years were 1950 through 1953, with the annual maximum concentrations occurring during low flow (Figure 53). After 1953, the annual concentrations gradually decreased toward 1971, with the yearly maximums occurring during higher flows.

Phosphorus-32

For the Hanford Reach, there were three peak concentration years (1953, 1957, and 1961), with the maximum for the 21-year period in 1961 as shown at Richland (Figure 54). The annual maximum values all occurred during low flow, indicating that dilution controlled the yearly trends for all years. After the maximum in 1961, yearly concentrations dropped sharply in 1962 and gradually decreased as reactor shutdowns began in early 1965.

Essentially the same trend of concentrations occurred for locations at The Dalles and Portland (Figures 55 and 56) as occurred in the Hanford Reach. The only noticeable difference was at the Portland location where the November 1952 peak concentration is unexpectedly high for the early 1950s.

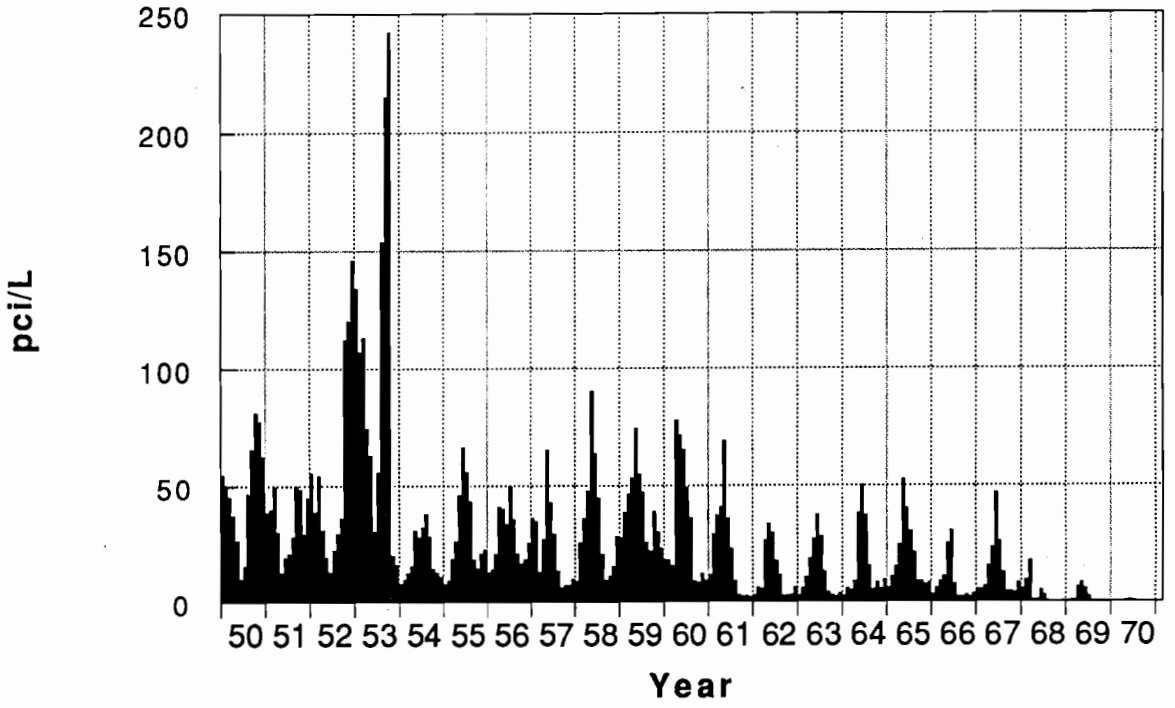

Figure 49. Computed Monthly Average Water Concentrations of Arsenic-76 at The Dalles, Oregon

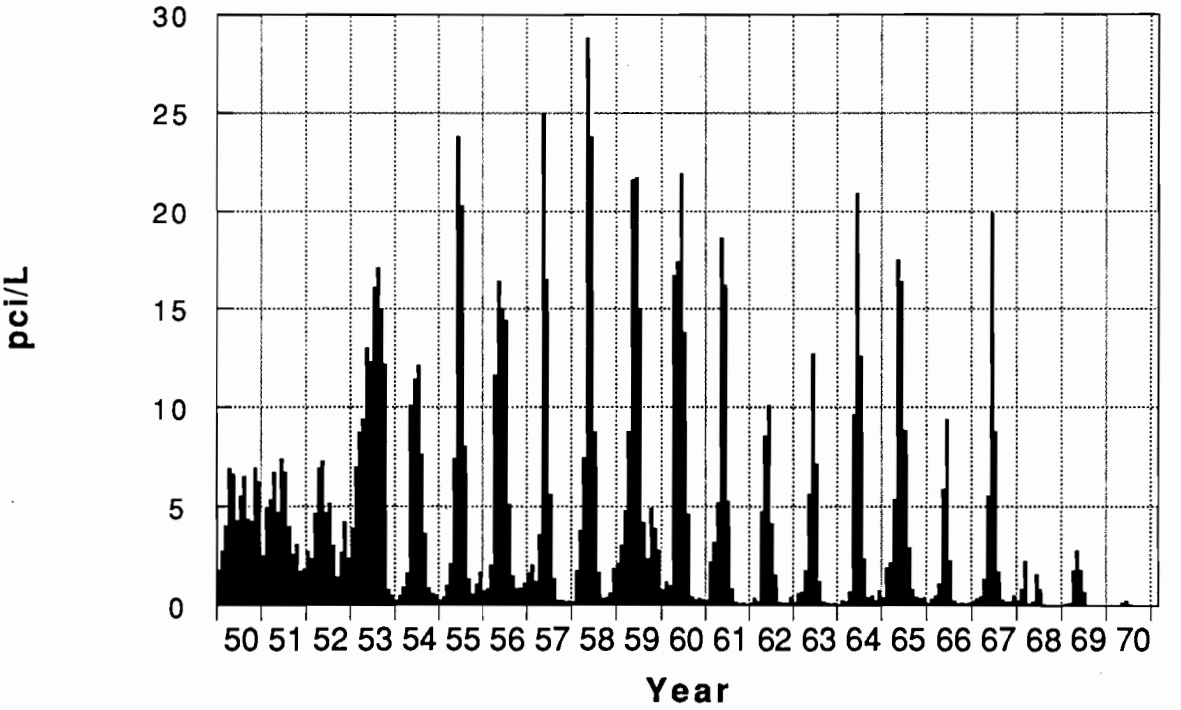

Figure 50. Computed Monthly Average Water Concentrations of Arsenic-76 at Portland, Oregon

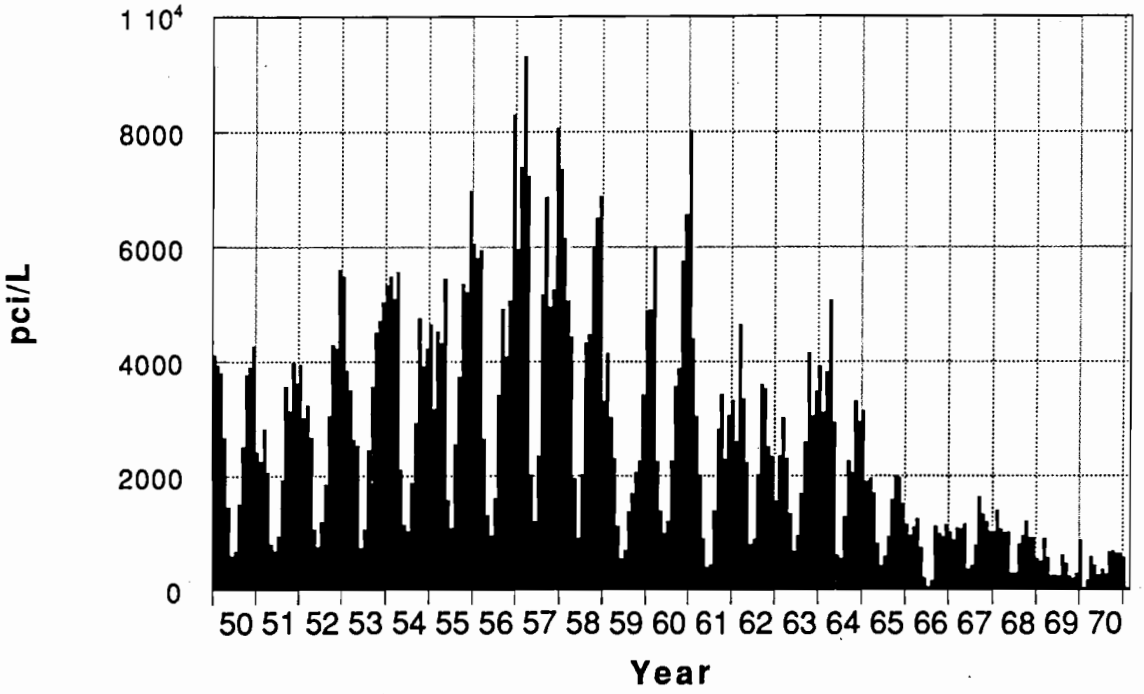

Figure 51. Computed Monthly Average Water Concentrations of Neptunium-239 at Richland, Washington

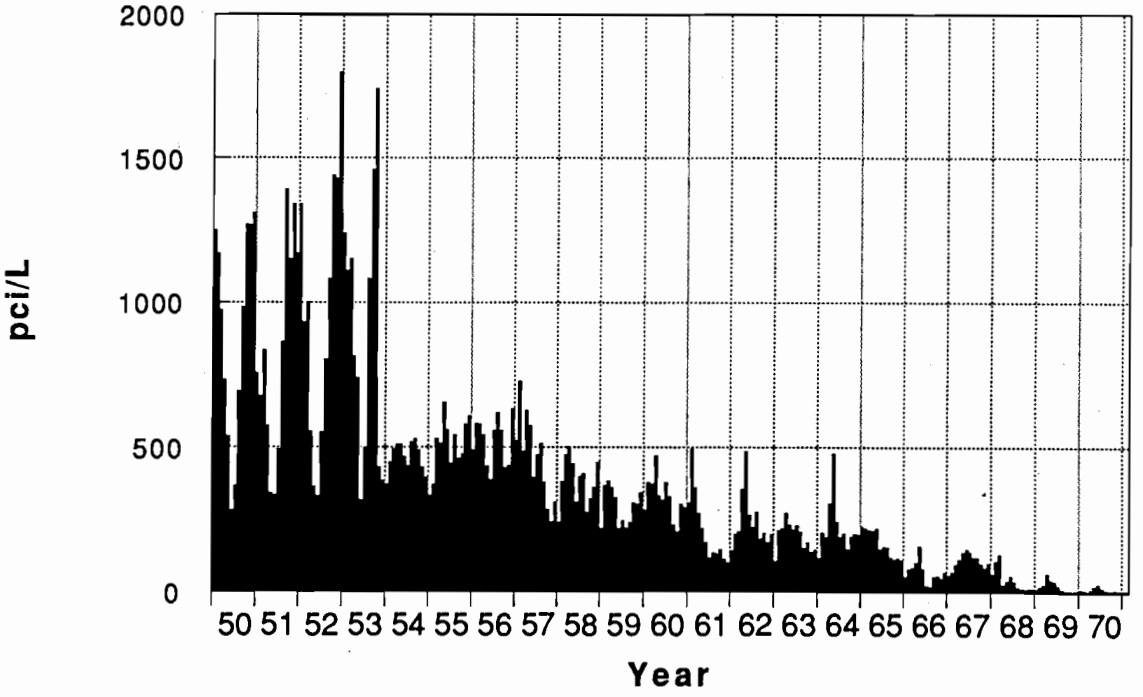

Figure 52. Computed Monthly Average Water Concentrations of Neptunium-239 at The Dalles, Oregon

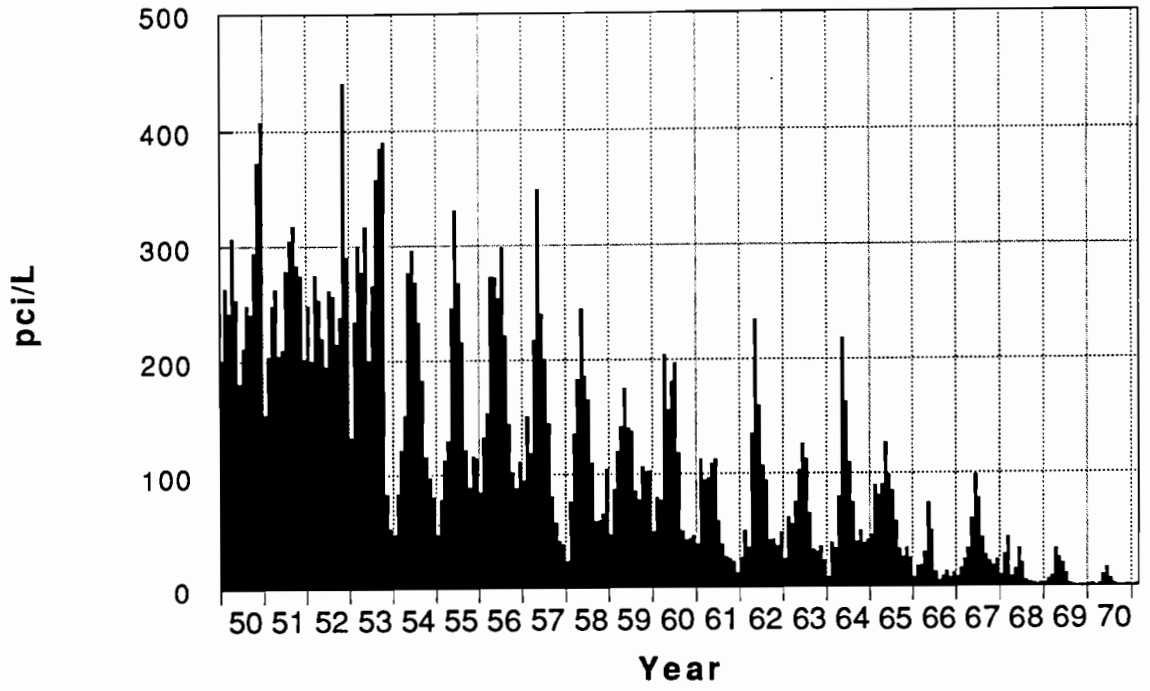

Figure 53. Computed Monthly Average Water Concentrations of Neptunium-239 at Portland, Oregon

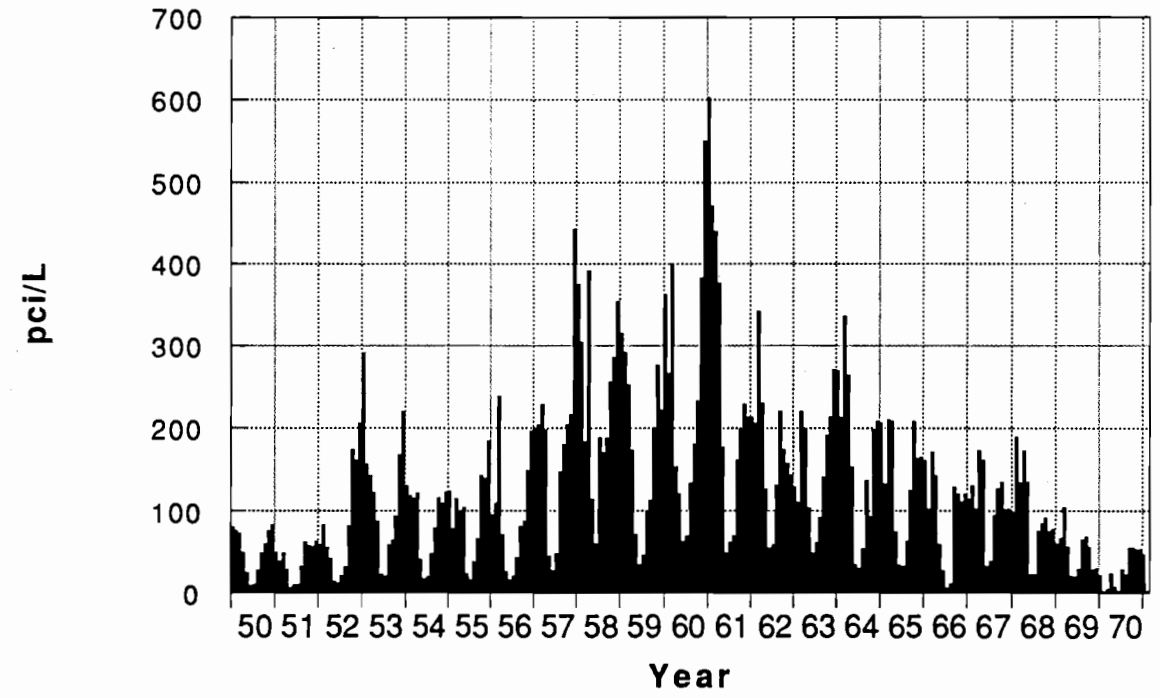

Figure 54. Computed Monthly Average Water Concentrations of Phosphorus-32 at Richland, Washington

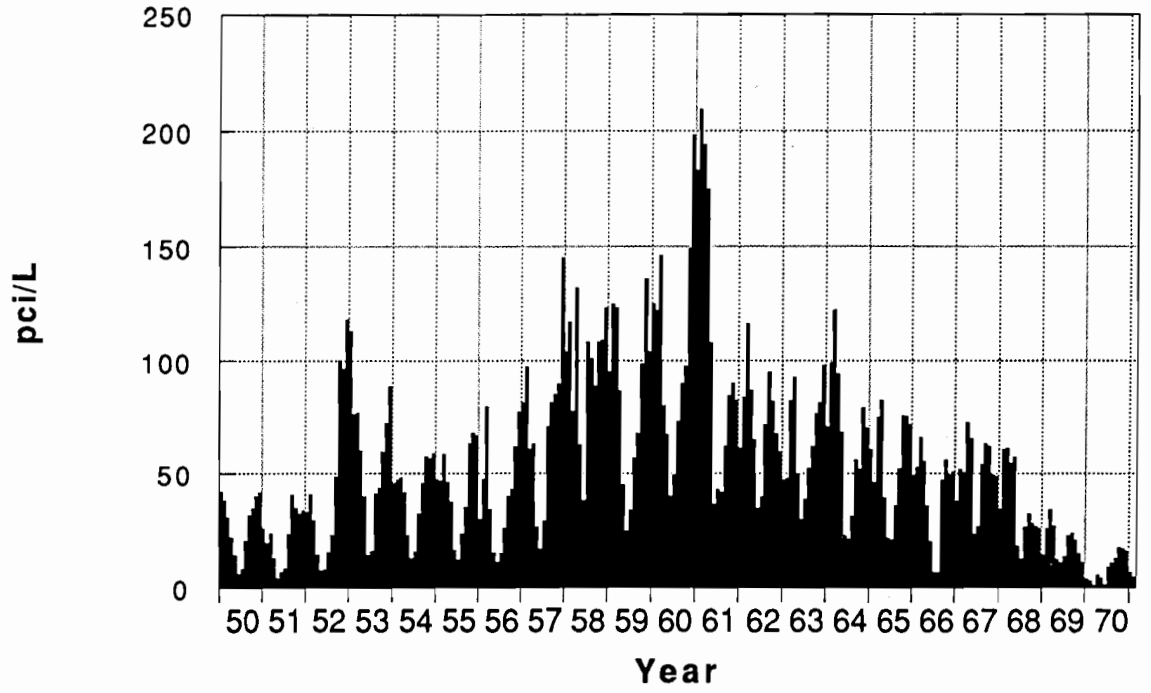

Figure 55. Computed Monthly Average Water Concentrations of Phosphorus-32 at The Dalles, Oregon

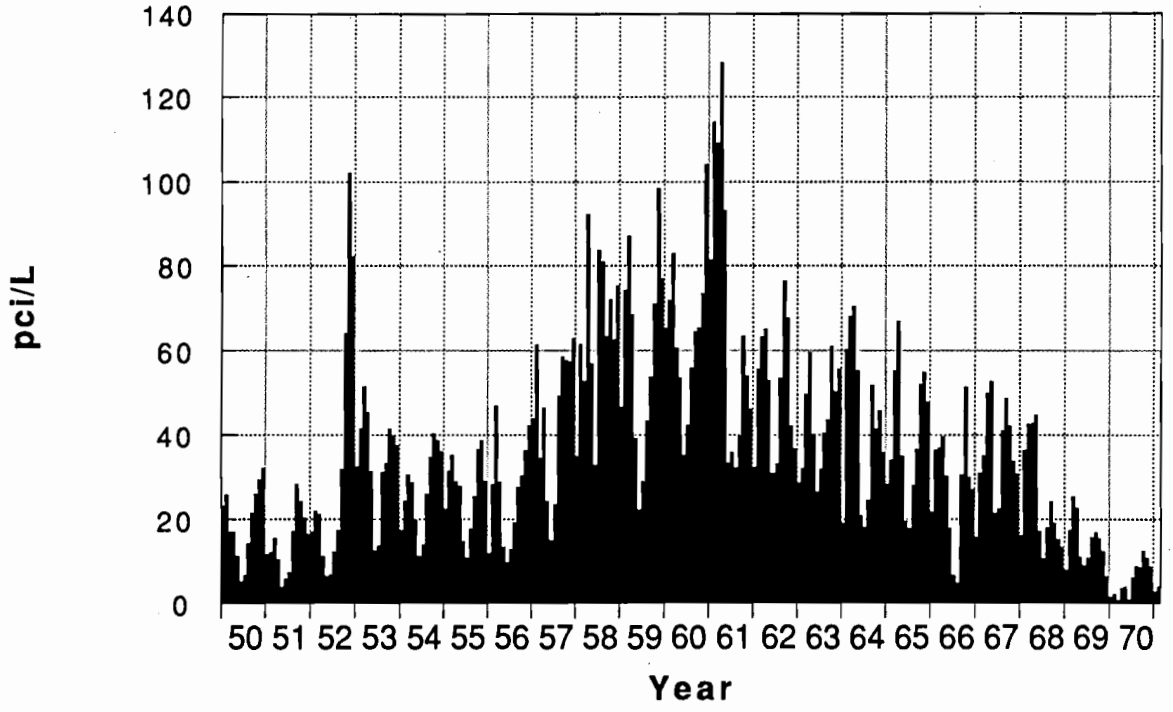

Figure 56. Computed Monthly Average Water Concentrations of Phosphorus-32 at Portland, Oregon

Zinc-65

The results for Richland, The Dalles, and Portland are shown in Figures 57, 58, and 59. The same basic trend occurred at all locations with peaks occurring in 1960, 1961, and 1962. The yearly maximums occurred during low flow because of dilution. The years with the highest concentrations were also 1960 through 1962. After 1962, concentrations dropped sharply to levels similar to those in the early 1950s. The reasons for the sharp drop in concentration after 1962 are not known. An examination of the source term report by Heeb and Bates (1994) may provide some insight.

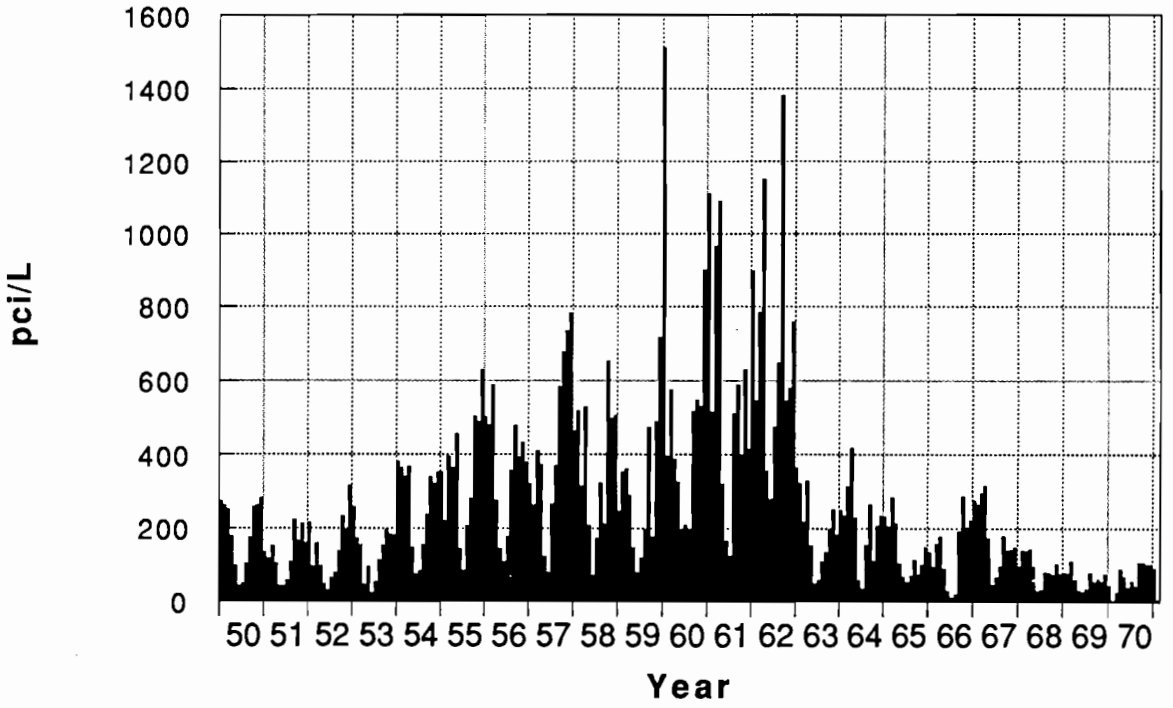

Figure 57. Computed Monthly Average Water Concentrations of Zinc-65 at Richland, Washington

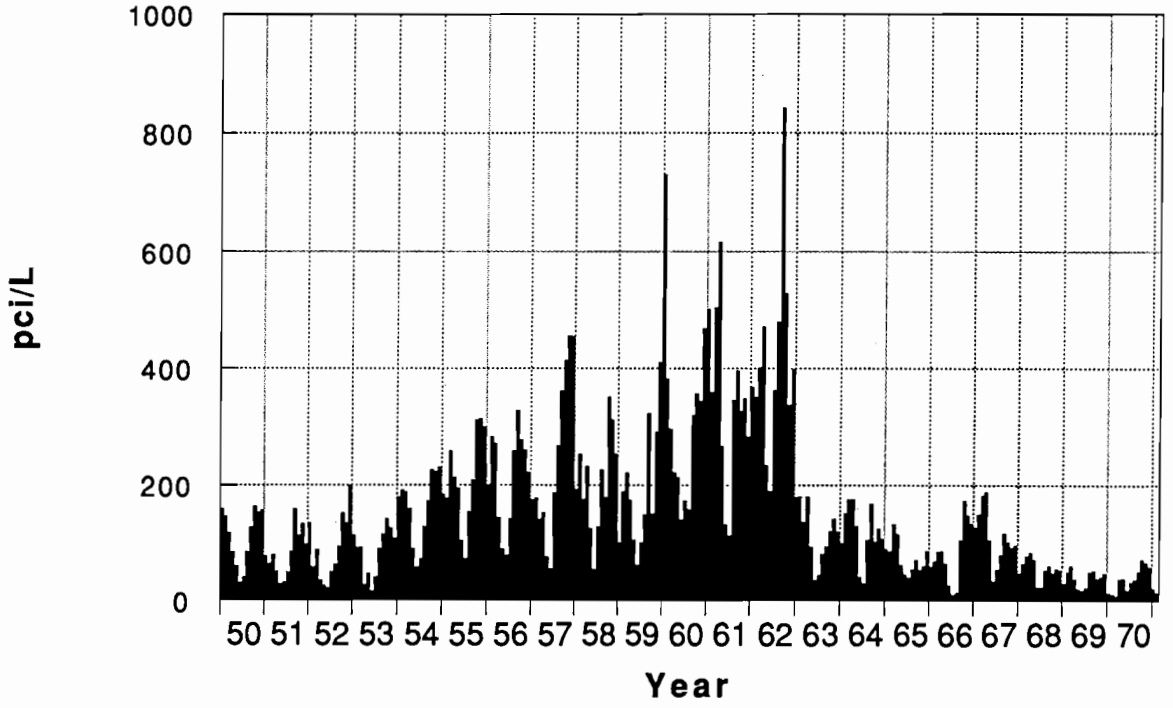

Figure 58. Computed Monthly Average Water Concentrations of Zinc-65 at The Dalles, Oregon

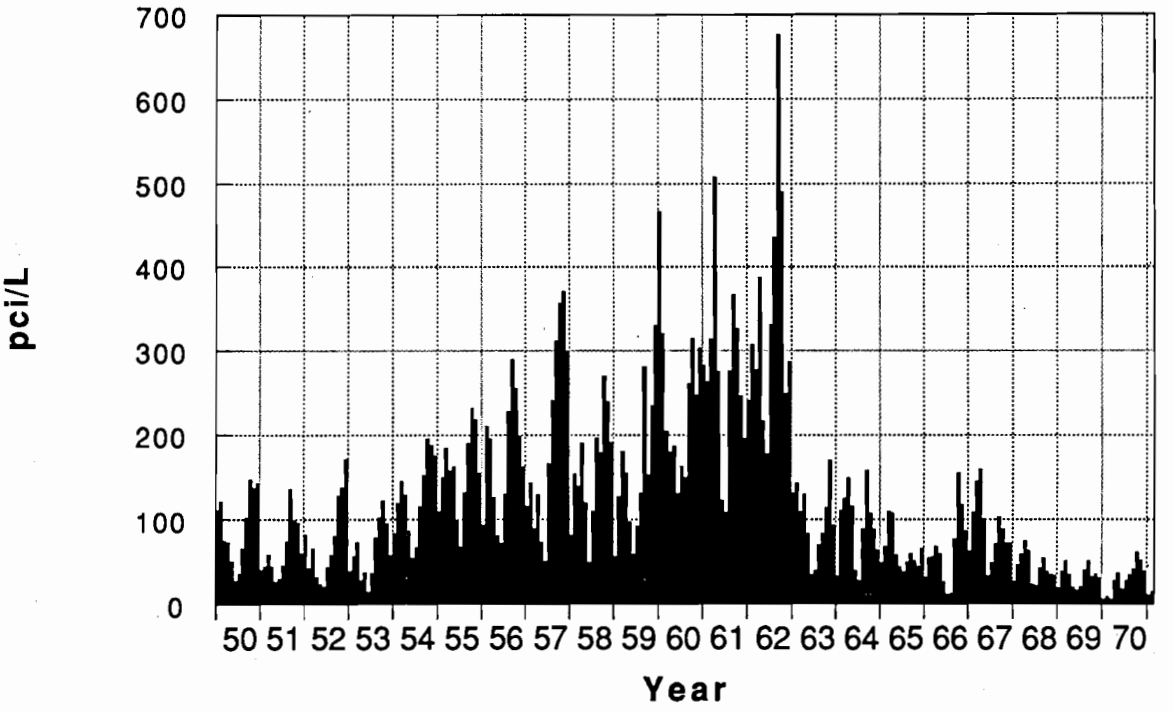

Figure 59. Computed Monthly Average Water Concentrations of Zinc-65 at Portland, Oregon

Conclusions

33 The level of validation attained for the hydraulics of the WSU-CHARIMA model demonstrated that the model is reliable for use in reconstructing water concentrations for the 21-year period from January 1950 to January 1971. Following completion of the initial radionuclide transport computations, it was evident from their comparison to historical monitoring data that the source term developed under the HEDR Project is representative of the monthly average releases. The comparison between computed and measured results *indicates* that reconstructions of water concentrations from Ringold to Bonneville Dam are representative estimates of the actual concentrations. Downstream of Bonneville Dam, at Portland, Oregon, the reconstructed concentrations of zinc-65 are less representative because tidal effects and sedimentation processes were not simulated. The concentrations for the other four radionuclides at Portland are representative for the level of radioactivity.

An evaluation of the results for each radionuclide suggested that each can be identified with one of two groups, based on its transport characteristics in the Columbia River. The first group of radionuclides, sodium-24, arsenic-76, and neptunium-239, have half-lives that vary from 15 hours to 2.33 days and are, therefore, sensitive to downstream travel times. The second group, phosphorus-32 and zinc-65, have half-lives of 14.3 days and 245 days, respectively, which are long enough to greatly reduce the effects of travel time.

Downstream travel times were significantly increased after 1953 when the operation of McNary Dam began. The reduced flow velocities over the length of McNary Reservoir (about 50 miles) increased the travel time and allowed more radioactive decay to occur. These longer travel times significantly reduced the water concentrations of sodium-24, arsenic-76, and neptunium-239 at locations below McNary Dam. Another modification to the water concentrations involved the timing of the higher concentrations for a given year. After McNary Dam began operations, the maximum water concentrations occurred during the spring to summer season with the spring flood. Although dilution increased during the flood, flow velocities could double and greatly reduce the time for decay.

35 The raising of the reservoir behind The Dalles Dam in March 1957 did not have as great an effect on radionuclide depletion as did McNary Dam, probably because of *the* proximity *of The Dalles Dam* to the Bonneville Dam and Reservoir. John Day Dam was brought up to operating level in April 1968, and a reduction in concentrations was evident. However, by 1968 most of the reactors were shut down and concentrations were extremely low below the Hanford Site.

For phosphorus-32 and zinc-65, the effects of the travel time-decay relationship were minimal. When the spring flood occurred, dilution reduced the concentrations at all locations. Because of the 245-day half-life of zinc-65, its concentration was reduced only a small amount downstream of the Snake River and McNary Dam.

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Appendix A

Columbia River Radionuclide Concentrations, January 1950 - January 1971

Appendix A

Columbia River Radionuclide Concentrations, January 1950 - January 1971

This appendix provides the radionuclide concentrations for sodium-24, phosphorus-32, zinc-65, arsenic-76, and neptunium-239 at twelve locations on the Columbia River. The locations are:

Location 1	River mile 354
Location 2	River mile 340
Location 3	River mile 329
Location 4	River mile 320
Location 5	River mile 285
Location 6	River mile 243
Location 7	River mile 217
Location 8	River mile 204
Location 9	River mile 195
Location 10	River mile 180
Location 11	River mile 165
Location 12	River mile 100

The period covered is from January 1950 through January 1971. For each month, a number was assigned for use in the computer code. January 1950 is designated as number 1. February 1950 is number 2. January 1971 is number 253.

These Columbia River water concentrations were predicted by WSU-CHARIMA, a one-dimensional unsteady flow hydraulic-contaminant transport computer model. CHARIMA was obtained from the Iowa Institute of Hydraulic Research at the University of Iowa (Holly et al. 1993). The CHARIMA model was modified to include radionuclide decay in the computations. The resulting model is identified as WSU-CHARIMA.

The radionuclide concentrations provided here have been used to estimate doses that individuals may have received from the Columbia River.

Table A.1. Columbia River Radionuclide Concentrations Computed from WSU-CHARIMA Hydraulic-Contaminant Transport Model (pCi/L)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
Location 1						
1	Jan-50	6.62E+02	8.14E+01	2.76E+02	4.21E+02	4.43E+03
2	Feb-50	6.17E+02	7.69E+01	2.63E+02	3.79E+02	4.20E+03
3	Mar-50	6.21E+02	7.39E+01	2.53E+02	3.80E+02	4.03E+03
4	Apr-50	4.85E+02	5.06E+01	1.77E+02	2.70E+02	2.82E+03
5	May-50	3.14E+02	2.54E+01	9.87E+01	1.32E+02	1.51E+03
6	Jun-50	1.56E+02	9.19E+00	4.44E+01	3.43E+01	6.31E+02
7	Jul-50	1.81E+02	1.07E+01	5.02E+01	4.95E+01	7.16E+02
8	Aug-50	3.50E+02	2.82E+01	1.04E+02	2.05E+02	1.58E+03
9	Sep-50	5.19E+02	4.95E+01	1.76E+02	3.60E+02	2.65E+03
10	Oct-50	8.63E+02	6.07E+01	2.59E+02	5.35E+02	4.01E+03
11	Nov-50	8.51E+02	7.66E+01	2.63E+02	5.14E+02	4.14E+03
12	Dec-50	7.32E+02	8.36E+01	2.83E+02	4.28E+02	4.51E+03
13	Jan-51	6.13E+02	5.08E+01	1.37E+02	2.58E+02	2.56E+03
14	Feb-51	9.30E+02	3.95E+01	1.19E+02	2.74E+02	2.37E+03
15	Mar-51	1.03E+03	4.93E+01	1.51E+02	3.45E+02	2.98E+03
16	Apr-51	6.01E+02	2.87E+01	1.06E+02	2.05E+02	2.15E+03
17	May-51	2.02E+02	6.60E+00	4.41E+01	4.94E+01	8.37E+02
18	Jun-51	2.01E+02	9.81E+00	4.32E+01	6.78E+01	7.21E+02
19	Jul-51	2.34E+02	1.06E+01	5.79E+01	6.94E+01	9.76E+02
20	Aug-51	6.02E+02	3.29E+01	1.08E+02	1.26E+02	2.04E+03
21	Sep-51	8.17E+02	6.31E+01	2.24E+02	2.82E+02	3.78E+03
22	Oct-51	8.86E+02	5.83E+01	1.66E+02	2.90E+02	3.32E+03
23	Nov-51	8.97E+02	5.72E+01	2.13E+02	1.82E+02	4.23E+03
24	Dec-51	9.02E+02	6.33E+01	1.59E+02	3.19E+02	3.85E+03
25	Jan-52	7.62E+02	5.99E+01	2.16E+02	3.52E+02	4.20E+03
26	Feb-52	9.56E+02	8.36E+01	9.61E+01	2.78E+02	3.20E+03
27	Mar-52	9.84E+02	5.64E+01	1.59E+02	3.74E+02	3.42E+03
28	Apr-52	1.04E+03	4.34E+01	9.78E+01	2.95E+02	2.82E+03
29	May-52	3.84E+02	1.46E+01	4.91E+01	9.61E+01	1.09E+03
30	Jun-52	2.76E+02	1.26E+01	3.21E+01	5.25E+01	7.99E+02
31	Jul-52	4.72E+02	2.16E+01	6.46E+01	9.02E+01	1.24E+03
32	Aug-52	7.37E+02	3.23E+01	7.98E+01	1.40E+02	1.94E+03
33	Sep-52	1.56E+03	8.27E+01	1.38E+02	2.33E+02	3.25E+03
34	Oct-52	1.76E+03	1.76E+02	2.33E+02	8.27E+02	4.58E+03
35	Nov-52	1.46E+03	1.64E+02	1.98E+02	8.55E+02	4.52E+03
36	Dec-52	1.79E+03	2.08E+02	3.17E+02	1.11E+03	6.00E+03
37	Jan-53	1.83E+03	2.96E+02	2.60E+02	1.40E+03	5.93E+03
38	Feb-53	1.49E+03	1.57E+02	1.72E+02	7.88E+02	4.07E+03
39	Mar-53	1.70E+03	1.44E+02	1.54E+02	7.33E+02	3.69E+03
40	Apr-53	1.36E+03	1.23E+02	4.58E+01	4.98E+02	2.78E+03
41	May-53	1.28E+03	8.78E+01	9.44E+01	4.16E+02	2.65E+03
42	Jun-53	3.69E+02	2.32E+01	2.38E+01	1.20E+02	7.70E+02
43	Jul-53	4.44E+02	2.19E+01	5.31E+01	2.18E+02	1.09E+03
44	Aug-53	1.09E+03	5.93E+01	1.14E+02	7.13E+02	2.58E+03
45	Sep-53	1.24E+03	6.48E+01	1.54E+02	1.11E+03	3.75E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
46	Oct-53	1.91E+03	9.43E+01	1.96E+02	1.36E+03	4.77E+03
47	Nov-53	2.04E+03	1.72E+02	1.84E+02	2.35E+03	5.18E+03
48	Dec-53	2.47E+03	2.23E+02	1.82E+02	2.09E+03	5.56E+03
49	Jan-54	1.87E+03	1.35E+02	3.86E+02	1.06E+03	5.93E+03
50	Feb-54	1.76E+03	1.20E+02	3.65E+02	1.05E+03	6.06E+03
51	Mar-54	1.82E+03	1.17E+02	3.42E+02	1.02E+03	5.58E+03
52	Apr-54	1.94E+03	1.24E+02	3.68E+02	1.09E+03	6.12E+03
53	May-54	8.43E+02	4.10E+01	1.46E+02	3.53E+02	2.22E+03
54	Jun-54	4.88E+02	1.83E+01	7.72E+01	1.39E+02	1.18E+03
55	Jul-54	5.48E+02	2.12E+01	8.61E+01	1.75E+02	1.06E+03
56	Aug-54	1.03E+03	4.87E+01	1.56E+02	5.18E+02	2.00E+03
57	Sep-54	1.46E+03	8.04E+01	2.38E+02	7.92E+02	3.16E+03
58	Oct-54	1.92E+03	1.18E+02	3.40E+02	1.17E+03	5.20E+03
59	Nov-54	1.89E+03	1.11E+02	3.21E+02	1.02E+03	4.28E+03
60	Dec-54	2.24E+03	1.25E+02	3.53E+02	1.10E+03	4.63E+03
61	Jan-55	2.33E+03	1.28E+02	3.58E+02	1.13E+03	5.18E+03
62	Feb-55	1.51E+03	7.94E+01	2.20E+02	6.92E+02	3.43E+03
63	Mar-55	2.82E+03	1.17E+02	3.97E+02	1.23E+03	4.89E+03
64	Apr-55	2.55E+03	1.01E+02	3.66E+02	1.46E+03	4.68E+03
65	May-55	1.48E+03	1.05E+02	4.55E+02	1.78E+03	5.89E+03
66	Jun-55	6.14E+02	2.42E+01	1.45E+02	4.26E+02	1.65E+03
67	Jul-55	7.48E+02	1.69E+01	8.67E+01	3.13E+02	1.12E+03
68	Aug-55	1.32E+03	3.84E+01	2.07E+02	8.64E+02	2.74E+03
69	Sep-55	2.09E+03	6.72E+01	2.82E+02	1.09E+03	4.05E+03
70	Oct-55	2.86E+03	1.46E+02	5.05E+02	1.64E+03	5.90E+03
71	Nov-55	2.94E+03	1.42E+02	4.91E+02	1.44E+03	5.68E+03
72	Dec-55	3.56E+03	1.87E+02	6.26E+02	1.79E+03	7.64E+03
73	Jan-56	2.35E+03	9.80E+01	5.06E+02	1.05E+03	6.68E+03
74	Feb-56	2.13E+03	1.12E+02	4.79E+02	1.17E+03	6.34E+03
75	Mar-56	3.16E+03	2.43E+02	5.87E+02	1.38E+03	6.51E+03
76	Apr-56	1.61E+03	7.21E+01	2.76E+02	5.98E+02	2.83E+03
77	May-56	8.26E+02	2.71E+01	1.46E+02	2.54E+02	1.37E+03
78	Jun-56	8.60E+02	1.69E+01	1.10E+02	1.58E+02	9.85E+02
79	Jul-56	1.41E+03	2.13E+01	1.78E+02	3.96E+02	1.70E+03
80	Aug-56	2.72E+03	4.43E+01	3.59E+02	9.59E+02	3.67E+03
81	Sep-56	3.37E+03	8.27E+01	4.78E+02	1.44E+03	5.35E+03
82	Oct-56	2.73E+03	8.88E+01	3.92E+02	1.54E+03	4.47E+03
83	Nov-56	3.10E+03	1.52E+02	4.33E+02	2.01E+03	5.57E+03
84	Dec-56	3.59E+03	2.00E+02	3.80E+02	3.04E+03	9.18E+03
85	Jan-57	3.42E+03	2.05E+02	3.27E+02	3.50E+03	6.57E+03
86	Feb-57	3.69E+03	2.08E+02	2.66E+02	2.67E+03	8.13E+03
87	Mar-57	5.76E+03	2.32E+02	4.11E+02	1.89E+03	1.03E+04
88	Apr-57	4.87E+03	2.01E+02	3.72E+02	2.11E+03	7.86E+03
89	May-57	1.56E+03	4.55E+01	1.23E+02	5.53E+02	2.12E+03
90	Jun-57	1.20E+03	2.84E+01	8.07E+01	3.03E+02	1.25E+03
91	Jul-57	2.97E+03	4.87E+01	2.67E+02	6.60E+02	2.51E+03
92	Aug-57	4.18E+03	1.50E+02	3.71E+02	1.15E+03	5.59E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
93	Sep-57	5.75E+03	1.84E+02	5.85E+02	2.02E+03	7.57E+03
94	Oct-57	6.65E+03	2.07E+02	6.74E+02	2.47E+03	5.43E+03
95	Nov-57	6.83E+03	2.20E+02	7.33E+02	3.22E+03	5.81E+03
96	Dec-57	6.88E+03	4.54E+02	7.83E+02	5.21E+03	8.98E+03
97	Jan-58	7.03E+03	3.87E+02	4.72E+02	5.17E+03	8.25E+03
98	Feb-58	5.69E+03	3.07E+02	5.16E+02	4.35E+03	6.74E+03
99	Mar-58	4.87E+03	1.86E+02	3.17E+02	2.74E+03	5.51E+03
100	Apr-58	4.29E+03	3.97E+02	5.29E+02	2.33E+03	4.77E+03
101	May-58	2.53E+03	1.15E+02	2.07E+02	1.18E+03	2.08E+03
102	Jun-58	1.94E+03	6.15E+01	7.32E+01	4.30E+02	9.43E+02
103	Jul-58	3.31E+03	1.91E+02	1.74E+02	1.04E+03	2.17E+03
104	Aug-58	4.50E+03	1.73E+02	3.24E+02	1.99E+03	4.68E+03
105	Sep-58	6.24E+03	1.91E+02	2.11E+02	2.81E+03	4.90E+03
106	Oct-58	6.87E+03	2.60E+02	6.54E+02	3.39E+03	6.62E+03
107	Nov-58	5.91E+03	2.89E+02	4.96E+02	4.04E+03	7.18E+03
108	Dec-58	6.61E+03	3.60E+02	5.04E+02	4.66E+03	7.55E+03
109	Jan-59	5.08E+03	3.22E+02	2.50E+02	3.28E+03	3.64E+03
110	Feb-59	4.20E+03	2.96E+02	3.55E+02	3.43E+03	4.50E+03
111	Mar-59	6.20E+03	2.56E+02	3.63E+02	2.51E+03	3.26E+03
112	Apr-59	5.94E+03	1.74E+02	2.90E+02	1.65E+03	2.46E+03
113	May-59	2.92E+03	7.20E+01	1.48E+02	7.14E+02	1.16E+03
114	Jun-59	1.88E+03	3.55E+01	8.04E+01	3.00E+02	5.82E+02
115	Jul-59	2.05E+03	4.75E+01	1.22E+02	3.57E+02	7.29E+02
116	Aug-59	6.15E+03	1.01E+02	1.99E+02	8.95E+02	1.48E+03
117	Sep-59	5.20E+03	1.15E+02	4.73E+02	1.00E+03	1.82E+03
118	Oct-59	4.12E+03	2.03E+02	1.76E+02	1.54E+03	2.22E+03
119	Nov-59	6.54E+03	2.80E+02	4.89E+02	1.32E+03	2.44E+03
120	Dec-59	8.82E+03	2.26E+02	7.20E+02	1.57E+03	3.72E+03
121	Jan-60	1.06E+04	3.71E+02	1.53E+03	3.67E+03	5.38E+03
122	Feb-60	1.02E+04	2.70E+02	3.92E+02	1.90E+03	5.38E+03
123	Mar-60	1.39E+04	4.05E+02	5.73E+02	2.80E+03	6.57E+03
124	Apr-60	7.25E+03	1.55E+02	3.91E+02	1.46E+03	2.42E+03
125	May-60	5.57E+03	1.22E+02	3.26E+02	1.03E+03	1.46E+03
126	Jun-60	2.58E+03	6.38E+01	1.97E+02	4.98E+02	1.04E+03
127	Jul-60	2.56E+03	7.05E+01	2.10E+02	4.68E+02	1.26E+03
128	Aug-60	6.54E+03	1.37E+02	2.00E+02	1.67E+03	2.44E+03
129	Sep-60	1.00E+04	1.83E+02	5.17E+02	1.82E+03	3.90E+03
130	Oct-60	8.87E+03	2.36E+02	5.45E+02	2.88E+03	4.26E+03
131	Nov-60	1.66E+04	3.89E+02	5.29E+02	3.40E+03	6.33E+03
132	Dec-60	1.18E+04	5.61E+02	9.01E+02	3.78E+03	7.27E+03
133	Jan-61	1.48E+04	6.19E+02	1.13E+03	5.05E+03	8.98E+03
134	Feb-61	6.95E+03	4.77E+02	5.10E+02	1.80E+03	4.72E+03
135	Mar-61	1.09E+04	4.46E+02	9.70E+02	2.45E+03	3.28E+03
136	Apr-61	7.64E+03	3.80E+02	1.09E+03	1.85E+03	2.16E+03
137	May-61	4.68E+03	1.77E+02	3.16E+02	9.33E+02	9.33E+02
138	Jun-61	1.90E+03	5.01E+01	1.67E+02	1.57E+02	4.19E+02
139	Jul-61	3.71E+03	6.27E+01	1.27E+02	3.63E+02	4.75E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
140	Aug-61	4.71E+03	7.05E+01	5.12E+02	7.21E+02	1.50E+03
141	Sep-61	3.47E+03	1.65E+02	5.90E+02	9.43E+02	3.12E+03
142	Oct-61	6.51E+03	2.02E+02	3.97E+02	1.15E+03	3.77E+03
143	Nov-61	7.69E+03	2.33E+02	6.30E+02	1.26E+03	2.51E+03
144	Dec-61	8.75E+03	2.17E+02	4.14E+02	1.29E+03	3.42E+03
145	Jan-62	8.66E+03	2.20E+02	9.10E+02	8.54E+02	3.74E+03
146	Feb-62	7.95E+03	2.09E+02	5.45E+02	9.69E+02	2.84E+03
147	Mar-62	1.14E+04	3.49E+02	7.86E+02	1.98E+03	5.18E+03
148	Apr-62	1.10E+04	2.31E+02	1.15E+03	1.27E+03	3.62E+03
149	May-62	4.99E+03	1.28E+02	3.55E+02	4.95E+02	2.39E+03
150	Jun-62	3.37E+03	5.60E+01	2.81E+02	2.35E+02	8.38E+02
151	Jul-62	3.36E+03	6.02E+01	4.75E+02	2.63E+02	9.33E+02
152	Aug-62	5.64E+03	1.34E+02	6.49E+02	5.03E+02	2.18E+03
153	Sep-62	8.76E+03	2.25E+02	1.39E+03	7.20E+02	3.97E+03
154	Oct-62	7.60E+03	1.75E+02	5.27E+02	6.73E+02	3.87E+03
155	Nov-62	5.60E+03	1.60E+02	5.78E+02	5.70E+02	2.73E+03
156	Dec-62	5.58E+03	1.46E+02	7.59E+02	6.59E+02	2.54E+03
157	Jan-63	5.13E+03	1.33E+02	3.69E+02	3.92E+02	1.72E+03
158	Feb-63	5.16E+03	1.12E+02	3.23E+02	4.66E+02	2.56E+03
159	Mar-63	9.49E+03	2.24E+02	2.17E+02	1.69E+03	3.30E+03
160	Apr-63	8.51E+03	2.02E+02	3.31E+02	1.04E+03	2.48E+03
161	May-63	3.41E+03	1.04E+02	1.52E+02	6.30E+02	1.45E+03
162	Jun-63	2.17E+03	5.00E+01	5.05E+01	3.05E+02	7.25E+02
163	Jul-63	2.82E+03	6.34E+01	6.01E+01	4.01E+02	9.95E+02
164	Aug-63	4.55E+03	9.37E+01	1.10E+02	7.79E+02	1.83E+03
165	Sep-63	6.74E+03	1.43E+02	1.34E+02	1.07E+03	2.85E+03
166	Oct-63	6.40E+03	1.95E+02	1.98E+02	1.28E+03	4.60E+03
167	Nov-63	7.71E+03	2.16E+02	2.50E+02	1.29E+03	3.36E+03
168	Dec-63	9.37E+03	2.73E+02	1.81E+02	1.53E+03	3.82E+03
169	Jan-64	9.33E+03	2.79E+02	2.53E+02	1.64E+03	4.43E+03
170	Feb-64	6.00E+03	2.15E+02	2.34E+02	1.22E+03	3.39E+03
171	Mar-64	8.12E+03	3.41E+02	3.14E+02	1.54E+03	4.21E+03
172	Apr-64	8.06E+03	2.67E+02	4.17E+02	1.35E+03	5.61E+03
173	May-64	5.75E+03	1.55E+02	2.29E+02	8.79E+02	3.15E+03
174	Jun-64	2.28E+03	3.53E+01	5.85E+01	2.81E+02	6.52E+02
175	Jul-64	2.47E+03	3.15E+01	3.71E+01	2.95E+02	5.96E+02
176	Aug-64	4.48E+03	5.48E+01	1.55E+02	5.12E+02	1.38E+03
177	Sep-64	6.43E+03	1.39E+02	2.64E+02	1.15E+03	2.47E+03
178	Oct-64	4.79E+03	9.46E+01	1.13E+02	8.85E+02	2.22E+03
179	Nov-64	8.40E+03	2.00E+02	2.07E+02	1.25E+03	3.60E+03
180	Dec-64	9.44E+03	2.10E+02	2.32E+02	1.28E+03	3.24E+03
181	Jan-65	6.33E+03	2.13E+02	2.36E+02	6.30E+02	3.49E+03
182	Feb-65	4.80E+03	1.31E+02	2.01E+02	4.40E+02	1.99E+03
183	Mar-65	5.92E+03	2.13E+02	2.85E+02	8.41E+02	2.11E+03
184	Apr-65	5.25E+03	2.11E+02	2.12E+02	9.27E+02	1.82E+03
185	May-65	2.32E+03	7.50E+01	1.06E+02	5.11E+02	8.62E+02
186	Jun-65	1.85E+03	3.51E+01	7.06E+01	2.66E+02	4.66E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
187	Jul-65	1.82E+03	3.39E+01	5.55E+01	3.46E+02	6.32E+02
188	Aug-65	2.71E+03	6.45E+01	7.13E+01	7.43E+02	9.85E+02
189	Sep-65	4.08E+03	1.26E+02	1.15E+02	1.15E+03	1.73E+03
190	Oct-65	5.43E+03	2.12E+02	7.65E+01	2.46E+03	2.22E+03
191	Nov-65	4.48E+03	1.62E+02	1.01E+02	1.60E+03	2.10E+03
192	Dec-65	5.15E+03	1.67E+02	1.47E+02	1.48E+03	1.65E+03
193	Jan-66	5.24E+03	1.64E+02	1.36E+02	8.94E+02	1.27E+03
194	Feb-66	4.18E+03	1.03E+02	9.71E+01	8.08E+02	1.02E+03
195	Mar-66	5.14E+03	1.73E+02	1.58E+02	1.20E+03	1.19E+03
196	Apr-66	4.69E+03	1.44E+02	1.76E+02	9.39E+02	1.35E+03
197	May-66	2.59E+03	6.05E+01	9.22E+01	4.18E+02	7.88E+02
198	Jun-66	1.55E+03	2.80E+01	3.11E+01	2.45E+02	2.29E+02
199	Jul-66	5.96E+02	6.92E+00	1.02E+01	6.11E+01	5.63E+01
200	Aug-66	1.46E+03	1.25E+01	2.12E+01	1.12E+02	1.77E+02
201	Sep-66	5.37E+03	1.31E+02	1.93E+02	7.10E+02	1.20E+03
202	Oct-66	4.81E+03	1.23E+02	2.88E+02	8.78E+02	1.07E+03
203	Nov-66	4.71E+03	1.13E+02	2.00E+02	5.98E+02	1.01E+03
204	Dec-66	5.56E+03	1.22E+02	2.21E+02	7.57E+02	1.23E+03
205	Jan-67	5.12E+03	1.18E+02	2.77E+02	9.79E+02	1.10E+03
206	Feb-67	4.82E+03	1.32E+02	2.63E+02	6.05E+02	9.37E+02
207	Mar-67	4.22E+03	1.03E+02	2.96E+02	6.94E+02	1.15E+03
208	Apr-67	5.10E+03	1.77E+02	3.19E+02	1.14E+03	1.15E+03
209	May-67	3.77E+03	1.61E+02	1.67E+02	7.87E+02	1.22E+03
210	Jun-67	1.04E+03	3.38E+01	4.73E+01	2.40E+02	3.87E+02
211	Jul-67	1.40E+03	3.99E+01	6.97E+01	2.17E+02	4.60E+02
212	Aug-67	2.83E+03	9.62E+01	9.79E+01	5.32E+02	8.48E+02
213	Sep-67	3.66E+03	1.27E+02	1.76E+02	5.63E+02	1.76E+03
214	Oct-67	4.02E+03	1.37E+02	1.40E+02	9.03E+02	1.45E+03
215	Nov-67	3.80E+03	1.02E+02	1.41E+02	6.69E+02	1.29E+03
216	Dec-67	3.66E+03	1.05E+02	1.50E+02	8.02E+02	1.09E+03
217	Jan-68	3.61E+03	1.01E+02	1.00E+02	9.87E+02	1.11E+03
218	Feb-68	4.55E+03	1.92E+02	1.41E+02	8.67E+02	1.54E+03
219	Mar-68	3.42E+03	1.35E+02	1.38E+02	8.60E+02	1.14E+03
220	Apr-68	3.33E+03	1.74E+02	1.43E+02	8.13E+02	1.07E+03
221	May-68	2.80E+03	1.37E+02	9.69E+01	3.61E+02	1.08E+03
222	Jun-68	1.01E+03	2.38E+01	3.10E+01	1.40E+02	3.17E+02
223	Jul-68	9.06E+02	2.34E+01	3.42E+01	1.64E+02	3.28E+02
224	Aug-68	2.27E+03	7.69E+01	8.12E+01	3.60E+02	8.70E+02
225	Sep-68	2.52E+03	8.55E+01	7.88E+01	3.55E+02	1.00E+03
226	Oct-68	3.12E+03	9.26E+01	7.43E+01	6.55E+02	1.29E+03
227	Nov-68	3.04E+03	7.65E+01	1.04E+02	5.53E+02	9.84E+02
228	Dec-68	2.74E+03	7.87E+01	7.76E+01	5.31E+02	9.67E+02
229	Jan-69	2.31E+03	6.13E+01	8.14E+01	3.75E+02	6.06E+02
230	Feb-69	1.88E+03	6.85E+01	7.96E+01	3.57E+02	5.40E+02
231	Mar-69	2.52E+03	1.05E+02	1.11E+02	6.40E+02	9.56E+02
232	Apr-69	1.50E+03	5.79E+01	6.19E+01	3.89E+02	6.16E+02
233	May-69	1.03E+03	2.13E+01	3.22E+01	2.69E+02	2.69E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
234	Jun-69	1.13E+03	2.11E+01	2.72E+01	2.19E+02	2.68E+02
235	Jul-69	1.08E+03	3.04E+01	3.55E+01	2.32E+02	2.63E+02
236	Aug-69	1.92E+03	6.62E+01	7.90E+01	3.61E+02	6.58E+02
237	Sep-69	2.10E+03	6.88E+01	5.41E+01	5.47E+02	5.06E+02
238	Oct-69	1.80E+03	5.76E+01	6.23E+01	4.59E+02	2.67E+02
239	Nov-69	1.45E+03	2.95E+01	5.65E+01	3.42E+02	2.30E+02
240	Dec-69	1.82E+03	3.10E+01	7.59E+01	4.07E+02	3.23E+02
241	Jan-70	2.92E+03	2.32E+01	4.61E+01	2.69E+02	9.29E+02
242	Feb-70	8.15E+01	1.21E+00	2.36E+00	1.12E+01	2.97E+01
243	Mar-70	4.05E+02	5.17E+00	2.65E+01	9.75E+00	1.84E+02
244	Apr-70	1.39E+03	2.42E+01	9.04E+01	1.63E+02	6.28E+02
245	May-70	1.07E+03	7.84E+00	6.83E+01	9.46E+01	4.75E+02
246	Jun-70	6.56E+02	2.56E+00	3.93E+01	3.40E+01	2.79E+02
247	Jul-70	9.17E+02	2.97E+01	5.66E+01	2.37E+02	3.98E+02
248	Aug-70	6.94E+02	2.34E+01	4.44E+01	1.83E+02	3.10E+02
249	Sep-70	1.59E+03	5.62E+01	1.07E+02	4.29E+02	7.35E+02
250	Oct-70	1.63E+03	5.71E+01	1.09E+02	4.39E+02	7.49E+02
251	Nov-70	1.54E+03	5.41E+01	1.03E+02	4.14E+02	7.08E+02
252	Dec-70	1.55E+03	5.43E+01	1.03E+02	4.18E+02	7.12E+02
253	Jan-71	1.41E+03	5.02E+01	9.55E+01	3.82E+02	6.56E+02
Location 2						
1	Jan-50	5.18E+02	7.99E+01	2.73E+02	3.63E+02	4.11E+03
2	Feb-50	4.89E+02	7.61E+01	2.63E+02	3.31E+02	3.94E+03
3	Mar-50	5.01E+02	7.32E+01	2.53E+02	3.35E+02	3.80E+03
4	Apr-50	4.03E+02	5.02E+01	1.78E+02	2.43E+02	2.68E+03
5	May-50	2.64E+02	2.53E+01	9.90E+01	1.19E+02	1.45E+03
6	Jun-50	1.31E+02	9.15E+00	4.45E+01	3.11E+01	6.02E+02
7	Jul-50	1.51E+02	1.06E+01	5.00E+01	4.45E+01	6.79E+02
8	Aug-50	2.92E+02	2.78E+01	1.04E+02	1.84E+02	1.50E+03
9	Sep-50	4.24E+02	4.89E+01	1.75E+02	3.20E+02	2.50E+03
10	Oct-50	6.90E+02	6.01E+01	2.59E+02	4.70E+02	3.77E+03
11	Nov-50	6.91E+02	7.58E+01	2.63E+02	4.56E+02	3.90E+03
12	Dec-50	5.93E+02	8.29E+01	2.83E+02	3.79E+02	4.26E+03
13	Jan-51	5.04E+02	5.03E+01	1.37E+02	2.30E+02	2.42E+03
14	Feb-51	7.63E+02	3.93E+01	1.19E+02	2.44E+02	2.25E+03
15	Mar-51	8.51E+02	4.88E+01	1.51E+02	3.08E+02	2.82E+03
16	Apr-51	5.02E+02	2.86E+01	1.06E+02	1.86E+02	2.05E+03
17	May-51	1.70E+02	6.61E+00	4.42E+01	4.50E+01	8.01E+02
18	Jun-51	1.68E+02	9.72E+00	4.31E+01	6.11E+01	6.86E+02
19	Jul-51	1.95E+02	1.05E+01	5.78E+01	6.25E+01	9.27E+02
20	Aug-51	5.02E+02	3.25E+01	1.08E+02	1.14E+02	1.93E+03
21	Sep-51	6.64E+02	6.24E+01	2.23E+02	2.50E+02	3.56E+03
22	Oct-51	7.24E+02	5.79E+01	1.66E+02	2.58E+02	3.14E+03
23	Nov-51	7.20E+02	5.67E+01	2.13E+02	1.61E+02	3.98E+03
24	Dec-51	7.22E+02	6.27E+01	1.60E+02	2.80E+02	3.62E+03
25	Jan-52	6.18E+02	5.91E+01	2.15E+02	3.11E+02	3.95E+03
26	Feb-52	7.67E+02	8.28E+01	9.71E+01	2.45E+02	3.02E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
27	Mar-52	8.06E+02	5.60E+01	1.59E+02	3.32E+02	3.23E+03
28	Apr-52	8.58E+02	4.31E+01	9.82E+01	2.65E+02	2.68E+03
29	May-52	3.24E+02	1.46E+01	4.93E+01	8.74E+01	1.05E+03
30	Jun-52	2.31E+02	1.25E+01	3.21E+01	4.74E+01	7.60E+02
31	Jul-52	3.94E+02	2.13E+01	6.44E+01	8.11E+01	1.18E+03
32	Aug-52	6.15E+02	3.19E+01	7.96E+01	1.26E+02	1.85E+03
33	Sep-52	1.24E+03	8.15E+01	1.38E+02	2.04E+02	3.05E+03
34	Oct-52	1.39E+03	1.74E+02	2.32E+02	7.16E+02	4.28E+03
35	Nov-52	1.15E+03	1.62E+02	1.98E+02	7.43E+02	4.23E+03
36	Dec-52	1.41E+03	2.06E+02	3.17E+02	9.61E+02	5.60E+03
37	Jan-53	1.42E+03	2.91E+02	2.58E+02	1.20E+03	5.49E+03
38	Feb-53	1.20E+03	1.57E+02	1.73E+02	6.96E+02	3.84E+03
39	Mar-53	1.40E+03	1.43E+02	1.54E+02	6.53E+02	3.50E+03
40	Apr-53	1.12E+03	1.23E+02	4.64E+01	4.47E+02	2.64E+03
41	May-53	1.07E+03	8.74E+01	9.43E+01	3.75E+02	2.53E+03
42	Jun-53	3.09E+02	2.31E+01	2.39E+01	1.08E+02	7.34E+02
43	Jul-53	3.71E+02	2.17E+01	5.29E+01	1.96E+02	1.04E+03
44	Aug-53	9.09E+02	5.87E+01	1.14E+02	6.41E+02	2.45E+03
45	Sep-53	1.03E+03	6.42E+01	1.53E+02	9.95E+02	3.55E+03
46	Oct-53	1.55E+03	9.33E+01	1.96E+02	1.21E+03	4.50E+03
47	Nov-53	1.45E+03	1.68E+02	1.84E+02	1.92E+03	4.71E+03
48	Dec-53	1.72E+03	2.20E+02	1.82E+02	1.71E+03	5.04E+03
49	Jan-54	1.32E+03	1.31E+02	3.81E+02	8.58E+02	5.33E+03
50	Feb-54	1.23E+03	1.19E+02	3.66E+02	8.54E+02	5.49E+03
51	Mar-54	1.31E+03	1.16E+02	3.42E+02	8.40E+02	5.10E+03
52	Apr-54	1.37E+03	1.22E+02	3.68E+02	8.94E+02	5.56E+03
53	May-54	6.72E+02	4.11E+01	1.48E+02	3.12E+02	2.10E+03
54	Jun-54	4.08E+02	1.82E+01	7.70E+01	1.25E+02	1.13E+03
55	Jul-54	4.58E+02	2.10E+01	8.60E+01	1.57E+02	1.01E+03
56	Aug-54	8.11E+02	4.80E+01	1.55E+02	4.51E+02	1.87E+03
57	Sep-54	1.12E+03	7.91E+01	2.37E+02	6.77E+02	2.92E+03
58	Oct-54	1.39E+03	1.16E+02	3.39E+02	9.73E+02	4.75E+03
59	Nov-54	1.38E+03	1.10E+02	3.22E+02	8.48E+02	3.92E+03
60	Dec-54	1.61E+03	1.23E+02	3.53E+02	9.10E+02	4.22E+03
61	Jan-55	1.63E+03	1.24E+02	3.53E+02	9.13E+02	4.65E+03
62	Feb-55	1.12E+03	7.90E+01	2.22E+02	5.83E+02	3.17E+03
63	Mar-55	2.12E+03	1.15E+02	3.95E+02	1.04E+03	4.52E+03
64	Apr-55	1.91E+03	9.99E+01	3.66E+02	1.23E+03	4.32E+03
65	May-55	1.12E+03	1.04E+02	4.55E+02	1.51E+03	5.45E+03
66	Jun-55	5.08E+02	2.43E+01	1.46E+02	3.85E+02	1.58E+03
67	Jul-55	6.24E+02	1.67E+01	8.66E+01	2.82E+02	1.07E+03
68	Aug-55	1.03E+03	3.79E+01	2.06E+02	7.44E+02	2.55E+03
69	Sep-55	1.57E+03	6.62E+01	2.81E+02	9.25E+02	3.73E+03
70	Oct-55	2.04E+03	1.43E+02	5.03E+02	1.35E+03	5.35E+03
71	Nov-55	2.17E+03	1.40E+02	4.90E+02	1.21E+03	5.22E+03
72	Dec-55	2.54E+03	1.84E+02	6.27E+02	1.48E+03	6.97E+03
73	Jan-56	1.69E+03	9.59E+01	5.01E+02	8.58E+02	6.06E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
74	Feb-56	1.54E+03	1.10E+02	4.80E+02	9.67E+02	5.81E+03
75	Mar-56	2.25E+03	2.39E+02	5.88E+02	1.14E+03	5.94E+03
76	Apr-56	1.26E+03	7.20E+01	2.77E+02	5.19E+02	2.65E+03
77	May-56	6.92E+02	2.69E+01	1.46E+02	2.30E+02	1.31E+03
78	Jun-56	7.18E+02	1.68E+01	1.10E+02	1.43E+02	9.37E+02
79	Jul-56	1.17E+03	2.11E+01	1.77E+02	3.55E+02	1.61E+03
80	Aug-56	2.09E+03	4.37E+01	3.57E+02	8.21E+02	3.41E+03
81	Sep-56	2.49E+03	8.13E+01	4.77E+02	1.20E+03	4.91E+03
82	Oct-56	1.97E+03	8.77E+01	3.93E+02	1.28E+03	4.09E+03
83	Nov-56	2.21E+03	1.49E+02	4.32E+02	1.65E+03	5.07E+03
84	Dec-56	2.54E+03	1.96E+02	3.80E+02	2.48E+03	8.30E+03
85	Jan-57	2.48E+03	2.00E+02	3.23E+02	2.89E+03	5.96E+03
86	Feb-57	2.65E+03	2.04E+02	2.65E+02	2.21E+03	7.39E+03
87	Mar-57	3.96E+03	2.29E+02	4.10E+02	1.54E+03	9.30E+03
88	Apr-57	3.57E+03	1.98E+02	3.73E+02	1.76E+03	7.24E+03
89	May-57	1.29E+03	4.57E+01	1.24E+02	4.97E+02	2.02E+03
90	Jun-57	9.99E+02	2.81E+01	8.05E+01	2.73E+02	1.19E+03
91	Jul-57	2.31E+03	4.81E+01	2.66E+02	5.69E+02	2.34E+03
92	Aug-57	3.18E+03	1.48E+02	3.70E+02	9.80E+02	5.17E+03
93	Sep-57	4.05E+03	1.80E+02	5.82E+02	1.64E+03	6.86E+03
94	Oct-57	4.68E+03	2.04E+02	6.74E+02	2.01E+03	4.96E+03
95	Nov-57	4.78E+03	2.16E+02	7.32E+02	2.61E+03	5.26E+03
96	Dec-57	4.76E+03	4.43E+02	7.81E+02	4.18E+03	8.06E+03
97	Jan-58	4.82E+03	3.75E+02	4.65E+02	4.13E+03	7.35E+03
98	Feb-58	4.04E+03	3.04E+02	5.17E+02	3.58E+03	6.16E+03
99	Mar-58	3.63E+03	1.84E+02	3.17E+02	2.31E+03	5.07E+03
100	Apr-58	3.25E+03	3.91E+02	5.28E+02	1.98E+03	4.43E+03
101	May-58	2.02E+03	1.15E+02	2.08E+02	1.04E+03	1.96E+03
102	Jun-58	1.62E+03	6.09E+01	7.32E+01	3.88E+02	8.97E+02
103	Jul-58	2.58E+03	1.88E+02	1.73E+02	8.97E+02	2.02E+03
104	Aug-58	3.41E+03	1.71E+02	3.23E+02	1.69E+03	4.32E+03
105	Sep-58	4.44E+03	1.88E+02	2.12E+02	2.30E+03	4.46E+03
106	Oct-58	4.86E+03	2.56E+02	6.50E+02	2.77E+03	6.00E+03
107	Nov-58	4.15E+03	2.85E+02	4.97E+02	3.29E+03	6.50E+03
108	Dec-58	4.70E+03	3.54E+02	5.04E+02	3.82E+03	6.87E+03
109	Jan-59	3.68E+03	3.15E+02	2.48E+02	2.70E+03	3.31E+03
110	Feb-59	3.14E+03	2.92E+02	3.54E+02	2.90E+03	4.14E+03
111	Mar-59	4.72E+03	2.53E+02	3.63E+02	2.15E+03	3.03E+03
112	Apr-59	4.57E+03	1.73E+02	2.91E+02	1.42E+03	2.30E+03
113	May-59	2.43E+03	7.17E+01	1.48E+02	6.43E+02	1.11E+03
114	Jun-59	1.57E+03	3.53E+01	8.05E+01	2.71E+02	5.56E+02
115	Jul-59	1.71E+03	4.70E+01	1.21E+02	3.21E+02	6.92E+02
116	Aug-59	4.73E+03	9.99E+01	1.98E+02	7.68E+02	1.37E+03
117	Sep-59	4.00E+03	1.13E+02	4.72E+02	8.61E+02	1.69E+03
118	Oct-59	3.16E+03	2.00E+02	1.77E+02	1.32E+03	2.06E+03
119	Nov-59	4.99E+03	2.76E+02	4.87E+02	1.13E+03	2.26E+03
120	Dec-59	6.61E+03	2.22E+02	7.15E+02	1.33E+03	3.41E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
121	Jan-60	7.69E+03	3.63E+02	1.51E+03	3.03E+03	4.89E+03
122	Feb-60	7.42E+03	2.66E+02	3.96E+02	1.58E+03	4.90E+03
123	Mar-60	9.89E+03	4.00E+02	5.75E+02	2.29E+03	6.00E+03
124	Apr-60	5.67E+03	1.54E+02	3.89E+02	1.27E+03	2.26E+03
125	May-60	4.46E+03	1.21E+02	3.27E+02	9.04E+02	1.38E+03
126	Jun-60	2.16E+03	6.33E+01	1.97E+02	4.50E+02	9.88E+02
127	Jul-60	2.11E+03	6.97E+01	2.10E+02	4.18E+02	1.19E+03
128	Aug-60	4.97E+03	1.34E+02	1.99E+02	1.42E+03	2.25E+03
129	Sep-60	7.28E+03	1.81E+02	5.15E+02	1.51E+03	3.57E+03
130	Oct-60	6.31E+03	2.33E+02	5.46E+02	2.35E+03	3.88E+03
131	Nov-60	1.18E+04	3.83E+02	5.31E+02	2.78E+03	5.75E+03
132	Dec-60	8.26E+03	5.50E+02	8.96E+02	3.05E+03	6.56E+03
133	Jan-61	1.02E+04	6.02E+02	1.11E+03	4.04E+03	8.02E+03
134	Feb-61	5.30E+03	4.72E+02	5.15E+02	1.55E+03	4.40E+03
135	Mar-61	8.29E+03	4.40E+02	9.66E+02	2.09E+03	3.05E+03
136	Apr-61	5.87E+03	3.77E+02	1.09E+03	1.59E+03	2.02E+03
137	May-61	3.75E+03	1.77E+02	3.22E+02	8.24E+02	8.86E+02
138	Jun-61	1.59E+03	4.98E+01	1.67E+02	1.43E+02	3.98E+02
139	Jul-61	2.96E+03	6.20E+01	1.27E+02	3.17E+02	4.46E+02
140	Aug-61	3.58E+03	6.97E+01	5.09E+02	6.14E+02	1.39E+03
141	Sep-61	2.47E+03	1.62E+02	5.88E+02	7.70E+02	2.82E+03
142	Oct-61	4.55E+03	1.99E+02	4.01E+02	9.30E+02	3.42E+03
143	Nov-61	5.35E+03	2.29E+02	6.27E+02	1.02E+03	2.29E+03
144	Dec-61	5.92E+03	2.13E+02	4.16E+02	1.03E+03	3.06E+03
145	Jan-62	5.97E+03	2.13E+02	8.93E+02	6.82E+02	3.32E+03
146	Feb-62	5.80E+03	2.06E+02	5.46E+02	8.04E+02	2.61E+03
147	Mar-62	7.87E+03	3.42E+02	7.83E+02	1.59E+03	4.65E+03
148	Apr-62	8.04E+03	2.30E+02	1.15E+03	1.07E+03	3.34E+03
149	May-62	3.93E+03	1.27E+02	3.57E+02	4.32E+02	2.24E+03
150	Jun-62	2.81E+03	5.56E+01	2.81E+02	2.12E+02	7.99E+02
151	Jul-62	2.70E+03	5.96E+01	4.74E+02	2.31E+02	8.78E+02
152	Aug-62	4.32E+03	1.31E+02	6.46E+02	4.30E+02	2.02E+03
153	Sep-62	6.19E+03	2.20E+02	1.38E+03	5.87E+02	3.59E+03
154	Oct-62	5.41E+03	1.74E+02	5.46E+02	5.53E+02	3.53E+03
155	Nov-62	4.03E+03	1.58E+02	5.79E+02	4.71E+02	2.51E+03
156	Dec-62	4.15E+03	1.44E+02	7.57E+02	5.54E+02	2.34E+03
157	Jan-63	3.79E+03	1.30E+02	3.65E+02	3.28E+02	1.57E+03
158	Feb-63	3.85E+03	1.11E+02	3.25E+02	3.93E+02	2.35E+03
159	Mar-63	6.89E+03	2.20E+02	2.18E+02	1.40E+03	3.02E+03
160	Apr-63	6.49E+03	2.00E+02	3.30E+02	8.92E+02	2.30E+03
161	May-63	2.66E+03	1.04E+02	1.53E+02	5.45E+02	1.35E+03
162	Jun-63	1.81E+03	4.96E+01	5.06E+01	2.76E+02	6.90E+02
163	Jul-63	2.27E+03	6.26E+01	5.99E+01	3.53E+02	9.35E+02
164	Aug-63	3.46E+03	9.22E+01	1.10E+02	6.63E+02	1.69E+03
165	Sep-63	4.82E+03	1.41E+02	1.35E+02	8.82E+02	2.59E+03
166	Oct-63	4.46E+03	1.91E+02	1.97E+02	1.04E+03	4.15E+03
167	Nov-63	5.28E+03	2.13E+02	2.50E+02	1.04E+03	3.05E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
168	Dec-63	6.53E+03	2.71E+02	1.83E+02	1.24E+03	3.48E+03
169	Jan-64	6.27E+03	2.70E+02	2.49E+02	1.30E+03	3.92E+03
170	Feb-64	4.37E+03	2.13E+02	2.35E+02	1.01E+03	3.12E+03
171	Mar-64	5.69E+03	3.36E+02	3.15E+02	1.25E+03	3.82E+03
172	Apr-64	5.63E+03	2.64E+02	4.18E+02	1.10E+03	5.08E+03
173	May-64	4.42E+03	1.54E+02	2.30E+02	7.55E+02	2.94E+03
174	Jun-64	1.91E+03	3.52E+01	5.87E+01	2.54E+02	6.25E+02
175	Jul-64	2.04E+03	3.11E+01	3.71E+01	2.64E+02	5.64E+02
176	Aug-64	3.44E+03	5.41E+01	1.54E+02	4.39E+02	1.28E+03
177	Sep-64	4.65E+03	1.37E+02	2.65E+02	9.48E+02	2.26E+03
178	Oct-64	3.63E+03	9.35E+01	1.13E+02	7.53E+02	2.05E+03
179	Nov-64	6.03E+03	1.98E+02	2.08E+02	1.03E+03	3.31E+03
180	Dec-64	6.69E+03	2.08E+02	2.33E+02	1.05E+03	2.95E+03
181	Jan-65	4.52E+03	2.06E+02	2.32E+02	5.14E+02	3.14E+03
182	Feb-65	3.68E+03	1.34E+02	2.06E+02	3.82E+02	1.91E+03
183	Mar-65	4.49E+03	2.10E+02	2.85E+02	7.15E+02	1.96E+03
184	Apr-65	3.98E+03	2.09E+02	2.14E+02	7.90E+02	1.70E+03
185	May-65	1.94E+03	7.47E+01	1.06E+02	4.60E+02	8.21E+02
186	Jun-65	1.54E+03	3.49E+01	7.06E+01	2.40E+02	4.44E+02
187	Jul-65	1.48E+03	3.35E+01	5.54E+01	3.06E+02	5.94E+02
188	Aug-65	2.08E+03	6.36E+01	7.14E+01	6.37E+02	9.16E+02
189	Sep-65	3.00E+03	1.25E+02	1.15E+02	9.64E+02	1.59E+03
190	Oct-65	3.79E+03	2.08E+02	7.69E+01	1.99E+03	2.00E+03
191	Nov-65	3.27E+03	1.64E+02	1.03E+02	1.35E+03	1.96E+03
192	Dec-65	3.75E+03	1.66E+02	1.48E+02	1.24E+03	1.52E+03
193	Jan-66	3.70E+03	1.62E+02	1.36E+02	7.29E+02	1.15E+03
194	Feb-66	3.13E+03	1.03E+02	9.83E+01	6.85E+02	9.48E+02
195	Mar-66	3.76E+03	1.71E+02	1.58E+02	9.97E+02	1.09E+03
196	Apr-66	3.40E+03	1.43E+02	1.77E+02	7.83E+02	1.24E+03
197	May-66	2.07E+03	6.05E+01	9.27E+01	3.69E+02	7.42E+02
198	Jun-66	1.29E+03	2.78E+01	3.12E+01	2.21E+02	2.20E+02
199	Jul-66	4.97E+02	6.97E+00	1.03E+01	5.56E+01	5.42E+01
200	Aug-66	1.11E+03	1.23E+01	2.13E+01	9.60E+01	1.64E+02
201	Sep-66	3.88E+03	1.29E+02	1.92E+02	5.86E+02	1.10E+03
202	Oct-66	3.38E+03	1.21E+02	2.88E+02	7.14E+02	9.76E+02
203	Nov-66	3.34E+03	1.12E+02	2.03E+02	4.93E+02	9.21E+02
204	Dec-66	4.03E+03	1.21E+02	2.22E+02	6.28E+02	1.13E+03
205	Jan-67	3.70E+03	1.15E+02	2.76E+02	8.08E+02	1.00E+03
206	Feb-67	3.53E+03	1.31E+02	2.66E+02	5.10E+02	8.67E+02
207	Mar-67	3.18E+03	1.03E+02	2.97E+02	5.89E+02	1.07E+03
208	Apr-67	3.77E+03	1.73E+02	3.17E+02	9.53E+02	1.06E+03
209	May-67	2.90E+03	1.62E+02	1.74E+02	6.85E+02	1.15E+03
210	Jun-67	8.72E+02	3.36E+01	4.73E+01	2.16E+02	3.69E+02
211	Jul-67	1.15E+03	3.95E+01	6.93E+01	1.94E+02	4.35E+02
212	Aug-67	2.17E+03	9.50E+01	9.80E+01	4.56E+02	7.88E+02
213	Sep-67	2.71E+03	1.27E+02	1.78E+02	4.76E+02	1.63E+03
214	Oct-67	2.89E+03	1.35E+02	1.41E+02	7.44E+02	1.33E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
215	Nov-67	2.77E+03	1.02E+02	1.42E+02	5.60E+02	1.19E+03
216	Dec-67	2.73E+03	1.03E+02	1.50E+02	6.74E+02	1.01E+03
217	Jan-68	2.60E+03	9.90E+01	9.92E+01	8.12E+02	1.01E+03
218	Feb-68	3.25E+03	1.89E+02	1.41E+02	7.14E+02	1.40E+03
219	Mar-68	2.58E+03	1.35E+02	1.39E+02	7.30E+02	1.06E+03
220	Apr-68	2.51E+03	1.73E+02	1.44E+02	6.93E+02	9.98E+02
221	May-68	2.15E+03	1.36E+02	9.75E+01	3.12E+02	1.00E+03
222	Jun-68	8.31E+02	2.38E+01	3.11E+01	1.25E+02	3.02E+02
223	Jul-68	7.34E+02	2.31E+01	3.41E+01	1.45E+02	3.09E+02
224	Aug-68	1.73E+03	7.57E+01	8.10E+01	3.07E+02	8.06E+02
225	Sep-68	1.91E+03	8.49E+01	7.93E+01	3.02E+02	9.31E+02
226	Oct-68	2.28E+03	9.20E+01	7.49E+01	5.46E+02	1.19E+03
227	Nov-68	2.23E+03	7.58E+01	1.04E+02	4.64E+02	9.07E+02
228	Dec-68	2.06E+03	7.82E+01	7.85E+01	4.52E+02	8.98E+02
229	Jan-69	1.75E+03	6.06E+01	8.15E+01	3.19E+02	5.62E+02
230	Feb-69	1.45E+03	6.77E+01	7.96E+01	3.06E+02	5.03E+02
231	Mar-69	1.93E+03	1.04E+02	1.12E+02	5.48E+02	8.92E+02
232	Apr-69	1.20E+03	5.74E+01	6.20E+01	3.40E+02	5.78E+02
233	May-69	8.57E+02	2.13E+01	3.23E+01	2.41E+02	2.56E+02
234	Jun-69	9.39E+02	2.10E+01	2.72E+01	1.98E+02	2.55E+02
235	Jul-69	8.60E+02	3.00E+01	3.54E+01	2.03E+02	2.46E+02
236	Aug-69	1.46E+03	6.56E+01	7.92E+01	3.07E+02	6.10E+02
237	Sep-69	1.53E+03	6.88E+01	5.53E+01	4.57E+02	4.70E+02
238	Oct-69	1.33E+03	5.70E+01	6.24E+01	3.85E+02	2.47E+02
239	Nov-69	1.08E+03	2.95E+01	5.67E+01	2.90E+02	2.12E+02
240	Dec-69	1.39E+03	3.08E+01	7.61E+01	3.47E+02	3.00E+02
241	Jan-70	2.16E+03	2.30E+01	4.62E+01	2.26E+02	8.56E+02
242	Feb-70	8.64E+01	1.53E+00	3.04E+00	1.23E+01	3.94E+01
243	Mar-70	3.03E+02	5.11E+00	2.65E+01	8.26E+00	1.69E+02
244	Apr-70	1.04E+03	2.39E+01	9.07E+01	1.37E+02	5.80E+02
245	May-70	8.09E+02	7.88E+00	6.88E+01	8.09E+01	4.42E+02
246	Jun-70	5.18E+02	2.53E+00	3.92E+01	2.97E+01	2.61E+02
247	Jul-70	7.04E+02	2.92E+01	5.66E+01	2.02E+02	3.71E+02
248	Aug-70	5.29E+02	2.32E+01	4.45E+01	1.57E+02	2.88E+02
249	Sep-70	1.15E+03	5.54E+01	1.07E+02	3.55E+02	6.71E+02
250	Oct-70	1.19E+03	5.64E+01	1.09E+02	3.65E+02	6.87E+02
251	Nov-70	1.12E+03	5.38E+01	1.04E+02	3.45E+02	6.52E+02
252	Dec-70	1.13E+03	5.38E+01	1.04E+02	3.48E+02	6.54E+02
253	Jan-71	9.76E+02	4.82E+01	9.31E+01	3.05E+02	5.81E+02
Location 3						
1	Jan-50	3.85E+02	7.53E+01	2.60E+02	2.99E+02	3.65E+03
2	Feb-50	3.60E+02	7.12E+01	2.49E+02	2.71E+02	3.47E+03
3	Mar-50	3.57E+02	6.62E+01	2.31E+02	2.65E+02	3.24E+03
4	Apr-50	3.02E+02	4.65E+01	1.66E+02	1.99E+02	2.35E+03
5	May-50	2.14E+02	2.43E+01	9.58E+01	1.04E+02	1.33E+03
6	Jun-50	1.08E+02	8.85E+00	4.33E+01	2.77E+01	5.60E+02
7	Jul-50	1.27E+02	1.04E+01	4.94E+01	4.00E+01	6.41E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
8	Aug-50	2.41E+02	2.72E+01	1.02E+02	1.64E+02	1.41E+03
9	Sep-50	3.26E+02	4.70E+01	1.70E+02	2.71E+02	2.27E+03
10	Oct-50	5.11E+02	5.66E+01	2.46E+02	3.86E+02	3.34E+03
11	Nov-50	5.02E+02	6.94E+01	2.43E+02	3.67E+02	3.38E+03
12	Dec-50	4.21E+02	7.37E+01	2.55E+02	2.97E+02	3.58E+03
13	Jan-51	3.65E+02	4.59E+01	1.26E+02	1.85E+02	2.09E+03
14	Feb-51	5.61E+02	3.56E+01	1.09E+02	1.97E+02	1.94E+03
15	Mar-51	6.20E+02	4.46E+01	1.39E+02	2.47E+02	2.43E+03
16	Apr-51	3.80E+02	2.66E+01	9.98E+01	1.53E+02	1.81E+03
17	May-51	1.41E+02	6.47E+00	4.33E+01	4.01E+01	7.48E+02
18	Jun-51	1.39E+02	9.43E+00	4.22E+01	5.40E+01	6.40E+02
19	Jul-51	1.63E+02	1.03E+01	5.73E+01	5.60E+01	8.76E+02
20	Aug-51	4.05E+02	3.16E+01	1.06E+02	9.96E+01	1.80E+03
21	Sep-51	5.05E+02	5.99E+01	2.16E+02	2.10E+02	3.23E+03
22	Oct-51	5.45E+02	5.53E+01	1.61E+02	2.15E+02	2.83E+03
23	Nov-51	5.40E+02	5.39E+01	2.04E+02	1.34E+02	3.56E+03
24	Dec-51	5.40E+02	5.95E+01	1.54E+02	2.32E+02	3.25E+03
25	Jan-52	4.66E+02	5.63E+01	2.07E+02	2.59E+02	3.55E+03
26	Feb-52	5.67E+02	7.76E+01	9.31E+01	2.02E+02	2.68E+03
27	Mar-52	5.99E+02	5.33E+01	1.52E+02	2.74E+02	2.89E+03
28	Apr-52	6.40E+02	4.12E+01	9.51E+01	2.21E+02	2.41E+03
29	May-52	2.67E+02	1.44E+01	4.88E+01	7.80E+01	9.87E+02
30	Jun-52	1.92E+02	1.22E+01	3.17E+01	4.24E+01	7.15E+02
31	Jul-52	3.26E+02	2.09E+01	6.35E+01	7.23E+01	1.11E+03
32	Aug-52	4.91E+02	3.10E+01	7.80E+01	1.09E+02	1.71E+03
33	Sep-52	9.32E+02	7.80E+01	1.34E+02	1.71E+02	2.75E+03
34	Oct-52	1.04E+03	1.65E+02	2.24E+02	5.94E+02	3.85E+03
35	Nov-52	8.68E+02	1.55E+02	1.91E+02	6.20E+02	3.82E+03
36	Dec-52	1.05E+03	1.97E+02	3.06E+02	8.00E+02	5.04E+03
37	Jan-53	9.83E+02	2.59E+02	2.33E+02	9.29E+02	4.61E+03
38	Feb-53	8.65E+02	1.44E+02	1.60E+02	5.59E+02	3.32E+03
39	Mar-53	1.04E+03	1.37E+02	1.49E+02	5.44E+02	3.15E+03
40	Apr-53	8.47E+02	1.18E+02	4.59E+01	3.76E+02	2.41E+03
41	May-53	8.25E+02	8.39E+01	9.10E+01	3.18E+02	2.30E+03
42	Jun-53	2.56E+02	2.26E+01	2.35E+01	9.62E+01	6.88E+02
43	Jul-53	3.08E+02	2.13E+01	5.23E+01	1.75E+02	9.77E+02
44	Aug-53	7.43E+02	5.71E+01	1.12E+02	5.65E+02	2.28E+03
45	Sep-53	7.93E+02	6.22E+01	1.50E+02	8.46E+02	3.25E+03
46	Oct-53	1.16E+03	8.93E+01	1.90E+02	1.01E+03	4.08E+03
47	Nov-53	8.05E+02	1.57E+02	1.78E+02	1.33E+03	3.88E+03
48	Dec-53	8.80E+02	2.00E+02	1.72E+02	1.13E+03	3.99E+03
49	Jan-54	6.97E+02	1.18E+02	3.51E+02	5.72E+02	4.21E+03
50	Feb-54	6.27E+02	1.06E+02	3.36E+02	5.53E+02	4.27E+03
51	Mar-54	7.22E+02	1.06E+02	3.21E+02	5.78E+02	4.13E+03
52	Apr-54	7.15E+02	1.11E+02	3.41E+02	5.91E+02	4.38E+03
53	May-54	4.86E+02	3.99E+01	1.44E+02	2.56E+02	1.89E+03
54	Jun-54	3.36E+02	1.77E+01	7.56E+01	1.11E+02	1.05E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
55	Jul-54	3.78E+02	2.05E+01	8.46E+01	1.40E+02	9.50E+02
56	Aug-54	6.17E+02	4.67E+01	1.53E+02	3.81E+02	1.71E+03
57	Sep-54	7.55E+02	7.55E+01	2.30E+02	5.32E+02	2.57E+03
58	Oct-54	7.94E+02	1.08E+02	3.24E+02	6.87E+02	3.92E+03
59	Nov-54	7.77E+02	1.03E+02	3.08E+02	6.00E+02	3.26E+03
60	Dec-54	9.00E+02	1.16E+02	3.39E+02	6.37E+02	3.48E+03
61	Jan-55	8.99E+02	1.15E+02	3.36E+02	6.32E+02	3.80E+03
62	Feb-55	6.52E+02	7.55E+01	2.17E+02	4.22E+02	2.68E+03
63	Mar-55	1.29E+03	1.10E+02	3.84E+02	7.69E+02	3.85E+03
64	Apr-55	1.09E+03	9.54E+01	3.58E+02	8.79E+02	3.63E+03
65	May-55	6.75E+02	9.82E+01	4.38E+02	1.09E+03	4.58E+03
66	Jun-55	4.07E+02	2.38E+01	1.43E+02	3.38E+02	1.47E+03
67	Jul-55	5.17E+02	1.64E+01	8.56E+01	2.52E+02	1.01E+03
68	Aug-55	7.37E+02	3.66E+01	2.02E+02	6.07E+02	2.29E+03
69	Sep-55	9.25E+02	6.27E+01	2.73E+02	6.72E+02	3.15E+03
70	Oct-55	1.11E+03	1.32E+02	4.78E+02	9.28E+02	4.37E+03
71	Nov-55	1.20E+03	1.27E+02	4.53E+02	8.30E+02	4.19E+03
72	Dec-55	1.31E+03	1.57E+02	5.48E+02	9.46E+02	5.25E+03
73	Jan-56	9.04E+02	8.40E+01	4.49E+02	5.68E+02	4.70E+03
74	Feb-56	8.62E+02	1.02E+02	4.56E+02	6.72E+02	4.76E+03
75	Mar-56	1.18E+03	2.07E+02	5.23E+02	7.43E+02	4.57E+03
76	Apr-56	8.75E+02	6.60E+01	2.56E+02	4.06E+02	2.26E+03
77	May-56	5.58E+02	2.57E+01	1.40E+02	2.00E+02	1.20E+03
78	Jun-56	5.90E+02	1.62E+01	1.07E+02	1.26E+02	8.69E+02
79	Jul-56	9.42E+02	2.06E+01	1.74E+02	3.10E+02	1.50E+03
80	Aug-56	1.43E+03	4.20E+01	3.49E+02	6.49E+02	3.01E+03
81	Sep-56	1.46E+03	7.67E+01	4.62E+02	8.67E+02	4.13E+03
82	Oct-56	1.10E+03	8.21E+01	3.79E+02	8.90E+02	3.39E+03
83	Nov-56	1.19E+03	1.37E+02	4.10E+02	1.12E+03	4.09E+03
84	Dec-56	1.25E+03	1.71E+02	3.41E+02	1.55E+03	6.24E+03
85	Jan-57	1.41E+03	1.84E+02	3.05E+02	2.03E+03	4.88E+03
86	Feb-57	1.48E+03	1.90E+02	2.54E+02	1.55E+03	6.05E+03
87	Mar-57	1.88E+03	2.07E+02	3.80E+02	9.82E+02	7.18E+03
88	Apr-57	1.97E+03	1.81E+02	3.47E+02	1.20E+03	5.84E+03
89	May-57	9.92E+02	4.40E+01	1.19E+02	4.22E+02	1.83E+03
90	Jun-57	8.16E+02	2.76E+01	7.96E+01	2.42E+02	1.12E+03
91	Jul-57	1.73E+03	4.69E+01	2.62E+02	4.79E+02	2.14E+03
92	Aug-57	2.02E+03	1.41E+02	3.63E+02	7.44E+02	4.47E+03
93	Sep-57	2.17E+03	1.70E+02	5.59E+02	1.12E+03	5.60E+03
94	Oct-57	2.46E+03	1.89E+02	6.42E+02	1.35E+03	4.05E+03
95	Nov-57	2.47E+03	2.02E+02	7.03E+02	1.73E+03	4.25E+03
96	Dec-57	2.33E+03	4.07E+02	7.45E+02	2.68E+03	6.34E+03
97	Jan-58	2.41E+03	3.43E+02	4.36E+02	2.69E+03	5.79E+03
98	Feb-58	2.08E+03	2.81E+02	4.87E+02	2.36E+03	4.91E+03
99	Mar-58	2.13E+03	1.72E+02	3.02E+02	1.66E+03	4.21E+03
100	Apr-58	1.99E+03	3.62E+02	4.99E+02	1.46E+03	3.73E+03
101	May-58	1.53E+03	1.12E+02	2.04E+02	8.73E+02	1.79E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
102	Jun-58	1.34E+03	5.99E+01	7.26E+01	3.47E+02	8.46E+02
103	Jul-58	1.94E+03	1.83E+02	1.71E+02	7.54E+02	1.85E+03
104	Aug-58	2.14E+03	1.65E+02	3.16E+02	1.27E+03	3.73E+03
105	Sep-58	2.41E+03	1.78E+02	2.08E+02	1.59E+03	3.70E+03
106	Oct-58	2.65E+03	2.39E+02	6.18E+02	1.91E+03	4.91E+03
107	Nov-58	2.11E+03	2.56E+02	4.64E+02	2.13E+03	5.09E+03
108	Dec-58	2.42E+03	3.14E+02	4.60E+02	2.49E+03	5.34E+03
109	Jan-59	1.98E+03	2.78E+02	2.24E+02	1.81E+03	2.59E+03
110	Feb-59	1.81E+03	2.66E+02	3.28E+02	2.03E+03	3.36E+03
111	Mar-59	2.92E+03	2.37E+02	3.45E+02	1.60E+03	2.57E+03
112	Apr-59	3.09E+03	1.65E+02	2.81E+02	1.12E+03	2.01E+03
113	May-59	1.92E+03	6.95E+01	1.45E+02	5.55E+02	1.02E+03
114	Jun-59	1.30E+03	3.46E+01	7.94E+01	2.42E+02	5.22E+02
115	Jul-59	1.42E+03	4.63E+01	1.20E+02	2.87E+02	6.53E+02
116	Aug-59	3.31E+03	9.65E+01	1.95E+02	6.17E+02	1.22E+03
117	Sep-59	2.74E+03	1.09E+02	4.59E+02	6.83E+02	1.50E+03
118	Oct-59	2.18E+03	1.90E+02	1.74E+02	1.04E+03	1.80E+03
119	Nov-59	3.22E+03	2.57E+02	4.59E+02	8.59E+02	1.93E+03
120	Dec-59	3.87E+03	1.99E+02	6.48E+02	9.29E+02	2.74E+03
121	Jan-60	4.26E+03	3.27E+02	1.39E+03	2.07E+03	3.91E+03
122	Feb-60	4.17E+03	2.48E+02	3.88E+02	1.12E+03	4.01E+03
123	Mar-60	5.19E+03	3.70E+02	5.46E+02	1.54E+03	4.84E+03
124	Apr-60	4.14E+03	1.47E+02	3.75E+02	1.04E+03	2.03E+03
125	May-60	3.43E+03	1.18E+02	3.21E+02	7.71E+02	1.28E+03
126	Jun-60	1.79E+03	6.22E+01	1.95E+02	4.02E+02	9.29E+02
127	Jul-60	1.71E+03	6.84E+01	2.08E+02	3.68E+02	1.12E+03
128	Aug-60	3.37E+03	1.29E+02	1.96E+02	1.11E+03	1.99E+03
129	Sep-60	4.12E+03	1.72E+02	4.97E+02	1.08E+03	2.98E+03
130	Oct-60	3.40E+03	2.17E+02	5.24E+02	1.60E+03	3.15E+03
131	Nov-60	6.23E+03	3.52E+02	5.04E+02	1.88E+03	4.63E+03
132	Dec-60	4.16E+03	5.08E+02	8.50E+02	1.99E+03	5.21E+03
133	Jan-61	5.19E+03	5.49E+02	1.05E+03	2.66E+03	6.34E+03
134	Feb-61	3.14E+03	4.30E+02	4.85E+02	1.12E+03	3.63E+03
135	Mar-61	4.88E+03	3.99E+02	8.88E+02	1.48E+03	2.50E+03
136	Apr-61	3.71E+03	3.50E+02	1.02E+03	1.19E+03	1.71E+03
137	May-61	2.75E+03	1.67E+02	3.13E+02	6.74E+02	7.88E+02
138	Jun-61	1.32E+03	4.87E+01	1.64E+02	1.28E+02	3.74E+02
139	Jul-61	2.29E+03	6.07E+01	1.26E+02	2.71E+02	4.12E+02
140	Aug-61	2.32E+03	6.72E+01	4.96E+02	4.71E+02	1.20E+03
141	Sep-61	1.32E+03	1.51E+02	5.68E+02	5.22E+02	2.29E+03
142	Oct-61	2.29E+03	1.86E+02	3.92E+02	6.14E+02	2.74E+03
143	Nov-61	2.68E+03	2.11E+02	5.93E+02	6.68E+02	1.84E+03
144	Dec-61	2.75E+03	1.96E+02	3.98E+02	6.40E+02	2.35E+03
145	Jan-62	2.98E+03	1.88E+02	8.13E+02	4.36E+02	2.55E+03
146	Feb-62	3.16E+03	1.88E+02	5.17E+02	5.50E+02	2.11E+03
147	Mar-62	3.84E+03	3.12E+02	7.37E+02	1.02E+03	3.63E+03
148	Apr-62	4.78E+03	2.17E+02	1.08E+03	7.73E+02	2.79E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
149	May-62	3.00E+03	1.24E+02	3.54E+02	3.67E+02	2.05E+03
150	Jun-62	2.31E+03	5.45E+01	2.77E+02	1.88E+02	7.51E+02
151	Jul-62	2.08E+03	5.85E+01	4.70E+02	1.98E+02	8.12E+02
152	Aug-62	2.94E+03	1.27E+02	6.34E+02	3.40E+02	1.78E+03
153	Sep-62	3.31E+03	2.05E+02	1.32E+03	4.00E+02	2.92E+03
154	Oct-62	2.86E+03	1.63E+02	5.41E+02	3.74E+02	2.87E+03
155	Nov-62	2.18E+03	1.47E+02	5.49E+02	3.22E+02	2.05E+03
156	Dec-62	2.33E+03	1.31E+02	7.04E+02	3.84E+02	1.90E+03
157	Jan-63	2.19E+03	1.20E+02	3.42E+02	2.32E+02	1.29E+03
158	Feb-63	2.21E+03	1.02E+02	3.02E+02	2.74E+02	1.90E+03
159	Mar-63	3.84E+03	2.04E+02	2.09E+02	9.67E+02	2.48E+03
160	Apr-63	4.04E+03	1.88E+02	3.13E+02	6.68E+02	1.96E+03
161	May-63	1.89E+03	9.98E+01	1.50E+02	4.39E+02	1.20E+03
162	Jun-63	1.49E+03	4.89E+01	5.04E+01	2.45E+02	6.50E+02
163	Jul-63	1.76E+03	6.12E+01	5.92E+01	3.03E+02	8.63E+02
164	Aug-63	2.28E+03	8.86E+01	1.07E+02	5.13E+02	1.48E+03
165	Sep-63	2.64E+03	1.32E+02	1.30E+02	6.12E+02	2.13E+03
166	Oct-63	2.30E+03	1.77E+02	1.88E+02	6.86E+02	3.31E+03
167	Nov-63	2.52E+03	1.94E+02	2.34E+02	6.59E+02	2.39E+03
168	Dec-63	3.19E+03	2.47E+02	1.74E+02	7.94E+02	2.72E+03
169	Jan-64	2.96E+03	2.42E+02	2.30E+02	8.06E+02	3.00E+03
170	Feb-64	2.42E+03	2.00E+02	2.25E+02	7.06E+02	2.57E+03
171	Mar-64	2.86E+03	3.06E+02	2.95E+02	8.13E+02	3.01E+03
172	Apr-64	2.84E+03	2.43E+02	3.92E+02	7.15E+02	3.99E+03
173	May-64	2.99E+03	1.50E+02	2.28E+02	5.96E+02	2.61E+03
174	Jun-64	1.58E+03	3.45E+01	5.79E+01	2.26E+02	5.89E+02
175	Jul-64	1.66E+03	3.05E+01	3.66E+01	2.32E+02	5.28E+02
176	Aug-64	2.43E+03	5.22E+01	1.50E+02	3.55E+02	1.14E+03
177	Sep-64	2.55E+03	1.26E+02	2.51E+02	6.46E+02	1.83E+03
178	Oct-64	2.20E+03	8.88E+01	1.11E+02	5.54E+02	1.74E+03
179	Nov-64	3.23E+03	1.80E+02	1.94E+02	6.99E+02	2.65E+03
180	Dec-64	3.43E+03	1.84E+02	2.12E+02	6.81E+02	2.29E+03
181	Jan-65	2.43E+03	1.76E+02	2.02E+02	3.38E+02	2.39E+03
182	Feb-65	2.17E+03	1.18E+02	1.84E+02	2.67E+02	1.52E+03
183	Mar-65	2.62E+03	1.89E+02	2.62E+02	5.03E+02	1.59E+03
184	Apr-65	2.50E+03	1.95E+02	2.04E+02	5.86E+02	1.44E+03
185	May-65	1.54E+03	7.28E+01	1.04E+02	3.98E+02	7.59E+02
186	Jun-65	1.28E+03	3.43E+01	6.96E+01	2.15E+02	4.18E+02
187	Jul-65	1.17E+03	3.27E+01	5.47E+01	2.65E+02	5.50E+02
188	Aug-65	1.52E+03	6.18E+01	7.06E+01	5.23E+02	8.30E+02
189	Sep-65	1.67E+03	1.15E+02	1.09E+02	6.66E+02	1.30E+03
190	Oct-65	1.93E+03	1.84E+02	7.14E+01	1.28E+03	1.56E+03
191	Nov-65	1.72E+03	1.51E+02	9.63E+01	9.09E+02	1.56E+03
192	Dec-65	2.04E+03	1.53E+02	1.39E+02	8.46E+02	1.24E+03
193	Jan-66	1.91E+03	1.43E+02	1.24E+02	4.77E+02	8.97E+02
194	Feb-66	1.79E+03	9.66E+01	9.40E+01	4.84E+02	7.85E+02
195	Mar-66	2.10E+03	1.56E+02	1.47E+02	6.88E+02	8.82E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
196	Apr-66	1.84E+03	1.28E+02	1.62E+02	5.28E+02	9.77E+02
197	May-66	1.52E+03	5.94E+01	9.17E+01	3.07E+02	6.74E+02
198	Jun-66	1.07E+03	2.74E+01	3.12E+01	1.97E+02	2.09E+02
199	Jul-66	4.02E+02	6.97E+00	1.03E+01	4.96E+01	5.16E+01
200	Aug-66	7.27E+02	1.17E+01	2.05E+01	7.35E+01	1.41E+02
201	Sep-66	2.11E+03	1.18E+02	1.81E+02	4.00E+02	8.86E+02
202	Oct-66	1.77E+03	1.10E+02	2.66E+02	4.70E+02	7.73E+02
203	Nov-66	1.74E+03	1.03E+02	1.93E+02	3.32E+02	7.36E+02
204	Dec-66	2.15E+03	1.08E+02	2.04E+02	4.19E+02	8.90E+02
205	Jan-67	1.99E+03	1.03E+02	2.53E+02	5.43E+02	7.92E+02
206	Feb-67	1.89E+03	1.17E+02	2.45E+02	3.45E+02	6.86E+02
207	Mar-67	1.90E+03	9.65E+01	2.84E+02	4.27E+02	8.91E+02
208	Apr-67	2.24E+03	1.59E+02	2.99E+02	6.82E+02	8.75E+02
209	May-67	1.79E+03	1.51E+02	1.67E+02	5.02E+02	9.60E+02
210	Jun-67	7.23E+02	3.30E+01	4.66E+01	1.93E+02	3.46E+02
211	Jul-67	9.27E+02	3.87E+01	6.86E+01	1.70E+02	4.06E+02
212	Aug-67	1.52E+03	9.19E+01	9.66E+01	3.67E+02	7.04E+02
213	Sep-67	1.53E+03	1.16E+02	1.66E+02	3.32E+02	1.32E+03
214	Oct-67	1.59E+03	1.24E+02	1.33E+02	5.05E+02	1.08E+03
215	Nov-67	1.54E+03	9.47E+01	1.35E+02	3.90E+02	9.74E+02
216	Dec-67	1.59E+03	9.38E+01	1.39E+02	4.74E+02	8.20E+02
217	Jan-68	1.42E+03	8.71E+01	8.93E+01	5.45E+02	7.89E+02
218	Feb-68	1.64E+03	1.56E+02	1.19E+02	4.48E+02	1.02E+03
219	Mar-68	1.58E+03	1.20E+02	1.25E+02	5.23E+02	8.58E+02
220	Apr-68	1.53E+03	1.62E+02	1.38E+02	5.08E+02	8.41E+02
221	May-68	1.42E+03	1.31E+02	9.59E+01	2.45E+02	8.77E+02
222	Jun-68	6.75E+02	2.37E+01	3.09E+01	1.11E+02	2.84E+02
223	Jul-68	5.78E+02	2.26E+01	3.38E+01	1.25E+02	2.86E+02
224	Aug-68	1.17E+03	7.27E+01	7.92E+01	2.42E+02	7.10E+02
225	Sep-68	1.15E+03	7.96E+01	7.60E+01	2.21E+02	7.82E+02
226	Oct-68	1.27E+03	8.43E+01	7.04E+01	3.74E+02	9.61E+02
227	Nov-68	1.25E+03	6.96E+01	9.66E+01	3.23E+02	7.39E+02
228	Dec-68	1.24E+03	7.28E+01	7.50E+01	3.27E+02	7.50E+02
229	Jan-69	1.09E+03	5.58E+01	7.64E+01	2.36E+02	4.70E+02
230	Feb-69	1.01E+03	6.48E+01	7.73E+01	2.45E+02	4.46E+02
231	Mar-69	1.22E+03	9.54E+01	1.04E+02	4.05E+02	7.42E+02
232	Apr-69	8.88E+02	5.46E+01	5.96E+01	2.82E+02	5.17E+02
233	May-69	6.69E+02	2.04E+01	3.12E+01	2.06E+02	2.34E+02
234	Jun-69	7.43E+02	2.02E+01	2.66E+01	1.71E+02	2.34E+02
235	Jul-69	6.53E+02	2.93E+01	3.49E+01	1.71E+02	2.26E+02
236	Aug-69	9.24E+02	6.15E+01	7.56E+01	2.31E+02	5.18E+02
237	Sep-69	8.44E+02	6.35E+01	5.27E+01	3.12E+02	3.85E+02
238	Oct-69	7.59E+02	5.27E+01	5.87E+01	2.71E+02	2.04E+02
239	Nov-69	6.41E+02	2.82E+01	5.41E+01	2.09E+02	1.77E+02
240	Dec-69	8.65E+02	2.93E+01	7.37E+01	2.60E+02	2.56E+02
241	Jan-70	1.22E+03	2.05E+01	4.21E+01	1.56E+02	6.83E+02
242	Feb-70	7.22E+01	1.95E+00	3.99E+00	1.20E+01	4.94E+01

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
243	Mar-70	1.73E+02	4.66E+00	2.47E+01	5.82E+00	1.38E+02
244	Apr-70	6.14E+02	2.20E+01	8.53E+01	9.79E+01	4.79E+02
245	May-70	5.07E+02	7.58E+00	6.60E+01	6.06E+01	3.76E+02
246	Jun-70	3.91E+02	2.46E+00	3.83E+01	2.50E+01	2.37E+02
247	Jul-70	5.03E+02	2.83E+01	5.60E+01	1.64E+02	3.35E+02
248	Aug-70	3.42E+02	2.22E+01	4.34E+01	1.20E+02	2.50E+02
249	Sep-70	6.27E+02	5.11E+01	1.01E+02	2.43E+02	5.44E+02
250	Oct-70	6.63E+02	5.21E+01	1.03E+02	2.54E+02	5.60E+02
251	Nov-70	6.19E+02	5.02E+01	9.92E+01	2.40E+02	5.35E+02
252	Dec-70	6.30E+02	4.93E+01	9.71E+01	2.40E+02	5.29E+02
253	Jan-71	4.99E+02	4.15E+01	8.22E+01	1.95E+02	4.39E+02
Location 4						
1	Jan-50	2.24E+02	5.20E+01	1.81E+02	1.88E+02	2.42E+03
2	Feb-50	1.89E+02	4.44E+01	1.56E+02	1.53E+02	2.07E+03
3	Mar-50	1.68E+02	3.66E+01	1.29E+02	1.34E+02	1.73E+03
4	Apr-50	1.38E+02	2.44E+01	8.76E+01	9.67E+01	1.19E+03
5	May-50	1.15E+02	1.54E+01	6.09E+01	6.02E+01	8.08E+02
6	Jun-50	6.92E+01	6.25E+00	3.07E+01	1.85E+01	3.86E+02
7	Jul-50	9.82E+01	8.86E+00	4.23E+01	3.23E+01	5.34E+02
8	Aug-50	1.72E+02	2.28E+01	8.65E+01	1.25E+02	1.14E+03
9	Sep-50	2.22E+02	3.64E+01	1.33E+02	1.95E+02	1.71E+03
10	Oct-50	2.98E+02	3.90E+01	1.71E+02	2.42E+02	2.21E+03
11	Nov-50	2.98E+02	4.67E+01	1.65E+02	2.27E+02	2.21E+03
12	Dec-50	2.40E+02	4.87E+01	1.70E+02	1.82E+02	2.29E+03
13	Jan-51	2.26E+02	3.19E+01	8.83E+01	1.20E+02	1.41E+03
14	Feb-51	3.01E+02	2.25E+01	6.90E+01	1.13E+02	1.17E+03
15	Mar-51	3.39E+02	2.76E+01	8.63E+01	1.42E+02	1.46E+03
16	Apr-51	1.73E+02	1.40E+01	5.26E+01	7.41E+01	9.15E+02
17	May-51	8.22E+01	4.29E+00	2.89E+01	2.48E+01	4.81E+02
18	Jun-51	9.69E+01	7.24E+00	3.25E+01	3.93E+01	4.81E+02
19	Jul-51	1.26E+02	8.90E+00	4.97E+01	4.56E+01	7.37E+02
20	Aug-51	2.91E+02	2.62E+01	8.84E+01	7.63E+01	1.44E+03
21	Sep-51	3.48E+02	4.68E+01	1.70E+02	1.53E+02	2.45E+03
22	Oct-51	3.41E+02	3.92E+01	1.15E+02	1.41E+02	1.94E+03
23	Nov-51	3.16E+02	3.70E+01	1.41E+02	8.39E+01	2.36E+03
24	Dec-51	2.98E+02	3.91E+01	1.02E+02	1.38E+02	2.05E+03
25	Jan-52	2.90E+02	3.96E+01	1.47E+02	1.70E+02	2.43E+03
26	Feb-52	2.97E+02	4.83E+01	5.89E+01	1.14E+02	1.61E+03
27	Mar-52	3.23E+02	3.30E+01	9.42E+01	1.57E+02	1.72E+03
28	Apr-52	2.10E+02	1.60E+01	3.73E+01	7.80E+01	8.97E+02
29	May-52	1.26E+02	7.77E+00	2.67E+01	3.90E+01	5.18E+02
30	Jun-52	1.15E+02	8.60E+00	2.25E+01	2.73E+01	4.85E+02
31	Jul-52	2.27E+02	1.71E+01	5.23E+01	5.40E+01	8.73E+02
32	Aug-52	3.48E+02	2.53E+01	6.42E+01	8.25E+01	1.35E+03
33	Sep-52	5.85E+02	5.77E+01	9.98E+01	1.16E+02	1.96E+03
34	Oct-52	6.34E+02	1.19E+02	1.62E+02	3.88E+02	2.66E+03
35	Nov-52	5.35E+02	1.13E+02	1.41E+02	4.11E+02	2.67E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
36	Dec-52	6.31E+02	1.40E+02	2.18E+02	5.16E+02	3.43E+03
37	Jan-53	4.70E+02	1.48E+02	1.34E+02	4.79E+02	2.52E+03
38	Feb-53	4.60E+02	9.06E+01	1.01E+02	3.20E+02	2.00E+03
39	Mar-53	5.98E+02	9.01E+01	9.86E+01	3.32E+02	2.01E+03
40	Apr-53	4.39E+02	6.96E+01	2.74E+01	2.06E+02	1.37E+03
41	May-53	3.90E+02	4.52E+01	4.92E+01	1.59E+02	1.20E+03
42	Jun-53	1.51E+02	1.51E+01	1.58E+01	6.00E+01	4.47E+02
43	Jul-53	2.13E+02	1.73E+01	4.26E+01	1.29E+02	7.61E+02
44	Aug-53	5.23E+02	4.71E+01	9.30E+01	4.27E+02	1.81E+03
45	Sep-53	5.63E+02	4.96E+01	1.20E+02	6.32E+02	2.52E+03
46	Oct-53	7.91E+02	6.86E+01	1.47E+02	7.28E+02	3.04E+03
47	Nov-53	3.24E+02	1.12E+02	1.32E+02	6.82E+02	2.42E+03
48	Dec-53	3.25E+02	1.37E+02	1.22E+02	5.46E+02	2.35E+03
49	Jan-54	2.67E+02	8.08E+01	2.47E+02	2.82E+02	2.50E+03
50	Feb-54	2.12E+02	6.51E+01	2.11E+02	2.41E+02	2.25E+03
51	Mar-54	2.67E+02	6.76E+01	2.10E+02	2.71E+02	2.31E+03
52	Apr-54	2.07E+02	5.31E+01	1.67E+02	2.13E+02	1.86E+03
53	May-54	2.22E+02	2.36E+01	8.61E+01	1.30E+02	1.04E+03
54	Jun-54	2.23E+02	1.39E+01	5.97E+01	7.93E+01	7.91E+02
55	Jul-54	2.78E+02	1.78E+01	7.41E+01	1.10E+02	7.92E+02
56	Aug-54	3.98E+02	4.02E+01	1.34E+02	2.79E+02	1.38E+03
57	Sep-54	4.19E+02	6.16E+01	1.91E+02	3.49E+02	1.90E+03
58	Oct-54	3.38E+02	7.97E+01	2.45E+02	3.70E+02	2.52E+03
59	Nov-54	3.28E+02	7.56E+01	2.32E+02	3.22E+02	2.09E+03
60	Dec-54	3.75E+02	8.65E+01	2.61E+02	3.40E+02	2.25E+03
61	Jan-55	3.59E+02	8.32E+01	2.49E+02	3.26E+02	2.37E+03
62	Feb-55	2.92E+02	5.86E+01	1.73E+02	2.40E+02	1.82E+03
63	Mar-55	5.81E+02	8.34E+01	2.98E+02	4.35E+02	2.57E+03
64	Apr-55	4.05E+02	5.71E+01	2.18E+02	4.00E+02	1.93E+03
65	May-55	2.11E+02	4.61E+01	2.09E+02	4.03E+02	1.93E+03
66	Jun-55	2.33E+02	1.65E+01	9.97E+01	2.10E+02	9.67E+02
67	Jul-55	3.78E+02	1.42E+01	7.47E+01	1.98E+02	8.35E+02
68	Aug-55	4.45E+02	3.10E+01	1.74E+02	4.22E+02	1.77E+03
69	Sep-55	4.33E+02	4.93E+01	2.21E+02	3.96E+02	2.18E+03
70	Oct-55	4.50E+02	9.56E+01	3.56E+02	4.83E+02	2.74E+03
71	Nov-55	5.10E+02	9.11E+01	3.34E+02	4.43E+02	2.65E+03
72	Dec-55	4.72E+02	9.63E+01	3.44E+02	4.29E+02	2.82E+03
73	Jan-56	3.34E+02	5.07E+01	2.78E+02	2.60E+02	2.51E+03
74	Feb-56	3.28E+02	6.76E+01	3.12E+02	3.25E+02	2.76E+03
75	Mar-56	3.90E+02	1.13E+02	2.95E+02	3.06E+02	2.22E+03
76	Apr-56	3.80E+02	3.82E+01	1.49E+02	1.99E+02	1.21E+03
77	May-56	3.03E+02	1.66E+01	9.10E+01	1.17E+02	7.39E+02
78	Jun-56	3.84E+02	1.23E+01	8.17E+01	8.76E+01	6.36E+02
79	Jul-56	6.55E+02	1.75E+01	1.50E+02	2.35E+02	1.21E+03
80	Aug-56	7.95E+02	3.39E+01	2.87E+02	4.24E+02	2.21E+03
81	Sep-56	6.49E+02	5.78E+01	3.58E+02	4.85E+02	2.73E+03
82	Oct-56	4.45E+02	5.83E+01	2.78E+02	4.57E+02	2.10E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
83	Nov-56	4.62E+02	9.48E+01	2.92E+02	5.58E+02	2.45E+03
84	Dec-56	4.63E+02	1.13E+02	2.35E+02	7.36E+02	3.57E+03
85	Jan-57	6.01E+02	1.35E+02	2.29E+02	1.09E+03	3.13E+03
86	Feb-57	5.73E+02	1.28E+02	1.76E+02	7.70E+02	3.54E+03
87	Mar-57	4.71E+02	9.38E+01	1.76E+02	3.17E+02	2.80E+03
88	Apr-57	5.89E+02	8.49E+01	1.66E+02	4.35E+02	2.46E+03
89	May-57	4.76E+02	2.56E+01	6.97E+01	2.20E+02	1.02E+03
90	Jun-57	5.00E+02	2.02E+01	5.87E+01	1.60E+02	7.82E+02
91	Jul-57	1.01E+03	3.77E+01	2.13E+02	3.20E+02	1.59E+03
92	Aug-57	1.01E+03	1.12E+02	2.95E+02	4.52E+02	3.16E+03
93	Sep-57	8.47E+02	1.23E+02	4.15E+02	5.67E+02	3.48E+03
94	Oct-57	9.20E+02	1.32E+02	4.62E+02	6.60E+02	2.45E+03
95	Nov-57	9.07E+02	1.42E+02	5.09E+02	8.38E+02	2.54E+03
96	Dec-57	7.91E+02	2.66E+02	5.10E+02	1.20E+03	3.52E+03
97	Jan-58	8.34E+02	2.27E+02	2.98E+02	1.23E+03	3.26E+03
98	Feb-58	6.56E+02	1.60E+02	2.82E+02	9.55E+02	2.40E+03
99	Mar-58	8.75E+02	1.10E+02	1.98E+02	8.28E+02	2.41E+03
100	Apr-58	7.05E+02	1.90E+02	2.67E+02	6.15E+02	1.79E+03
101	May-58	6.72E+02	6.40E+01	1.17E+02	4.27E+02	9.50E+02
102	Jun-58	8.54E+02	4.54E+01	5.57E+01	2.39E+02	6.15E+02
103	Jul-58	1.17E+03	1.51E+02	1.43E+02	5.19E+02	1.41E+03
104	Aug-58	1.08E+03	1.34E+02	2.61E+02	7.82E+02	2.67E+03
105	Sep-58	9.61E+02	1.30E+02	1.60E+02	8.17E+02	2.33E+03
106	Oct-58	1.05E+03	1.72E+02	4.54E+02	9.77E+02	3.04E+03
107	Nov-58	7.28E+02	1.61E+02	3.04E+02	9.46E+02	2.75E+03
108	Dec-58	8.36E+02	1.88E+02	2.84E+02	1.09E+03	2.80E+03
109	Jan-59	7.47E+02	1.69E+02	1.39E+02	8.35E+02	1.40E+03
110	Feb-59	7.67E+02	1.78E+02	2.23E+02	1.05E+03	2.00E+03
111	Mar-59	1.35E+03	1.63E+02	2.42E+02	8.83E+02	1.61E+03
112	Apr-59	1.33E+03	1.02E+02	1.76E+02	5.64E+02	1.13E+03
113	May-59	1.13E+03	4.94E+01	1.04E+02	3.54E+02	6.91E+02
114	Jun-59	8.23E+02	2.59E+01	5.99E+01	1.65E+02	3.76E+02
115	Jul-59	1.04E+03	4.07E+01	1.07E+02	2.28E+02	5.50E+02
116	Aug-59	1.92E+03	8.01E+01	1.65E+02	4.17E+02	9.27E+02
117	Sep-59	1.45E+03	8.58E+01	3.63E+02	4.29E+02	1.06E+03
118	Oct-59	1.08E+03	1.34E+02	1.28E+02	5.96E+02	1.17E+03
119	Nov-59	1.55E+03	1.84E+02	3.34E+02	4.96E+02	1.26E+03
120	Dec-59	1.81E+03	1.45E+02	4.82E+02	5.29E+02	1.78E+03
121	Jan-60	1.75E+03	2.29E+02	1.00E+03	1.07E+03	2.40E+03
122	Feb-60	1.64E+03	1.65E+02	2.77E+02	5.61E+02	2.34E+03
123	Mar-60	1.68E+03	2.14E+02	3.24E+02	6.35E+02	2.43E+03
124	Apr-60	2.10E+03	9.80E+01	2.51E+02	5.92E+02	1.27E+03
125	May-60	1.72E+03	7.63E+01	2.11E+02	4.33E+02	7.79E+02
126	Jun-60	1.10E+03	4.56E+01	1.44E+02	2.66E+02	6.50E+02
127	Jul-60	1.23E+03	6.05E+01	1.86E+02	2.89E+02	9.37E+02
128	Aug-60	1.84E+03	1.05E+02	1.63E+02	7.20E+02	1.46E+03
129	Sep-60	1.76E+03	1.30E+02	3.83E+02	5.94E+02	1.95E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
130	Oct-60	1.35E+03	1.58E+02	3.93E+02	8.16E+02	1.97E+03
131	Nov-60	2.36E+03	2.44E+02	3.61E+02	9.29E+02	2.76E+03
132	Dec-60	1.47E+03	3.40E+02	5.86E+02	9.17E+02	2.97E+03
133	Jan-61	1.84E+03	3.60E+02	7.04E+02	1.22E+03	3.55E+03
134	Feb-61	1.32E+03	2.75E+02	3.22E+02	5.75E+02	2.11E+03
135	Mar-61	2.14E+03	2.65E+02	5.97E+02	7.76E+02	1.51E+03
136	Apr-61	1.66E+03	2.28E+02	6.76E+02	6.25E+02	1.02E+03
137	May-61	1.47E+03	1.15E+02	2.21E+02	4.02E+02	5.11E+02
138	Jun-61	9.39E+02	4.05E+01	1.37E+02	9.76E+01	2.99E+02
139	Jul-61	1.53E+03	5.36E+01	1.14E+02	2.05E+02	3.41E+02
140	Aug-61	1.23E+03	5.65E+01	4.21E+02	3.02E+02	8.92E+02
141	Sep-61	5.34E+02	1.10E+02	4.31E+02	2.69E+02	1.43E+03
142	Oct-61	8.40E+02	1.32E+02	2.93E+02	2.99E+02	1.65E+03
143	Nov-61	9.76E+02	1.49E+02	4.30E+02	3.24E+02	1.11E+03
144	Dec-61	8.91E+02	1.29E+02	2.74E+02	2.81E+02	1.29E+03
145	Jan-62	1.06E+03	1.20E+02	5.31E+02	1.99E+02	1.40E+03
146	Feb-62	1.21E+03	1.23E+02	3.51E+02	2.64E+02	1.21E+03
147	Mar-62	1.22E+03	1.86E+02	4.53E+02	4.20E+02	1.84E+03
148	Apr-62	1.67E+03	1.13E+02	5.56E+02	3.18E+02	1.30E+03
149	May-62	1.42E+03	7.69E+01	2.25E+02	1.96E+02	1.19E+03
150	Jun-62	1.40E+03	3.98E+01	2.03E+02	1.24E+02	5.26E+02
151	Jul-62	1.34E+03	4.92E+01	3.99E+02	1.43E+02	6.39E+02
152	Aug-62	1.64E+03	1.04E+02	5.31E+02	2.24E+02	1.33E+03
153	Sep-62	1.35E+03	1.55E+02	1.02E+03	2.13E+02	1.88E+03
154	Oct-62	1.02E+03	1.08E+02	3.81E+02	1.73E+02	1.61E+03
155	Nov-62	8.23E+02	9.67E+01	3.70E+02	1.54E+02	1.18E+03
156	Dec-62	9.43E+02	8.67E+01	4.73E+02	1.92E+02	1.11E+03
157	Jan-63	9.34E+02	8.44E+01	2.47E+02	1.23E+02	8.05E+02
158	Feb-63	8.67E+02	6.24E+01	1.89E+02	1.30E+02	1.03E+03
159	Mar-63	1.48E+03	1.32E+02	1.41E+02	4.63E+02	1.41E+03
160	Apr-63	1.74E+03	1.22E+02	2.06E+02	3.46E+02	1.15E+03
161	May-63	7.78E+02	5.58E+01	8.54E+01	2.05E+02	6.21E+02
162	Jun-63	8.62E+02	3.41E+01	3.55E+01	1.54E+02	4.33E+02
163	Jul-63	1.12E+03	5.04E+01	4.94E+01	2.15E+02	6.65E+02
164	Aug-63	1.21E+03	7.17E+01	8.80E+01	3.27E+02	1.08E+03
165	Sep-63	1.06E+03	9.56E+01	9.69E+01	3.17E+02	1.33E+03
166	Oct-63	8.61E+02	1.26E+02	1.37E+02	3.37E+02	1.99E+03
167	Nov-63	8.47E+02	1.29E+02	1.59E+02	2.97E+02	1.36E+03
168	Dec-63	1.09E+03	1.61E+02	1.19E+02	3.58E+02	1.51E+03
169	Jan-64	9.36E+02	1.49E+02	1.46E+02	3.40E+02	1.56E+03
170	Feb-64	9.53E+02	1.40E+02	1.62E+02	3.56E+02	1.56E+03
171	Mar-64	9.86E+02	1.98E+02	1.98E+02	3.68E+02	1.67E+03
172	Apr-64	7.92E+02	1.18E+02	1.93E+02	2.53E+02	1.66E+03
173	May-64	1.18E+03	7.89E+01	1.22E+02	2.65E+02	1.28E+03
174	Jun-64	9.07E+02	2.35E+01	3.97E+01	1.40E+02	3.85E+02
175	Jul-64	1.14E+03	2.55E+01	3.10E+01	1.74E+02	4.21E+02
176	Aug-64	1.37E+03	4.19E+01	1.22E+02	2.32E+02	8.33E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
177	Sep-64	1.05E+03	8.87E+01	1.82E+02	3.33E+02	1.13E+03
178	Oct-64	1.02E+03	6.75E+01	8.71E+01	3.18E+02	1.17E+03
179	Nov-64	1.28E+03	1.25E+02	1.39E+02	3.54E+02	1.60E+03
180	Dec-64	1.16E+03	1.03E+02	1.21E+02	2.87E+02	1.14E+03
181	Jan-65	8.86E+02	9.71E+01	1.14E+02	1.47E+02	1.19E+03
182	Feb-65	7.83E+02	6.07E+01	9.65E+01	1.12E+02	7.14E+02
183	Mar-65	9.79E+02	1.06E+02	1.49E+02	2.23E+02	8.05E+02
184	Apr-65	8.87E+02	1.02E+02	1.10E+02	2.45E+02	6.84E+02
185	May-65	7.62E+02	4.40E+01	6.35E+01	2.15E+02	4.38E+02
186	Jun-65	7.20E+02	2.30E+01	4.70E+01	1.30E+02	2.68E+02
187	Jul-65	7.22E+02	2.53E+01	4.29E+01	1.81E+02	4.02E+02
188	Aug-65	8.24E+02	4.80E+01	5.59E+01	3.31E+02	5.91E+02
189	Sep-65	6.91E+02	7.98E+01	7.77E+01	3.45E+02	7.92E+02
190	Oct-65	6.98E+02	1.18E+02	4.83E+01	5.89E+02	8.69E+02
191	Nov-65	6.70E+02	1.04E+02	6.70E+01	4.54E+02	9.26E+02
192	Dec-65	8.08E+02	1.03E+02	9.55E+01	4.22E+02	7.31E+02
193	Jan-66	6.75E+02	8.96E+01	7.93E+01	2.15E+02	4.86E+02
194	Feb-66	7.56E+02	6.87E+01	6.82E+01	2.55E+02	4.88E+02
195	Mar-66	8.24E+02	1.01E+02	9.75E+01	3.35E+02	5.06E+02
196	Apr-66	6.33E+02	6.95E+01	8.90E+01	2.21E+02	4.71E+02
197	May-66	8.07E+02	4.08E+01	6.35E+01	1.82E+02	4.32E+02
198	Jun-66	7.27E+02	2.23E+01	2.56E+01	1.45E+02	1.63E+02
199	Jul-66	2.88E+02	6.30E+00	9.35E+00	3.95E+01	4.41E+01
200	Aug-66	3.96E+02	9.68E+00	1.73E+01	4.80E+01	1.05E+02
201	Sep-66	9.13E+02	8.95E+01	1.41E+02	2.20E+02	5.84E+02
202	Oct-66	7.13E+02	8.02E+01	1.97E+02	2.42E+02	4.86E+02
203	Nov-66	6.68E+02	7.33E+01	1.43E+02	1.68E+02	4.49E+02
204	Dec-66	8.64E+02	7.55E+01	1.46E+02	2.13E+02	5.40E+02
205	Jan-67	7.79E+02	6.64E+01	1.66E+02	2.63E+02	4.50E+02
206	Feb-67	7.49E+02	7.60E+01	1.63E+02	1.69E+02	3.94E+02
207	Mar-67	8.36E+02	6.68E+01	1.99E+02	2.27E+02	5.48E+02
208	Apr-67	9.52E+02	1.02E+02	1.96E+02	3.46E+02	5.08E+02
209	May-67	6.79E+02	8.25E+01	9.45E+01	2.23E+02	4.75E+02
210	Jun-67	4.55E+02	2.45E+01	3.49E+01	1.30E+02	2.47E+02
211	Jul-67	6.43E+02	3.30E+01	5.90E+01	1.29E+02	3.29E+02
212	Aug-67	8.70E+02	7.64E+01	8.20E+01	2.46E+02	5.34E+02
213	Sep-67	7.14E+02	9.11E+01	1.33E+02	1.94E+02	8.99E+02
214	Oct-67	6.46E+02	8.74E+01	9.73E+01	2.60E+02	6.69E+02
215	Nov-67	6.17E+02	6.60E+01	9.55E+01	1.99E+02	5.90E+02
216	Dec-67	7.37E+02	6.67E+01	1.01E+02	2.64E+02	5.25E+02
217	Jan-68	5.90E+02	5.95E+01	6.24E+01	2.80E+02	4.76E+02
218	Feb-68	6.16E+02	8.82E+01	6.92E+01	2.03E+02	5.25E+02
219	Mar-68	7.40E+02	8.07E+01	8.55E+01	2.86E+02	5.27E+02
220	Apr-68	6.65E+02	1.05E+02	9.17E+01	2.63E+02	4.95E+02
221	May-68	6.02E+02	7.86E+01	5.88E+01	1.23E+02	4.79E+02
222	Jun-68	4.06E+02	1.71E+01	2.24E+01	7.18E+01	1.96E+02
223	Jul-68	3.91E+02	1.93E+01	2.91E+01	9.34E+01	2.30E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
224	Aug-68	6.20E+02	5.72E+01	6.36E+01	1.52E+02	5.07E+02
225	Sep-68	5.44E+02	6.00E+01	5.87E+01	1.28E+02	5.25E+02
226	Oct-68	5.21E+02	5.92E+01	5.09E+01	1.93E+02	5.89E+02
227	Nov-68	4.97E+02	4.58E+01	6.44E+01	1.59E+02	4.30E+02
228	Dec-68	5.47E+02	5.01E+01	5.30E+01	1.75E+02	4.62E+02
229	Jan-69	4.72E+02	3.51E+01	4.88E+01	1.20E+02	2.69E+02
230	Feb-69	5.00E+02	4.62E+01	5.63E+01	1.42E+02	2.91E+02
231	Mar-69	5.09E+02	5.77E+01	6.42E+01	1.99E+02	4.09E+02
232	Apr-69	4.44E+02	3.32E+01	3.66E+01	1.53E+02	2.99E+02
233	May-69	3.51E+02	1.31E+01	2.00E+01	1.17E+02	1.42E+02
234	Jun-69	4.48E+02	1.49E+01	1.97E+01	1.12E+02	1.64E+02
235	Jul-69	4.06E+02	2.42E+01	2.92E+01	1.20E+02	1.74E+02
236	Aug-69	4.87E+02	4.99E+01	6.26E+01	1.47E+02	3.77E+02
237	Sep-69	3.67E+02	4.85E+01	4.18E+01	1.72E+02	2.57E+02
238	Oct-69	3.40E+02	3.94E+01	4.47E+01	1.52E+02	1.36E+02
239	Nov-69	3.03E+02	2.16E+01	4.19E+01	1.21E+02	1.19E+02
240	Dec-69	4.21E+02	2.25E+01	5.76E+01	1.54E+02	1.76E+02
241	Jan-70	5.04E+02	1.28E+01	2.67E+01	7.66E+01	3.83E+02
242	Feb-70	2.96E+01	1.36E+00	2.86E+00	6.23E+00	3.10E+01
243	Mar-70	7.06E+01	3.02E+00	1.63E+01	2.93E+00	7.96E+01
244	Apr-70	2.57E+02	1.40E+01	5.53E+01	4.87E+01	2.74E+02
245	May-70	1.83E+02	4.01E+00	3.43E+01	2.54E+01	1.75E+02
246	Jun-70	1.71E+02	1.35E+00	2.11E+01	1.22E+01	1.23E+02
247	Jul-70	2.46E+02	2.00E+01	4.04E+01	9.42E+01	2.17E+02
248	Aug-70	1.78E+02	1.79E+01	3.57E+01	7.55E+01	1.81E+02
249	Sep-70	2.58E+02	3.65E+01	7.39E+01	1.27E+02	3.39E+02
250	Oct-70	2.73E+02	3.72E+01	7.52E+01	1.32E+02	3.48E+02
251	Nov-70	2.40E+02	3.37E+01	6.82E+01	1.17E+02	3.13E+02
252	Dec-70	2.47E+02	3.19E+01	6.44E+01	1.17E+02	3.02E+02
253	Jan-71	1.62E+02	2.14E+01	4.32E+01	7.73E+01	2.02E+02
Location 5						
1	Jan-50	1.22E+02	4.94E+01	1.77E+02	1.30E+02	2.01E+03
2	Feb-50	1.09E+02	4.30E+01	1.55E+02	1.11E+02	1.77E+03
3	Mar-50	9.75E+01	3.53E+01	1.27E+02	9.68E+01	1.47E+03
4	Apr-50	8.50E+01	2.38E+01	8.71E+01	7.28E+01	1.04E+03
5	May-50	7.38E+01	1.51E+01	6.11E+01	4.67E+01	7.17E+02
6	Jun-50	4.86E+01	6.17E+00	3.07E+01	1.52E+01	3.50E+02
7	Jul-50	6.55E+01	8.63E+00	4.19E+01	2.53E+01	4.74E+02
8	Aug-50	1.04E+02	2.21E+01	8.58E+01	9.23E+01	9.80E+02
9	Sep-50	1.29E+02	3.53E+01	1.32E+02	1.42E+02	1.46E+03
10	Oct-50	1.72E+02	3.81E+01	1.71E+02	1.76E+02	1.89E+03
11	Nov-50	1.73E+02	4.52E+01	1.64E+02	1.65E+02	1.89E+03
12	Dec-50	1.41E+02	4.73E+01	1.69E+02	1.33E+02	1.97E+03
13	Jan-51	1.30E+02	3.03E+01	8.58E+01	8.58E+01	1.18E+03
14	Feb-51	1.79E+02	2.19E+01	6.86E+01	8.37E+01	1.01E+03
15	Mar-51	1.98E+02	2.66E+01	8.52E+01	1.04E+02	1.25E+03
16	Apr-51	1.09E+02	1.38E+01	5.28E+01	5.69E+01	8.06E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
17	May-51	5.62E+01	4.28E+00	2.90E+01	2.00E+01	4.34E+02
18	Jun-51	6.58E+01	7.07E+00	3.24E+01	3.13E+01	4.30E+02
19	Jul-51	8.15E+01	8.68E+00	4.94E+01	3.53E+01	6.49E+02
20	Aug-51	1.73E+02	2.54E+01	8.77E+01	5.63E+01	1.24E+03
21	Sep-51	1.99E+02	4.54E+01	1.69E+02	1.10E+02	2.08E+03
22	Oct-51	1.98E+02	3.83E+01	1.15E+02	1.03E+02	1.67E+03
23	Nov-51	1.84E+02	3.61E+01	1.40E+02	6.17E+01	2.02E+03
24	Dec-51	1.72E+02	3.79E+01	1.02E+02	9.93E+01	1.75E+03
25	Jan-52	1.68E+02	3.82E+01	1.45E+02	1.23E+02	2.06E+03
26	Feb-52	1.72E+02	4.66E+01	5.96E+01	8.34E+01	1.38E+03
27	Mar-52	1.90E+02	3.23E+01	9.34E+01	1.15E+02	1.48E+03
28	Apr-52	1.32E+02	1.57E+01	3.75E+01	5.96E+01	7.88E+02
29	May-52	8.62E+01	7.67E+00	2.66E+01	3.13E+01	4.66E+02
30	Jun-52	7.63E+01	8.41E+00	2.25E+01	2.15E+01	4.31E+02
31	Jul-52	1.43E+02	1.66E+01	5.17E+01	4.09E+01	7.61E+02
32	Aug-52	2.04E+02	2.46E+01	6.41E+01	6.04E+01	1.16E+03
33	Sep-52	3.23E+02	5.56E+01	9.90E+01	8.17E+01	1.65E+03
34	Oct-52	3.44E+02	1.15E+02	1.61E+02	2.69E+02	2.24E+03
35	Nov-52	2.88E+02	1.10E+02	1.40E+02	2.85E+02	2.24E+03
36	Dec-52	3.35E+02	1.35E+02	2.16E+02	3.56E+02	2.86E+03
37	Jan-53	2.57E+02	1.41E+02	1.31E+02	3.33E+02	2.09E+03
38	Feb-53	2.66E+02	8.79E+01	1.00E+02	2.33E+02	1.71E+03
39	Mar-53	3.47E+02	8.73E+01	9.77E+01	2.41E+02	1.72E+03
40	Apr-53	2.60E+02	6.78E+01	2.81E+01	1.52E+02	1.19E+03
41	May-53	2.43E+02	4.42E+01	4.88E+01	1.21E+02	1.05E+03
42	Jun-53	1.04E+02	1.49E+01	1.59E+01	4.84E+01	4.03E+02
43	Jul-53	1.36E+02	1.69E+01	4.22E+01	9.91E+01	6.68E+02
44	Aug-53	3.08E+02	4.57E+01	9.24E+01	3.12E+02	1.56E+03
45	Sep-53	3.28E+02	4.83E+01	1.20E+02	4.59E+02	2.16E+03
46	Oct-53	4.58E+02	6.67E+01	1.46E+02	5.29E+02	2.61E+03
47	Nov-53	3.95E+00	8.39E+01	1.31E+02	4.53E+01	6.54E+02
48	Dec-53	3.40E+00	1.03E+02	1.17E+02	3.59E+01	5.97E+02
49	Jan-54	3.28E+00	5.55E+01	2.07E+02	1.87E+01	6.08E+02
50	Feb-54	3.87E+00	5.48E+01	2.12E+02	2.19E+01	6.98E+02
51	Mar-54	5.88E+00	5.54E+01	2.06E+02	2.75E+01	7.55E+02
52	Apr-54	8.91E+00	4.71E+01	1.71E+02	3.30E+01	7.59E+02
53	May-54	5.23E+01	2.32E+01	9.01E+01	5.24E+01	6.69E+02
54	Jun-54	8.02E+01	1.32E+01	5.91E+01	4.40E+01	5.92E+02
55	Jul-54	8.07E+01	1.65E+01	7.25E+01	5.28E+01	5.56E+02
56	Aug-54	4.31E+01	3.50E+01	1.30E+02	7.15E+01	7.12E+02
57	Sep-54	2.02E+01	5.03E+01	1.81E+02	5.51E+01	7.51E+02
58	Oct-54	5.48E+00	6.41E+01	2.39E+02	3.08E+01	7.32E+02
59	Nov-54	5.06E+00	6.27E+01	2.34E+02	2.69E+01	6.38E+02
60	Dec-54	4.64E+00	6.64E+01	2.46E+02	2.39E+01	5.96E+02
61	Jan-55	3.43E+00	5.62E+01	2.07E+02	1.85E+01	5.32E+02
62	Feb-55	4.31E+00	5.14E+01	1.85E+02	1.98E+01	5.52E+02
63	Mar-55	1.10E+01	6.60E+01	2.78E+02	3.99E+01	7.93E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
64	Apr-55	1.44E+01	5.07E+01	2.24E+02	5.42E+01	7.48E+02
65	May-55	1.86E+01	4.15E+01	2.07E+02	9.33E+01	9.46E+02
66	Jun-55	7.24E+01	1.65E+01	1.02E+02	1.06E+02	7.04E+02
67	Jul-55	1.02E+02	1.31E+01	7.34E+01	9.18E+01	5.72E+02
68	Aug-55	3.52E+01	2.55E+01	1.62E+02	8.22E+01	7.60E+02
69	Sep-55	7.94E+00	3.91E+01	2.17E+02	3.75E+01	6.71E+02
70	Oct-55	5.26E+00	7.19E+01	3.35E+02	3.24E+01	7.21E+02
71	Nov-55	1.05E+01	7.53E+01	3.30E+02	4.41E+01	8.56E+02
72	Dec-55	1.45E+01	7.85E+01	3.33E+02	4.98E+01	9.48E+02
73	Jan-56	9.45E+00	3.72E+01	2.38E+02	2.94E+01	7.97E+02
74	Feb-56	6.65E+00	5.46E+01	3.08E+02	3.10E+01	8.87E+02
75	Mar-56	1.71E+01	9.29E+01	2.97E+02	4.49E+01	8.79E+02
76	Apr-56	7.41E+01	3.74E+01	1.51E+02	7.36E+01	7.48E+02
77	May-56	1.08E+02	1.61E+01	9.10E+01	6.43E+01	5.55E+02
78	Jun-56	1.55E+02	1.16E+01	8.00E+01	5.13E+01	4.86E+02
79	Jul-56	1.26E+02	1.60E+01	1.45E+02	8.68E+01	7.40E+02
80	Aug-56	4.35E+01	2.81E+01	2.73E+02	7.00E+01	8.83E+02
81	Sep-56	1.24E+01	4.50E+01	3.47E+02	4.34E+01	8.23E+02
82	Oct-56	6.74E+00	4.77E+01	2.88E+02	3.61E+01	6.33E+02
83	Nov-56	6.30E+00	7.12E+01	2.81E+02	4.08E+01	6.69E+02
84	Dec-56	6.92E+00	8.79E+01	2.35E+02	5.55E+01	9.61E+02
85	Jan-57	8.32E+00	9.49E+01	1.94E+02	8.19E+01	8.15E+02
86	Feb-57	1.04E+01	1.09E+02	1.88E+02	7.52E+01	1.10E+03
87	Mar-57	1.39E+01	7.59E+01	1.63E+02	4.12E+01	9.59E+02
88	Apr-57	3.69E+01	7.44E+01	1.65E+02	8.28E+01	1.12E+03
89	May-57	1.61E+02	2.66E+01	7.32E+01	1.16E+02	7.63E+02
90	Jun-57	1.45E+02	1.85E+01	5.69E+01	7.61E+01	5.37E+02
91	Jul-57	9.11E+01	3.24E+01	1.99E+02	7.54E+01	7.69E+02
92	Aug-57	2.78E+01	8.62E+01	2.86E+02	4.84E+01	1.01E+03
93	Sep-57	8.06E+00	9.67E+01	3.92E+02	3.18E+01	8.52E+02
94	Oct-57	8.28E+00	1.03E+02	4.46E+02	3.79E+01	6.39E+02
95	Nov-57	6.68E+00	1.10E+02	4.95E+02	4.14E+01	5.81E+02
96	Dec-57	5.75E+00	1.87E+02	4.94E+02	5.66E+01	7.57E+02
97	Jan-58	5.64E+00	1.46E+02	2.39E+02	5.54E+01	6.41E+02
98	Feb-58	1.85E+01	1.44E+02	2.87E+02	1.04E+02	8.17E+02
99	Mar-58	3.25E+01	9.29E+01	1.94E+02	1.18E+02	9.00E+02
100	Apr-58	5.64E+01	1.58E+02	2.54E+02	1.35E+02	8.59E+02
101	May-58	1.61E+02	6.56E+01	1.24E+02	1.79E+02	6.33E+02
102	Jun-58	2.41E+02	4.18E+01	5.47E+01	1.14E+02	4.25E+02
103	Jul-58	1.08E+02	1.26E+02	1.34E+02	1.17E+02	6.59E+02
104	Aug-58	2.61E+01	1.14E+02	2.44E+02	7.72E+01	8.15E+02
105	Sep-58	9.21E+00	1.05E+02	1.80E+02	4.90E+01	6.11E+02
106	Oct-58	1.04E+01	1.31E+02	3.96E+02	5.88E+01	7.42E+02
107	Nov-58	1.02E+01	1.31E+02	3.24E+02	7.11E+01	7.82E+02
108	Dec-58	1.88E+01	1.48E+02	2.73E+02	1.09E+02	8.96E+02
109	Jan-59	2.49E+01	1.22E+02	1.17E+02	9.84E+01	4.45E+02
110	Feb-59	2.63E+01	1.48E+02	2.10E+02	1.34E+02	7.14E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
111	Mar-59	6.02E+01	1.41E+02	2.36E+02	1.45E+02	6.80E+02
112	Apr-59	1.24E+02	9.52E+01	1.80E+02	1.42E+02	5.90E+02
113	May-59	2.53E+02	4.75E+01	1.05E+02	1.49E+02	4.61E+02
114	Jun-59	2.94E+02	2.52E+01	6.06E+01	9.23E+01	2.86E+02
115	Jul-59	2.33E+02	3.69E+01	1.03E+02	9.32E+01	3.52E+02
116	Aug-59	1.12E+02	6.56E+01	1.56E+02	7.32E+01	3.85E+02
117	Sep-59	6.93E+01	7.55E+01	3.44E+02	6.95E+01	4.31E+02
118	Oct-59	7.16E+01	1.13E+02	1.44E+02	1.15E+02	5.24E+02
119	Nov-59	8.17E+01	1.55E+02	3.13E+02	8.84E+01	5.28E+02
120	Dec-59	7.10E+01	1.20E+02	4.47E+02	7.33E+01	6.36E+02
121	Jan-60	2.78E+01	1.62E+02	8.50E+02	8.42E+01	6.39E+02
122	Feb-60	3.58E+01	1.40E+02	3.56E+02	6.42E+01	7.46E+02
123	Mar-60	4.38E+01	1.76E+02	3.21E+02	6.39E+01	7.76E+02
124	Apr-60	2.99E+02	8.90E+01	2.38E+02	1.84E+02	7.25E+02
125	May-60	3.06E+02	7.29E+01	2.18E+02	1.55E+02	4.90E+02
126	Jun-60	2.91E+02	4.30E+01	1.43E+02	1.22E+02	4.42E+02
127	Jul-60	2.18E+02	5.41E+01	1.79E+02	1.03E+02	5.55E+02
128	Aug-60	9.24E+01	8.46E+01	1.62E+02	1.11E+02	5.75E+02
129	Sep-60	2.07E+01	1.06E+02	3.51E+02	4.31E+01	5.20E+02
130	Oct-60	1.30E+01	1.20E+02	3.83E+02	4.46E+01	4.81E+02
131	Nov-60	2.46E+01	1.83E+02	3.59E+02	6.08E+01	6.93E+02
132	Dec-60	1.34E+01	2.48E+02	5.27E+02	4.82E+01	6.78E+02
133	Jan-61	1.69E+01	2.43E+02	5.89E+02	6.67E+01	7.79E+02
134	Feb-61	5.77E+01	2.42E+02	3.61E+02	9.47E+01	8.96E+02
135	Mar-61	9.48E+01	2.26E+02	5.59E+02	1.20E+02	6.37E+02
136	Apr-61	1.02E+02	2.01E+02	6.60E+02	1.21E+02	4.69E+02
137	May-61	2.79E+02	1.13E+02	2.53E+02	1.46E+02	3.21E+02
138	Jun-61	3.64E+02	3.85E+01	1.34E+02	5.75E+01	2.25E+02
139	Jul-61	1.80E+02	4.72E+01	1.13E+02	5.51E+01	1.82E+02
140	Aug-61	3.49E+01	4.75E+01	3.81E+02	3.23E+01	2.76E+02
141	Sep-61	6.20E+00	7.77E+01	4.18E+02	1.55E+01	3.16E+02
142	Oct-61	5.90E+00	1.03E+02	3.31E+02	1.44E+01	3.65E+02
143	Nov-61	6.31E+00	1.12E+02	3.92E+02	1.51E+01	2.65E+02
144	Dec-61	5.22E+00	1.00E+02	2.93E+02	1.24E+01	2.61E+02
145	Jan-62	1.36E+01	7.96E+01	4.28E+02	1.34E+01	3.38E+02
146	Feb-62	2.50E+01	9.96E+01	3.64E+02	2.53E+01	3.99E+02
147	Mar-62	1.53E+01	1.45E+02	4.43E+02	2.80E+01	4.78E+02
148	Apr-62	1.63E+02	1.00E+02	5.19E+02	7.20E+01	6.07E+02
149	May-62	2.57E+02	7.14E+01	2.35E+02	7.26E+01	7.25E+02
150	Jun-62	3.54E+02	3.73E+01	1.98E+02	5.57E+01	3.62E+02
151	Jul-62	1.73E+02	4.38E+01	3.83E+02	4.18E+01	3.48E+02
152	Aug-62	8.19E+01	8.37E+01	5.08E+02	3.50E+01	5.01E+02
153	Sep-62	1.26E+01	1.17E+02	9.42E+02	1.23E+01	4.32E+02
154	Oct-62	1.33E+01	9.28E+01	4.92E+02	1.25E+01	4.43E+02
155	Nov-62	1.44E+01	8.03E+01	3.63E+02	1.32E+01	3.66E+02
156	Dec-62	2.69E+01	7.08E+01	4.42E+02	2.22E+01	3.85E+02
157	Jan-63	1.85E+01	6.00E+01	2.09E+02	1.11E+01	2.31E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
158	Feb-63	3.82E+01	5.63E+01	1.96E+02	1.99E+01	4.03E+02
159	Mar-63	3.40E+01	1.02E+02	1.43E+02	4.28E+01	4.48E+02
160	Apr-63	8.50E+01	1.06E+02	1.97E+02	5.88E+01	4.91E+02
161	May-63	1.12E+02	5.40E+01	9.18E+01	6.44E+01	3.63E+02
162	Jun-63	2.25E+02	3.18E+01	3.58E+01	7.04E+01	2.96E+02
163	Jul-63	1.56E+02	4.33E+01	4.65E+01	6.41E+01	3.56E+02
164	Aug-63	4.24E+01	5.95E+01	8.34E+01	4.25E+01	3.87E+02
165	Sep-63	1.18E+01	7.50E+01	9.73E+01	2.11E+01	3.46E+02
166	Oct-63	6.12E+00	9.47E+01	1.29E+02	1.64E+01	4.28E+02
167	Nov-63	5.68E+00	1.00E+02	1.54E+02	1.46E+01	3.30E+02
168	Dec-63	8.97E+00	1.22E+02	1.24E+02	1.94E+01	3.56E+02
169	Jan-64	6.58E+00	9.58E+01	1.18E+02	1.57E+01	3.11E+02
170	Feb-64	1.35E+01	1.17E+02	1.60E+02	2.74E+01	4.48E+02
171	Mar-64	1.07E+01	1.49E+02	1.87E+02	2.36E+01	4.26E+02
172	Apr-64	2.45E+01	1.07E+02	1.89E+02	3.21E+01	5.91E+02
173	May-64	1.98E+02	7.39E+01	1.27E+02	8.51E+01	7.28E+02
174	Jun-64	3.55E+02	2.31E+01	4.03E+01	8.14E+01	3.05E+02
175	Jul-64	2.64E+02	2.27E+01	2.98E+01	7.11E+01	2.66E+02
176	Aug-64	8.45E+01	3.52E+01	1.12E+02	4.31E+01	3.51E+02
177	Sep-64	1.63E+01	6.78E+01	1.77E+02	2.54E+01	3.20E+02
178	Oct-64	2.20E+01	5.85E+01	9.81E+01	3.25E+01	3.82E+02
179	Nov-64	1.74E+01	9.63E+01	1.32E+02	2.68E+01	4.42E+02
180	Dec-64	3.48E+01	8.42E+01	1.16E+02	3.33E+01	3.94E+02
181	Jan-65	3.72E+01	7.75E+01	1.04E+02	2.18E+01	4.51E+02
182	Feb-65	7.72E+01	5.36E+01	9.27E+01	2.85E+01	3.68E+02
183	Mar-65	6.65E+01	8.78E+01	1.41E+02	4.35E+01	3.66E+02
184	Apr-65	1.01E+02	9.35E+01	1.18E+02	6.17E+01	3.51E+02
185	May-65	2.06E+02	4.21E+01	6.34E+01	9.97E+01	3.04E+02
186	Jun-65	2.42E+02	2.21E+01	4.67E+01	6.98E+01	1.99E+02
187	Jul-65	1.32E+02	2.26E+01	4.16E+01	6.38E+01	2.36E+02
188	Aug-65	5.17E+01	4.08E+01	5.55E+01	6.27E+01	2.65E+02
189	Sep-65	1.57E+01	6.22E+01	7.37E+01	3.39E+01	2.43E+02
190	Oct-65	1.01E+01	9.35E+01	5.41E+01	4.41E+01	2.52E+02
191	Nov-65	8.79E+00	8.59E+01	6.32E+01	3.46E+01	2.57E+02
192	Dec-65	1.32E+01	8.46E+01	9.11E+01	3.67E+01	2.31E+02
193	Jan-66	1.03E+01	6.41E+01	6.84E+01	1.65E+01	1.30E+02
194	Feb-66	1.51E+01	5.97E+01	6.94E+01	2.43E+01	1.58E+02
195	Mar-66	1.92E+01	7.96E+01	9.15E+01	3.46E+01	1.68E+02
196	Apr-66	2.77E+01	6.23E+01	8.87E+01	3.58E+01	1.90E+02
197	May-66	1.21E+02	3.84E+01	6.43E+01	5.79E+01	2.45E+02
198	Jun-66	1.63E+02	2.10E+01	2.63E+01	6.01E+01	1.12E+02
199	Jul-66	4.89E+01	6.65E+00	1.02E+01	1.54E+01	3.02E+01
200	Aug-66	1.44E+01	7.68E+00	1.59E+01	6.40E+00	3.57E+01
201	Sep-66	8.51E+00	6.11E+01	1.19E+02	1.22E+01	1.32E+02
202	Oct-66	7.41E+00	6.67E+01	1.91E+02	1.49E+01	1.30E+02
203	Nov-66	6.30E+00	5.80E+01	1.48E+02	1.06E+01	1.12E+02
204	Dec-66	1.32E+01	6.15E+01	1.44E+02	1.71E+01	1.56E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
205	Jan-67	1.49E+01	4.89E+01	1.46E+02	2.36E+01	1.31E+02
206	Feb-67	1.78E+01	6.13E+01	1.59E+02	1.96E+01	1.35E+02
207	Mar-67	2.31E+01	5.84E+01	1.96E+02	2.64E+01	1.90E+02
208	Apr-67	3.99E+01	8.41E+01	1.95E+02	5.12E+01	2.06E+02
209	May-67	8.35E+01	7.36E+01	1.03E+02	5.62E+01	2.29E+02
210	Jun-67	1.84E+02	2.39E+01	3.50E+01	7.66E+01	1.91E+02
211	Jul-67	1.35E+02	2.93E+01	5.60E+01	5.03E+01	2.01E+02
212	Aug-67	4.34E+01	6.32E+01	8.08E+01	3.86E+01	2.14E+02
213	Sep-67	1.28E+01	7.29E+01	1.23E+02	1.78E+01	2.54E+02
214	Oct-67	9.87E+00	7.14E+01	1.01E+02	2.03E+01	2.04E+02
215	Nov-67	1.00E+01	5.74E+01	9.61E+01	1.75E+01	1.81E+02
216	Dec-67	2.22E+01	5.67E+01	1.00E+02	3.21E+01	1.94E+02
217	Jan-68	1.17E+01	4.36E+01	5.44E+01	2.52E+01	1.38E+02
218	Feb-68	2.38E+01	7.14E+01	6.71E+01	3.06E+01	2.01E+02
219	Mar-68	4.51E+01	6.97E+01	8.11E+01	5.23E+01	2.30E+02
220	Apr-68	3.17E+01	8.37E+01	8.59E+01	4.11E+01	1.94E+02
221	May-68	5.48E+01	7.56E+01	6.57E+01	2.98E+01	2.35E+02
222	Jun-68	1.02E+02	1.76E+01	2.28E+01	3.18E+01	1.36E+02
223	Jul-68	6.11E+01	1.63E+01	2.65E+01	2.90E+01	1.24E+02
224	Aug-68	2.32E+01	4.70E+01	6.22E+01	2.15E+01	1.90E+02
225	Sep-68	1.33E+01	4.88E+01	5.76E+01	1.37E+01	1.71E+02
226	Oct-68	8.02E+00	4.76E+01	5.03E+01	1.48E+01	1.69E+02
227	Nov-68	1.12E+01	4.05E+01	6.30E+01	1.70E+01	1.51E+02
228	Dec-68	1.62E+01	4.15E+01	5.32E+01	2.12E+01	1.64E+02
229	Jan-69	2.44E+01	2.69E+01	4.26E+01	1.96E+01	1.05E+02
230	Feb-69	3.01E+01	3.86E+01	5.37E+01	2.62E+01	1.26E+02
231	Mar-69	3.50E+01	5.07E+01	6.41E+01	4.01E+01	1.87E+02
232	Apr-69	9.02E+01	3.14E+01	3.71E+01	6.04E+01	1.92E+02
233	May-69	9.13E+01	1.30E+01	2.06E+01	5.33E+01	1.01E+02
234	Jun-69	9.58E+01	1.37E+01	1.95E+01	4.56E+01	1.05E+02
235	Jul-69	4.84E+01	2.02E+01	2.73E+01	3.13E+01	8.64E+01
236	Aug-69	1.23E+01	3.98E+01	5.90E+01	1.64E+01	1.22E+02
237	Sep-69	3.90E+00	3.92E+01	4.47E+01	1.04E+01	7.16E+01
238	Oct-69	5.05E+00	3.29E+01	4.31E+01	1.24E+01	4.44E+01
239	Nov-69	5.62E+00	1.98E+01	4.23E+01	1.15E+01	3.79E+01
240	Dec-69	9.28E+00	1.82E+01	5.41E+01	1.56E+01	5.57E+01
241	Jan-70	1.54E+01	9.49E+00	2.32E+01	9.03E+00	1.26E+02
242	Feb-70	1.76E+00	2.35E+00	5.88E+00	1.52E+00	2.49E+01
243	Mar-70	1.75E+00	2.24E+00	1.41E+01	3.30E-01	2.49E+01
244	Apr-70	8.55E+00	1.06E+01	4.91E+01	5.95E+00	9.51E+01
245	May-70	2.40E+01	4.65E+00	3.67E+01	7.16E+00	9.38E+01
246	Jun-70	3.83E+01	1.27E+00	2.06E+01	5.14E+00	7.92E+01
247	Jul-70	1.64E+01	1.62E+01	3.86E+01	1.68E+01	9.45E+01
248	Aug-70	5.34E+00	1.51E+01	3.55E+01	9.11E+00	6.46E+01
249	Sep-70	2.76E+00	2.70E+01	6.69E+01	8.06E+00	8.45E+01
250	Oct-70	3.64E+00	3.09E+01	7.63E+01	1.00E+01	1.00E+02
251	Nov-70	3.62E+00	2.74E+01	6.73E+01	9.54E+00	9.19E+01

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
252	Dec-70	4.63E+00	2.60E+01	6.29E+01	1.09E+01	9.49E+01
253	Jan-71	5.34E+00	1.62E+01	3.82E+01	9.63E+00	6.89E+01
Location 6						
1	Jan-50	5.94E+01	4.69E+01	1.73E+02	8.48E+01	1.62E+03
2	Feb-50	5.57E+01	4.22E+01	1.57E+02	7.54E+01	1.48E+03
3	Mar-50	5.24E+01	3.42E+01	1.27E+02	6.73E+01	1.23E+03
4	Apr-50	4.98E+01	2.34E+01	8.77E+01	5.35E+01	8.99E+02
5	May-50	4.72E+01	1.50E+01	6.16E+01	3.62E+01	6.37E+02
6	Jun-50	3.69E+01	6.14E+00	3.08E+01	1.31E+01	3.26E+02
7	Jul-50	4.53E+01	8.39E+00	4.14E+01	2.03E+01	4.23E+02
8	Aug-50	5.87E+01	2.13E+01	8.50E+01	6.55E+01	8.30E+02
9	Sep-50	6.63E+01	3.40E+01	1.31E+02	9.54E+01	1.21E+03
10	Oct-50	8.74E+01	3.72E+01	1.71E+02	1.19E+02	1.57E+03
11	Nov-50	9.03E+01	4.36E+01	1.63E+02	1.13E+02	1.57E+03
12	Dec-50	7.42E+01	4.62E+01	1.69E+02	9.22E+01	1.65E+03
13	Jan-51	6.76E+01	2.88E+01	8.40E+01	5.82E+01	9.73E+02
14	Feb-51	9.98E+01	2.16E+01	6.94E+01	5.97E+01	8.66E+02
15	Mar-51	1.10E+02	2.58E+01	8.48E+01	7.31E+01	1.05E+03
16	Apr-51	6.62E+01	1.37E+01	5.35E+01	4.27E+01	7.05E+02
17	May-51	4.01E+01	4.32E+00	2.92E+01	1.66E+01	3.96E+02
18	Jun-51	4.67E+01	6.91E+00	3.22E+01	2.55E+01	3.90E+02
19	Jul-51	5.22E+01	8.46E+00	4.89E+01	2.71E+01	5.69E+02
20	Aug-51	9.34E+01	2.43E+01	8.67E+01	3.91E+01	1.04E+03
21	Sep-51	1.01E+02	4.36E+01	1.67E+02	7.29E+01	1.71E+03
22	Oct-51	1.02E+02	3.73E+01	1.17E+02	6.97E+01	1.40E+03
23	Nov-51	9.42E+01	3.51E+01	1.40E+02	4.23E+01	1.67E+03
24	Dec-51	8.78E+01	3.68E+01	1.02E+02	6.65E+01	1.46E+03
25	Jan-52	8.34E+01	3.60E+01	1.41E+02	8.09E+01	1.67E+03
26	Feb-52	8.83E+01	4.51E+01	6.14E+01	5.71E+01	1.16E+03
27	Mar-52	1.01E+02	3.18E+01	9.29E+01	7.88E+01	1.24E+03
28	Apr-52	7.94E+01	1.55E+01	3.82E+01	4.47E+01	6.90E+02
29	May-52	6.18E+01	7.60E+00	2.66E+01	2.58E+01	4.25E+02
30	Jun-52	5.17E+01	8.22E+00	2.24E+01	1.72E+01	3.86E+02
31	Jul-52	8.54E+01	1.60E+01	5.09E+01	3.01E+01	6.53E+02
32	Aug-52	1.07E+02	2.38E+01	6.39E+01	4.14E+01	9.64E+02
33	Sep-52	1.60E+02	5.31E+01	9.80E+01	5.41E+01	1.35E+03
34	Oct-52	1.70E+02	1.10E+02	1.60E+02	1.76E+02	1.83E+03
35	Nov-52	1.42E+02	1.06E+02	1.40E+02	1.88E+02	1.83E+03
36	Dec-52	1.58E+02	1.30E+02	2.14E+02	2.29E+02	2.31E+03
37	Jan-53	1.25E+02	1.34E+02	1.28E+02	2.17E+02	1.68E+03
38	Feb-53	1.38E+02	8.60E+01	1.00E+02	1.60E+02	1.43E+03
39	Mar-53	1.81E+02	8.50E+01	9.80E+01	1.65E+02	1.44E+03
40	Apr-53	1.42E+02	6.65E+01	2.94E+01	1.08E+02	1.01E+03
41	May-53	1.45E+02	4.34E+01	4.85E+01	8.93E+01	9.05E+02
42	Jun-53	7.66E+01	1.47E+01	1.59E+01	4.03E+01	3.70E+02
43	Jul-53	8.55E+01	1.64E+01	4.16E+01	7.48E+01	5.82E+02
44	Aug-53	1.65E+02	4.40E+01	9.15E+01	2.15E+02	1.30E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
45	Sep-53	1.68E+02	4.68E+01	1.19E+02	3.08E+02	1.78E+03
46	Oct-53	2.30E+02	6.44E+01	1.46E+02	3.55E+02	2.15E+03
47	Nov-53	2.01E+00	8.03E+01	1.31E+02	3.02E+01	5.40E+02
48	Dec-53	1.72E+00	9.97E+01	1.18E+02	2.43E+01	4.96E+02
49	Jan-54	1.60E+00	5.22E+01	2.01E+02	1.22E+01	4.88E+02
50	Feb-54	2.00E+00	5.36E+01	2.13E+02	1.49E+01	5.81E+02
51	Mar-54	3.02E+00	5.37E+01	2.06E+02	1.86E+01	6.27E+02
52	Apr-54	4.78E+00	4.60E+01	1.72E+02	2.30E+01	6.39E+02
53	May-54	3.64E+01	2.32E+01	9.14E+01	4.17E+01	5.99E+02
54	Jun-54	6.05E+01	1.30E+01	5.89E+01	3.74E+01	5.46E+02
55	Jul-54	5.63E+01	1.62E+01	7.20E+01	4.26E+01	5.01E+02
56	Aug-54	2.59E+01	3.39E+01	1.29E+02	5.23E+01	6.13E+02
57	Sep-54	1.13E+01	4.86E+01	1.79E+02	3.90E+01	6.33E+02
58	Oct-54	2.82E+00	6.19E+01	2.38E+02	2.08E+01	6.03E+02
59	Nov-54	2.56E+00	6.10E+01	2.35E+02	1.81E+01	5.30E+02
60	Dec-54	2.37E+00	6.41E+01	2.45E+02	1.61E+01	4.93E+02
61	Jan-55	1.67E+00	5.29E+01	2.01E+02	1.20E+01	4.26E+02
62	Feb-55	2.18E+00	5.05E+01	1.88E+02	1.34E+01	4.59E+02
63	Mar-55	5.57E+00	6.35E+01	2.74E+02	2.67E+01	6.53E+02
64	Apr-55	7.71E+00	4.97E+01	2.25E+02	3.76E+01	6.30E+02
65	May-55	1.06E+01	4.06E+01	2.07E+02	6.67E+01	8.05E+02
66	Jun-55	5.25E+01	1.66E+01	1.04E+02	8.78E+01	6.45E+02
67	Jul-55	6.97E+01	1.28E+01	7.33E+01	7.31E+01	5.12E+02
68	Aug-55	2.12E+01	2.45E+01	1.59E+02	5.95E+01	6.45E+02
69	Sep-55	4.14E+00	3.78E+01	2.17E+02	2.59E+01	5.59E+02
70	Oct-55	2.64E+00	6.88E+01	3.31E+02	2.15E+01	5.91E+02
71	Nov-55	5.34E+00	7.33E+01	3.31E+02	2.99E+01	7.11E+02
72	Dec-55	7.80E+00	7.57E+01	3.31E+02	3.41E+01	7.85E+02
73	Jan-56	4.88E+00	3.52E+01	2.32E+02	1.98E+01	6.52E+02
74	Feb-56	3.42E+00	5.28E+01	3.08E+02	2.10E+01	7.36E+02
75	Mar-56	9.15E+00	8.99E+01	2.99E+02	3.11E+01	7.39E+02
76	Apr-56	4.91E+01	3.70E+01	1.51E+02	5.69E+01	6.59E+02
77	May-56	7.89E+01	1.59E+01	9.11E+01	5.35E+01	5.08E+02
78	Jun-56	1.16E+02	1.14E+01	7.95E+01	4.34E+01	4.48E+02
79	Jul-56	8.01E+01	1.56E+01	1.44E+02	6.59E+01	6.47E+02
80	Aug-56	2.49E+01	2.70E+01	2.70E+02	4.96E+01	7.44E+02
81	Sep-56	6.54E+00	4.33E+01	3.45E+02	2.96E+01	6.83E+02
82	Oct-56	3.46E+00	4.64E+01	2.91E+02	2.43E+01	5.28E+02
83	Nov-56	3.19E+00	6.78E+01	2.78E+02	2.72E+01	5.47E+02
84	Dec-56	3.56E+00	8.50E+01	2.37E+02	3.74E+01	7.91E+02
85	Jan-57	4.12E+00	8.97E+01	1.89E+02	5.37E+01	6.57E+02
86	Feb-57	5.32E+00	1.07E+02	1.90E+02	5.14E+01	9.11E+02
87	Mar-57	7.43E+00	7.32E+01	1.61E+02	2.91E+01	7.99E+02
88	Apr-57	2.05E+01	7.27E+01	1.65E+02	5.85E+01	9.50E+02
89	May-57	1.19E+02	2.69E+01	7.48E+01	9.63E+01	7.04E+02
90	Jun-57	1.03E+02	1.81E+01	5.64E+01	6.21E+01	4.85E+02
91	Jul-57	5.40E+01	3.15E+01	1.96E+02	5.52E+01	6.59E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
92	Aug-57	1.50E+01	8.23E+01	2.83E+02	3.33E+01	8.37E+02
93	Sep-57	4.19E+00	9.38E+01	3.89E+02	2.14E+01	7.07E+02
94	Oct-57	4.14E+00	9.95E+01	4.45E+02	2.52E+01	5.32E+02
95	Nov-57	3.33E+00	1.06E+02	4.93E+02	2.75E+01	4.77E+02
96	Dec-57	2.89E+00	1.79E+02	4.93E+02	3.76E+01	6.20E+02
97	Jan-58	2.74E+00	1.37E+02	2.33E+02	3.59E+01	5.14E+02
98	Feb-58	9.62E+00	1.42E+02	2.89E+02	7.06E+01	6.82E+02
99	Mar-58	1.78E+01	9.02E+01	1.93E+02	8.33E+01	7.55E+02
100	Apr-58	3.26E+01	1.53E+02	2.53E+02	9.73E+01	7.37E+02
101	May-58	1.13E+02	6.61E+01	1.26E+02	1.43E+02	5.70E+02
102	Jun-58	1.70E+02	4.08E+01	5.45E+01	9.33E+01	3.83E+02
103	Jul-58	6.49E+01	1.21E+02	1.32E+02	8.55E+01	5.63E+02
104	Aug-58	1.41E+01	1.12E+02	2.42E+02	5.32E+01	6.77E+02
105	Sep-58	4.65E+00	1.02E+02	1.82E+02	3.28E+01	5.07E+02
106	Oct-58	5.18E+00	1.26E+02	3.90E+02	3.92E+01	6.09E+02
107	Nov-58	5.14E+00	1.26E+02	3.26E+02	4.75E+01	6.45E+02
108	Dec-58	9.81E+00	1.43E+02	2.72E+02	7.46E+01	7.46E+02
109	Jan-59	1.34E+01	1.16E+02	1.15E+02	6.76E+01	3.67E+02
110	Feb-59	1.43E+01	1.43E+02	2.07E+02	9.31E+01	5.95E+02
111	Mar-59	3.31E+01	1.37E+02	2.35E+02	1.03E+02	5.79E+02
112	Apr-59	7.17E+01	9.38E+01	1.81E+02	1.04E+02	5.09E+02
113	May-59	1.62E+02	4.70E+01	1.06E+02	1.16E+02	4.09E+02
114	Jun-59	2.20E+02	2.50E+01	6.09E+01	7.83E+01	2.65E+02
115	Jul-59	1.53E+02	3.59E+01	1.02E+02	7.24E+01	3.10E+02
116	Aug-59	6.48E+01	6.33E+01	1.55E+02	5.25E+01	3.26E+02
117	Sep-59	3.78E+01	7.36E+01	3.41E+02	4.85E+01	3.62E+02
118	Oct-59	4.05E+01	1.09E+02	1.47E+02	8.14E+01	4.45E+02
119	Nov-59	4.53E+01	1.51E+02	3.10E+02	6.32E+01	4.47E+02
120	Dec-59	3.95E+01	1.17E+02	4.40E+02	5.15E+01	5.31E+02
121	Jan-60	1.37E+01	1.53E+02	8.28E+02	5.51E+01	5.15E+02
122	Feb-60	1.86E+01	1.36E+02	3.71E+02	4.48E+01	6.21E+02
123	Mar-60	2.27E+01	1.71E+02	3.22E+02	4.31E+01	6.45E+02
124	Apr-60	1.81E+02	8.73E+01	2.36E+02	1.37E+02	6.32E+02
125	May-60	1.92E+02	7.19E+01	2.19E+02	1.18E+02	4.32E+02
126	Jun-60	1.95E+02	4.22E+01	1.43E+02	9.67E+01	3.93E+02
127	Jul-60	1.38E+02	5.26E+01	1.78E+02	7.89E+01	4.85E+02
128	Aug-60	5.23E+01	8.17E+01	1.62E+02	7.84E+01	4.88E+02
129	Sep-60	1.04E+01	1.03E+02	3.47E+02	2.91E+01	4.28E+02
130	Oct-60	6.64E+00	1.15E+02	3.81E+02	2.96E+01	3.96E+02
131	Nov-60	1.22E+01	1.77E+02	3.61E+02	4.06E+01	5.68E+02
132	Dec-60	6.97E+00	2.39E+02	5.20E+02	3.25E+01	5.60E+02
133	Jan-61	8.17E+00	2.29E+02	5.74E+02	4.31E+01	6.24E+02
134	Feb-61	3.12E+01	2.37E+02	3.70E+02	6.67E+01	7.61E+02
135	Mar-61	5.21E+01	2.20E+02	5.54E+02	8.48E+01	5.44E+02
136	Apr-61	5.72E+01	1.95E+02	6.56E+02	8.59E+01	4.00E+02
137	May-61	1.85E+02	1.13E+02	2.61E+02	1.13E+02	2.85E+02
138	Jun-61	2.74E+02	3.80E+01	1.33E+02	4.93E+01	2.07E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
139	Jul-61	1.11E+02	4.60E+01	1.14E+02	4.10E+01	1.59E+02
140	Aug-61	1.92E+01	4.62E+01	3.74E+02	2.23E+01	2.28E+02
141	Sep-61	3.33E+00	7.45E+01	4.18E+02	1.06E+01	2.60E+02
142	Oct-61	2.84E+00	9.94E+01	3.34E+02	9.38E+00	2.97E+02
143	Nov-61	3.16E+00	1.07E+02	3.86E+02	1.00E+01	2.20E+02
144	Dec-61	2.61E+00	9.73E+01	2.96E+02	8.31E+00	2.14E+02
145	Jan-62	6.71E+00	7.52E+01	4.17E+02	8.79E+00	2.72E+02
146	Feb-62	1.30E+01	9.65E+01	3.68E+02	1.72E+01	3.33E+02
147	Mar-62	7.75E+00	1.40E+02	4.42E+02	1.87E+01	3.94E+02
148	Apr-62	9.51E+01	9.79E+01	5.15E+02	5.20E+01	5.18E+02
149	May-62	1.60E+02	7.00E+01	2.38E+02	5.52E+01	6.33E+02
150	Jun-62	2.35E+02	3.66E+01	1.97E+02	4.40E+01	3.25E+02
151	Jul-62	1.06E+02	4.26E+01	3.78E+02	3.12E+01	3.01E+02
152	Aug-62	4.63E+01	8.05E+01	5.05E+02	2.48E+01	4.20E+02
153	Sep-62	6.61E+00	1.13E+02	9.28E+02	8.39E+00	3.55E+02
154	Oct-62	6.65E+00	9.12E+01	5.09E+02	8.32E+00	3.66E+02
155	Nov-62	7.29E+00	7.79E+01	3.62E+02	8.87E+00	3.04E+02
156	Dec-62	1.42E+01	6.86E+01	4.37E+02	1.52E+01	3.21E+02
157	Jan-63	9.36E+00	5.67E+01	2.03E+02	7.41E+00	1.87E+02
158	Feb-63	2.09E+01	5.50E+01	1.98E+02	1.39E+01	3.38E+02
159	Mar-63	1.77E+01	9.80E+01	1.44E+02	2.87E+01	3.72E+02
160	Apr-63	4.62E+01	1.04E+02	1.95E+02	4.15E+01	4.16E+02
161	May-63	6.89E+01	5.39E+01	9.40E+01	4.86E+01	3.20E+02
162	Jun-63	1.49E+02	3.12E+01	3.59E+01	5.53E+01	2.63E+02
163	Jul-63	9.66E+01	4.19E+01	4.59E+01	4.81E+01	3.08E+02
164	Aug-63	2.32E+01	5.77E+01	8.28E+01	2.97E+01	3.25E+02
165	Sep-63	6.01E+00	7.25E+01	9.72E+01	1.43E+01	2.86E+02
166	Oct-63	3.05E+00	9.12E+01	1.28E+02	1.09E+01	3.48E+02
167	Nov-63	2.80E+00	9.66E+01	1.53E+02	9.69E+00	2.73E+02
168	Dec-63	4.50E+00	1.18E+02	1.25E+02	1.30E+01	2.93E+02
169	Jan-64	3.21E+00	9.02E+01	1.14E+02	1.02E+01	2.49E+02
170	Feb-64	6.78E+00	1.14E+02	1.60E+02	1.82E+01	3.70E+02
171	Mar-64	5.44E+00	1.43E+02	1.87E+02	1.59E+01	3.53E+02
172	Apr-64	1.27E+01	1.04E+02	1.88E+02	2.19E+01	4.89E+02
173	May-64	1.25E+02	7.33E+01	1.30E+02	6.42E+01	6.38E+02
174	Jun-64	2.75E+02	2.31E+01	4.08E+01	7.01E+01	2.87E+02
175	Jul-64	1.77E+02	2.21E+01	2.96E+01	5.59E+01	2.36E+02
176	Aug-64	4.87E+01	3.41E+01	1.10E+02	3.11E+01	2.98E+02
177	Sep-64	8.40E+00	6.52E+01	1.76E+02	1.70E+01	2.64E+02
178	Oct-64	1.12E+01	5.69E+01	9.95E+01	2.20E+01	3.16E+02
179	Nov-64	8.82E+00	9.27E+01	1.31E+02	1.81E+01	3.65E+02
180	Dec-64	1.87E+01	8.13E+01	1.15E+02	2.28E+01	3.28E+02
181	Jan-65	2.01E+01	7.45E+01	1.03E+02	1.51E+01	3.77E+02
182	Feb-65	4.54E+01	5.23E+01	9.20E+01	2.09E+01	3.17E+02
183	Mar-65	3.83E+01	8.48E+01	1.40E+02	3.12E+01	3.12E+02
184	Apr-65	6.13E+01	9.19E+01	1.19E+02	4.55E+01	3.03E+02
185	May-65	1.36E+02	4.14E+01	6.32E+01	7.81E+01	2.70E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
186	Jun-65	1.78E+02	2.19E+01	4.66E+01	5.86E+01	1.83E+02
187	Jul-65	8.47E+01	2.20E+01	4.15E+01	4.88E+01	2.06E+02
188	Aug-65	2.93E+01	3.95E+01	5.54E+01	4.46E+01	2.25E+02
189	Sep-65	8.54E+00	5.99E+01	7.31E+01	2.36E+01	2.02E+02
190	Oct-65	5.15E+00	8.98E+01	5.46E+01	2.94E+01	2.08E+02
191	Nov-65	4.45E+00	8.42E+01	6.30E+01	2.35E+01	2.13E+02
192	Dec-65	6.59E+00	8.15E+01	8.98E+01	2.45E+01	1.91E+02
193	Jan-66	5.13E+00	6.08E+01	6.67E+01	1.09E+01	1.05E+02
194	Feb-66	7.67E+00	5.83E+01	6.97E+01	1.63E+01	1.31E+02
195	Mar-66	9.94E+00	7.64E+01	9.04E+01	2.33E+01	1.39E+02
196	Apr-66	1.51E+01	6.14E+01	8.92E+01	2.54E+01	1.61E+02
197	May-66	7.36E+01	3.78E+01	6.45E+01	4.30E+01	2.12E+02
198	Jun-66	1.06E+02	2.07E+01	2.66E+01	4.66E+01	1.00E+02
199	Jul-66	3.09E+01	6.76E+00	1.05E+01	1.21E+01	2.74E+01
200	Aug-66	8.11E+00	7.40E+00	1.57E+01	4.56E+00	2.98E+01
201	Sep-66	4.17E+00	5.77E+01	1.16E+02	7.95E+00	1.06E+02
202	Oct-66	3.73E+00	6.49E+01	1.90E+02	9.91E+00	1.08E+02
203	Nov-66	3.17E+00	5.65E+01	1.50E+02	7.16E+00	9.26E+01
204	Dec-66	6.46E+00	5.88E+01	1.42E+02	1.12E+01	1.26E+02
205	Jan-67	7.49E+00	4.65E+01	1.43E+02	1.57E+01	1.06E+02
206	Feb-67	9.33E+00	5.95E+01	1.59E+02	1.36E+01	1.13E+02
207	Mar-67	1.20E+01	5.68E+01	1.95E+02	1.80E+01	1.57E+02
208	Apr-67	2.18E+01	8.16E+01	1.95E+02	3.59E+01	1.75E+02
209	May-67	5.21E+01	7.21E+01	1.05E+02	4.18E+01	1.97E+02
210	Jun-67	1.40E+02	2.38E+01	3.50E+01	6.53E+01	1.77E+02
211	Jul-67	9.06E+01	2.84E+01	5.53E+01	3.97E+01	1.78E+02
212	Aug-67	2.45E+01	6.06E+01	8.00E+01	2.72E+01	1.80E+02
213	Sep-67	6.91E+00	7.10E+01	1.22E+02	1.24E+01	2.10E+02
214	Oct-67	5.08E+00	6.94E+01	1.02E+02	1.37E+01	1.70E+02
215	Nov-67	5.02E+00	5.59E+01	9.58E+01	1.17E+01	1.50E+02
216	Dec-67	1.18E+01	5.58E+01	1.02E+02	2.22E+01	1.64E+02
217	Jan-68	5.94E+00	4.14E+01	5.33E+01	1.68E+01	1.12E+02
218	Feb-68	1.29E+01	6.86E+01	6.65E+01	2.14E+01	1.69E+02
219	Mar-68	2.56E+01	6.81E+01	8.08E+01	3.74E+01	1.96E+02
220	Apr-68	1.18E+00	6.64E+01	8.17E+01	5.59E+00	7.20E+01
221	May-68	4.23E+00	6.84E+01	7.05E+01	5.56E+00	9.99E+01
222	Jun-68	2.17E+01	1.81E+01	2.36E+01	1.28E+01	8.99E+01
223	Jul-68	9.42E+00	1.42E+01	2.52E+01	9.11E+00	6.91E+01
224	Aug-68	5.10E-01	3.59E+01	5.78E+01	2.16E+00	5.88E+01
225	Sep-68	2.20E-01	4.06E+01	5.96E+01	1.21E+00	5.11E+01
226	Oct-68	8.00E-02	3.73E+01	4.99E+01	8.20E-01	4.17E+01
227	Nov-68	1.20E-01	3.38E+01	6.00E+01	1.14E+00	4.16E+01
228	Dec-68	2.60E-01	3.38E+01	5.50E+01	1.77E+00	4.88E+01
229	Jan-69	8.00E-01	2.06E+01	3.78E+01	2.50E+00	3.67E+01
230	Feb-69	1.27E+00	3.20E+01	5.20E+01	3.97E+00	5.09E+01
231	Mar-69	1.45E+00	4.39E+01	6.47E+01	5.97E+00	7.42E+01
232	Apr-69	1.46E+01	2.97E+01	3.82E+01	2.07E+01	1.15E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
233	May-69	2.02E+01	1.30E+01	2.13E+01	2.19E+01	6.83E+01
234	Jun-69	1.71E+01	1.24E+01	1.93E+01	1.67E+01	6.36E+01
235	Jul-69	6.34E+00	1.64E+01	2.47E+01	8.46E+00	4.28E+01
236	Aug-69	1.80E-01	3.03E+01	5.45E+01	1.31E+00	3.26E+01
237	Sep-69	2.00E-02	3.09E+01	4.96E+01	4.30E-01	1.75E+01
238	Oct-69	4.00E-02	2.70E+01	4.23E+01	6.50E-01	1.16E+01
239	Nov-69	5.00E-02	1.73E+01	4.14E+01	6.80E-01	9.49E+00
240	Dec-69	1.10E-01	1.45E+01	5.12E+01	1.10E+00	1.49E+01
241	Jan-70	3.00E-01	6.77E+00	1.98E+01	7.90E-01	3.53E+01
242	Feb-70	7.00E-02	3.34E+00	1.01E+01	2.70E-01	1.46E+01
243	Mar-70	2.00E-02	1.59E+00	1.18E+01	3.00E-02	6.47E+00
244	Apr-70	1.80E-01	7.91E+00	4.42E+01	5.60E-01	2.93E+01
245	May-70	3.55E+00	4.64E+00	3.81E+01	1.83E+00	4.46E+01
246	Jun-70	7.30E+00	1.19E+00	2.01E+01	1.98E+00	4.86E+01
247	Jul-70	1.01E+00	1.22E+01	3.58E+01	2.42E+00	3.77E+01
248	Aug-70	1.10E-01	1.30E+01	3.66E+01	9.20E-01	2.14E+01
249	Sep-70	2.00E-02	1.90E+01	5.96E+01	3.40E-01	1.71E+01
250	Oct-70	2.00E-02	2.37E+01	7.43E+01	4.60E-01	2.22E+01
251	Nov-70	3.00E-02	2.20E+01	6.76E+01	5.20E-01	2.25E+01
252	Dec-70	5.00E-02	2.12E+01	6.30E+01	7.50E-01	2.60E+01
253	Jan-71	1.00E-01	1.07E+01	3.00E+01	8.20E-01	1.84E+01
Location 7						
1	Jan-50	3.79E+01	4.48E+01	1.68E+02	6.46E+01	1.40E+03
2	Feb-50	3.70E+01	4.07E+01	1.54E+02	5.89E+01	1.30E+03
3	Mar-50	3.59E+01	3.26E+01	1.23E+02	5.32E+01	1.08E+03
4	Apr-50	3.44E+01	2.24E+01	8.53E+01	4.26E+01	7.96E+02
5	May-50	3.41E+01	1.46E+01	6.08E+01	2.98E+01	5.77E+02
6	Jun-50	2.75E+01	6.04E+00	3.06E+01	1.10E+01	2.99E+02
7	Jul-50	3.44E+01	8.23E+00	4.11E+01	1.72E+01	3.90E+02
8	Aug-50	4.16E+01	2.08E+01	8.44E+01	5.32E+01	7.50E+02
9	Sep-50	4.53E+01	3.32E+01	1.30E+02	7.60E+01	1.08E+03
10	Oct-50	5.96E+01	3.65E+01	1.70E+02	9.45E+01	1.41E+03
11	Nov-50	6.28E+01	4.23E+01	1.61E+02	9.07E+01	1.40E+03
12	Dec-50	5.13E+01	4.47E+01	1.66E+02	7.38E+01	1.47E+03
13	Jan-51	4.68E+01	2.74E+01	8.10E+01	4.61E+01	8.53E+02
14	Feb-51	6.82E+01	2.07E+01	6.74E+01	4.73E+01	7.63E+02
15	Mar-51	7.57E+01	2.46E+01	8.21E+01	5.81E+01	9.28E+02
16	Apr-51	4.71E+01	1.32E+01	5.19E+01	3.46E+01	6.27E+02
17	May-51	3.01E+01	4.25E+00	2.89E+01	1.41E+01	3.63E+02
18	Jun-51	3.47E+01	6.76E+00	3.20E+01	2.13E+01	3.57E+02
19	Jul-51	3.98E+01	8.33E+00	4.87E+01	2.31E+01	5.26E+02
20	Aug-51	6.63E+01	2.38E+01	8.62E+01	3.20E+01	9.36E+02
21	Sep-51	6.84E+01	4.26E+01	1.66E+02	5.80E+01	1.53E+03
22	Oct-51	7.07E+01	3.66E+01	1.17E+02	5.63E+01	1.26E+03
23	Nov-51	6.45E+01	3.43E+01	1.39E+02	3.41E+01	1.48E+03
24	Dec-51	5.98E+01	3.58E+01	1.02E+02	5.24E+01	1.30E+03
25	Jan-52	5.75E+01	3.50E+01	1.39E+02	6.48E+01	1.49E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
26	Feb-52	6.07E+01	4.35E+01	6.12E+01	4.58E+01	1.04E+03
27	Mar-52	7.02E+01	3.09E+01	9.08E+01	6.32E+01	1.11E+03
28	Apr-52	5.55E+01	1.48E+01	3.70E+01	3.58E+01	6.09E+02
29	May-52	4.59E+01	7.41E+00	2.62E+01	2.16E+01	3.87E+02
30	Jun-52	3.87E+01	8.05E+00	2.22E+01	1.45E+01	3.54E+02
31	Jul-52	6.21E+01	1.56E+01	5.04E+01	2.49E+01	5.94E+02
32	Aug-52	7.59E+01	2.34E+01	6.38E+01	3.37E+01	8.72E+02
33	Sep-52	1.04E+02	5.16E+01	9.73E+01	4.22E+01	1.19E+03
34	Oct-52	1.05E+02	1.07E+02	1.59E+02	1.31E+02	1.59E+03
35	Nov-52	8.84E+01	1.03E+02	1.40E+02	1.42E+02	1.59E+03
36	Dec-52	9.91E+01	1.27E+02	2.12E+02	1.73E+02	2.02E+03
37	Jan-53	7.93E+01	1.26E+02	1.23E+02	1.64E+02	1.44E+03
38	Feb-53	9.40E+01	8.27E+01	9.77E+01	1.27E+02	1.26E+03
39	Mar-53	1.25E+02	8.17E+01	9.57E+01	1.32E+02	1.27E+03
40	Apr-53	9.88E+01	6.36E+01	2.90E+01	8.64E+01	8.95E+02
41	May-53	1.02E+02	4.16E+01	4.69E+01	7.19E+01	8.03E+02
42	Jun-53	5.72E+01	1.44E+01	1.58E+01	3.39E+01	3.38E+02
43	Jul-53	6.40E+01	1.61E+01	4.11E+01	6.29E+01	5.33E+02
44	Aug-53	1.19E+02	4.30E+01	9.08E+01	1.77E+02	1.18E+03
45	Sep-53	1.17E+02	4.58E+01	1.18E+02	2.48E+02	1.60E+03
46	Oct-53	1.54E+02	6.29E+01	1.45E+02	2.79E+02	1.91E+03
47	Nov-53	1.35E+00	7.78E+01	1.30E+02	2.37E+01	4.80E+02
48	Dec-53	1.15E+00	9.63E+01	1.16E+02	1.91E+01	4.38E+02
49	Jan-54	1.07E+00	5.00E+01	1.95E+02	9.48E+00	4.27E+02
50	Feb-54	1.36E+00	5.15E+01	2.07E+02	1.18E+01	5.11E+02
51	Mar-54	2.06E+00	5.17E+01	2.02E+02	1.48E+01	5.55E+02
52	Apr-54	3.29E+00	4.41E+01	1.68E+02	1.82E+01	5.64E+02
53	May-54	2.69E+01	2.28E+01	9.09E+01	3.47E+01	5.46E+02
54	Jun-54	4.38E+01	1.28E+01	5.85E+01	3.10E+01	4.97E+02
55	Jul-54	4.22E+01	1.59E+01	7.16E+01	3.60E+01	4.62E+02
56	Aug-54	1.87E+01	3.32E+01	1.28E+02	4.29E+01	5.57E+02
57	Sep-54	8.16E+00	4.76E+01	1.78E+02	3.21E+01	5.75E+02
58	Oct-54	1.93E+00	6.05E+01	2.37E+02	1.66E+01	5.40E+02
59	Nov-54	1.75E+00	5.99E+01	2.34E+02	1.45E+01	4.77E+02
60	Dec-54	1.61E+00	6.26E+01	2.43E+02	1.28E+01	4.40E+02
61	Jan-55	1.10E+00	5.10E+01	1.97E+02	9.31E+00	3.74E+02
62	Feb-55	1.48E+00	4.96E+01	1.88E+02	1.07E+01	4.12E+02
63	Mar-55	3.83E+00	6.19E+01	2.71E+02	2.13E+01	5.84E+02
64	Apr-55	5.36E+00	4.81E+01	2.21E+02	3.00E+01	5.61E+02
65	May-55	7.28E+00	3.90E+01	2.01E+02	5.29E+01	7.11E+02
66	Jun-55	3.91E+01	1.64E+01	1.04E+02	7.38E+01	5.94E+02
67	Jul-55	5.27E+01	1.26E+01	7.24E+01	6.19E+01	4.71E+02
68	Aug-55	1.56E+01	2.39E+01	1.58E+02	4.90E+01	5.85E+02
69	Sep-55	2.89E+00	3.71E+01	2.17E+02	2.10E+01	5.05E+02
70	Oct-55	1.76E+00	6.69E+01	3.28E+02	1.70E+01	5.27E+02
71	Nov-55	3.70E+00	7.19E+01	3.29E+02	2.41E+01	6.39E+02
72	Dec-55	5.27E+00	7.23E+01	3.22E+02	2.67E+01	6.87E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
73	Jan-56	3.31E+00	3.29E+01	2.20E+02	1.54E+01	5.62E+02
74	Feb-56	2.33E+00	5.08E+01	3.01E+02	1.66E+01	6.51E+02
75	Mar-56	6.07E+00	8.52E+01	2.89E+02	2.42E+01	6.46E+02
76	Apr-56	3.52E+01	3.56E+01	1.47E+02	4.62E+01	5.87E+02
77	May-56	5.90E+01	1.55E+01	8.94E+01	4.48E+01	4.63E+02
78	Jun-56	8.79E+01	1.12E+01	7.89E+01	3.69E+01	4.12E+02
79	Jul-56	6.07E+01	1.53E+01	1.43E+02	5.58E+01	5.95E+02
80	Aug-56	1.79E+01	2.65E+01	2.68E+02	4.06E+01	6.73E+02
81	Sep-56	4.62E+00	4.22E+01	3.44E+02	2.39E+01	6.14E+02
82	Oct-56	2.37E+00	4.55E+01	2.91E+02	1.94E+01	4.75E+02
83	Nov-56	2.15E+00	6.58E+01	2.75E+02	2.15E+01	4.87E+02
84	Dec-56	2.43E+00	8.27E+01	2.35E+02	2.97E+01	7.04E+02
85	Jan-57	2.55E+00	8.67E+01	1.86E+02	4.24E+01	5.82E+02
86	Feb-57	3.29E+00	1.04E+02	1.88E+02	4.07E+01	8.08E+02
87	Mar-57	5.03E+00	6.86E+01	1.53E+02	2.29E+01	6.90E+02
88	Apr-57	1.38E+01	6.85E+01	1.58E+02	4.55E+01	8.24E+02
89	May-57	8.79E+01	2.65E+01	7.43E+01	8.04E+01	6.42E+02
90	Jun-57	7.78E+01	1.77E+01	5.58E+01	5.26E+01	4.45E+02
91	Jul-57	3.85E+01	3.08E+01	1.94E+02	4.52E+01	5.97E+02
92	Aug-57	1.04E+01	8.00E+01	2.82E+02	2.66E+01	7.45E+02
93	Sep-57	2.55E+00	9.15E+01	3.86E+02	1.58E+01	6.12E+02
94	Oct-57	2.43E+00	9.64E+01	4.41E+02	1.84E+01	4.59E+02
95	Nov-57	1.91E+00	1.03E+02	4.87E+02	1.97E+01	4.06E+02
96	Dec-57	1.66E+00	1.70E+02	4.84E+02	2.67E+01	5.20E+02
97	Jan-58	1.55E+00	1.28E+02	2.23E+02	2.53E+01	4.24E+02
98	Feb-58	5.99E+00	1.33E+02	2.74E+02	5.17E+01	5.70E+02
99	Mar-58	1.22E+01	8.62E+01	1.87E+02	6.61E+01	6.63E+02
100	Apr-58	2.22E+01	1.44E+02	2.43E+02	7.65E+01	6.45E+02
101	May-58	8.09E+01	6.42E+01	1.24E+02	1.17E+02	5.12E+02
102	Jun-58	1.26E+02	3.98E+01	5.40E+01	7.83E+01	3.50E+02
103	Jul-58	4.67E+01	1.17E+02	1.31E+02	7.00E+01	5.08E+02
104	Aug-58	9.69E+00	1.10E+02	2.40E+02	4.20E+01	6.00E+02
105	Sep-58	2.77E+00	9.97E+01	1.83E+02	2.42E+01	4.39E+02
106	Oct-58	3.10E+00	1.22E+02	3.83E+02	2.89E+01	5.24E+02
107	Nov-58	3.19E+00	1.23E+02	3.26E+02	3.58E+01	5.62E+02
108	Dec-58	6.58E+00	1.39E+02	2.68E+02	5.84E+01	6.57E+02
109	Jan-59	9.06E+00	1.10E+02	1.10E+02	5.28E+01	3.19E+02
110	Feb-59	9.82E+00	1.38E+02	2.02E+02	7.39E+01	5.25E+02
111	Mar-59	2.28E+01	1.33E+02	2.31E+02	8.29E+01	5.17E+02
112	Apr-59	4.94E+01	9.10E+01	1.78E+02	8.31E+01	4.54E+02
113	May-59	1.21E+02	4.62E+01	1.05E+02	9.71E+01	3.75E+02
114	Jun-59	1.61E+02	2.47E+01	6.08E+01	6.54E+01	2.43E+02
115	Jul-59	1.15E+02	3.52E+01	1.01E+02	6.12E+01	2.85E+02
116	Aug-59	4.65E+01	6.19E+01	1.54E+02	4.31E+01	2.96E+02
117	Sep-59	2.66E+01	7.25E+01	3.39E+02	3.94E+01	3.28E+02
118	Oct-59	2.88E+01	1.07E+02	1.48E+02	6.62E+01	4.02E+02
119	Nov-59	3.17E+01	1.47E+02	3.06E+02	5.14E+01	4.04E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
120	Dec-59	2.78E+01	1.14E+02	4.35E+02	4.17E+01	4.76E+02
121	Jan-60	8.72E+00	1.47E+02	8.09E+02	4.18E+01	4.46E+02
122	Feb-60	1.27E+01	1.33E+02	3.74E+02	3.59E+01	5.51E+02
123	Mar-60	1.44E+01	1.63E+02	3.13E+02	3.23E+01	5.54E+02
124	Apr-60	1.29E+02	8.45E+01	2.31E+02	1.11E+02	5.67E+02
125	May-60	1.41E+02	7.01E+01	2.17E+02	9.79E+01	3.93E+02
126	Jun-60	1.48E+02	4.15E+01	1.42E+02	8.22E+01	3.61E+02
127	Jul-60	1.03E+02	5.17E+01	1.77E+02	6.62E+01	4.45E+02
128	Aug-60	3.72E+01	7.99E+01	1.62E+02	6.37E+01	4.40E+02
129	Sep-60	6.39E+00	1.01E+02	3.43E+02	2.20E+01	3.72E+02
130	Oct-60	4.01E+00	1.12E+02	3.78E+02	2.16E+01	3.41E+02
131	Nov-60	7.34E+00	1.71E+02	3.59E+02	3.01E+01	4.89E+02
132	Dec-60	4.18E+00	2.30E+02	5.11E+02	2.38E+01	4.79E+02
133	Jan-61	4.83E+00	2.19E+02	5.61E+02	3.13E+01	5.29E+02
134	Feb-61	2.15E+01	2.29E+02	3.67E+02	5.34E+01	6.78E+02
135	Mar-61	3.59E+01	2.12E+02	5.39E+02	6.75E+01	4.85E+02
136	Apr-61	3.99E+01	1.89E+02	6.43E+02	6.91E+01	3.58E+02
137	May-61	1.36E+02	1.11E+02	2.63E+02	9.35E+01	2.59E+02
138	Jun-61	2.09E+02	3.75E+01	1.32E+02	4.23E+01	1.91E+02
139	Jul-61	8.14E+01	4.52E+01	1.14E+02	3.39E+01	1.45E+02
140	Aug-61	1.35E+01	4.54E+01	3.70E+02	1.78E+01	2.03E+02
141	Sep-61	2.11E+00	7.21E+01	4.17E+02	7.99E+00	2.24E+02
142	Oct-61	1.65E+00	9.66E+01	3.36E+02	6.79E+00	2.54E+02
143	Nov-61	1.83E+00	1.04E+02	3.80E+02	7.27E+00	1.90E+02
144	Dec-61	1.50E+00	9.44E+01	2.96E+02	6.00E+00	1.81E+02
145	Jan-62	4.15E+00	7.18E+01	4.06E+02	6.56E+00	2.33E+02
146	Feb-62	8.36E+00	9.31E+01	3.64E+02	1.32E+01	2.92E+02
147	Mar-62	4.73E+00	1.33E+02	4.31E+02	1.37E+01	3.34E+02
148	Apr-62	6.52E+01	9.31E+01	4.96E+02	4.10E+01	4.53E+02
149	May-62	1.15E+02	6.80E+01	2.36E+02	4.54E+01	5.70E+02
150	Jun-62	1.78E+02	3.60E+01	1.95E+02	3.74E+01	3.00E+02
151	Jul-62	7.63E+01	4.18E+01	3.75E+02	2.57E+01	2.74E+02
152	Aug-62	3.30E+01	7.87E+01	5.02E+02	2.02E+01	3.80E+02
153	Sep-62	4.11E+00	1.09E+02	9.16E+02	6.31E+00	3.06E+02
154	Oct-62	4.17E+00	8.96E+01	5.21E+02	6.29E+00	3.19E+02
155	Nov-62	4.71E+00	7.57E+01	3.58E+02	6.77E+00	2.67E+02
156	Dec-62	9.78E+00	6.62E+01	4.28E+02	1.20E+01	2.85E+02
157	Jan-63	6.23E+00	5.45E+01	1.98E+02	5.79E+00	1.65E+02
158	Feb-63	1.42E+01	5.23E+01	1.91E+02	1.09E+01	2.95E+02
159	Mar-63	1.20E+01	9.37E+01	1.41E+02	2.23E+01	3.26E+02
160	Apr-63	3.14E+01	9.94E+01	1.89E+02	3.27E+01	3.66E+02
161	May-63	4.87E+01	5.20E+01	9.23E+01	3.92E+01	2.86E+02
162	Jun-63	1.13E+02	3.06E+01	3.58E+01	4.70E+01	2.43E+02
163	Jul-63	7.05E+01	4.10E+01	4.55E+01	3.99E+01	2.80E+02
164	Aug-63	1.66E+01	5.66E+01	8.23E+01	2.42E+01	2.94E+02
165	Sep-63	3.66E+00	7.04E+01	9.68E+01	1.07E+01	2.47E+02
166	Oct-63	1.78E+00	8.83E+01	1.27E+02	7.88E+00	2.97E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
167	Nov-63	1.61E+00	9.35E+01	1.51E+02	7.00E+00	2.35E+02
168	Dec-63	2.64E+00	1.14E+02	1.25E+02	9.44E+00	2.51E+02
169	Jan-64	1.84E+00	8.55E+01	1.11E+02	7.29E+00	2.09E+02
170	Feb-64	4.19E+00	1.10E+02	1.58E+02	1.37E+01	3.20E+02
171	Mar-64	3.30E+00	1.38E+02	1.84E+02	1.18E+01	3.03E+02
172	Apr-64	8.48E+00	9.98E+01	1.82E+02	1.70E+01	4.25E+02
173	May-64	9.12E+01	7.16E+01	1.28E+02	5.28E+01	5.76E+02
174	Jun-64	2.06E+02	2.28E+01	4.06E+01	5.92E+01	2.65E+02
175	Jul-64	1.34E+02	2.17E+01	2.95E+01	4.74E+01	2.18E+02
176	Aug-64	3.48E+01	3.34E+01	1.09E+02	2.55E+01	2.70E+02
177	Sep-64	5.40E+00	6.34E+01	1.76E+02	1.30E+01	2.32E+02
178	Oct-64	7.39E+00	5.58E+01	1.00E+02	1.72E+01	2.80E+02
179	Nov-64	5.52E+00	9.02E+01	1.30E+02	1.37E+01	3.19E+02
180	Dec-64	1.22E+01	7.79E+01	1.13E+02	1.75E+01	2.85E+02
181	Jan-65	1.34E+01	6.97E+01	9.80E+01	1.16E+01	3.24E+02
182	Feb-65	3.12E+01	4.97E+01	8.86E+01	1.65E+01	2.79E+02
183	Mar-65	2.67E+01	8.15E+01	1.36E+02	2.49E+01	2.78E+02
184	Apr-65	4.34E+01	8.79E+01	1.16E+02	3.65E+01	2.68E+02
185	May-65	1.02E+02	4.03E+01	6.21E+01	6.55E+01	2.46E+02
186	Jun-65	1.32E+02	2.15E+01	4.63E+01	4.92E+01	1.68E+02
187	Jul-65	6.35E+01	2.16E+01	4.13E+01	4.09E+01	1.89E+02
188	Aug-65	2.07E+01	3.86E+01	5.52E+01	3.63E+01	2.03E+02
189	Sep-65	5.80E+00	5.84E+01	7.27E+01	1.86E+01	1.79E+02
190	Oct-65	3.20E+00	8.69E+01	5.47E+01	2.21E+01	1.81E+02
191	Nov-65	2.78E+00	8.29E+01	6.27E+01	1.79E+01	1.87E+02
192	Dec-65	4.20E+00	7.97E+01	8.92E+01	1.88E+01	1.68E+02
193	Jan-66	3.19E+00	5.84E+01	6.54E+01	8.20E+00	9.06E+01
194	Feb-66	5.06E+00	5.74E+01	6.97E+01	1.27E+01	1.16E+02
195	Mar-66	6.64E+00	7.35E+01	8.84E+01	1.82E+01	1.23E+02
196	Apr-66	1.04E+01	5.94E+01	8.74E+01	2.02E+01	1.43E+02
197	May-66	5.32E+01	3.72E+01	6.43E+01	3.54E+01	1.92E+02
198	Jun-66	7.98E+01	2.04E+01	2.67E+01	3.96E+01	9.34E+01
199	Jul-66	2.27E+01	6.78E+00	1.06E+01	1.02E+01	2.56E+01
200	Aug-66	5.74E+00	7.24E+00	1.56E+01	3.70E+00	2.67E+01
201	Sep-66	2.49E+00	5.55E+01	1.14E+02	5.83E+00	9.05E+01
202	Oct-66	2.25E+00	6.34E+01	1.88E+02	7.34E+00	9.35E+01
203	Nov-66	1.90E+00	5.52E+01	1.51E+02	5.35E+00	8.03E+01
204	Dec-66	4.03E+00	5.66E+01	1.39E+02	8.43E+00	1.09E+02
205	Jan-67	4.80E+00	4.42E+01	1.38E+02	1.19E+01	9.16E+01
206	Feb-67	6.19E+00	5.73E+01	1.57E+02	1.07E+01	9.98E+01
207	Mar-67	8.06E+00	5.50E+01	1.91E+02	1.41E+01	1.39E+02
208	Apr-67	1.49E+01	7.86E+01	1.92E+02	2.84E+01	1.55E+02
209	May-67	3.73E+01	6.92E+01	1.03E+02	3.37E+01	1.74E+02
210	Jun-67	1.06E+02	2.34E+01	3.48E+01	5.55E+01	1.63E+02
211	Jul-67	6.77E+01	2.79E+01	5.48E+01	3.34E+01	1.63E+02
212	Aug-67	1.75E+01	5.91E+01	7.97E+01	2.22E+01	1.62E+02
213	Sep-67	4.57E+00	6.99E+01	1.22E+02	9.82E+00	1.86E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
214	Oct-67	3.20E+00	6.81E+01	1.02E+02	1.04E+01	1.51E+02
215	Nov-67	3.16E+00	5.47E+01	9.53E+01	8.97E+00	1.31E+02
216	Dec-67	7.98E+00	5.50E+01	1.02E+02	1.77E+01	1.48E+02
217	Jan-68	3.88E+00	4.00E+01	5.23E+01	1.30E+01	9.84E+01
218	Feb-68	8.89E+00	6.66E+01	6.58E+01	1.72E+01	1.51E+02
219	Mar-68	1.79E+01	6.63E+01	7.97E+01	3.02E+01	1.76E+02
220	Apr-68	1.10E-01	5.91E+01	8.27E+01	1.38E+00	3.73E+01
221	May-68	7.50E-01	6.15E+01	7.13E+01	1.77E+00	5.38E+01
222	Jun-68	7.26E+00	1.84E+01	2.42E+01	6.69E+00	6.67E+01
223	Jul-68	2.60E+00	1.32E+01	2.47E+01	4.12E+00	4.66E+01
224	Aug-68	4.00E-02	2.96E+01	5.45E+01	4.50E-01	2.61E+01
225	Sep-68	1.00E-02	3.55E+01	6.07E+01	2.10E-01	2.16E+01
226	Oct-68	0.00	3.14E+01	4.94E+01	1.10E-01	1.59E+01
227	Nov-68	0.00	2.98E+01	5.84E+01	1.70E-01	1.66E+01
228	Dec-68	1.00E-02	2.81E+01	5.40E+01	3.00E-01	2.01E+01
229	Jan-69	7.00E-02	1.64E+01	3.34E+01	5.60E-01	1.67E+01
230	Feb-69	1.30E-01	2.80E+01	5.09E+01	1.03E+00	2.65E+01
231	Mar-69	1.50E-01	3.74E+01	6.14E+01	1.49E+00	3.66E+01
232	Apr-69	3.88E+00	2.79E+01	3.80E+01	9.36E+00	7.77E+01
233	May-69	6.92E+00	1.27E+01	2.14E+01	1.15E+01	5.08E+01
234	Jun-69	5.17E+00	1.15E+01	1.89E+01	8.19E+00	4.44E+01
235	Jul-69	1.66E+00	1.45E+01	2.35E+01	3.68E+00	2.77E+01
236	Aug-69	1.00E-02	2.52E+01	5.14E+01	2.40E-01	1.34E+01
237	Sep-69	0.00	2.64E+01	5.30E+01	5.00E-02	6.56E+00
238	Oct-69	0.00	2.28E+01	4.07E+01	8.00E-02	4.25E+00
239	Nov-69	0.00	1.63E+01	4.28E+01	1.00E-01	3.76E+00
240	Dec-69	0.00	1.23E+01	4.89E+01	1.70E-01	5.84E+00
241	Jan-70	2.00E-02	4.88E+00	1.61E+01	1.30E-01	1.33E+01
242	Feb-70	1.00E-02	3.29E+00	1.12E+01	6.00E-02	7.57E+00
243	Mar-70	0.00	1.18E+00	9.86E+00	0.00	2.42E+00
244	Apr-70	1.00E-02	6.25E+00	3.99E+01	1.00E-01	1.22E+01
245	May-70	1.05E+00	4.49E+00	3.84E+01	7.80E-01	2.69E+01
246	Jun-70	2.31E+00	1.12E+00	1.96E+01	1.01E+00	3.44E+01
247	Jul-70	1.80E-01	9.95E+00	3.37E+01	6.60E-01	2.05E+01
248	Aug-70	1.00E-02	1.17E+01	3.73E+01	1.90E-01	9.95E+00
249	Sep-70	0.00	1.46E+01	5.42E+01	4.00E-02	5.53E+00
250	Oct-70	0.00	1.98E+01	7.34E+01	5.00E-02	7.63E+00
251	Nov-70	0.00	1.90E+01	6.86E+01	7.00E-02	8.35E+00
252	Dec-70	0.00	1.80E+01	6.16E+01	1.10E-01	1.01E+01
253	Jan-71	1.00E-02	8.15E+00	2.56E+01	1.60E-01	7.62E+00
Location 8						
1	Jan-50	3.57E+01	4.23E+01	1.59E+02	6.08E+01	1.32E+03
2	Feb-50	3.46E+01	3.81E+01	1.44E+02	5.52E+01	1.22E+03
3	Mar-50	3.39E+01	3.08E+01	1.16E+02	5.03E+01	1.02E+03
4	Apr-50	3.31E+01	2.16E+01	8.20E+01	4.10E+01	7.65E+02
5	May-50	3.33E+01	1.43E+01	5.94E+01	2.92E+01	5.63E+02
6	Jun-50	2.72E+01	5.96E+00	3.02E+01	1.09E+01	2.95E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
7	Jul-50	3.39E+01	8.11E+00	4.05E+01	1.70E+01	3.84E+02
8	Aug-50	4.05E+01	2.02E+01	8.20E+01	5.17E+01	7.28E+02
9	Sep-50	4.34E+01	3.18E+01	1.24E+02	7.28E+01	1.03E+03
10	Oct-50	5.67E+01	3.47E+01	1.62E+02	8.99E+01	1.34E+03
11	Nov-50	5.95E+01	4.01E+01	1.53E+02	8.60E+01	1.33E+03
12	Dec-50	4.81E+01	4.18E+01	1.56E+02	6.92E+01	1.37E+03
13	Jan-51	4.35E+01	2.56E+01	7.56E+01	4.30E+01	7.96E+02
14	Feb-51	6.33E+01	1.93E+01	6.26E+01	4.39E+01	7.09E+02
15	Mar-51	7.14E+01	2.32E+01	7.75E+01	5.48E+01	8.75E+02
16	Apr-51	4.52E+01	1.27E+01	4.99E+01	3.32E+01	6.02E+02
17	May-51	2.96E+01	4.17E+00	2.83E+01	1.38E+01	3.57E+02
18	Jun-51	3.43E+01	6.67E+00	3.15E+01	2.10E+01	3.53E+02
19	Jul-51	3.92E+01	8.20E+00	4.79E+01	2.28E+01	5.18E+02
20	Aug-51	6.42E+01	2.29E+01	8.33E+01	3.09E+01	9.05E+02
21	Sep-51	6.52E+01	4.06E+01	1.58E+02	5.52E+01	1.46E+03
22	Oct-51	6.75E+01	3.49E+01	1.11E+02	5.37E+01	1.20E+03
23	Nov-51	6.11E+01	3.25E+01	1.31E+02	3.23E+01	1.41E+03
24	Dec-51	5.67E+01	3.40E+01	9.66E+01	4.96E+01	1.23E+03
25	Jan-52	5.46E+01	3.33E+01	1.32E+02	6.16E+01	1.42E+03
26	Feb-52	5.72E+01	4.10E+01	5.77E+01	4.31E+01	9.76E+02
27	Mar-52	6.67E+01	2.94E+01	8.62E+01	6.00E+01	1.05E+03
28	Apr-52	5.31E+01	1.41E+01	3.53E+01	3.42E+01	5.82E+02
29	May-52	4.52E+01	7.29E+00	2.57E+01	2.13E+01	3.81E+02
30	Jun-52	3.81E+01	7.91E+00	2.19E+01	1.43E+01	3.48E+02
31	Jul-52	6.07E+01	1.52E+01	4.92E+01	2.44E+01	5.81E+02
32	Aug-52	7.31E+01	2.25E+01	6.14E+01	3.25E+01	8.40E+02
33	Sep-52	9.89E+01	4.89E+01	9.22E+01	4.00E+01	1.13E+03
34	Oct-52	1.00E+02	1.01E+02	1.50E+02	1.24E+02	1.51E+03
35	Nov-52	8.33E+01	9.73E+01	1.32E+02	1.34E+02	1.50E+03
36	Dec-52	9.28E+01	1.19E+02	1.99E+02	1.63E+02	1.89E+03
37	Jan-53	7.19E+01	1.15E+02	1.12E+02	1.49E+02	1.31E+03
38	Feb-53	8.74E+01	7.70E+01	9.09E+01	1.18E+02	1.17E+03
39	Mar-53	1.18E+02	7.74E+01	9.06E+01	1.25E+02	1.21E+03
40	Apr-53	9.42E+01	6.07E+01	2.77E+01	8.23E+01	8.53E+02
41	May-53	9.89E+01	4.03E+01	4.53E+01	6.95E+01	7.77E+02
42	Jun-53	5.64E+01	1.42E+01	1.55E+01	3.35E+01	3.33E+02
43	Jul-53	6.29E+01	1.59E+01	4.04E+01	6.17E+01	5.24E+02
44	Aug-53	1.15E+02	4.15E+01	8.77E+01	1.71E+02	1.13E+03
45	Sep-53	1.12E+02	4.39E+01	1.13E+02	2.38E+02	1.53E+03
46	Oct-53	1.47E+02	6.00E+01	1.39E+02	2.67E+02	1.83E+03
47	Nov-53	1.27E+00	7.32E+01	1.23E+02	2.23E+01	4.53E+02
48	Dec-53	1.06E+00	8.90E+01	1.07E+02	1.77E+01	4.05E+02
49	Jan-54	9.80E-01	4.62E+01	1.80E+02	8.74E+00	3.94E+02
50	Feb-54	1.25E+00	4.73E+01	1.91E+02	1.08E+01	4.70E+02
51	Mar-54	1.92E+00	4.82E+01	1.88E+02	1.38E+01	5.18E+02
52	Apr-54	3.12E+00	4.19E+01	1.59E+02	1.73E+01	5.35E+02
53	May-54	2.64E+01	2.23E+01	8.88E+01	3.40E+01	5.34E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
54	Jun-54	4.32E+01	1.26E+01	5.77E+01	3.06E+01	4.90E+02
55	Jul-54	4.17E+01	1.57E+01	7.07E+01	3.55E+01	4.56E+02
56	Aug-54	1.83E+01	3.24E+01	1.25E+02	4.19E+01	5.44E+02
57	Sep-54	7.93E+00	4.60E+01	1.72E+02	3.11E+01	5.56E+02
58	Oct-54	1.85E+00	5.78E+01	2.26E+02	1.59E+01	5.15E+02
59	Nov-54	1.67E+00	5.70E+01	2.23E+02	1.38E+01	4.54E+02
60	Dec-54	1.53E+00	5.93E+01	2.30E+02	1.22E+01	4.18E+02
61	Jan-55	1.04E+00	4.81E+01	1.86E+02	8.76E+00	3.52E+02
62	Feb-55	1.41E+00	4.71E+01	1.78E+02	1.01E+01	3.91E+02
63	Mar-55	3.65E+00	5.90E+01	2.59E+02	2.03E+01	5.58E+02
64	Apr-55	5.16E+00	4.63E+01	2.13E+02	2.88E+01	5.40E+02
65	May-55	7.03E+00	3.77E+01	1.95E+02	5.12E+01	6.87E+02
66	Jun-55	3.84E+01	1.62E+01	1.02E+02	7.27E+01	5.85E+02
67	Jul-55	5.18E+01	1.24E+01	7.15E+01	6.12E+01	4.65E+02
68	Aug-55	1.53E+01	2.32E+01	1.53E+02	4.78E+01	5.69E+02
69	Sep-55	2.78E+00	3.55E+01	2.08E+02	2.02E+01	4.85E+02
70	Oct-55	1.68E+00	6.37E+01	3.12E+02	1.62E+01	5.02E+02
71	Nov-55	3.51E+00	6.83E+01	3.13E+02	2.29E+01	6.07E+02
72	Dec-55	4.91E+00	6.74E+01	3.00E+02	2.49E+01	6.40E+02
73	Jan-56	3.05E+00	3.02E+01	2.02E+02	1.42E+01	5.17E+02
74	Feb-56	2.19E+00	4.76E+01	2.83E+02	1.56E+01	6.12E+02
75	Mar-56	5.71E+00	8.02E+01	2.72E+02	2.28E+01	6.08E+02
76	Apr-56	3.42E+01	3.44E+01	1.42E+02	4.48E+01	5.68E+02
77	May-56	5.82E+01	1.52E+01	8.77E+01	4.40E+01	4.55E+02
78	Jun-56	8.69E+01	1.11E+01	7.78E+01	3.64E+01	4.06E+02
79	Jul-56	5.97E+01	1.50E+01	1.40E+02	5.48E+01	5.84E+02
80	Aug-56	1.74E+01	2.56E+01	2.59E+02	3.94E+01	6.51E+02
81	Sep-56	4.43E+00	4.03E+01	3.28E+02	2.29E+01	5.86E+02
82	Oct-56	2.25E+00	4.32E+01	2.77E+02	1.85E+01	4.52E+02
83	Nov-56	2.04E+00	6.22E+01	2.60E+02	2.04E+01	4.60E+02
84	Dec-56	2.29E+00	7.79E+01	2.22E+02	2.80E+01	6.62E+02
85	Jan-57	1.39E+00	8.21E+01	1.76E+02	4.02E+01	5.51E+02
86	Feb-57	1.87E+00	9.79E+01	1.78E+02	3.84E+01	7.62E+02
87	Mar-57	3.23E+00	6.26E+01	1.41E+02	1.74E+01	5.75E+02
88	Apr-57	9.68E+00	6.44E+01	1.51E+02	3.61E+01	7.20E+02
89	May-57	7.85E+01	2.62E+01	7.34E+01	7.44E+01	6.14E+02
90	Jun-57	6.94E+01	1.73E+01	5.49E+01	4.88E+01	4.25E+02
91	Jul-57	2.91E+01	2.96E+01	1.88E+02	3.78E+01	5.39E+02
92	Aug-57	6.56E+00	7.43E+01	2.69E+02	1.97E+01	6.25E+02
93	Sep-57	1.32E+00	8.44E+01	3.64E+02	1.03E+01	4.87E+02
94	Oct-57	1.22E+00	8.86E+01	4.17E+02	1.20E+01	3.67E+02
95	Nov-57	9.30E-01	9.39E+01	4.58E+02	1.25E+01	3.18E+02
96	Dec-57	8.10E-01	1.53E+02	4.55E+02	1.69E+01	4.03E+02
97	Jan-58	7.40E-01	1.13E+02	2.01E+02	1.58E+01	3.22E+02
98	Feb-58	3.76E+00	1.20E+02	2.52E+02	3.69E+01	4.60E+02
99	Mar-58	7.92E+00	8.00E+01	1.77E+02	5.02E+01	5.61E+02
100	Apr-58	1.63E+01	1.36E+02	2.32E+02	6.23E+01	5.71E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
101	May-58	6.96E+01	6.28E+01	1.22E+02	1.05E+02	4.80E+02
102	Jun-58	1.13E+02	3.89E+01	5.31E+01	7.28E+01	3.34E+02
103	Jul-58	3.60E+01	1.12E+02	1.26E+02	5.84E+01	4.56E+02
104	Aug-58	6.06E+00	1.04E+02	2.29E+02	3.08E+01	5.01E+02
105	Sep-58	1.41E+00	9.24E+01	1.77E+02	1.59E+01	3.52E+02
106	Oct-58	1.58E+00	1.13E+02	3.59E+02	1.90E+01	4.17E+02
107	Nov-58	1.73E+00	1.13E+02	3.09E+02	2.44E+01	4.53E+02
108	Dec-58	3.98E+00	1.28E+02	2.54E+02	4.23E+01	5.46E+02
109	Jan-59	5.97E+00	1.01E+02	1.03E+02	3.99E+01	2.68E+02
110	Feb-59	6.33E+00	1.29E+02	1.91E+02	5.55E+01	4.44E+02
111	Mar-59	1.52E+01	1.26E+02	2.21E+02	6.45E+01	4.50E+02
112	Apr-59	3.68E+01	8.76E+01	1.73E+02	6.90E+01	4.09E+02
113	May-59	1.04E+02	4.53E+01	1.03E+02	8.84E+01	3.55E+02
114	Jun-59	1.46E+02	2.44E+01	6.04E+01	6.16E+01	2.35E+02
115	Jul-59	9.95E+01	3.44E+01	9.95E+01	5.56E+01	2.70E+02
116	Aug-59	3.35E+01	5.88E+01	1.49E+02	3.47E+01	2.61E+02
117	Sep-59	1.82E+01	6.92E+01	3.26E+02	3.09E+01	2.86E+02
118	Oct-59	2.05E+01	1.02E+02	1.47E+02	5.32E+01	3.56E+02
119	Nov-59	2.20E+01	1.40E+02	2.94E+02	4.11E+01	3.55E+02
120	Dec-59	1.89E+01	1.08E+02	4.15E+02	3.23E+01	4.08E+02
121	Jan-60	4.93E+00	1.34E+02	7.57E+02	2.91E+01	3.61E+02
122	Feb-60	7.67E+00	1.25E+02	3.68E+02	2.66E+01	4.61E+02
123	Mar-60	9.17E+00	1.51E+02	2.96E+02	2.35E+01	4.58E+02
124	Apr-60	1.03E+02	8.13E+01	2.23E+02	9.62E+01	5.21E+02
125	May-60	1.19E+02	6.82E+01	2.12E+02	8.67E+01	3.66E+02
126	Jun-60	1.31E+02	4.07E+01	1.40E+02	7.62E+01	3.45E+02
127	Jul-60	8.59E+01	5.03E+01	1.74E+02	5.90E+01	4.15E+02
128	Aug-60	2.61E+01	7.57E+01	1.58E+02	5.03E+01	3.86E+02
129	Sep-60	3.38E+00	9.39E+01	3.25E+02	1.49E+01	3.01E+02
130	Oct-60	2.07E+00	1.03E+02	3.59E+02	1.41E+01	2.72E+02
131	Nov-60	3.77E+00	1.56E+02	3.41E+02	2.00E+01	3.88E+02
132	Dec-60	2.15E+00	2.09E+02	4.76E+02	1.55E+01	3.77E+02
133	Jan-61	2.42E+00	1.97E+02	5.19E+02	2.02E+01	4.11E+02
134	Feb-61	1.41E+01	2.13E+02	3.51E+02	4.07E+01	5.79E+02
135	Mar-61	2.38E+01	1.99E+02	5.10E+02	5.20E+01	4.20E+02
136	Apr-61	2.79E+01	1.79E+02	6.18E+02	5.52E+01	3.16E+02
137	May-61	1.15E+02	1.08E+02	2.61E+02	8.32E+01	2.42E+02
138	Jun-61	1.90E+02	3.70E+01	1.30E+02	4.00E+01	1.84E+02
139	Jul-61	6.47E+01	4.37E+01	1.12E+02	2.90E+01	1.34E+02
140	Aug-61	8.70E+00	4.29E+01	3.52E+02	1.33E+01	1.70E+02
141	Sep-61	1.14E+00	6.57E+01	3.97E+02	5.33E+00	1.77E+02
142	Oct-61	7.90E-01	8.86E+01	3.22E+02	4.28E+00	1.97E+02
143	Nov-61	8.70E-01	9.42E+01	3.54E+02	4.58E+00	1.49E+02
144	Dec-61	6.90E-01	8.54E+01	2.79E+02	3.71E+00	1.38E+02
145	Jan-62	2.26E+00	6.53E+01	3.78E+02	4.47E+00	1.87E+02
146	Feb-62	4.91E+00	8.62E+01	3.47E+02	9.41E+00	2.43E+02
147	Mar-62	2.56E+00	1.21E+02	4.03E+02	9.20E+00	2.65E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
148	Apr-62	5.03E+01	8.83E+01	4.74E+02	3.41E+01	4.03E+02
149	May-62	9.57E+01	6.61E+01	2.32E+02	4.04E+01	5.32E+02
150	Jun-62	1.57E+02	3.53E+01	1.91E+02	3.46E+01	2.87E+02
151	Jul-62	6.06E+01	4.04E+01	3.66E+02	2.22E+01	2.52E+02
152	Aug-62	2.30E+01	7.43E+01	4.84E+02	1.59E+01	3.29E+02
153	Sep-62	2.20E+00	9.98E+01	8.57E+02	4.22E+00	2.41E+02
154	Oct-62	2.29E+00	8.39E+01	5.10E+02	4.31E+00	2.59E+02
155	Nov-62	2.67E+00	7.01E+01	3.38E+02	4.71E+00	2.18E+02
156	Dec-62	6.13E+00	6.16E+01	4.04E+02	8.91E+00	2.40E+02
157	Jan-63	3.69E+00	5.01E+01	1.86E+02	4.15E+00	1.36E+02
158	Feb-63	9.39E+00	4.87E+01	1.80E+02	8.34E+00	2.51E+02
159	Mar-63	7.29E+00	8.63E+01	1.34E+02	1.59E+01	2.71E+02
160	Apr-63	2.15E+01	9.44E+01	1.81E+02	2.57E+01	3.20E+02
161	May-63	3.87E+01	5.05E+01	9.06E+01	3.37E+01	2.62E+02
162	Jun-63	1.01E+02	3.01E+01	3.54E+01	4.38E+01	2.33E+02
163	Jul-63	5.72E+01	3.96E+01	4.44E+01	3.48E+01	2.58E+02
164	Aug-63	1.08E+01	5.36E+01	7.90E+01	1.84E+01	2.52E+02
165	Sep-63	1.90E+00	6.50E+01	9.21E+01	7.14E+00	1.98E+02
166	Oct-63	8.50E-01	8.08E+01	1.19E+02	5.00E+00	2.30E+02
167	Nov-63	7.50E-01	8.51E+01	1.42E+02	4.40E+00	1.84E+02
168	Dec-63	1.28E+00	1.04E+02	1.18E+02	6.02E+00	1.96E+02
169	Jan-64	8.90E-01	7.69E+01	1.02E+02	4.62E+00	1.61E+02
170	Feb-64	2.31E+00	1.03E+02	1.51E+02	9.44E+00	2.62E+02
171	Mar-64	1.77E+00	1.28E+02	1.76E+02	8.03E+00	2.46E+02
172	Apr-64	5.44E+00	9.56E+01	1.76E+02	1.29E+01	3.66E+02
173	May-64	7.77E+01	6.96E+01	1.26E+02	4.68E+01	5.33E+02
174	Jun-64	1.88E+02	2.26E+01	4.04E+01	5.59E+01	2.57E+02
175	Jul-64	1.18E+02	2.13E+01	2.91E+01	4.37E+01	2.08E+02
176	Aug-64	2.51E+01	3.21E+01	1.05E+02	2.08E+01	2.40E+02
177	Sep-64	3.09E+00	5.92E+01	1.69E+02	9.05E+00	1.92E+02
178	Oct-64	4.43E+00	5.33E+01	9.87E+01	1.26E+01	2.37E+02
179	Nov-64	2.99E+00	8.39E+01	1.24E+02	9.47E+00	2.60E+02
180	Dec-64	8.08E+00	7.17E+01	1.05E+02	1.30E+01	2.39E+02
181	Jan-65	8.63E+00	6.34E+01	9.05E+01	8.72E+00	2.71E+02
182	Feb-65	2.30E+01	4.69E+01	8.42E+01	1.36E+01	2.48E+02
183	Mar-65	1.92E+01	7.74E+01	1.31E+02	2.02E+01	2.48E+02
184	Apr-65	3.51E+01	8.39E+01	1.13E+02	3.10E+01	2.41E+02
185	May-65	9.14E+01	3.96E+01	6.12E+01	6.10E+01	2.37E+02
186	Jun-65	1.19E+02	2.12E+01	4.58E+01	4.63E+01	1.63E+02
187	Jul-65	5.37E+01	2.10E+01	4.05E+01	3.65E+01	1.77E+02
188	Aug-65	1.46E+01	3.69E+01	5.36E+01	2.91E+01	1.80E+02
189	Sep-65	3.58E+00	5.45E+01	6.95E+01	1.36E+01	1.50E+02
190	Oct-65	1.72E+00	7.99E+01	5.24E+01	1.50E+01	1.47E+02
191	Nov-65	1.48E+00	7.77E+01	5.95E+01	1.23E+01	1.52E+02
192	Dec-65	2.35E+00	7.43E+01	8.49E+01	1.32E+01	1.39E+02
193	Jan-66	1.74E+00	5.28E+01	6.06E+01	5.56E+00	7.23E+01
194	Feb-66	2.93E+00	5.38E+01	6.65E+01	9.05E+00	9.64E+01

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
195	Mar-66	4.05E+00	6.85E+01	8.41E+01	1.34E+01	1.03E+02
196	Apr-66	6.82E+00	5.65E+01	8.42E+01	1.57E+01	1.24E+02
197	May-66	4.32E+01	3.62E+01	6.30E+01	3.09E+01	1.77E+02
198	Jun-66	6.87E+01	2.00E+01	2.64E+01	3.60E+01	8.91E+01
199	Jul-66	1.86E+01	6.71E+00	1.06E+01	9.13E+00	2.42E+01
200	Aug-66	3.88E+00	6.83E+00	1.49E+01	2.89E+00	2.29E+01
201	Sep-66	1.25E+00	5.05E+01	1.07E+02	3.79E+00	7.12E+01
202	Oct-66	1.12E+00	5.86E+01	1.77E+02	4.74E+00	7.43E+01
203	Nov-66	9.60E-01	5.13E+01	1.45E+02	3.56E+00	6.42E+01
204	Dec-66	2.21E+00	5.24E+01	1.32E+02	5.80E+00	8.88E+01
205	Jan-67	2.76E+00	4.04E+01	1.29E+02	8.39E+00	7.48E+01
206	Feb-67	3.76E+00	5.34E+01	1.49E+02	7.83E+00	8.38E+01
207	Mar-67	4.97E+00	5.19E+01	1.83E+02	1.04E+01	1.17E+02
208	Apr-67	9.89E+00	7.47E+01	1.87E+02	2.20E+01	1.36E+02
209	May-67	3.12E+01	6.67E+01	1.02E+02	2.92E+01	1.58E+02
210	Jun-67	9.64E+01	2.32E+01	3.45E+01	5.22E+01	1.58E+02
211	Jul-67	5.89E+01	2.72E+01	5.37E+01	3.04E+01	1.54E+02
212	Aug-67	1.23E+01	5.61E+01	7.71E+01	1.75E+01	1.42E+02
213	Sep-67	2.59E+00	6.55E+01	1.17E+02	6.97E+00	1.53E+02
214	Oct-67	1.76E+00	6.39E+01	9.89E+01	7.19E+00	1.25E+02
215	Nov-67	1.75E+00	5.12E+01	9.10E+01	6.25E+00	1.08E+02
216	Dec-67	4.74E+00	5.12E+01	9.66E+01	1.27E+01	1.24E+02
217	Jan-68	2.23E+00	3.68E+01	4.93E+01	9.16E+00	8.08E+01
218	Feb-68	5.82E+00	6.26E+01	6.31E+01	1.32E+01	1.29E+02
219	Mar-68	1.26E+01	6.28E+01	7.64E+01	2.40E+01	1.54E+02
220	Apr-68	6.00E-02	5.61E+01	8.07E+01	9.60E-01	3.10E+01
221	May-68	4.90E-01	5.87E+01	6.98E+01	1.34E+00	4.59E+01
222	Jun-68	5.66E+00	1.82E+01	2.41E+01	5.75E+00	6.17E+01
223	Jul-68	1.91E+00	1.27E+01	2.41E+01	3.39E+00	4.19E+01
224	Aug-68	2.00E-02	2.75E+01	5.23E+01	3.10E-01	2.11E+01
225	Sep-68	0.00	3.33E+01	5.89E+01	1.30E-01	1.70E+01
226	Oct-68	0.00	2.92E+01	4.76E+01	7.00E-02	1.24E+01
227	Nov-68	0.00	2.76E+01	5.54E+01	1.00E-01	1.28E+01
228	Dec-68	1.00E-02	2.61E+01	5.20E+01	1.90E-01	1.59E+01
229	Jan-69	4.00E-02	1.51E+01	3.14E+01	3.80E-01	1.35E+01
230	Feb-69	8.00E-02	2.65E+01	4.93E+01	7.30E-01	2.22E+01
231	Mar-69	9.00E-02	3.50E+01	5.89E+01	1.06E+00	3.03E+01
232	Apr-69	2.83E+00	2.70E+01	3.73E+01	7.69E+00	6.98E+01
233	May-69	5.42E+00	1.24E+01	2.11E+01	9.91E+00	4.69E+01
234	Jun-69	3.91E+00	1.11E+01	1.85E+01	6.89E+00	4.02E+01
235	Jul-69	1.21E+00	1.38E+01	2.28E+01	3.00E+00	2.47E+01
236	Aug-69	1.00E-02	2.33E+01	4.89E+01	1.60E-01	1.06E+01
237	Sep-69	0.00	2.42E+01	5.12E+01	3.00E-02	4.95E+00
238	Oct-69	0.00	2.11E+01	3.87E+01	4.00E-02	3.22E+00
239	Nov-69	0.00	1.52E+01	4.08E+01	6.00E-02	2.86E+00
240	Dec-69	0.00	1.15E+01	4.69E+01	1.10E-01	4.55E+00
241	Jan-70	1.00E-02	4.31E+00	1.46E+01	8.00E-02	1.02E+01

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
242	Feb-70	0.00	3.13E+00	1.10E+01	4.00E-02	6.27E+00
243	Mar-70	0.00	1.06E+00	9.08E+00	0.00	1.86E+00
244	Apr-70	1.00E-02	5.72E+00	3.77E+01	6.00E-02	9.64E+00
245	May-70	8.00E-01	4.38E+00	3.78E+01	6.40E-01	2.38E+01
246	Jun-70	1.78E+00	1.10E+00	1.93E+01	8.70E-01	3.14E+01
247	Jul-70	1.20E-01	9.26E+00	3.25E+01	4.80E-01	1.75E+01
248	Aug-70	0.00	1.10E+01	3.61E+01	1.20E-01	8.06E+00
249	Sep-70	0.00	1.32E+01	5.07E+01	2.00E-02	4.07E+00
250	Oct-70	0.00	1.82E+01	7.00E+01	3.00E-02	5.67E+00
251	Nov-70	0.00	1.75E+01	6.54E+01	4.00E-02	6.30E+00
252	Dec-70	0.00	1.65E+01	5.86E+01	7.00E-02	7.74E+00
253	Jan-71	0.00	7.17E+00	2.31E+01	1.00E-01	5.87E+00
Location 9						
1	Jan-50	2.99E+01	4.18E+01	1.58E+02	5.47E+01	1.25E+03
2	Feb-50	2.93E+01	3.79E+01	1.44E+02	5.01E+01	1.17E+03
3	Mar-50	2.85E+01	3.06E+01	1.16E+02	4.54E+01	9.74E+02
4	Apr-50	2.80E+01	2.14E+01	8.21E+01	3.72E+01	7.31E+02
5	May-50	2.83E+01	1.42E+01	5.94E+01	2.65E+01	5.39E+02
6	Jun-50	2.33E+01	5.93E+00	3.02E+01	9.98E+00	2.83E+02
7	Jul-50	2.90E+01	8.03E+00	4.04E+01	1.54E+01	3.67E+02
8	Aug-50	3.41E+01	2.00E+01	8.19E+01	4.67E+01	6.93E+02
9	Sep-50	3.64E+01	3.15E+01	1.24E+02	6.56E+01	9.82E+02
10	Oct-50	4.76E+01	3.45E+01	1.62E+02	8.13E+01	1.27E+03
11	Nov-50	5.00E+01	3.98E+01	1.52E+02	7.77E+01	1.27E+03
12	Dec-50	4.05E+01	4.15E+01	1.56E+02	6.26E+01	1.31E+03
13	Jan-51	3.67E+01	2.53E+01	7.53E+01	3.88E+01	7.56E+02
14	Feb-51	5.34E+01	1.92E+01	6.27E+01	3.98E+01	6.76E+02
15	Mar-51	6.01E+01	2.30E+01	7.74E+01	4.95E+01	8.33E+02
16	Apr-51	3.84E+01	1.26E+01	4.99E+01	3.02E+01	5.76E+02
17	May-51	2.53E+01	4.16E+00	2.84E+01	1.26E+01	3.42E+02
18	Jun-51	2.93E+01	6.61E+00	3.15E+01	1.91E+01	3.37E+02
19	Jul-51	3.33E+01	8.13E+00	4.78E+01	2.07E+01	4.94E+02
20	Aug-51	5.40E+01	2.27E+01	8.31E+01	2.80E+01	8.61E+02
21	Sep-51	5.48E+01	4.03E+01	1.58E+02	4.98E+01	1.39E+03
22	Oct-51	5.66E+01	3.47E+01	1.12E+02	4.85E+01	1.15E+03
23	Nov-51	5.09E+01	3.23E+01	1.31E+02	2.93E+01	1.34E+03
24	Dec-51	4.77E+01	3.37E+01	9.68E+01	4.49E+01	1.17E+03
25	Jan-52	4.58E+01	3.29E+01	1.32E+02	5.55E+01	1.34E+03
26	Feb-52	4.81E+01	4.06E+01	5.79E+01	3.90E+01	9.31E+02
27	Mar-52	5.60E+01	2.92E+01	8.62E+01	5.42E+01	1.00E+03
28	Apr-52	4.50E+01	1.40E+01	3.54E+01	3.11E+01	5.57E+02
29	May-52	3.86E+01	7.25E+00	2.57E+01	1.94E+01	3.65E+02
30	Jun-52	3.25E+01	7.84E+00	2.19E+01	1.30E+01	3.33E+02
31	Jul-52	5.14E+01	1.51E+01	4.91E+01	2.21E+01	5.53E+02
32	Aug-52	6.15E+01	2.23E+01	6.14E+01	2.93E+01	8.00E+02
33	Sep-52	8.29E+01	4.84E+01	9.21E+01	3.61E+01	1.08E+03
34	Oct-52	8.37E+01	1.00E+02	1.50E+02	1.12E+02	1.44E+03

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
35	Nov-52	6.98E+01	9.65E+01	1.32E+02	1.20E+02	1.43E+03
36	Dec-52	7.72E+01	1.18E+02	1.99E+02	1.46E+02	1.80E+03
37	Jan-53	5.98E+01	1.13E+02	1.12E+02	1.34E+02	1.24E+03
38	Feb-53	7.34E+01	7.65E+01	9.09E+01	1.07E+02	1.11E+03
39	Mar-53	9.95E+01	7.69E+01	9.07E+01	1.13E+02	1.15E+03
40	Apr-53	7.94E+01	6.03E+01	2.79E+01	7.46E+01	8.14E+02
41	May-53	8.37E+01	4.00E+01	4.53E+01	6.31E+01	7.41E+02
42	Jun-53	4.82E+01	1.41E+01	1.56E+01	3.05E+01	3.19E+02
43	Jul-53	5.34E+01	1.57E+01	4.03E+01	5.60E+01	4.99E+02
44	Aug-53	9.64E+01	4.11E+01	8.76E+01	1.54E+02	1.08E+03
45	Sep-53	9.43E+01	4.36E+01	1.13E+02	2.15E+02	1.46E+03
46	Oct-53	1.24E+02	5.95E+01	1.39E+02	2.42E+02	1.74E+03
47	Nov-53	1.07E+00	7.25E+01	1.23E+02	2.01E+01	4.31E+02
48	Dec-53	8.90E-01	8.83E+01	1.07E+02	1.60E+01	3.86E+02
49	Jan-54	8.20E-01	4.56E+01	1.79E+02	7.83E+00	3.74E+02
50	Feb-54	1.05E+00	4.70E+01	1.91E+02	9.79E+00	4.48E+02
51	Mar-54	1.62E+00	4.79E+01	1.88E+02	1.24E+01	4.93E+02
52	Apr-54	2.63E+00	4.16E+01	1.59E+02	1.56E+01	5.10E+02
53	May-54	2.25E+01	2.22E+01	8.90E+01	3.09E+01	5.10E+02
54	Jun-54	3.70E+01	1.25E+01	5.77E+01	2.80E+01	4.69E+02
55	Jul-54	3.56E+01	1.55E+01	7.05E+01	3.23E+01	4.36E+02
56	Aug-54	1.55E+01	3.21E+01	1.25E+02	3.80E+01	5.18E+02
57	Sep-54	6.70E+00	4.56E+01	1.72E+02	2.82E+01	5.30E+02
58	Oct-54	1.56E+00	5.73E+01	2.26E+02	1.44E+01	4.91E+02
59	Nov-54	1.40E+00	5.66E+01	2.23E+02	1.25E+01	4.33E+02
60	Dec-54	1.29E+00	5.88E+01	2.30E+02	1.10E+01	3.98E+02
61	Jan-55	8.60E-01	4.74E+01	1.85E+02	7.87E+00	3.34E+02
62	Feb-55	1.18E+00	4.68E+01	1.78E+02	9.15E+00	3.73E+02
63	Mar-55	3.06E+00	5.85E+01	2.58E+02	1.83E+01	5.30E+02
64	Apr-55	4.32E+00	4.60E+01	2.13E+02	2.60E+01	5.14E+02
65	May-55	5.93E+00	3.74E+01	1.95E+02	4.62E+01	6.54E+02
66	Jun-55	3.27E+01	1.62E+01	1.03E+02	6.63E+01	5.60E+02
67	Jul-55	4.41E+01	1.23E+01	7.15E+01	5.58E+01	4.45E+02
68	Aug-55	1.30E+01	2.30E+01	1.53E+02	4.34E+01	5.42E+02
69	Sep-55	2.35E+00	3.52E+01	2.08E+02	1.83E+01	4.62E+02
70	Oct-55	1.41E+00	6.31E+01	3.12E+02	1.46E+01	4.77E+02
71	Nov-55	2.95E+00	6.78E+01	3.13E+02	2.07E+01	5.79E+02
72	Dec-55	4.13E+00	6.68E+01	3.00E+02	2.25E+01	6.08E+02
73	Jan-56	2.56E+00	2.98E+01	2.01E+02	1.28E+01	4.91E+02
74	Feb-56	1.84E+00	4.72E+01	2.83E+02	1.41E+01	5.83E+02
75	Mar-56	4.77E+00	7.95E+01	2.72E+02	2.05E+01	5.80E+02
76	Apr-56	2.91E+01	3.43E+01	1.42E+02	4.08E+01	5.44E+02
77	May-56	4.98E+01	1.51E+01	8.78E+01	4.02E+01	4.36E+02
78	Jun-56	7.58E+01	1.10E+01	7.76E+01	3.36E+01	3.90E+02
79	Jul-56	5.09E+01	1.49E+01	1.40E+02	4.98E+01	5.58E+02
80	Aug-56	1.48E+01	2.53E+01	2.58E+02	3.56E+01	6.20E+02
81	Sep-56	3.74E+00	3.99E+01	3.27E+02	2.07E+01	5.59E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
82	Oct-56	1.89E+00	4.29E+01	2.77E+02	1.67E+01	4.31E+02
83	Nov-56	1.71E+00	6.16E+01	2.60E+02	1.84E+01	4.38E+02
84	Dec-56	1.93E+00	7.72E+01	2.22E+02	2.52E+01	6.30E+02
85	Jan-57	6.30E-01	8.12E+01	1.75E+02	3.62E+01	5.23E+02
86	Feb-57	8.90E-01	9.72E+01	1.78E+02	3.47E+01	7.26E+02
87	Mar-57	1.84E+00	6.09E+01	1.40E+02	1.28E+01	4.88E+02
88	Apr-57	5.90E+00	6.31E+01	1.51E+02	2.69E+01	6.26E+02
89	May-57	6.37E+01	2.61E+01	7.39E+01	6.53E+01	5.75E+02
90	Jun-57	5.55E+01	1.71E+01	5.45E+01	4.27E+01	3.97E+02
91	Jul-57	1.91E+01	2.89E+01	1.86E+02	2.93E+01	4.74E+02
92	Aug-57	3.50E+00	7.08E+01	2.67E+02	1.34E+01	5.12E+02
93	Sep-57	5.80E-01	8.12E+01	3.61E+02	6.20E+00	3.81E+02
94	Oct-57	5.00E-01	8.47E+01	4.14E+02	7.09E+00	2.87E+02
95	Nov-57	3.70E-01	8.96E+01	4.56E+02	7.23E+00	2.44E+02
96	Dec-57	3.20E-01	1.45E+02	4.55E+02	9.79E+00	3.09E+02
97	Jan-58	3.00E-01	1.04E+02	1.93E+02	9.09E+00	2.42E+02
98	Feb-58	2.12E+00	1.17E+02	2.52E+02	2.56E+01	3.82E+02
99	Mar-58	4.48E+00	7.77E+01	1.76E+02	3.60E+01	4.74E+02
100	Apr-58	1.07E+01	1.32E+02	2.31E+02	4.77E+01	5.01E+02
101	May-58	5.50E+01	6.25E+01	1.23E+02	9.03E+01	4.44E+02
102	Jun-58	8.96E+01	3.83E+01	5.29E+01	6.38E+01	3.12E+02
103	Jul-58	2.41E+01	1.08E+02	1.25E+02	4.50E+01	3.99E+02
104	Aug-58	3.18E+00	1.01E+02	2.26E+02	2.05E+01	4.08E+02
105	Sep-58	6.00E-01	8.88E+01	1.79E+02	9.52E+00	2.77E+02
106	Oct-58	6.60E-01	1.08E+02	3.51E+02	1.13E+01	3.23E+02
107	Nov-58	7.90E-01	1.09E+02	3.12E+02	1.53E+01	3.62E+02
108	Dec-58	2.04E+00	1.23E+02	2.53E+02	2.83E+01	4.48E+02
109	Jan-59	3.34E+00	9.52E+01	9.98E+01	2.77E+01	2.21E+02
110	Feb-59	3.47E+00	1.25E+02	1.89E+02	3.86E+01	3.70E+02
111	Mar-59	8.51E+00	1.23E+02	2.21E+02	4.63E+01	3.84E+02
112	Apr-59	2.36E+01	8.64E+01	1.74E+02	5.32E+01	3.61E+02
113	May-59	7.81E+01	4.49E+01	1.04E+02	7.47E+01	3.28E+02
114	Jun-59	1.20E+02	2.43E+01	6.05E+01	5.49E+01	2.22E+02
115	Jul-59	7.53E+01	3.38E+01	9.89E+01	4.72E+01	2.48E+02
116	Aug-59	2.08E+01	5.68E+01	1.47E+02	2.58E+01	2.24E+02
117	Sep-59	1.04E+01	6.75E+01	3.22E+02	2.20E+01	2.42E+02
118	Oct-59	1.23E+01	9.86E+01	1.50E+02	3.90E+01	3.07E+02
119	Nov-59	1.29E+01	1.36E+02	2.91E+02	3.01E+01	3.03E+02
120	Dec-59	1.10E+01	1.04E+02	4.10E+02	2.32E+01	3.42E+02
121	Jan-60	2.33E+00	1.25E+02	7.30E+02	1.84E+01	2.84E+02
122	Feb-60	3.90E+00	1.22E+02	3.82E+02	1.82E+01	3.79E+02
123	Mar-60	4.98E+00	1.46E+02	2.96E+02	1.58E+01	3.74E+02
124	Apr-60	7.22E+01	8.01E+01	2.22E+02	7.78E+01	4.70E+02
125	May-60	8.72E+01	6.73E+01	2.13E+02	7.17E+01	3.34E+02
126	Jun-60	1.01E+02	4.02E+01	1.39E+02	6.54E+01	3.20E+02
127	Jul-60	6.30E+01	4.93E+01	1.73E+02	4.91E+01	3.78E+02
128	Aug-60	1.56E+01	7.32E+01	1.58E+02	3.63E+01	3.30E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
129	Sep-60	1.44E+00	9.00E+01	3.19E+02	9.09E+00	2.35E+02
130	Oct-60	8.80E-01	9.75E+01	3.57E+02	8.26E+00	2.11E+02
131	Nov-60	1.59E+00	1.49E+02	3.44E+02	1.21E+01	3.03E+02
132	Dec-60	9.30E-01	1.98E+02	4.68E+02	9.24E+00	2.92E+02
133	Jan-61	9.80E-01	1.83E+02	5.02E+02	1.16E+01	3.09E+02
134	Feb-61	8.03E+00	2.09E+02	3.59E+02	2.92E+01	4.95E+02
135	Mar-61	1.35E+01	1.94E+02	5.05E+02	3.72E+01	3.61E+02
136	Apr-61	1.67E+01	1.75E+02	6.15E+02	4.08E+01	2.74E+02
137	May-61	8.78E+01	1.08E+02	2.67E+02	6.94E+01	2.21E+02
138	Jun-61	1.57E+02	3.66E+01	1.30E+02	3.61E+01	1.74E+02
139	Jul-61	4.52E+01	4.28E+01	1.12E+02	2.30E+01	1.20E+02
140	Aug-61	4.75E+00	4.16E+01	3.45E+02	9.00E+00	1.38E+02
141	Sep-61	5.20E-01	6.19E+01	3.96E+02	3.24E+00	1.36E+02
142	Oct-61	3.00E-01	8.43E+01	3.27E+02	2.40E+00	1.48E+02
143	Nov-61	3.50E-01	8.98E+01	3.48E+02	2.65E+00	1.17E+02
144	Dec-61	2.70E-01	8.21E+01	2.83E+02	2.12E+00	1.04E+02
145	Jan-62	1.03E+00	6.13E+01	3.67E+02	2.78E+00	1.46E+02
146	Feb-62	2.48E+00	8.35E+01	3.51E+02	6.28E+00	2.01E+02
147	Mar-62	1.18E+00	1.16E+02	4.01E+02	5.72E+00	2.10E+02
148	Apr-62	3.38E+01	8.67E+01	4.71E+02	2.66E+01	3.55E+02
149	May-62	6.97E+01	6.51E+01	2.34E+02	3.35E+01	4.85E+02
150	Jun-62	1.21E+02	3.49E+01	1.90E+02	2.97E+01	2.68E+02
151	Jul-62	4.18E+01	3.96E+01	3.62E+02	1.77E+01	2.25E+02
152	Aug-62	1.38E+01	7.15E+01	4.80E+02	1.15E+01	2.78E+02
153	Sep-62	1.01E+00	9.48E+01	8.41E+02	2.61E+00	1.87E+02
154	Oct-62	1.04E+00	8.17E+01	5.29E+02	2.67E+00	2.05E+02
155	Nov-62	1.26E+00	6.77E+01	3.37E+02	2.99E+00	1.76E+02
156	Dec-62	3.26E+00	5.97E+01	3.99E+02	6.10E+00	2.01E+02
157	Jan-63	1.84E+00	4.71E+01	1.80E+02	2.72E+00	1.09E+02
158	Feb-63	5.39E+00	4.77E+01	1.81E+02	6.00E+00	2.13E+02
159	Mar-63	3.77E+00	8.22E+01	1.34E+02	1.05E+01	2.22E+02
160	Apr-63	1.24E+01	9.25E+01	1.80E+02	1.86E+01	2.74E+02
161	May-63	2.69E+01	5.00E+01	9.16E+01	2.70E+01	2.36E+02
162	Jun-63	7.74E+01	2.97E+01	3.55E+01	3.76E+01	2.17E+02
163	Jul-63	4.07E+01	3.86E+01	4.40E+01	2.83E+01	2.32E+02
164	Aug-63	5.83E+00	5.20E+01	7.84E+01	1.28E+01	2.11E+02
165	Sep-63	8.20E-01	6.18E+01	9.16E+01	4.34E+00	1.55E+02
166	Oct-63	3.30E-01	7.65E+01	1.18E+02	2.86E+00	1.74E+02
167	Nov-63	2.90E-01	8.12E+01	1.40E+02	2.52E+00	1.42E+02
168	Dec-63	5.10E-01	9.79E+01	1.18E+02	3.47E+00	1.49E+02
169	Jan-64	3.50E-01	7.07E+01	9.79E+01	2.60E+00	1.20E+02
170	Feb-64	1.02E+00	9.92E+01	1.50E+02	5.80E+00	2.06E+02
171	Mar-64	7.70E-01	1.22E+02	1.75E+02	4.90E+00	1.94E+02
172	Apr-64	2.87E+00	9.41E+01	1.76E+02	8.87E+00	3.05E+02
173	May-64	5.70E+01	6.84E+01	1.27E+02	3.82E+01	4.78E+02
174	Jun-64	1.57E+02	2.25E+01	4.06E+01	5.02E+01	2.45E+02
175	Jul-64	9.08E+01	2.09E+01	2.91E+01	3.72E+01	1.92E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
176	Aug-64	1.53E+01	3.12E+01	1.04E+02	1.54E+01	2.05E+02
177	Sep-64	1.44E+00	5.60E+01	1.67E+02	5.61E+00	1.52E+02
178	Oct-64	2.17E+00	5.19E+01	1.01E+02	8.26E+00	1.94E+02
179	Nov-64	1.30E+00	7.92E+01	1.22E+02	5.80E+00	2.03E+02
180	Dec-64	4.83E+00	7.01E+01	1.06E+02	9.25E+00	2.01E+02
181	Jan-65	4.88E+00	6.08E+01	8.90E+01	6.19E+00	2.28E+02
182	Feb-65	1.52E+01	4.61E+01	8.40E+01	1.06E+01	2.22E+02
183	Mar-65	1.19E+01	7.51E+01	1.30E+02	1.51E+01	2.16E+02
184	Apr-65	2.50E+01	8.23E+01	1.14E+02	2.46E+01	2.14E+02
185	May-65	7.06E+01	3.93E+01	6.14E+01	5.25E+01	2.21E+02
186	Jun-65	9.40E+01	2.11E+01	4.58E+01	4.04E+01	1.52E+02
187	Jul-65	3.99E+01	2.06E+01	4.04E+01	3.05E+01	1.61E+02
188	Aug-65	8.77E+00	3.58E+01	5.35E+01	2.14E+01	1.56E+02
189	Sep-65	1.88E+00	5.21E+01	6.88E+01	9.11E+00	1.22E+02
190	Oct-65	7.60E-01	7.55E+01	5.26E+01	9.14E+00	1.15E+02
191	Nov-65	6.50E-01	7.52E+01	5.88E+01	7.60E+00	1.20E+02
192	Dec-65	1.10E+00	7.17E+01	8.42E+01	8.43E+00	1.12E+02
193	Jan-66	7.90E-01	4.92E+01	5.84E+01	3.44E+00	5.64E+01
194	Feb-66	1.43E+00	5.27E+01	6.70E+01	5.92E+00	7.90E+01
195	Mar-66	2.05E+00	6.60E+01	8.35E+01	8.91E+00	8.54E+01
196	Apr-66	3.74E+00	5.54E+01	8.43E+01	1.11E+01	1.04E+02
197	May-66	3.08E+01	3.58E+01	6.33E+01	2.50E+01	1.60E+02
198	Jun-66	5.18E+01	1.98E+01	2.65E+01	3.06E+01	8.30E+01
199	Jul-66	1.34E+01	6.76E+00	1.07E+01	7.62E+00	2.25E+01
200	Aug-66	2.23E+00	6.57E+00	1.47E+01	2.06E+00	1.90E+01
201	Sep-66	5.10E-01	4.69E+01	1.03E+02	2.20E+00	5.39E+01
202	Oct-66	4.50E-01	5.58E+01	1.73E+02	2.73E+00	5.71E+01
203	Nov-66	4.00E-01	4.96E+01	1.47E+02	2.15E+00	5.03E+01
204	Dec-66	1.03E+00	5.07E+01	1.32E+02	3.70E+00	7.15E+01
205	Jan-67	1.32E+00	3.79E+01	1.25E+02	5.37E+00	5.94E+01
206	Feb-67	1.92E+00	5.18E+01	1.49E+02	5.35E+00	6.97E+01
207	Mar-67	2.56E+00	5.05E+01	1.82E+02	7.01E+00	9.68E+01
208	Apr-67	5.37E+00	7.27E+01	1.88E+02	1.54E+01	1.15E+02
209	May-67	2.25E+01	6.54E+01	1.04E+02	2.33E+01	1.40E+02
210	Jun-67	8.03E+01	2.30E+01	3.46E+01	4.69E+01	1.50E+02
211	Jul-67	4.51E+01	2.66E+01	5.33E+01	2.59E+01	1.41E+02
212	Aug-67	7.33E+00	5.41E+01	7.68E+01	1.26E+01	1.21E+02
213	Sep-67	1.23E+00	6.30E+01	1.15E+02	4.51E+00	1.21E+02
214	Oct-67	7.90E-01	6.18E+01	1.00E+02	4.45E+00	1.00E+02
215	Nov-67	8.00E-01	4.96E+01	9.04E+01	3.95E+00	8.60E+01
216	Dec-67	2.29E+00	4.87E+01	9.46E+01	8.23E+00	1.00E+02
217	Jan-68	1.06E+00	3.47E+01	4.79E+01	5.84E+00	6.41E+01
218	Feb-68	3.24E+00	6.07E+01	6.32E+01	9.28E+00	1.09E+02
219	Mar-68	7.52E+00	6.11E+01	7.59E+01	1.76E+01	1.32E+02
220	Apr-68	3.00E-02	5.48E+01	8.11E+01	7.00E-01	2.67E+01
221	May-68	3.30E-01	5.74E+01	7.00E+01	1.04E+00	4.01E+01
222	Jun-68	4.31E+00	1.82E+01	2.42E+01	4.90E+00	5.73E+01

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
223	Jul-68	1.42E+00	1.25E+01	2.40E+01	2.83E+00	3.83E+01
224	Aug-68	1.00E-02	2.63E+01	5.17E+01	2.20E-01	1.78E+01
225	Sep-68	0.00	3.23E+01	5.90E+01	9.00E-02	1.41E+01
226	Oct-68	0.00	2.82E+01	4.76E+01	5.00E-02	1.01E+01
227	Nov-68	0.00	2.67E+01	5.48E+01	7.00E-02	1.04E+01
228	Dec-68	0.00	2.55E+01	5.26E+01	1.30E-01	1.33E+01
229	Jan-69	2.00E-02	1.44E+01	3.06E+01	2.80E-01	1.14E+01
230	Feb-69	5.00E-02	2.57E+01	4.92E+01	5.40E-01	1.93E+01
231	Mar-69	5.00E-02	3.41E+01	5.87E+01	7.80E-01	2.62E+01
232	Apr-69	2.12E+00	2.68E+01	3.76E+01	6.47E+00	6.43E+01
233	May-69	4.17E+00	1.24E+01	2.12E+01	8.49E+00	4.37E+01
234	Jun-69	2.96E+00	1.09E+01	1.84E+01	5.85E+00	3.71E+01
235	Jul-69	8.90E-01	1.35E+01	2.26E+01	2.50E+00	2.25E+01
236	Aug-69	0.00	2.23E+01	4.82E+01	1.10E-01	8.71E+00
237	Sep-69	0.00	2.34E+01	5.17E+01	2.00E-02	4.03E+00
238	Oct-69	0.00	2.04E+01	3.85E+01	3.00E-02	2.61E+00
239	Nov-69	0.00	1.48E+01	4.06E+01	4.00E-02	2.31E+00
240	Dec-69	0.00	1.11E+01	4.66E+01	7.00E-02	3.72E+00
241	Jan-70	0.00	4.08E+00	1.42E+01	6.00E-02	8.47E+00
242	Feb-70	0.00	3.19E+00	1.14E+01	3.00E-02	5.64E+00
243	Mar-70	0.00	1.01E+00	8.78E+00	0.00	1.52E+00
244	Apr-70	0.00	5.45E+00	3.69E+01	4.00E-02	7.99E+00
245	May-70	6.00E-01	4.38E+00	3.82E+01	5.30E-01	2.14E+01
246	Jun-70	1.36E+00	1.09E+00	1.92E+01	7.40E-01	2.91E+01
247	Jul-70	8.00E-02	8.85E+00	3.21E+01	3.60E-01	1.54E+01
248	Aug-70	0.00	1.08E+01	3.62E+01	9.00E-02	6.82E+00
249	Sep-70	0.00	1.25E+01	4.97E+01	1.00E-02	3.21E+00
250	Oct-70	0.00	1.75E+01	6.98E+01	2.00E-02	4.51E+00
251	Nov-70	0.00	1.69E+01	6.52E+01	3.00E-02	5.07E+00
252	Dec-70	0.00	1.59E+01	5.83E+01	4.00E-02	6.33E+00
253	Jan-71	0.00	6.81E+00	2.24E+01	7.00E-02	4.93E+00
Location 10						
1	Jan-50	1.37E+01	3.88E+01	1.52E+02	3.41E+01	9.76E+02
2	Feb-50	1.57E+01	3.65E+01	1.42E+02	3.46E+01	9.71E+02
3	Mar-50	1.82E+01	2.92E+01	1.13E+02	3.44E+01	8.42E+02
4	Apr-50	2.04E+01	2.08E+01	8.09E+01	3.08E+01	6.64E+02
5	May-50	2.28E+01	1.41E+01	5.95E+01	2.33E+01	5.06E+02
6	Jun-50	2.00E+01	5.87E+00	3.01E+01	9.14E+00	2.70E+02
7	Jul-50	2.41E+01	7.90E+00	4.00E+01	1.38E+01	3.46E+02
8	Aug-50	2.37E+01	1.95E+01	8.09E+01	3.73E+01	6.20E+02
9	Sep-50	2.04E+01	3.02E+01	1.22E+02	4.61E+01	8.21E+02
10	Oct-50	2.48E+01	3.33E+01	1.60E+02	5.52E+01	1.05E+03
11	Nov-50	3.00E+01	3.81E+01	1.50E+02	5.72E+01	1.08E+03
12	Dec-50	2.42E+01	3.95E+01	1.51E+02	4.58E+01	1.11E+03
13	Jan-51	2.27E+01	2.38E+01	7.23E+01	2.87E+01	6.42E+02
14	Feb-51	3.57E+01	1.85E+01	6.15E+01	3.10E+01	5.92E+02
15	Mar-51	4.01E+01	2.22E+01	7.58E+01	3.87E+01	7.33E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
16	Apr-51	2.87E+01	1.23E+01	4.93E+01	2.53E+01	5.25E+02
17	May-51	2.06E+01	4.13E+00	2.82E+01	1.12E+01	3.21E+02
18	Jun-51	2.43E+01	6.50E+00	3.13E+01	1.71E+01	3.19E+02
19	Jul-51	2.65E+01	8.01E+00	4.75E+01	1.82E+01	4.63E+02
20	Aug-51	3.51E+01	2.19E+01	8.19E+01	2.16E+01	7.52E+02
21	Sep-51	2.80E+01	3.84E+01	1.55E+02	3.30E+01	1.13E+03
22	Oct-51	3.18E+01	3.37E+01	1.12E+02	3.44E+01	9.70E+02
23	Nov-51	2.80E+01	3.11E+01	1.29E+02	2.06E+01	1.12E+03
24	Dec-51	2.61E+01	3.22E+01	9.58E+01	3.11E+01	9.82E+02
25	Jan-52	2.53E+01	3.11E+01	1.28E+02	3.88E+01	1.11E+03
26	Feb-52	2.68E+01	3.85E+01	5.79E+01	2.77E+01	7.83E+02
27	Mar-52	3.48E+01	2.85E+01	8.47E+01	4.05E+01	8.67E+02
28	Apr-52	3.41E+01	1.38E+01	3.53E+01	2.64E+01	5.13E+02
29	May-52	3.18E+01	7.16E+00	2.55E+01	1.73E+01	3.44E+02
30	Jun-52	2.68E+01	7.73E+00	2.18E+01	1.17E+01	3.15E+02
31	Jul-52	3.92E+01	1.48E+01	4.85E+01	1.87E+01	5.09E+02
32	Aug-52	3.76E+01	2.16E+01	6.09E+01	2.19E+01	6.90E+02
33	Sep-52	3.84E+01	4.57E+01	9.04E+01	2.30E+01	8.59E+02
34	Oct-52	3.67E+01	9.41E+01	1.47E+02	6.75E+01	1.12E+03
35	Nov-52	3.06E+01	9.23E+01	1.31E+02	7.36E+01	1.12E+03
36	Dec-52	3.24E+01	1.11E+02	1.93E+02	8.68E+01	1.38E+03
37	Jan-53	3.04E+01	1.03E+02	1.04E+02	8.59E+01	9.65E+02
38	Feb-53	4.31E+01	7.35E+01	8.89E+01	7.77E+01	9.46E+02
39	Mar-53	5.98E+01	7.45E+01	8.98E+01	8.35E+01	9.89E+02
40	Apr-53	5.29E+01	5.89E+01	2.84E+01	5.87E+01	7.24E+02
41	May-53	6.30E+01	3.91E+01	4.43E+01	5.31E+01	6.76E+02
42	Jun-53	4.01E+01	1.39E+01	1.55E+01	2.74E+01	3.02E+02
43	Jul-53	4.24E+01	1.55E+01	3.98E+01	4.87E+01	4.65E+02
44	Aug-53	6.30E+01	3.98E+01	8.65E+01	1.19E+02	9.48E+02
45	Sep-53	5.35E+01	4.21E+01	1.11E+02	1.52E+02	1.22E+03
46	Oct-53	6.36E+01	5.71E+01	1.37E+02	1.64E+02	1.44E+03
47	Nov-53	5.40E-01	6.89E+01	1.21E+02	1.33E+01	3.52E+02
48	Dec-53	4.50E-01	8.42E+01	1.06E+02	1.07E+01	3.16E+02
49	Jan-54	4.30E-01	4.25E+01	1.72E+02	5.30E+00	3.01E+02
50	Feb-54	5.80E-01	4.50E+01	1.87E+02	6.80E+00	3.72E+02
51	Mar-54	9.50E-01	4.56E+01	1.84E+02	8.99E+00	4.16E+02
52	Apr-54	1.69E+00	4.00E+01	1.56E+02	1.19E+01	4.43E+02
53	May-54	2.07E+01	2.22E+01	8.99E+01	2.85E+01	4.87E+02
54	Jun-54	3.03E+01	1.24E+01	5.73E+01	2.49E+01	4.43E+02
55	Jul-54	2.94E+01	1.53E+01	7.00E+01	2.88E+01	4.12E+02
56	Aug-54	1.17E+01	3.14E+01	1.24E+02	3.19E+01	4.76E+02
57	Sep-54	4.51E+00	4.42E+01	1.69E+02	2.21E+01	4.67E+02
58	Oct-54	8.50E-01	5.50E+01	2.23E+02	9.94E+00	4.08E+02
59	Nov-54	7.40E-01	5.46E+01	2.21E+02	8.56E+00	3.61E+02
60	Dec-54	6.70E-01	5.63E+01	2.27E+02	7.42E+00	3.26E+02
61	Jan-55	4.10E-01	4.43E+01	1.78E+02	5.02E+00	2.64E+02
62	Feb-55	6.20E-01	4.55E+01	1.79E+02	6.27E+00	3.11E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
63	Mar-55	1.73E+00	5.63E+01	2.54E+02	1.31E+01	4.47E+02
64	Apr-55	2.73E+00	4.49E+01	2.12E+02	1.97E+01	4.49E+02
65	May-55	4.31E+00	3.65E+01	1.92E+02	3.81E+01	5.93E+02
66	Jun-55	2.68E+01	1.61E+01	1.03E+02	5.88E+01	5.29E+02
67	Jul-55	3.60E+01	1.22E+01	7.12E+01	4.97E+01	4.20E+02
68	Aug-55	9.29E+00	2.26E+01	1.53E+02	3.42E+01	4.86E+02
69	Sep-55	1.33E+00	3.39E+01	2.06E+02	1.31E+01	3.90E+02
70	Oct-55	6.90E-01	5.97E+01	3.05E+02	9.53E+00	3.86E+02
71	Nov-55	1.60E+00	6.52E+01	3.09E+02	1.44E+01	4.84E+02
72	Dec-55	2.68E+00	6.33E+01	2.90E+02	1.67E+01	5.14E+02
73	Jan-56	1.58E+00	2.80E+01	1.92E+02	9.45E+00	4.15E+02
74	Feb-56	1.02E+00	4.52E+01	2.78E+02	9.91E+00	4.89E+02
75	Mar-56	3.18E+00	7.60E+01	2.67E+02	1.57E+01	5.03E+02
76	Apr-56	2.32E+01	3.37E+01	1.41E+02	3.53E+01	5.04E+02
77	May-56	4.20E+01	1.49E+01	8.68E+01	3.62E+01	4.11E+02
78	Jun-56	6.48E+01	1.08E+01	7.70E+01	3.06E+01	3.71E+02
79	Jul-56	4.01E+01	1.46E+01	1.39E+02	4.30E+01	5.18E+02
80	Aug-56	1.03E+01	2.45E+01	2.54E+02	2.82E+01	5.48E+02
81	Sep-56	2.11E+00	3.81E+01	3.23E+02	1.45E+01	4.66E+02
82	Oct-56	1.00E+00	4.14E+01	2.76E+02	1.14E+01	3.60E+02
83	Nov-56	8.90E-01	5.86E+01	2.56E+02	1.24E+01	3.60E+02
84	Dec-56	1.05E+00	7.38E+01	2.20E+02	1.75E+01	5.20E+02
85	Jan-57	2.90E-01	7.65E+01	1.69E+02	2.47E+01	4.28E+02
86	Feb-57	4.40E-01	9.41E+01	1.78E+02	2.48E+01	6.10E+02
87	Mar-57	1.07E+00	5.84E+01	1.37E+02	9.41E+00	4.11E+02
88	Apr-57	3.85E+00	6.09E+01	1.48E+02	2.07E+01	5.47E+02
89	May-57	5.07E+01	2.60E+01	7.41E+01	5.66E+01	5.36E+02
90	Jun-57	4.32E+01	1.67E+01	5.40E+01	3.67E+01	3.67E+02
91	Jul-57	1.32E+01	2.80E+01	1.83E+02	2.31E+01	4.21E+02
92	Aug-57	1.91E+00	6.72E+01	2.64E+02	9.22E+00	4.22E+02
93	Sep-57	2.50E-01	7.76E+01	3.55E+02	3.72E+00	2.98E+02
94	Oct-57	2.00E-01	8.02E+01	4.08E+02	4.16E+00	2.23E+02
95	Nov-57	1.50E-01	8.51E+01	4.50E+02	4.16E+00	1.87E+02
96	Dec-57	1.30E-01	1.35E+02	4.51E+02	5.65E+00	2.35E+02
97	Jan-58	1.20E-01	9.40E+01	1.81E+02	5.11E+00	1.77E+02
98	Feb-58	1.26E+00	1.12E+02	2.47E+02	1.80E+01	3.14E+02
99	Mar-58	2.58E+00	7.45E+01	1.73E+02	2.60E+01	3.98E+02
100	Apr-58	7.10E+00	1.27E+02	2.27E+02	3.70E+01	4.41E+02
101	May-58	4.10E+01	6.18E+01	1.22E+02	7.54E+01	4.05E+02
102	Jun-58	6.94E+01	3.76E+01	5.26E+01	5.49E+01	2.89E+02
103	Jul-58	1.66E+01	1.05E+02	1.23E+02	3.54E+01	3.52E+02
104	Aug-58	1.72E+00	9.81E+01	2.23E+02	1.40E+01	3.34E+02
105	Sep-58	2.50E-01	8.46E+01	1.80E+02	5.65E+00	2.16E+02
106	Oct-58	2.70E-01	1.02E+02	3.41E+02	6.72E+00	2.49E+02
107	Nov-58	3.70E-01	1.04E+02	3.10E+02	9.66E+00	2.89E+02
108	Dec-58	1.05E+00	1.17E+02	2.49E+02	1.89E+01	3.65E+02
109	Jan-59	1.93E+00	8.83E+01	9.49E+01	1.95E+01	1.81E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
110	Feb-59	1.93E+00	1.19E+02	1.84E+02	2.68E+01	3.05E+02
111	Mar-59	4.88E+00	1.18E+02	2.18E+02	3.34E+01	3.28E+02
112	Apr-59	1.59E+01	8.45E+01	1.72E+02	4.22E+01	3.21E+02
113	May-59	5.80E+01	4.43E+01	1.03E+02	6.26E+01	3.01E+02
114	Jun-59	9.26E+01	2.40E+01	6.04E+01	4.75E+01	2.07E+02
115	Jul-59	5.69E+01	3.31E+01	9.80E+01	3.98E+01	2.28E+02
116	Aug-59	1.37E+01	5.46E+01	1.44E+02	1.97E+01	1.94E+02
117	Sep-59	6.36E+00	6.57E+01	3.18E+02	1.61E+01	2.06E+02
118	Oct-59	7.80E+00	9.51E+01	1.52E+02	2.95E+01	2.67E+02
119	Nov-59	7.67E+00	1.30E+02	2.83E+02	2.25E+01	2.60E+02
120	Dec-59	6.70E+00	1.01E+02	4.03E+02	1.69E+01	2.88E+02
121	Jan-60	1.04E+00	1.16E+02	7.00E+02	1.13E+01	2.21E+02
122	Feb-60	2.01E+00	1.17E+02	3.91E+02	1.25E+01	3.11E+02
123	Mar-60	2.96E+00	1.39E+02	2.91E+02	1.10E+01	3.07E+02
124	Apr-60	5.06E+01	7.83E+01	2.19E+02	6.29E+01	4.24E+02
125	May-60	6.45E+01	6.59E+01	2.12E+02	5.95E+01	3.05E+02
126	Jun-60	7.76E+01	3.96E+01	1.38E+02	5.60E+01	2.96E+02
127	Jul-60	4.64E+01	4.82E+01	1.71E+02	4.08E+01	3.44E+02
128	Aug-60	9.76E+00	7.05E+01	1.57E+02	2.69E+01	2.84E+02
129	Sep-60	6.20E-01	8.58E+01	3.11E+02	5.60E+00	1.84E+02
130	Oct-60	3.80E-01	9.22E+01	3.53E+02	4.85E+00	1.64E+02
131	Nov-60	6.80E-01	1.40E+02	3.42E+02	7.32E+00	2.35E+02
132	Dec-60	4.00E-01	1.86E+02	4.55E+02	5.51E+00	2.26E+02
133	Jan-61	4.00E-01	1.67E+02	4.75E+02	6.66E+00	2.30E+02
134	Feb-61	4.71E+00	1.99E+02	3.56E+02	2.09E+01	4.15E+02
135	Mar-61	7.85E+00	1.85E+02	4.87E+02	2.67E+01	3.06E+02
136	Apr-61	1.04E+01	1.69E+02	6.03E+02	3.08E+01	2.38E+02
137	May-61	6.34E+01	1.06E+02	2.70E+02	5.71E+01	2.01E+02
138	Jun-61	1.29E+02	3.61E+01	1.28E+02	3.21E+01	1.64E+02
139	Jul-61	3.27E+01	4.18E+01	1.12E+02	1.87E+01	1.09E+02
140	Aug-61	2.66E+00	4.01E+01	3.35E+02	6.20E+00	1.13E+02
141	Sep-61	2.40E-01	5.78E+01	3.92E+02	1.99E+00	1.05E+02
142	Oct-61	1.20E-01	7.96E+01	3.28E+02	1.35E+00	1.11E+02
143	Nov-61	1.40E-01	8.49E+01	3.40E+02	1.54E+00	9.11E+01
144	Dec-61	1.00E-01	7.81E+01	2.84E+02	1.21E+00	7.86E+01
145	Jan-62	4.80E-01	5.71E+01	3.53E+02	1.75E+00	1.15E+02
146	Feb-62	1.22E+00	7.98E+01	3.50E+02	4.11E+00	1.64E+02
147	Mar-62	5.50E-01	1.10E+02	3.93E+02	3.55E+00	1.64E+02
148	Apr-62	2.30E+01	8.37E+01	4.45E+02	2.07E+01	3.09E+02
149	May-62	5.03E+01	6.38E+01	2.34E+02	2.76E+01	4.39E+02
150	Jun-62	9.28E+01	3.43E+01	1.89E+02	2.54E+01	2.49E+02
151	Jul-62	2.95E+01	3.86E+01	3.58E+02	1.43E+01	2.02E+02
152	Aug-62	8.68E+00	6.86E+01	4.74E+02	8.56E+00	2.37E+02
153	Sep-62	4.80E-01	8.95E+01	8.19E+02	1.65E+00	1.45E+02
154	Oct-62	4.80E-01	7.87E+01	5.41E+02	1.67E+00	1.62E+02
155	Nov-62	6.00E-01	6.47E+01	3.31E+02	1.90E+00	1.41E+02
156	Dec-62	1.72E+00	5.71E+01	3.90E+02	4.15E+00	1.66E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
157	Jan-63	9.10E-01	4.41E+01	1.73E+02	1.77E+00	8.71E+01
158	Feb-63	3.21E+00	4.56E+01	1.77E+02	4.36E+00	1.81E+02
159	Mar-63	1.95E+00	7.73E+01	1.33E+02	6.86E+00	1.81E+02
160	Apr-63	7.48E+00	8.92E+01	1.76E+02	1.36E+01	2.34E+02
161	May-63	1.93E+01	4.93E+01	9.20E+01	2.21E+01	2.14E+02
162	Jun-63	5.97E+01	2.93E+01	3.55E+01	3.23E+01	2.01E+02
163	Jul-63	2.89E+01	3.76E+01	4.36E+01	2.30E+01	2.09E+02
164	Aug-63	3.19E+00	5.02E+01	7.74E+01	8.87E+00	1.76E+02
165	Sep-63	3.50E-01	5.85E+01	9.03E+01	2.63E+00	1.20E+02
166	Oct-63	1.30E-01	7.19E+01	1.15E+02	1.64E+00	1.31E+02
167	Nov-63	1.10E-01	7.72E+01	1.39E+02	1.45E+00	1.10E+02
168	Dec-63	2.10E-01	9.19E+01	1.17E+02	2.01E+00	1.14E+02
169	Jan-64	1.30E-01	6.40E+01	9.21E+01	1.45E+00	8.79E+01
170	Feb-64	4.70E-01	9.42E+01	1.47E+02	3.64E+00	1.63E+02
171	Mar-64	3.40E-01	1.15E+02	1.71E+02	3.00E+00	1.51E+02
172	Apr-64	1.52E+00	9.19E+01	1.75E+02	6.08E+00	2.53E+02
173	May-64	4.21E+01	6.67E+01	1.26E+02	3.14E+01	4.29E+02
174	Jun-64	1.24E+02	2.23E+01	4.06E+01	4.37E+01	2.31E+02
175	Jul-64	6.97E+01	2.06E+01	2.89E+01	3.18E+01	1.77E+02
176	Aug-64	9.76E+00	3.02E+01	1.02E+02	1.16E+01	1.77E+02
177	Sep-64	7.00E-01	5.24E+01	1.63E+02	3.52E+00	1.20E+02
178	Oct-64	1.08E+00	5.04E+01	1.02E+02	5.50E+00	1.59E+02
179	Nov-64	5.60E-01	7.37E+01	1.18E+02	3.53E+00	1.58E+02
180	Dec-64	2.98E+00	6.75E+01	1.05E+02	6.57E+00	1.68E+02
181	Jan-65	2.81E+00	5.77E+01	8.65E+01	4.42E+00	1.91E+02
182	Feb-65	1.04E+01	4.49E+01	8.29E+01	8.51E+00	1.99E+02
183	Mar-65	7.78E+00	7.24E+01	1.28E+02	1.16E+01	1.90E+02
184	Apr-65	1.81E+01	8.03E+01	1.13E+02	1.98E+01	1.90E+02
185	May-65	5.42E+01	3.88E+01	6.10E+01	4.49E+01	2.04E+02
186	Jun-65	7.54E+01	2.09E+01	4.56E+01	3.56E+01	1.43E+02
187	Jul-65	3.00E+01	2.02E+01	4.02E+01	2.55E+01	1.47E+02
188	Aug-65	5.51E+00	3.47E+01	5.31E+01	1.62E+01	1.36E+02
189	Sep-65	1.01E+00	4.93E+01	6.74E+01	6.16E+00	9.88E+01
190	Oct-65	3.50E-01	7.13E+01	5.25E+01	5.72E+00	9.14E+01
191	Nov-65	2.90E-01	7.12E+01	5.72E+01	4.70E+00	9.40E+01
192	Dec-65	5.00E-01	6.85E+01	8.26E+01	5.32E+00	8.99E+01
193	Jan-66	3.50E-01	4.50E+01	5.52E+01	2.10E+00	4.32E+01
194	Feb-66	6.80E-01	5.09E+01	6.65E+01	3.82E+00	6.38E+01
195	Mar-66	1.03E+00	6.24E+01	8.15E+01	5.89E+00	6.96E+01
196	Apr-66	2.04E+00	5.33E+01	8.27E+01	7.75E+00	8.69E+01
197	May-66	2.17E+01	3.53E+01	6.32E+01	2.02E+01	1.43E+02
198	Jun-66	3.91E+01	1.95E+01	2.65E+01	2.58E+01	7.69E+01
199	Jul-66	9.55E+00	6.73E+00	1.08E+01	6.33E+00	2.07E+01
200	Aug-66	1.33E+00	6.29E+00	1.44E+01	1.50E+00	1.58E+01
201	Sep-66	2.10E-01	4.33E+01	9.93E+01	1.27E+00	4.07E+01
202	Oct-66	1.80E-01	5.30E+01	1.68E+02	1.60E+00	4.42E+01
203	Nov-66	1.70E-01	4.74E+01	1.47E+02	1.30E+00	3.92E+01

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
204	Dec-66	4.70E-01	4.83E+01	1.30E+02	2.31E+00	5.66E+01
205	Jan-67	6.20E-01	3.49E+01	1.19E+02	3.40E+00	4.65E+01
206	Feb-67	9.70E-01	4.94E+01	1.47E+02	3.60E+00	5.72E+01
207	Mar-67	1.32E+00	4.88E+01	1.80E+02	4.71E+00	7.96E+01
208	Apr-67	2.93E+00	6.99E+01	1.87E+02	1.07E+01	9.68E+01
209	May-67	1.65E+01	6.37E+01	1.04E+02	1.87E+01	1.24E+02
210	Jun-67	6.30E+01	2.28E+01	3.44E+01	4.06E+01	1.40E+02
211	Jul-67	3.45E+01	2.60E+01	5.25E+01	2.20E+01	1.29E+02
212	Aug-67	4.65E+00	5.21E+01	7.62E+01	9.31E+00	1.04E+02
213	Sep-67	5.80E-01	6.00E+01	1.12E+02	2.90E+00	9.57E+01
214	Oct-67	3.60E-01	5.89E+01	9.96E+01	2.76E+00	8.03E+01
215	Nov-67	3.80E-01	4.77E+01	8.93E+01	2.54E+00	6.92E+01
216	Dec-67	1.15E+00	4.65E+01	9.30E+01	5.45E+00	8.18E+01
217	Jan-68	5.00E-01	3.21E+01	4.57E+01	3.69E+00	5.03E+01
218	Feb-68	1.87E+00	5.96E+01	6.37E+01	6.61E+00	9.24E+01
219	Mar-68	4.70E+00	5.87E+01	7.42E+01	1.32E+01	1.14E+02
220	Apr-68	2.00E-02	5.32E+01	8.08E+01	5.10E-01	2.31E+01
221	May-68	2.20E-01	5.57E+01	6.95E+01	8.10E-01	3.50E+01
222	Jun-68	3.29E+00	1.81E+01	2.42E+01	4.17E+00	5.30E+01
223	Jul-68	1.05E+00	1.22E+01	2.38E+01	2.36E+00	3.50E+01
224	Aug-68	1.00E-02	2.51E+01	5.07E+01	1.60E-01	1.50E+01
225	Sep-68	0.00	3.11E+01	5.87E+01	6.00E-02	1.16E+01
226	Oct-68	0.00	2.72E+01	4.73E+01	3.00E-02	8.29E+00
227	Nov-68	0.00	2.56E+01	5.36E+01	4.00E-02	8.46E+00
228	Dec-68	0.00	2.47E+01	5.26E+01	9.00E-02	1.12E+01
229	Jan-69	1.00E-02	1.37E+01	2.97E+01	2.10E-01	9.77E+00
230	Feb-69	3.00E-02	2.49E+01	4.87E+01	4.20E-01	1.69E+01
231	Mar-69	3.00E-02	3.30E+01	5.79E+01	6.00E-01	2.29E+01
232	Apr-69	1.57E+00	2.62E+01	3.74E+01	5.40E+00	5.86E+01
233	May-69	3.18E+00	1.22E+01	2.11E+01	7.22E+00	4.04E+01
234	Jun-69	2.25E+00	1.07E+01	1.82E+01	4.95E+00	3.40E+01
235	Jul-69	6.40E-01	1.31E+01	2.23E+01	2.06E+00	2.04E+01
236	Aug-69	0.00	2.12E+01	4.71E+01	8.00E-02	7.17E+00
237	Sep-69	0.00	2.24E+01	5.18E+01	1.00E-02	3.27E+00
238	Oct-69	0.00	1.96E+01	3.80E+01	2.00E-02	2.10E+00
239	Nov-69	0.00	1.43E+01	4.00E+01	3.00E-02	1.86E+00
240	Dec-69	0.00	1.07E+01	4.61E+01	5.00E-02	3.04E+00
241	Jan-70	0.00	3.76E+00	1.34E+01	4.00E-02	6.92E+00
242	Feb-70	0.00	3.18E+00	1.17E+01	3.00E-02	4.99E+00
243	Mar-70	0.00	9.40E-01	8.36E+00	0.00	1.23E+00
244	Apr-70	0.00	5.13E+00	3.58E+01	3.00E-02	6.61E+00
245	May-70	4.40E-01	4.34E+00	3.82E+01	4.40E-01	1.91E+01
246	Jun-70	1.04E+00	1.07E+00	1.90E+01	6.30E-01	2.67E+01
247	Jul-70	6.00E-02	8.43E+00	3.15E+01	2.80E-01	1.37E+01
248	Aug-70	0.00	1.05E+01	3.62E+01	6.00E-02	5.79E+00
249	Sep-70	0.00	1.18E+01	4.84E+01	1.00E-02	2.55E+00
250	Oct-70	0.00	1.68E+01	6.93E+01	1.00E-02	3.60E+00

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
251	Nov-70	0.00	1.61E+01	6.45E+01	2.00E-02	4.08E+00
252	Dec-70	0.00	1.53E+01	5.76E+01	3.00E-02	5.16E+00
253	Jan-71	0.00	6.32E+00	2.12E+01	5.00E-02	4.11E+00
Location 11						
1	Jan-50	4.74E+00	3.51E+01	1.44E+02	1.78E+01	6.95E+02
2	Feb-50	6.48E+00	3.51E+01	1.42E+02	2.05E+01	7.55E+02
3	Mar-50	8.64E+00	2.76E+01	1.10E+02	2.20E+01	6.73E+02
4	Apr-50	1.11E+01	2.02E+01	8.04E+01	2.15E+01	5.58E+02
5	May-50	1.37E+01	1.36E+01	5.86E+01	1.72E+01	4.33E+02
6	Jun-50	1.40E+01	5.77E+00	3.00E+01	7.48E+00	2.45E+02
7	Jul-50	1.62E+01	7.68E+00	3.96E+01	1.09E+01	3.07E+02
8	Aug-50	1.24E+01	1.86E+01	7.96E+01	2.49E+01	5.09E+02
9	Sep-50	8.67E+00	2.85E+01	1.20E+02	2.75E+01	6.34E+02
10	Oct-50	9.70E+00	3.18E+01	1.58E+02	3.17E+01	8.02E+02
11	Nov-50	1.33E+01	3.60E+01	1.47E+02	3.53E+01	8.49E+02
12	Dec-50	1.11E+01	3.75E+01	1.49E+02	2.88E+01	8.77E+02
13	Jan-51	1.05E+01	2.22E+01	6.95E+01	1.80E+01	5.02E+02
14	Feb-51	1.85E+01	1.79E+01	6.09E+01	2.07E+01	4.85E+02
15	Mar-51	1.98E+01	2.12E+01	7.45E+01	2.53E+01	5.95E+02
16	Apr-51	1.67E+01	1.21E+01	4.92E+01	1.84E+01	4.49E+02
17	May-51	1.39E+01	4.06E+00	2.79E+01	8.90E+00	2.85E+02
18	Jun-51	1.69E+01	6.35E+00	3.10E+01	1.38E+01	2.87E+02
19	Jul-51	1.74E+01	7.81E+00	4.71E+01	1.42E+01	4.08E+02
20	Aug-51	1.75E+01	2.08E+01	8.05E+01	1.42E+01	6.07E+02
21	Sep-51	1.11E+01	3.61E+01	1.51E+02	1.87E+01	8.51E+02
22	Oct-51	1.34E+01	3.23E+01	1.12E+02	2.07E+01	7.61E+02
23	Nov-51	1.14E+01	2.96E+01	1.27E+02	1.24E+01	8.57E+02
24	Dec-51	1.06E+01	3.05E+01	9.50E+01	1.80E+01	7.55E+02
25	Jan-52	1.04E+01	2.88E+01	1.22E+02	2.26E+01	8.42E+02
26	Feb-52	1.16E+01	3.65E+01	5.89E+01	1.71E+01	6.21E+02
27	Mar-52	1.61E+01	2.77E+01	8.33E+01	2.55E+01	6.93E+02
28	Apr-52	2.00E+01	1.34E+01	3.55E+01	1.93E+01	4.41E+02
29	May-52	2.18E+01	7.03E+00	2.53E+01	1.39E+01	3.09E+02
30	Jun-52	1.76E+01	7.54E+00	2.17E+01	9.12E+00	2.79E+02
31	Jul-52	2.29E+01	1.42E+01	4.77E+01	1.36E+01	4.32E+02
32	Aug-52	1.75E+01	2.06E+01	6.04E+01	1.39E+01	5.52E+02
33	Sep-52	1.37E+01	4.25E+01	8.87E+01	1.25E+01	6.35E+02
34	Oct-52	1.15E+01	8.68E+01	1.43E+02	3.32E+01	7.99E+02
35	Nov-52	9.60E+00	8.75E+01	1.31E+02	3.70E+01	8.09E+02
36	Dec-52	9.52E+00	1.02E+02	1.87E+02	4.17E+01	9.59E+02
37	Jan-53	1.17E+01	9.11E+01	9.61E+01	4.66E+01	6.87E+02
38	Feb-53	1.93E+01	7.02E+01	8.74E+01	4.85E+01	7.47E+02
39	Mar-53	2.69E+01	7.13E+01	8.91E+01	5.21E+01	7.86E+02
40	Apr-53	2.56E+01	5.67E+01	2.92E+01	3.85E+01	5.90E+02
41	May-53	3.62E+01	3.79E+01	4.39E+01	3.81E+01	5.74E+02
42	Jun-53	2.81E+01	1.37E+01	1.55E+01	2.22E+01	2.73E+02
43	Jul-53	2.67E+01	1.50E+01	3.92E+01	3.68E+01	4.05E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
44	Aug-53	3.05E+01	3.77E+01	8.48E+01	7.58E+01	7.57E+02
45	Sep-53	2.28E+01	4.02E+01	1.10E+02	9.11E+01	9.51E+02
46	Oct-53	2.48E+01	5.40E+01	1.36E+02	9.41E+01	1.10E+03
47	Nov-53	2.10E-01	6.45E+01	1.20E+02	7.48E+00	2.68E+02
48	Dec-53	1.70E-01	7.91E+01	1.05E+02	6.16E+00	2.40E+02
49	Jan-54	1.70E-01	3.88E+01	1.63E+02	2.99E+00	2.24E+02
50	Feb-54	2.50E-01	4.30E+01	1.85E+02	4.13E+00	2.92E+02
51	Mar-54	4.20E-01	4.32E+01	1.81E+02	5.51E+00	3.26E+02
52	Apr-54	8.20E-01	3.85E+01	1.55E+02	7.72E+00	3.58E+02
53	May-54	1.18E+01	2.14E+01	8.83E+01	2.06E+01	4.13E+02
54	Jun-54	2.12E+01	1.21E+01	5.70E+01	2.03E+01	4.00E+02
55	Jul-54	2.02E+01	1.49E+01	6.95E+01	2.30E+01	3.70E+02
56	Aug-54	6.67E+00	3.01E+01	1.22E+02	2.25E+01	4.00E+02
57	Sep-54	2.25E+00	4.21E+01	1.67E+02	1.45E+01	3.78E+02
58	Oct-54	3.50E-01	5.22E+01	2.20E+02	5.88E+00	3.14E+02
59	Nov-54	2.90E-01	5.21E+01	2.20E+02	4.98E+00	2.79E+02
60	Dec-54	2.70E-01	5.31E+01	2.23E+02	4.29E+00	2.48E+02
61	Jan-55	1.50E-01	4.03E+01	1.69E+02	2.70E+00	1.91E+02
62	Feb-55	2.40E-01	4.38E+01	1.79E+02	3.65E+00	2.39E+02
63	Mar-55	7.20E-01	5.32E+01	2.49E+02	7.73E+00	3.46E+02
64	Apr-55	1.27E+00	4.34E+01	2.12E+02	1.26E+01	3.61E+02
65	May-55	2.29E+00	3.52E+01	1.90E+02	2.61E+01	4.90E+02
66	Jun-55	1.84E+01	1.60E+01	1.03E+02	4.68E+01	4.74E+02
67	Jul-55	2.45E+01	1.19E+01	7.08E+01	3.96E+01	3.76E+02
68	Aug-55	5.48E+00	2.12E+01	1.47E+02	2.44E+01	4.00E+02
69	Sep-55	5.70E-01	3.22E+01	2.05E+02	8.01E+00	3.05E+02
70	Oct-55	2.60E-01	5.56E+01	2.98E+02	5.31E+00	2.89E+02
71	Nov-55	6.70E-01	6.21E+01	3.06E+02	8.66E+00	3.77E+02
72	Dec-55	1.35E+00	6.00E+01	2.85E+02	1.07E+01	4.08E+02
73	Jan-56	7.30E-01	2.59E+01	1.84E+02	5.90E+00	3.24E+02
74	Feb-56	4.40E-01	4.29E+01	2.75E+02	6.02E+00	3.83E+02
75	Mar-56	1.58E+00	7.20E+01	2.65E+02	1.02E+01	4.05E+02
76	Apr-56	1.50E+01	3.32E+01	1.40E+02	2.69E+01	4.40E+02
77	May-56	2.90E+01	1.46E+01	8.63E+01	2.92E+01	3.70E+02
78	Jun-56	4.54E+01	1.06E+01	7.63E+01	2.48E+01	3.34E+02
79	Jul-56	2.54E+01	1.42E+01	1.37E+02	3.25E+01	4.50E+02
80	Aug-56	5.43E+00	2.33E+01	2.49E+02	1.88E+01	4.45E+02
81	Sep-56	9.30E-01	3.59E+01	3.18E+02	8.80E+00	3.62E+02
82	Oct-56	4.00E-01	3.95E+01	2.77E+02	6.59E+00	2.78E+02
83	Nov-56	3.60E-01	5.49E+01	2.52E+02	7.18E+00	2.75E+02
84	Dec-56	4.30E-01	6.92E+01	2.17E+02	1.02E+01	3.95E+02
85	Jan-57	1.20E-01	7.03E+01	1.62E+02	1.40E+01	3.18E+02
86	Feb-57	1.80E-01	8.99E+01	1.78E+02	1.49E+01	4.70E+02
87	Mar-57	5.30E-01	5.60E+01	1.34E+02	6.39E+00	3.34E+02
88	Apr-57	2.04E+00	6.03E+01	1.52E+02	1.42E+01	4.66E+02
89	May-57	3.51E+01	2.57E+01	7.45E+01	4.52E+01	4.80E+02
90	Jun-57	2.98E+01	1.63E+01	5.35E+01	2.94E+01	3.28E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
91	Jul-57	7.38E+00	2.70E+01	1.80E+02	1.64E+01	3.53E+02
92	Aug-57	9.00E-01	6.32E+01	2.60E+02	5.82E+00	3.32E+02
93	Sep-57	1.00E-01	7.38E+01	3.50E+02	2.09E+00	2.25E+02
94	Oct-57	7.00E-02	7.56E+01	4.01E+02	2.27E+00	1.68E+02
95	Nov-57	5.00E-02	8.04E+01	4.45E+02	2.21E+00	1.38E+02
96	Dec-57	5.00E-02	1.26E+02	4.48E+02	3.02E+00	1.73E+02
97	Jan-58	4.00E-02	8.41E+01	1.69E+02	2.70E+00	1.26E+02
98	Feb-58	6.00E-01	1.08E+02	2.43E+02	1.13E+01	2.47E+02
99	Mar-58	1.28E+00	7.11E+01	1.70E+02	1.72E+01	3.20E+02
100	Apr-58	3.99E+00	1.21E+02	2.25E+02	2.59E+01	3.69E+02
101	May-58	2.79E+01	6.11E+01	1.23E+02	5.91E+01	3.59E+02
102	Jun-58	4.78E+01	3.66E+01	5.22E+01	4.41E+01	2.59E+02
103	Jul-58	9.66E+00	1.00E+02	1.21E+02	2.51E+01	2.94E+02
104	Aug-58	8.10E-01	9.46E+01	2.19E+02	8.72E+00	2.63E+02
105	Sep-58	9.00E-02	8.04E+01	1.82E+02	3.14E+00	1.64E+02
106	Oct-58	1.00E-01	9.63E+01	3.30E+02	3.69E+00	1.86E+02
107	Nov-58	1.50E-01	9.87E+01	3.09E+02	5.61E+00	2.21E+02
108	Dec-58	4.70E-01	1.11E+02	2.45E+02	1.16E+01	2.87E+02
109	Jan-59	9.30E-01	8.14E+01	9.03E+01	1.23E+01	1.41E+02
110	Feb-59	9.30E-01	1.14E+02	1.80E+02	1.71E+01	2.43E+02
111	Mar-59	2.36E+00	1.14E+02	2.15E+02	2.20E+01	2.67E+02
112	Apr-59	8.81E+00	8.61E+01	1.79E+02	3.06E+01	2.81E+02
113	May-59	3.75E+01	4.36E+01	1.03E+02	4.85E+01	2.66E+02
114	Jun-59	6.48E+01	2.36E+01	6.04E+01	3.87E+01	1.88E+02
115	Jul-59	3.77E+01	3.22E+01	9.70E+01	3.10E+01	2.01E+02
116	Aug-59	7.41E+00	5.21E+01	1.43E+02	1.35E+01	1.60E+02
117	Sep-59	3.14E+00	6.35E+01	3.13E+02	1.05E+01	1.67E+02
118	Oct-59	4.02E+00	9.10E+01	1.55E+02	1.97E+01	2.20E+02
119	Nov-59	3.98E+00	1.25E+02	2.79E+02	1.53E+01	2.13E+02
120	Dec-59	3.46E+00	9.68E+01	3.94E+02	1.12E+01	2.32E+02
121	Jan-60	4.20E-01	1.07E+02	6.68E+02	6.53E+00	1.65E+02
122	Feb-60	8.90E-01	1.12E+02	4.01E+02	7.84E+00	2.45E+02
123	Mar-60	1.33E+00	1.33E+02	2.89E+02	6.62E+00	2.38E+02
124	Apr-60	3.07E+01	7.63E+01	2.16E+02	4.66E+01	3.66E+02
125	May-60	4.05E+01	6.40E+01	2.10E+02	4.47E+01	2.63E+02
126	Jun-60	5.20E+01	3.87E+01	1.38E+02	4.42E+01	2.63E+02
127	Jul-60	2.92E+01	4.69E+01	1.70E+02	3.09E+01	2.99E+02
128	Aug-60	5.06E+00	6.73E+01	1.56E+02	1.79E+01	2.32E+02
129	Sep-60	2.40E-01	8.13E+01	3.02E+02	3.23E+00	1.39E+02
130	Oct-60	1.50E-01	8.68E+01	3.50E+02	2.66E+00	1.23E+02
131	Nov-60	2.50E-01	1.31E+02	3.39E+02	4.07E+00	1.75E+02
132	Dec-60	1.60E-01	1.74E+02	4.41E+02	3.08E+00	1.69E+02
133	Jan-61	1.40E-01	1.50E+02	4.46E+02	3.48E+00	1.63E+02
134	Feb-61	2.29E+00	1.90E+02	3.57E+02	1.35E+01	3.35E+02
135	Mar-61	3.82E+00	1.76E+02	4.73E+02	1.73E+01	2.49E+02
136	Apr-61	5.31E+00	1.62E+02	5.93E+02	2.06E+01	1.96E+02
137	May-61	4.13E+01	1.05E+02	2.77E+02	4.34E+01	1.76E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
138	Jun-61	9.09E+01	3.55E+01	1.27E+02	2.63E+01	1.47E+02
139	Jul-61	1.98E+01	4.04E+01	1.11E+02	1.36E+01	9.34E+01
140	Aug-61	1.30E+00	3.84E+01	3.24E+02	3.92E+00	8.80E+01
141	Sep-61	1.00E-01	5.36E+01	3.89E+02	1.15E+00	7.78E+01
142	Oct-61	4.00E-02	7.47E+01	3.31E+02	7.00E-01	8.02E+01
143	Nov-61	5.00E-02	7.94E+01	3.29E+02	8.30E-01	6.85E+01
144	Dec-61	3.00E-02	7.43E+01	2.87E+02	6.40E-01	5.73E+01
145	Jan-62	1.90E-01	5.26E+01	3.38E+02	1.00E+00	8.60E+01
146	Feb-62	5.30E-01	7.61E+01	3.51E+02	2.50E+00	1.30E+02
147	Mar-62	2.20E-01	1.03E+02	3.85E+02	2.03E+00	1.24E+02
148	Apr-62	1.33E+01	8.19E+01	4.60E+02	1.48E+01	2.63E+02
149	May-62	3.14E+01	6.21E+01	2.35E+02	2.08E+01	3.81E+02
150	Jun-62	6.22E+01	3.36E+01	1.87E+02	2.01E+01	2.23E+02
151	Jul-62	1.76E+01	3.74E+01	3.53E+02	1.05E+01	1.73E+02
152	Aug-62	4.56E+00	6.55E+01	4.68E+02	5.76E+00	1.93E+02
153	Sep-62	2.00E-01	8.42E+01	7.97E+02	9.70E-01	1.09E+02
154	Oct-62	1.90E-01	7.55E+01	5.56E+02	9.50E-01	1.22E+02
155	Nov-62	2.50E-01	6.17E+01	3.27E+02	1.12E+00	1.10E+02
156	Dec-62	7.90E-01	5.45E+01	3.83E+02	2.60E+00	1.32E+02
157	Jan-63	3.90E-01	4.07E+01	1.66E+02	1.06E+00	6.68E+01
158	Feb-63	1.59E+00	4.47E+01	1.79E+02	2.88E+00	1.47E+02
159	Mar-63	8.90E-01	7.24E+01	1.31E+02	4.17E+00	1.42E+02
160	Apr-63	3.68E+00	8.59E+01	1.73E+02	8.91E+00	1.90E+02
161	May-63	1.14E+01	4.87E+01	9.32E+01	1.62E+01	1.85E+02
162	Jun-63	4.00E+01	2.87E+01	3.56E+01	2.55E+01	1.79E+02
163	Jul-63	1.77E+01	3.63E+01	4.30E+01	1.71E+01	1.79E+02
164	Aug-63	1.52E+00	4.81E+01	7.64E+01	5.68E+00	1.42E+02
165	Sep-63	1.40E-01	5.53E+01	8.96E+01	1.51E+00	9.09E+01
166	Oct-63	5.00E-02	6.70E+01	1.12E+02	8.70E-01	9.44E+01
167	Nov-63	4.00E-02	7.33E+01	1.37E+02	7.70E-01	8.23E+01
168	Dec-63	7.00E-02	8.65E+01	1.17E+02	1.09E+00	8.41E+01
169	Jan-64	5.00E-02	5.73E+01	8.62E+01	7.60E-01	6.21E+01
170	Feb-64	1.90E-01	8.92E+01	1.45E+02	2.09E+00	1.24E+02
171	Mar-64	1.30E-01	1.07E+02	1.68E+02	1.69E+00	1.14E+02
172	Apr-64	6.90E-01	8.93E+01	1.74E+02	3.81E+00	2.01E+02
173	May-64	2.70E+01	6.46E+01	1.25E+02	2.35E+01	3.66E+02
174	Jun-64	8.54E+01	2.20E+01	4.06E+01	3.54E+01	2.09E+02
175	Jul-64	4.68E+01	2.00E+01	2.88E+01	2.49E+01	1.57E+02
176	Aug-64	5.31E+00	2.93E+01	1.00E+02	8.08E+00	1.47E+02
177	Sep-64	3.00E-01	4.86E+01	1.59E+02	2.05E+00	9.11E+01
178	Oct-64	4.60E-01	4.88E+01	1.05E+02	3.31E+00	1.24E+02
179	Nov-64	2.10E-01	6.80E+01	1.14E+02	2.00E+00	1.18E+02
180	Dec-64	1.66E+00	6.51E+01	1.04E+02	4.39E+00	1.36E+02
181	Jan-65	1.35E+00	5.37E+01	8.30E+01	2.81E+00	1.50E+02
182	Feb-65	5.78E+00	4.33E+01	8.15E+01	6.00E+00	1.68E+02
183	Mar-65	4.06E+00	6.86E+01	1.25E+02	7.84E+00	1.56E+02
184	Apr-65	1.10E+01	7.72E+01	1.13E+02	1.42E+01	1.58E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
185	May-65	3.59E+01	3.78E+01	6.03E+01	3.51E+01	1.80E+02
186	Jun-65	5.28E+01	2.06E+01	4.54E+01	2.89E+01	1.30E+02
187	Jul-65	1.93E+01	1.96E+01	3.99E+01	1.94E+01	1.28E+02
188	Aug-65	2.83E+00	3.32E+01	5.26E+01	1.08E+01	1.12E+02
189	Sep-65	4.80E-01	4.65E+01	6.61E+01	3.90E+00	7.76E+01
190	Oct-65	1.40E-01	6.71E+01	5.27E+01	3.29E+00	7.00E+01
191	Nov-65	1.10E-01	6.69E+01	5.52E+01	2.67E+00	7.04E+01
192	Dec-65	2.00E-01	6.49E+01	8.08E+01	3.11E+00	6.95E+01
193	Jan-66	1.30E-01	4.03E+01	5.13E+01	1.16E+00	3.14E+01
194	Feb-66	2.80E-01	4.85E+01	6.55E+01	2.25E+00	4.93E+01
195	Mar-66	4.50E-01	5.84E+01	7.91E+01	3.57E+00	5.44E+01
196	Apr-66	9.60E-01	5.08E+01	8.07E+01	4.95E+00	6.90E+01
197	May-66	1.31E+01	3.44E+01	6.31E+01	1.48E+01	1.22E+02
198	Jun-66	2.46E+01	1.93E+01	2.69E+01	1.98E+01	6.96E+01
199	Jul-66	5.86E+00	6.71E+00	1.09E+01	4.83E+00	1.83E+01
200	Aug-66	6.90E-01	5.96E+00	1.41E+01	1.00E+00	1.26E+01
201	Sep-66	8.00E-02	3.94E+01	9.46E+01	6.80E-01	2.95E+01
202	Oct-66	7.00E-02	5.02E+01	1.65E+02	8.70E-01	3.31E+01
203	Nov-66	6.00E-02	4.44E+01	1.46E+02	7.10E-01	2.90E+01
204	Dec-66	1.80E-01	4.54E+01	1.27E+02	1.32E+00	4.27E+01
205	Jan-67	2.50E-01	3.14E+01	1.11E+02	1.95E+00	3.44E+01
206	Feb-67	4.30E-01	4.63E+01	1.43E+02	2.23E+00	4.47E+01
207	Mar-67	5.80E-01	4.64E+01	1.76E+02	2.87E+00	6.20E+01
208	Apr-67	1.36E+00	6.60E+01	1.84E+02	6.77E+00	7.73E+01
209	May-67	1.05E+01	6.14E+01	1.05E+02	1.38E+01	1.04E+02
210	Jun-67	4.40E+01	2.24E+01	3.43E+01	3.29E+01	1.26E+02
211	Jul-67	2.29E+01	2.52E+01	5.19E+01	1.71E+01	1.13E+02
212	Aug-67	2.44E+00	4.96E+01	7.54E+01	6.20E+00	8.48E+01
213	Sep-67	2.40E-01	5.68E+01	1.10E+02	1.74E+00	7.30E+01
214	Oct-67	1.40E-01	5.53E+01	9.83E+01	1.57E+00	6.12E+01
215	Nov-67	1.50E-01	4.57E+01	8.81E+01	1.49E+00	5.32E+01
216	Dec-67	4.90E-01	4.39E+01	9.09E+01	3.29E+00	6.39E+01
217	Jan-68	2.00E-01	2.91E+01	4.31E+01	2.10E+00	3.73E+01
218	Feb-68	9.30E-01	5.42E+01	6.03E+01	4.28E+00	7.28E+01
219	Mar-68	2.41E+00	5.55E+01	7.20E+01	8.76E+00	9.21E+01
220	Apr-68	1.00E-02	5.11E+01	8.03E+01	3.30E-01	1.89E+01
221	May-68	1.30E-01	5.34E+01	6.88E+01	5.70E-01	2.89E+01
222	Jun-68	2.18E+00	1.80E+01	2.43E+01	3.25E+00	4.71E+01
223	Jul-68	6.80E-01	1.19E+01	2.35E+01	1.81E+00	3.07E+01
224	Aug-68	0.00	2.36E+01	4.94E+01	1.10E-01	1.20E+01
225	Sep-68	0.00	2.97E+01	5.83E+01	4.00E-02	9.23E+00
226	Oct-68	0.00	2.60E+01	4.70E+01	2.00E-02	6.55E+00
227	Nov-68	0.00	2.40E+01	5.17E+01	3.00E-02	6.50E+00
228	Dec-68	0.00	2.35E+01	5.22E+01	6.00E-02	8.85E+00
229	Jan-69	1.00E-02	1.27E+01	2.84E+01	1.30E-01	7.74E+00
230	Feb-69	2.00E-02	2.37E+01	4.78E+01	2.80E-01	1.39E+01
231	Mar-69	2.00E-02	3.15E+01	5.70E+01	4.00E-01	1.87E+01

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
232	Apr-69	1.00E+00	2.55E+01	3.71E+01	4.11E+00	5.11E+01
233	May-69	2.15E+00	1.20E+01	2.10E+01	5.68E+00	3.60E+01
234	Jun-69	1.46E+00	1.03E+01	1.80E+01	3.83E+00	2.98E+01
235	Jul-69	4.10E-01	1.26E+01	2.19E+01	1.57E+00	1.78E+01
236	Aug-69	0.00	2.00E+01	4.58E+01	5.00E-02	5.66E+00
237	Sep-69	0.00	2.14E+01	5.19E+01	1.00E-02	2.56E+00
238	Oct-69	0.00	1.87E+01	3.74E+01	1.00E-02	1.63E+00
239	Nov-69	0.00	1.37E+01	3.94E+01	2.00E-02	1.43E+00
240	Dec-69	0.00	1.02E+01	4.50E+01	3.00E-02	2.36E+00
241	Jan-70	0.00	3.36E+00	1.23E+01	3.00E-02	5.25E+00
242	Feb-70	0.00	3.14E+00	1.19E+01	2.00E-02	4.23E+00
243	Mar-70	0.00	8.60E-01	7.91E+00	0.00	9.50E-01
244	Apr-70	0.00	4.74E+00	3.42E+01	2.00E-02	5.14E+00
245	May-70	3.00E-01	4.33E+00	3.89E+01	3.40E-01	1.68E+01
246	Jun-70	7.00E-01	1.04E+00	1.89E+01	5.00E-01	2.36E+01
247	Jul-70	3.00E-02	7.88E+00	3.08E+01	1.90E-01	1.15E+01
248	Aug-70	0.00	1.01E+01	3.61E+01	4.00E-02	4.72E+00
249	Sep-70	0.00	1.10E+01	4.69E+01	0.00	1.94E+00
250	Oct-70	0.00	1.60E+01	6.89E+01	1.00E-02	2.76E+00
251	Nov-70	0.00	1.52E+01	6.33E+01	1.00E-02	3.13E+00
252	Dec-70	0.00	1.45E+01	5.66E+01	2.00E-02	4.02E+00
253	Jan-71	0.00	5.69E+00	1.97E+01	3.00E-02	3.17E+00
Location 12						
1	Jan-50	1.20E-01	2.33E+01	1.11E+02	1.79E+00	2.01E+02
2	Feb-50	2.50E-01	2.59E+01	1.21E+02	2.76E+00	2.63E+02
3	Mar-50	6.20E-01	1.70E+01	7.49E+01	4.00E+00	2.42E+02
4	Apr-50	1.73E+00	1.70E+01	7.30E+01	6.90E+00	3.07E+02
5	May-50	3.14E+00	1.12E+01	5.10E+01	6.65E+00	2.53E+02
6	Jun-50	5.64E+00	5.24E+00	2.81E+01	4.30E+00	1.81E+02
7	Jul-50	5.67E+00	6.67E+00	3.60E+01	5.52E+00	2.11E+02
8	Aug-50	1.59E+00	1.40E+01	6.57E+01	6.50E+00	2.48E+02
9	Sep-50	4.60E-01	2.14E+01	1.02E+02	4.38E+00	2.41E+02
10	Oct-50	3.40E-01	2.60E+01	1.47E+02	4.27E+00	2.94E+02
11	Nov-50	8.80E-01	2.94E+01	1.37E+02	6.95E+00	3.73E+02
12	Dec-50	8.50E-01	3.21E+01	1.43E+02	6.26E+00	4.07E+02
13	Jan-51	5.60E-01	1.17E+01	4.10E+01	2.56E+00	1.54E+02
14	Feb-51	2.21E+00	1.22E+01	4.50E+01	4.94E+00	2.04E+02
15	Mar-51	1.69E+00	1.54E+01	5.81E+01	5.34E+00	2.48E+02
16	Apr-51	3.27E+00	1.04E+01	4.51E+01	6.71E+00	2.62E+02
17	May-51	4.81E+00	3.90E+00	2.70E+01	4.74E+00	2.05E+02
18	Jun-51	6.04E+00	5.82E+00	2.99E+01	7.38E+00	2.10E+02
19	Jul-51	4.88E+00	7.15E+00	4.52E+01	6.73E+00	2.78E+02
20	Aug-51	2.28E+00	1.70E+01	7.39E+01	3.98E+00	3.05E+02
21	Sep-51	4.80E-01	2.84E+01	1.36E+02	2.61E+00	3.18E+02
22	Oct-51	5.90E-01	2.43E+01	9.92E+01	3.07E+00	2.83E+02
23	Nov-51	4.10E-01	2.03E+01	9.65E+01	1.74E+00	2.74E+02
24	Dec-51	3.30E-01	1.64E+01	6.01E+01	1.85E+00	2.02E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
25	Jan-52	3.60E-01	1.70E+01	8.22E+01	2.71E+00	2.48E+02
26	Feb-52	5.10E-01	2.20E+01	4.24E+01	2.38E+00	2.01E+02
27	Mar-52	1.10E+00	2.11E+01	6.59E+01	4.65E+00	2.74E+02
28	Apr-52	3.85E+00	1.12E+01	3.22E+01	6.94E+00	2.53E+02
29	May-52	7.52E+00	6.43E+00	2.39E+01	7.27E+00	2.20E+02
30	Jun-52	5.77E+00	6.80E+00	2.07E+01	4.69E+00	1.96E+02
31	Jul-52	4.78E+00	1.22E+01	4.38E+01	5.16E+00	2.61E+02
32	Aug-52	1.42E+00	1.73E+01	5.73E+01	3.03E+00	2.56E+02
33	Sep-52	3.70E-01	3.18E+01	8.02E+01	1.46E+00	2.15E+02
34	Oct-52	2.00E-01	6.39E+01	1.28E+02	2.69E+00	2.38E+02
35	Nov-52	1.40E-01	1.02E+02	1.38E+02	4.22E+00	4.40E+02
36	Dec-52	9.00E-02	8.22E+01	1.71E+02	2.42E+00	2.90E+02
37	Jan-53	3.50E-01	3.27E+01	3.92E+01	3.89E+00	1.34E+02
38	Feb-53	9.50E-01	4.15E+01	5.70E+01	7.00E+00	2.34E+02
39	Mar-53	1.50E+00	5.14E+01	7.27E+01	8.75E+00	3.00E+02
40	Apr-53	2.63E+00	4.53E+01	2.89E+01	9.39E+00	2.77E+02
41	May-53	6.62E+00	3.14E+01	3.76E+01	1.30E+01	3.17E+02
42	Jun-53	1.06E+01	1.26E+01	1.49E+01	1.23E+01	2.01E+02
43	Jul-53	7.03E+00	1.36E+01	3.66E+01	1.61E+01	2.65E+02
44	Aug-53	2.74E+00	3.11E+01	7.84E+01	1.71E+01	3.58E+02
45	Sep-53	1.18E+00	3.33E+01	1.02E+02	1.50E+01	3.85E+02
46	Oct-53	7.90E-01	4.14E+01	1.22E+02	1.22E+01	3.90E+02
47	Nov-53	1.00E-02	3.97E+01	9.55E+01	7.90E-01	8.35E+01
48	Dec-53	0.00	3.75E+01	5.85E+01	5.10E-01	5.31E+01
49	Jan-54	0.00	1.74E+01	8.37E+01	2.50E-01	4.81E+01
50	Feb-54	1.00E-02	2.45E+01	1.19E+02	5.00E-01	8.37E+01
51	Mar-54	2.00E-02	3.07E+01	1.45E+02	9.10E-01	1.22E+02
52	Apr-54	7.00E-02	2.88E+01	1.29E+02	1.63E+00	1.52E+02
53	May-54	4.21E+00	1.98E+01	8.68E+01	1.01E+01	2.76E+02
54	Jun-54	7.98E+00	1.12E+01	5.48E+01	1.14E+01	2.96E+02
55	Jul-54	6.94E+00	1.37E+01	6.68E+01	1.21E+01	2.68E+02
56	Aug-54	1.29E+00	2.60E+01	1.15E+02	7.64E+00	2.33E+02
57	Sep-54	2.40E-01	3.46E+01	1.52E+02	3.63E+00	1.83E+02
58	Oct-54	2.00E-02	4.03E+01	1.95E+02	8.80E-01	1.16E+02
59	Nov-54	1.00E-02	3.87E+01	1.88E+02	6.40E-01	9.76E+01
60	Dec-54	1.00E-02	3.62E+01	1.75E+02	5.40E-01	8.09E+01
61	Jan-55	0.00	2.26E+01	1.10E+02	2.40E-01	4.76E+01
62	Feb-55	1.00E-02	3.16E+01	1.50E+02	4.30E-01	7.82E+01
63	Mar-55	3.00E-02	3.52E+01	1.84E+02	9.90E-01	1.13E+02
64	Apr-55	8.00E-02	2.91E+01	1.58E+02	2.09E+00	1.30E+02
65	May-55	3.10E-01	2.79E+01	1.63E+02	7.43E+00	2.45E+02
66	Jun-55	6.32E+00	1.48E+01	9.94E+01	2.38E+01	3.31E+02
67	Jul-55	8.23E+00	1.08E+01	6.80E+01	2.03E+01	2.67E+02
68	Aug-55	1.13E+00	1.76E+01	1.32E+02	8.06E+00	2.16E+02
69	Sep-55	3.00E-02	2.55E+01	1.90E+02	1.34E+00	1.22E+02
70	Oct-55	1.00E-02	3.65E+01	2.31E+02	5.90E-01	8.92E+01
71	Nov-55	3.00E-02	3.87E+01	2.18E+02	1.08E+00	1.16E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
72	Dec-55	1.10E-01	2.92E+01	1.55E+02	1.67E+00	1.14E+02
73	Jan-56	3.00E-02	1.19E+01	9.33E+01	7.50E-01	8.50E+01
74	Feb-56	2.00E-02	2.84E+01	2.10E+02	8.60E-01	1.33E+02
75	Mar-56	1.50E-01	4.68E+01	1.95E+02	2.03E+00	1.54E+02
76	Apr-56	4.29E+00	2.89E+01	1.26E+02	1.16E+01	2.72E+02
77	May-56	1.15E+01	1.33E+01	8.13E+01	1.64E+01	2.72E+02
78	Jun-56	1.92E+01	9.70E+00	7.22E+01	1.50E+01	2.54E+02
79	Jul-56	6.88E+00	1.28E+01	1.30E+02	1.44E+01	2.98E+02
80	Aug-56	7.60E-01	1.92E+01	2.27E+02	5.10E+00	2.22E+02
81	Sep-56	6.00E-02	2.77E+01	2.89E+02	1.51E+00	1.45E+02
82	Oct-56	1.00E-02	3.04E+01	2.55E+02	8.50E-01	1.02E+02
83	Nov-56	1.00E-02	3.63E+01	1.99E+02	8.80E-01	8.85E+01
84	Dec-56	1.00E-02	4.22E+01	1.63E+02	1.12E+00	1.11E+02
85	Jan-57	0.00	4.38E+01	1.16E+02	1.62E+00	9.49E+01
86	Feb-57	1.00E-02	6.13E+01	1.43E+02	2.03E+00	1.51E+02
87	Mar-57	4.00E-02	3.47E+01	9.00E+01	1.22E+00	1.19E+02
88	Apr-57	2.20E-01	4.63E+01	1.29E+02	3.56E+00	2.17E+02
89	May-57	1.40E+01	2.44E+01	7.35E+01	2.50E+01	3.49E+02
90	Jun-57	1.16E+01	1.49E+01	5.09E+01	1.65E+01	2.40E+02
91	Jul-57	1.30E+00	2.35E+01	1.66E+02	5.58E+00	2.01E+02
92	Aug-57	1.10E-01	4.91E+01	2.40E+02	1.36E+00	1.45E+02
93	Sep-57	0.00	5.84E+01	3.11E+02	2.70E-01	8.07E+01
94	Oct-57	0.00	5.75E+01	3.56E+02	2.50E-01	5.80E+01
95	Nov-57	0.00	5.72E+01	3.70E+02	2.10E-01	4.16E+01
96	Dec-57	0.00	6.27E+01	2.99E+02	2.10E-01	3.81E+01
97	Jan-58	0.00	3.50E+01	8.15E+01	1.80E-01	2.37E+01
98	Feb-58	4.00E-02	6.15E+01	1.54E+02	1.76E+00	7.57E+01
99	Mar-58	1.10E-01	5.27E+01	1.39E+02	3.79E+00	1.36E+02
100	Apr-58	6.20E-01	9.22E+01	1.90E+02	7.45E+00	1.83E+02
101	May-58	9.14E+00	5.69E+01	1.20E+02	2.88E+01	2.44E+02
102	Jun-58	1.68E+01	3.30E+01	4.98E+01	2.38E+01	1.86E+02
103	Jul-58	2.04E+00	8.36E+01	1.10E+02	8.76E+00	1.66E+02
104	Aug-58	6.00E-02	8.10E+01	1.96E+02	1.70E+00	1.10E+02
105	Sep-58	0.00	6.34E+01	1.79E+02	3.90E-01	5.89E+01
106	Oct-58	0.00	7.20E+01	2.69E+02	4.00E-01	5.95E+01
107	Nov-58	0.00	6.26E+01	2.39E+02	6.20E-01	6.56E+01
108	Dec-58	3.00E-02	7.52E+01	1.91E+02	1.86E+00	1.04E+02
109	Jan-59	6.00E-02	4.66E+01	5.60E+01	2.13E+00	4.74E+01
110	Feb-59	7.00E-02	7.42E+01	1.27E+02	3.03E+00	8.71E+01
111	Mar-59	1.90E-01	8.70E+01	1.80E+02	4.79E+00	1.20E+02
112	Apr-59	1.19E+00	6.84E+01	1.55E+02	8.76E+00	1.42E+02
113	May-59	9.91E+00	3.92E+01	9.75E+01	2.16E+01	1.75E+02
114	Jun-59	2.41E+01	2.24E+01	5.95E+01	2.17E+01	1.41E+02
115	Jul-59	1.17E+01	2.91E+01	9.23E+01	1.50E+01	1.38E+02
116	Aug-59	1.22E+00	4.32E+01	1.31E+02	4.22E+00	8.53E+01
117	Sep-59	2.90E-01	5.36E+01	2.80E+02	2.38E+00	7.77E+01
118	Oct-59	4.30E-01	7.09E+01	1.53E+02	4.90E+00	1.06E+02

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
119	Nov-59	3.80E-01	9.84E+01	2.34E+02	3.89E+00	1.02E+02
120	Dec-59	3.90E-01	7.69E+01	3.29E+02	2.81E+00	1.03E+02
121	Jan-60	1.00E-02	6.53E+01	4.66E+02	7.90E-01	4.99E+01
122	Feb-60	4.00E-02	7.19E+01	3.20E+02	1.19E+00	7.99E+01
123	Mar-60	9.00E-02	8.28E+01	2.05E+02	1.01E+00	7.73E+01
124	Apr-60	6.17E+00	6.04E+01	1.80E+02	1.67E+01	2.04E+02
125	May-60	9.34E+00	5.35E+01	1.87E+02	1.74E+01	1.57E+02
126	Jun-60	1.62E+01	3.52E+01	1.31E+02	2.19E+01	1.81E+02
127	Jul-60	7.63E+00	4.23E+01	1.63E+02	1.38E+01	1.97E+02
128	Aug-60	6.10E-01	5.58E+01	1.50E+02	4.64E+00	1.19E+02
129	Sep-60	1.00E-02	6.44E+01	2.60E+02	4.60E-01	5.00E+01
130	Oct-60	0.00	6.53E+01	3.14E+02	3.00E-01	4.21E+01
131	Nov-60	0.00	7.33E+01	2.47E+02	3.60E-01	4.35E+01
132	Dec-60	0.00	1.04E+02	3.02E+02	3.00E-01	4.59E+01
133	Jan-61	0.00	8.13E+01	2.82E+02	2.80E-01	3.83E+01
134	Feb-61	1.50E-01	1.14E+02	2.63E+02	2.21E+00	1.13E+02
135	Mar-61	2.80E-01	1.09E+02	3.13E+02	3.18E+00	9.45E+01
136	Apr-61	5.60E-01	1.28E+02	5.08E+02	5.20E+00	9.58E+01
137	May-61	1.18E+01	9.31E+01	2.75E+02	1.86E+01	1.09E+02
138	Jun-61	3.89E+01	3.35E+01	1.23E+02	1.62E+01	1.13E+02
139	Jul-61	4.81E+00	3.59E+01	1.09E+02	5.27E+00	5.89E+01
140	Aug-61	1.30E-01	3.23E+01	2.75E+02	8.60E-01	3.77E+01
141	Sep-61	0.00	3.96E+01	3.66E+02	1.70E-01	2.69E+01
142	Oct-61	0.00	6.33E+01	3.25E+02	8.00E-02	2.47E+01
143	Nov-61	0.00	5.39E+01	2.46E+02	1.10E-01	2.26E+01
144	Dec-61	0.00	4.60E+01	1.96E+02	5.00E-02	1.29E+01
145	Jan-62	1.00E-02	3.26E+01	2.40E+02	1.10E-01	2.54E+01
146	Feb-62	2.00E-02	5.55E+01	3.07E+02	3.90E-01	4.98E+01
147	Mar-62	0.00	6.31E+01	2.78E+02	2.10E-01	3.48E+01
148	Apr-62	2.41E+00	6.51E+01	3.87E+02	4.76E+00	1.35E+02
149	May-62	7.42E+00	5.29E+01	2.18E+02	8.58E+00	2.34E+02
150	Jun-62	1.94E+01	3.10E+01	1.78E+02	1.01E+01	1.60E+02
151	Jul-62	3.98E+00	3.32E+01	3.30E+02	4.15E+00	1.07E+02
152	Aug-62	5.70E-01	5.34E+01	4.35E+02	1.55E+00	9.40E+01
153	Sep-62	1.00E-02	7.64E+01	6.76E+02	1.80E-01	4.18E+01
154	Oct-62	1.00E-02	6.75E+01	4.90E+02	1.20E-01	4.21E+01
155	Nov-62	1.00E-02	4.21E+01	2.49E+02	1.30E-01	3.63E+01
156	Dec-62	4.00E-02	3.68E+01	2.86E+02	4.30E-01	4.85E+01
157	Jan-63	2.00E-02	2.88E+01	1.32E+02	1.70E-01	2.47E+01
158	Feb-63	1.40E-01	3.21E+01	1.43E+02	6.00E-01	6.18E+01
159	Mar-63	6.00E-02	4.95E+01	1.10E+02	6.80E-01	5.57E+01
160	Apr-63	3.10E-01	5.94E+01	1.30E+02	1.77E+00	7.53E+01
161	May-63	2.20E+00	4.02E+01	8.36E+01	5.61E+00	1.03E+02
162	Jun-63	1.22E+01	2.66E+01	3.52E+01	1.27E+01	1.26E+02
163	Jul-63	4.31E+00	3.20E+01	4.04E+01	7.15E+00	1.13E+02
164	Aug-63	1.30E-01	4.04E+01	7.03E+01	1.24E+00	6.55E+01
165	Sep-63	0.00	4.35E+01	8.34E+01	2.10E-01	3.30E+01

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
166	Oct-63	0.00	6.09E+01	1.14E+02	1.00E-01	3.08E+01
167	Nov-63	0.00	5.01E+01	1.70E+02	7.00E-02	3.52E+01
168	Dec-63	0.00	5.55E+01	9.37E+01	1.00E-01	2.33E+01
169	Jan-64	0.00	1.91E+01	3.34E+01	4.00E-02	9.17E+00
170	Feb-64	1.00E-02	6.02E+01	1.11E+02	2.50E-01	3.89E+01
171	Mar-64	0.00	6.80E+01	1.25E+02	1.90E-01	3.42E+01
172	Apr-64	4.00E-02	7.03E+01	1.49E+02	6.80E-01	7.98E+01
173	May-64	7.07E+00	5.53E+01	1.16E+02	9.64E+00	2.18E+02
174	Jun-64	3.61E+01	2.10E+01	4.01E+01	2.09E+01	1.63E+02
175	Jul-64	1.52E+01	1.82E+01	2.77E+01	1.26E+01	1.10E+02
176	Aug-64	7.50E-01	2.46E+01	8.90E+01	2.39E+00	7.50E+01
177	Sep-64	2.00E-02	5.16E+01	1.58E+02	4.40E-01	3.99E+01
178	Oct-64	2.00E-02	4.14E+01	1.08E+02	5.30E-01	4.96E+01
179	Nov-64	1.00E-02	4.56E+01	8.90E+01	2.60E-01	3.88E+01
180	Dec-64	1.60E-01	3.59E+01	6.44E+01	7.30E-01	4.15E+01
181	Jan-65	8.00E-02	2.85E+01	4.92E+01	4.30E-01	4.61E+01
182	Feb-65	9.20E-01	3.41E+01	6.84E+01	1.92E+00	8.96E+01
183	Mar-65	5.20E-01	5.52E+01	1.10E+02	2.19E+00	8.11E+01
184	Apr-65	2.67E+00	6.68E+01	1.08E+02	5.36E+00	9.02E+01
185	May-65	1.12E+01	3.50E+01	5.81E+01	1.75E+01	1.27E+02
186	Jun-65	1.99E+01	1.97E+01	4.48E+01	1.64E+01	9.86E+01
187	Jul-65	5.48E+00	1.79E+01	3.88E+01	8.85E+00	8.51E+01
188	Aug-65	3.40E-01	2.81E+01	4.97E+01	2.94E+00	5.83E+01
189	Sep-65	4.00E-02	3.65E+01	5.95E+01	8.40E-01	3.34E+01
190	Oct-65	1.00E-02	5.19E+01	5.15E+01	4.50E-01	2.62E+01
191	Nov-65	0.00	5.49E+01	4.47E+01	3.80E-01	3.40E+01
192	Dec-65	1.00E-02	4.76E+01	6.58E+01	4.20E-01	2.51E+01
193	Jan-66	0.00	2.18E+01	3.17E+01	1.20E-01	8.41E+00
194	Feb-66	1.00E-02	3.64E+01	5.52E+01	3.40E-01	1.82E+01
195	Mar-66	2.00E-02	3.69E+01	5.65E+01	5.30E-01	1.87E+01
196	Apr-66	8.00E-02	3.94E+01	6.83E+01	1.08E+00	3.00E+01
197	May-66	3.00E+00	3.04E+01	5.96E+01	5.87E+00	7.40E+01
198	Jun-66	6.96E+00	1.80E+01	2.71E+01	9.40E+00	4.95E+01
199	Jul-66	1.50E+00	6.70E+00	1.13E+01	2.29E+00	1.32E+01
200	Aug-66	8.00E-02	4.86E+00	1.25E+01	2.70E-01	5.80E+00
201	Sep-66	0.00	3.06E+01	7.71E+01	9.00E-02	9.35E+00
202	Oct-66	0.00	5.13E+01	1.55E+02	1.40E-01	1.36E+01
203	Nov-66	0.00	3.01E+01	1.18E+02	7.00E-02	8.15E+00
204	Dec-66	1.00E-02	2.72E+01	8.70E+01	1.50E-01	1.23E+01
205	Jan-67	1.00E-02	1.58E+01	6.30E+01	2.20E-01	9.09E+00
206	Feb-67	2.00E-02	3.10E+01	1.09E+02	3.70E-01	1.62E+01
207	Mar-67	3.00E-02	3.50E+01	1.46E+02	4.80E-01	2.38E+01
208	Apr-67	1.00E-01	4.98E+01	1.59E+02	1.35E+00	3.35E+01
209	May-67	2.95E+00	5.26E+01	1.01E+02	5.55E+00	6.00E+01
210	Jun-67	1.90E+01	2.15E+01	3.38E+01	1.99E+01	9.80E+01
211	Jul-67	7.72E+00	2.26E+01	4.89E+01	8.80E+00	7.80E+01
212	Aug-67	3.40E-01	4.10E+01	7.12E+01	1.71E+00	4.35E+01

Table A.1. (contd)

Month No.	Month	Na-24	P-32	Zn-65	As-76	Np-239
213	Sep-67	2.00E-02	4.86E+01	1.03E+02	3.20E-01	2.77E+01
214	Oct-67	0.00	4.21E+01	8.88E+01	2.00E-01	2.25E+01
215	Nov-67	1.00E-02	3.40E+01	7.29E+01	2.00E-01	1.85E+01
216	Dec-67	3.00E-02	3.09E+01	7.23E+01	5.20E-01	2.36E+01
217	Jan-68	1.00E-02	1.62E+01	2.72E+01	2.50E-01	1.05E+01
218	Feb-68	8.00E-02	3.64E+01	4.60E+01	8.40E-01	2.81E+01
219	Mar-68	2.70E-01	4.25E+01	5.96E+01	2.24E+00	4.36E+01
220	Apr-68	0.00	4.28E+01	7.51E+01	8.00E-02	9.19E+00
221	May-68	2.00E-02	4.47E+01	6.34E+01	1.90E-01	1.56E+01
222	Jun-68	6.50E-01	1.73E+01	2.41E+01	1.57E+00	3.29E+01
223	Jul-68	1.90E-01	1.07E+01	2.22E+01	8.30E-01	2.07E+01
224	Aug-68	0.00	1.81E+01	4.31E+01	3.00E-02	5.66E+00
225	Sep-68	0.00	2.42E+01	5.43E+01	1.00E-02	3.96E+00
226	Oct-68	0.00	1.92E+01	3.97E+01	0.00	2.55E+00
227	Nov-68	0.00	1.53E+01	3.57E+01	0.00	2.07E+00
228	Dec-68	0.00	1.33E+01	3.39E+01	1.00E-02	2.67E+00
229	Jan-69	0.00	8.01E+00	1.97E+01	3.00E-02	2.92E+00
230	Feb-69	0.00	1.74E+01	3.86E+01	7.00E-02	6.31E+00
231	Mar-69	0.00	2.54E+01	5.08E+01	1.10E-01	9.22E+00
232	Apr-69	2.50E-01	2.27E+01	3.52E+01	1.77E+00	3.28E+01
233	May-69	6.70E-01	1.11E+01	2.01E+01	2.79E+00	2.51E+01
234	Jun-69	4.20E-01	9.07E+00	1.67E+01	1.81E+00	1.99E+01
235	Jul-69	1.00E-01	1.09E+01	2.03E+01	6.90E-01	1.16E+01
236	Aug-69	0.00	1.57E+01	4.01E+01	1.00E-02	2.49E+00
237	Sep-69	0.00	1.69E+01	5.11E+01	0.00	1.07E+00
238	Oct-69	0.00	1.55E+01	3.32E+01	0.00	6.40E-01
239	Nov-69	0.00	1.24E+01	3.64E+01	0.00	9.30E-01
240	Dec-69	0.00	6.43E+00	3.13E+01	0.00	7.40E-01
241	Jan-70	0.00	1.46E+00	5.88E+00	0.00	1.36E+00
242	Feb-70	0.00	2.18E+00	9.10E+00	0.00	1.77E+00
243	Mar-70	0.00	6.20E-01	6.28E+00	0.00	3.80E-01
244	Apr-70	0.00	3.47E+00	2.83E+01	0.00	2.15E+00
245	May-70	8.00E-02	3.85E+00	3.66E+01	1.50E-01	1.00E+01
246	Jun-70	2.10E-01	9.80E-01	1.82E+01	2.50E-01	1.64E+01
247	Jul-70	1.00E-02	6.18E+00	2.80E+01	6.00E-02	6.77E+00
248	Aug-70	0.00	8.79E+00	3.49E+01	1.00E-02	2.31E+00
249	Sep-70	0.00	8.52E+00	4.17E+01	0.00	9.60E-01
250	Oct-70	0.00	1.24E+01	6.16E+01	0.00	9.80E-01
251	Nov-70	0.00	1.09E+01	5.18E+01	0.00	1.06E+00
252	Dec-70	0.00	8.83E+00	3.91E+01	0.00	1.27E+00
253	Jan-71	0.00	2.75E+00	1.04E+01	1.00E-02	9.30E-01

Appendix B

Summary of Technical Steering Panel Comments and Battelle, Pacific Northwest Laboratories Responses

Summary of Technical Steering Panel Comments and Battelle, Pacific Northwest Laboratories Responses

Document Number: **PNWD-2225 HEDR** Document Title: **"Reconstruction of Radionuclide Concentrations in the Columbia River from Hanford, Washington to Portland, Oregon January 1950—January 1971"**

Summary Comments by: **P. Klingeman**

The TSP reviewers find that this is a very good report on the river pathway. I believe that the analysis was carried out in an excellent professional manner. The authors for the report, Walters, Richmond, and Gilmore, are to be commended for their fine work. The work product reflects quite favorably on the Battelle river pathway analysis for HEDRP.

The summary of TSP comments is attached. The majority of these comments are of an editorial nature. The remaining comments involve suggestions intended to improve clarity of the text or to anticipate questions that may occur to readers.

Comment Number	Commenter	Page, Paragraph	Comment Summary	Resolution
TSP COMMENTS:				
1	J. Till	Full Report	This is good work and I am pleased to see the progress we have made on the river pathway over the past two years. I believe our decisions to model the river in pieces was a sound one. One comment that must be responded to. I have asked on two occasions for a copy of the documentation and software for the WSU-CHARIMA model. To date, I have not received this information.	Provided with this report.

Comment Number	Commenter	Page, Paragraph	Comment Summary	Resolution
2	P. Klingeman	General Comment	There are several small corrections needed that are of an editorial style or format nature. Some of these are listed by TSP reviewers. Others may be a matter of preference among writers and are not specifically mentioned. There are several places where technical corrections are recommended by TSP reviewers. Mainly, these are requests to provide more information to better inform the reader. We have all been rather close to the subject matter and it has been discussed many times in TSP meetings; therefore, we can fill in the gaps. But other readers will not have that information in mind. Hence, one or two additional sentences should be added for clarification at several places, as requested in the TSP review comments.	See responses to specific comments.
3	G. Roessler	General Comment	Half life and half lives only have a hyphen when used as modifiers.	BNW usage is to hyphenate "half-life."
4	M.L. Blazek	General Comment	Battelle should reevaluate the list of dominant radionuclides to ensure and confirm accuracy of the current list.	See Napier (1993).
5	P. Klingeman	Pg v, Scope Section	Add statement to cover 1944-1949 by indicating the relatively small source term releases to the river in that period and the limited contribution to dose compared to contributions for the 1950-1970 period.	Text revised.

NA = No action.

Comment Number	Commenter	Page, Paragraph	Comment Summary	Resolution
6	M.L. Blazek	Pg v	Add language to explain how and why radionuclides were chosen. Add an explanation of why chromium-51 concentrations were used in transport model validation but not used in dose estimates.	Text revised. Also, see Napier (1993).
			Explain how the conclusion was drawn that accurate results are possible without sediment corrections.	Text revised.
7	P. Klingeman	Pg vi, Results Section	Para 1: Add a closing sentence that explains what resulted for P-32 and Zn-65. This was done for Na-24, As-76, and Np-239, so a parallel summary is needed.	Text revised.
			Para 2: Expand the closing sentence to more fully explain why tidal effects and sedimentation processes were not simulated. Readers will otherwise think that no consideration was given to these effects and processes.	Reference to sediment and tidal effects removed. These processes are discussed later in the report and revisions have been added to the text.
8	M.L. Blazek	Pg vi	States in part that reconstructed concentrations of zinc-65 are less representative..." at Portland because tidal effects were not simulated. Describe how much "less representative".	NA. To determine the effects of Pacific Ocean tides would require modifying the model to simulate tidal hydraulics which is beyond the scope of the HEDR Project.
9	P. Klingeman	Pg 1, Para 2	Regarding the period 1950-1971, mention the source term to support the reason for not including earlier years or later years.	The source term is available for the 1944-1971 period. Emphasis on the 1950-1971 time period was determined by the TSP.

NA = No action.

Comment Number	Commenter	Page, Paragraph	Comment Summary	Resolution
10	P. Klingeman	Pg 1, Para 2, Line 7	...each of the eight reactors that used once-through cooling by river water (this excludes the N-Reactor, which did not discharge its cooling water to the river),... See introduction to PNWD-2223 for some wording help.	Text revised.
11	P. Klingeman	Pg 1, Para 3	Expand on the radionuclides used. Refer to the initial analysis of radionuclides, leading to identification of 19 (?) dominant radionuclides that might contribute to dose from the river pathway. Indicate how/why this was later reduced to 11 radionuclides plus total beta. Indicate how/why this was further reduced to 5 radionuclides.	The five radionuclides were selected based on a scoping study by Napier (1993). The remaining radionuclides contributed less than 2 percent of the total dose.
12	P. Klingeman	Pg 1	Add new paragraph at end of Introduction. This should inform the reader of all other reports on the river pathway that provide information in support of this report and the work reported herein. Although reference citations are given in appropriate places in the text, the TSP members want to make sure that these latest reports give "up-front" information to the reader about the several other important reports needed to fully understand and use the material in the new document.	Text revised.

NA = No action.

Comment Number	Commenter	Page, Paragraph	Comment Summary	Resolution
13	P. Klingeman	Pg 3, Para 2, Line 5	Under TSP Recommendations: ...format for the period of greatest radionuclide input to the river and for a few years before and after this period, when radioactivity releases from the reactors were increasing from or declining to low levels. This resulted in computations for a...	Text revised.
14	P. Klingeman	Page 5	Entire page on Data Quality Objectives: Tighten up the text. In the first paragraph state what the two objectives are. ...The following two data quality objectives were applied to the modeling results: precision and representativeness.	Text revised.
			Then when each is presented (in paragraphs 2 and 5) start the sentence with This objective ... since you are referring to the heading when you start with The objective. Alternatively, start with The precision objective ... Otherwise, the text NOWHERE states what the objectives are. They are hidden in the headings.	Text revised.
			Split the first paragraph under Precision into two paragraphs where the 3rd sentence begins. This is more consistent with how channel geometry was handled in a separate paragraph.	Revised.
			In the 3rd paragraph under Precision, clarify that "sources" does not refer to source term. ...two sources of uncertainty,...	Text revised.

NA = No action.

Comment Number	Commenter	Page, Paragraph	Comment Summary	Resolution
15	B. Shleien	Pg 5, Last Line	If the external reviewers are not named, no validation can be made as to the competence of the reviewers, and the statement engenders suspicion rather than confidence.	Sentence removed.
16	P. McGavran	Pg 7, Para 2	Last sentence raised questions, from whom? Is this sentence necessary?	Sentence removed.
17	P. McGavran	Pg 8	Define abbreviation RM as River Mile before it's used.	RM is defined in the introduction.
18	B. Shleien	Pg 8, Travel Time	Where is the base point from which the travel time is measured? For short-lived materials this is important. (See point 5 in my comments on PNWD-2223.) One may assume that the releases from each individual reactor are considered independently in determining transit time and, hence, calculation of concentrations at each location, but I did not see a statement to that effect in the document. Needs clarification.	The starting point for the SRT model routing is at the downstream boundary of the reactor area as discussed in the paragraph just before the section, "SRT Model Results."
			Are sedimentation effects responsible for Cr-51 results being below measured values at The Dalles and Bonneville dam?	Chromium-51 computed results mostly plotted within the monitoring data at The Dalles and Bonneville dam except for the fall-winter months of October through January (low flow). Sorption to sediment is known to occur at lower river locations after Chromium-51 is reduced from the hexavalent to the trivalent state. See the section "Radionuclide Transport Model Validation."

NA = No action.

Comment Number	Commenter	Page, Paragraph	Comment Summary	Resolution
			Cr-51 is the only radionuclide employed in validation work. Yet extensive data are available for other radionuclides. One gets the impression that work was limited on this portion of the project. From that flows the natural question as to why.	Chromium-51 was the only radionuclide necessary for validation. It was chosen because it behaves in a conservative manner over most of the river length and is not taken up by sediment until the lower river locations are reached. Its monitoring database was large and extended over the entire river length and it was not to be used in dose estimates. Therefore, it was determined to be the best choice for validating mass conservation in the transport equation. See the section, "Radionuclide Transport Model Validation."
19	P. Klingeman	Pg 9	In these figures, beginning with Figure 1, the label on the x-axis is not clear to the reader. For example, it could easily appear that river miles refers to the distance traveled from the reactors. The text reference to Figure 1 and RM (note also that RM is used before defined and is not defined when written out) in the 4th paragraph on page 8 is inadequate to clarify this. Could the graphs be labeled as Columbia River Mile or as Miles above Mouth of River, so some similar variation?	See response to comment 17.
			In these figures travel time is only directly implied by the dates. Perhaps the two curves in each case could be labeled, such as "large river flows" and "small river flows" or "high discharge" and "low discharge".	Figure captions revised.

NA = No action.

Comment Number	Commenter	Page, Paragraph	Comment Summary	Resolution
20	G. Caldwell	Pg 16, Para 4, Line 4	Omit "most," it's either current or old.	Text revised.
21	P. Klingeman	Pg 19, Para 1, Lines 5 & 6	Briefly restate why Cr-51 was used at this stage of the work. Briefly state where the monitoring data were available. How many locations were involved and were they spread out along the river or bunched up?	The reasons for using chromium-51 are in the first paragraph of the section, "Radionuclide Transport Model Validation." Text revised to include discussion of monitoring location.
22	P. Klingeman	Pg 24, Para 1	Put the 1 foot elevation into perspective by noting the range of change in water surface elevations. For example, is it 1 foot out of three (mostly less than a 33% error) or 1 foot out of 10 or more (mostly less than a 10% error)? From the figures, it looks like up to 1 foot in ranges on the order of 5 feet. That looks OK in the figures but may sound bad if reported only as "mostly within 1 foot".	Text revised on page 22, paragraphs 2 and 3.
23	P. Klingeman	Pg 31, Fig 22 & 23	Shift the ordinate scale so that it has a zero, consistent with Figures 19-21.	Figures have been replotted.
24	B. Shleien	Pgs 33-50	The radionuclides used to validate the code for different parameters which affect it (plume, sediment, roughness) appear to be chosen in an arbitrary manner. Again, why not use all available data? Otherwise, give an adequate reason why all the data available were not employed.	Only 7 radionuclides were available in the source term. Five were used to calculate dose and two were included for validation. Chromium-51 was selected as the best to use (see comment 18). Scandium-46 was included in the source term as an alternate, if needed. However, very little data on its behavior in the Columbia River were available.

NA = No action.

Comment Number	Commenter	Page, Paragraph	Comment Summary	Resolution
25	P. McGavran	Pg 37 Etc.	Sorbed to deposited sediments, sorption. This is correct but not very familiar? Is absorbed or adsorbed as correct?	NA. Sorption is the term for any process which takes up and holds molecules of another substance, as by absorption or adsorption.
26	G. Caldwell	Pg 38, Figure 25	What factors contribute to the difference between computed and measured water concentrations? Should they be listed and discussed briefly, adjacent to the figure? Also the same comment for Figures 26, 28, 29, and 32.	Text revised.
27	P. Klingeman	Pg 41, Para 2, Sentence ?	Be specific about what kinds of hydraulic effects are indicated. Reader will not otherwise understand it.	Text revised.
28	P. McGavran	Pg 41, Para 2, and Pg 42, Last Para	"Are indicated?" The overestimation can be explained by sediment sorption and tidal effects. A little more detailed explanation would help clarify.	Text revised.
29	P. Klingeman	Pg 43, Para 1	Need to be careful not to make sediment the "fall guy" for all differences between computed results and measured concentrations or to make it clear that the differences are small. Remember, in several places report says that sedimentation processes were not simulated. The statement here may suggest that they should have been. Should they have been simulated?	Based on the early work by various groups, sediment uptake is a very dominant process in the instream storage of radionuclides, and the overall trend in model results provides some support for this assumption (Walters et al. 1992). If estimated doses were well above the dose cutoff level or if the amount of radioactivity stored in the sediment was crucial to the project, then sediment studies could be justified.

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Comment Number	Commenter	Page, Paragraph	Comment Summary	Resolution
30	G. Caldwell	Pg 43, Para 2	What effect would correction for sedimentation and resuspension have on the overall result and uncertainty if it were possible or practical to do?	Of the five radionuclides considered in the river, zinc-65 would be the most affected by sediment corrections. The other four radionuclides did not indicate a strong affinity for sediment. Corrections to zinc-65 would have primarly reduced the concentrations at Portland. At other locations it is difficult to determine without further study.
31	P. Klingeman	Pg 45, Para 1, Line 4	...will be considered?	Text revised.
32	B. Shleien	Pgs 51 and Following	It appears that all the concentration values in this report were computed from the source term information in PNWD-2223. So state. Also state that it was done on a reactor by reactor basis. Thus, the source term is the basis for calculation of the radiation doses.	See the section, "Introduction."
33	G. Roessler	Pg 63, Para 1, Line 6	comparison...indicates	Text revised.
34	P. Klingeman	Pg 63, Para 1 of Conclusions	Expand the last part of the sentence to more fully explain why tidal effects and sedimentation processes were not simulated. (Same note as for Summary section)	Text added at the end of the section, "Validation of Unsteady Flow Hydraulics."
35	P. Klingeman	Pg 63, Para 4, Line 2	...its... What does <u>its</u> refer to? Unclear statement about proximity to Bonneville.	Text revised.

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Comment Number	Commenter	Page, Paragraph	Comment Summary	Resolution
PUBLIC COMMENTS: None				

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