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Pasture Grass Interception and Retention of ^{131}I, ^{7}Be, and Insoluble Microspheres Deposited in Rain

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Environmental Sciences Division
Publication No. 3247

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ENVIRONMENTAL SCIENCES DIVISION

PASTURE GRASS INTERCEPTION AND RETENTION OF ^{131}I, ^{7}Be, AND INSOLUBLE MICROSPHERES DEPOSITED IN RAIN

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ABSTRACT

During the summer of 1987, a series of field experiments was conducted for the National Cancer Institute to investigate the initial interception and postdeposition retention by pasture vegetation of soluble and insoluble forms of ^{131}I in rain. These experiments employed mechanical rain simulators to reproduce rain intensities ranging from 1.4 to 12.2 cm/h and droplet sizes of 1.7 and 2.5 mm. The tracers used in this study were ^{131}I as either iodide or periodate, $^{7}Be^{2+}$, and three size classes of radioactively labelled polystyrene microspheres (3, 9, and 25 μm in diameter). These materials were applied in simulated rain, in amounts varying from 1 to 30 mm, to pure stands of white clover and fescue and to mixed stands of old field vegetation.

For either chemical form of ^{131}I, the fraction intercepted by vegetation over 5 cm tall decreased in almost direct proportion to the amount of rain. At low amounts of rain (1 to 2.5 mm) and high biomass (0.2 to 0.3 kg_{dry}/m^2), the highest values of interception for ^{131}I ranged from 20 to 55%. At high amounts of rain (20 to 30 mm) and low values of biomass (0.05 to 0.12 kg_{dry}/m^2), the interception fraction decreased to about 0.6 to 2%. Unlike the results for ^{131}I, approximately 10 to 80% of the insoluble microspheres and soluble $^{7}Be^{2+}$ was intercepted by vegetation over 5 cm tall, with only minor differences attributed to the amount or intensity of rain. The most important variable for the vegetation interception of these substances was the amount of standing biomass. The effect of differences in vegetation type was minor compared to the combined influence of biomass and the amount and intensity of rain.

No significant differences were detected in the postdeposition retention of either the insoluble particles or ^{7}Be or ^{131}I. Environmental half-times that included the effect of dilution from tissue growth ranged from 7.3 to 15.4 days. Neither the amount of rain nor growth dilution was identified as important factors controlling postdeposition retention of any of these materials.

Other results are given in this report for the collection efficiency of gummed paper, the potential for rapid root uptake of ^{131}I and ^{7}Be, the transfer to vegetation of ambient ^{7}Be, and the potential for ^{7}Be to be used as a tracer for soluble ^{131}I and insoluble particles.

1. INTRODUCTION

From the 1950s through the early 1960s the Nevada Test Site was the site of aboveground detonations of nuclear devices. Much of the debris produced from these tests was injected into the upper atmosphere and transported eastward to neighboring states and beyond. Among the more radiologically important materials associated with this debris was the radionuclide ^{131}I. Iodine-131, which has a physical half-life of 8.05 days, was present in the atmosphere in both particulate and gaseous forms (Voillequé 1986). Exposure to humans occurs primarily from the ingestion of contaminated foods, of which milk is the principal food of concern. Another important route of human exposure is the direct inhalation of ^{131}I in air. The contamination of food products with ^{131}I is directly influenced by the processes of wet and dry deposition and the interception and retention of deposited ^{131}I by vegetation.

An important mechanism for the deposition of ^{131}I from the Nevada Test Site in the eastern portion of the United States was precipitation scavenging during convective storms. Once deposited, ^{131}I had the potential for rapid transport to milk as the result of dairy cattle grazing on contaminated pasture. The consumption of ^{131}I-contaminated milk is typically the most important pathway of human exposure with the thyroid being the organ of interest (Hoffman 1973a and b, Bouville et al. 1988).

Most environmental assessment models assume that from 20 to 25% of the activity in wet deposition will be intercepted and initially retained by the edible portions of pasture vegetation (USNRC 1977, BMI 1979). This assumption is based primarily on experiments in which radioisotopes have been applied as a fine spray over very short periods of time (Milbourn and Taylor 1965, Chadwick and Chamberlain 1970, Miller 1980). From his review of the literature of such experiments, Anspaugh (1987) concluded that an appropriate average value would be 40 to 50%. He recommended that 100% would not be unreasonable as a conservative estimate for use in a predictive model.

From a literature review, Voillequé (1986) obtained 30 values of interception and initial retention that produced a median of 35% with a geometric standard deviation of 2.9. Fitting the parameters of the water storage capacity of vegetation and in-storm evaporation of rain on the plant surface to these data, Voillequé (1986) modified a model originally proposed by Horton (1919) and predicted that there would be as much as 32% initial retention at 20 mm of rain when the vegetation biomass density was at 150 g/m^2 dry wt. At this same biomass density, the model predicts that more than 40% of the total deposition in rain would be initially intercepted and retained by vegetation when rainfall is 1 mm.

For convective storms, these values are contrary to what one would expect. Convective storms are typified by thundershowers of moderate to high intensity (0.6 to more than 12 cm/h). During a thundershower, rapid saturation of the plant surface should occur, and much of what is initially intercepted by leaves should be lost by runoff. In addition, the moderate to high intensities of precipitation associated with thunderstorms should reduce the opportunity for in-storm evaporation of raindrops on the plant surface.

This report presents the results of field experiments conducted at the Oak Ridge National Laboratory (ORNL) during the summer of 1987 to quantify the interception and initial retention by pasture-type vegetation of soluble and insoluble forms of ^{131}I deposited by moderate- to high-intensity precipitation. Two mechanical rain simulators were used to mimic precipitation associated with convective storms. Three size classes of radioactively labelled microspheres were included to simulate insoluble particulate matter in rain. In addition, the studies included an evaluation of the postdeposition weathering of these materials from vegetation and evaluated the potential for using naturally occurring cosmogenic ^{7}Be as a quantitative tracer of the transfer of ^{131}I from rain to vegetation. Because the total deposition of Nevada Test Site fallout in the eastern United States is being reconstructed from the analysis of gummed paper samples, the efficiency of this material in collecting soluble and insoluble ^{131}I in rain was also evaluated experimentally.

2. METHODS

2.1 EXPERIMENTS WITH SIMULATED RAIN

2.1.1 Field Site Description

The area chosen for the application of simulated rain was an old field situated on floodplain alluvium, composed of a moderately fertile loamy soil, with a slight grade. The field had been planted in Kentucky 31 fescue (*Festuca arundinacae,* var. Kentucky 31) several years earlier but was overrun with successional old field vegetation. The area, which measured approximately 60 by 200 m, was enclosed by a security fence to prevent unauthorized entry.

The study site was mowed in the fall of 1986 and in February 1987. Approximately two-thirds of the area was plowed and prepared for planting. During the first week of March, one-half of the prepared area was planted in Kentucky 31 tall fescue (*Festuca arundinacae* var. Kentucky 31) and the other half in Ladino white cover (*Trifolium repens* var. Ladino). These two species were chosen to represent different growth forms typically found in pasture vegetation. The unplowed area of the field was left in its natural state to provide a third category of vegetation, a mixed community of old field vegetation composed of fescue, Johnson grass (*Sorghum* sp.), panic grasses (*Panicum* sp.), ragweed (*Ambrosia* sp.), milkweed (*Asclepias* sp.), snake weed (*Eupatorium* sp.), and black-eyed susan (*Rudbeckia hirta*). Fertilizer was applied to the entire field at the time of planting. Sections of the field were mowed during mid-summer to control the height of the vegetation and eliminate weeds growing in the fescue and clover areas.

2.1.2 Plot Description

Approximately 1 week before the start of an experiment, plots of the three categories of vegetation were established in adjacent areas of the field. The plots were grouped for convenience and to minimize the size of the areas that would be contaminated with radioisotopes. Individual plots were placed approximately 3 m apart to allow sufficient space to maneuver between plots.

One-meter-square plots were marked with wooden stakes placed at each corner, and a 0.33-m^2 metal ring was placed on the ground inside each plot to designate the area that would be sampled. The area surrounding each group of plots was roped off to limit access and to designate it as a contamination zone following the application of the radioisotopes.

2.1.3 Rain Simulators

2.1.3.1 Description

Two small portable rainfall simulators (Simulators 1 and 2) were designed and constructed to produce a uniform distribution pattern of water with droplet sizes and terminal velocities corresponding to natural rain. Simulator 1 was designed to deliver simulated rain at rates typical of moderate-intensity storms (1 to 4 cm/h), while Simulator 2 was designed to produce rates common to very high intensity storms (4 to 12 cm/h).

A diagram of Simulator 2 is shown in Fig. 2.1. This simulator had a main tank made of plastic which held approximately 30 L of solution. An electric water pump was used to lift the solution from the bottom of the tank through Tygon tubing into a head tank located approximately 2 m above the ground. An overflow line on the head tank constantly recycled excess solution back to the main tank. A hose from the bottom of the head tank delivered the rain solution to the simulator nozzle by gravity flow at constant pressure proportional to the height of the tank above the nozzle.

The primary differences between the high- and moderate-intensity simulators were the size of the nozzle and the way in which the solution was delivered to the nozzle. The pressure of the water in the high-intensity simulator was adjusted by raising or lowering the head tank. The moderate-intensity simulator needed more water pressure to produce realistic rain droplets; therefore, the hose from the water pump was connected directly to the nozzle and the pressure was regulated with a valve on the water pump.

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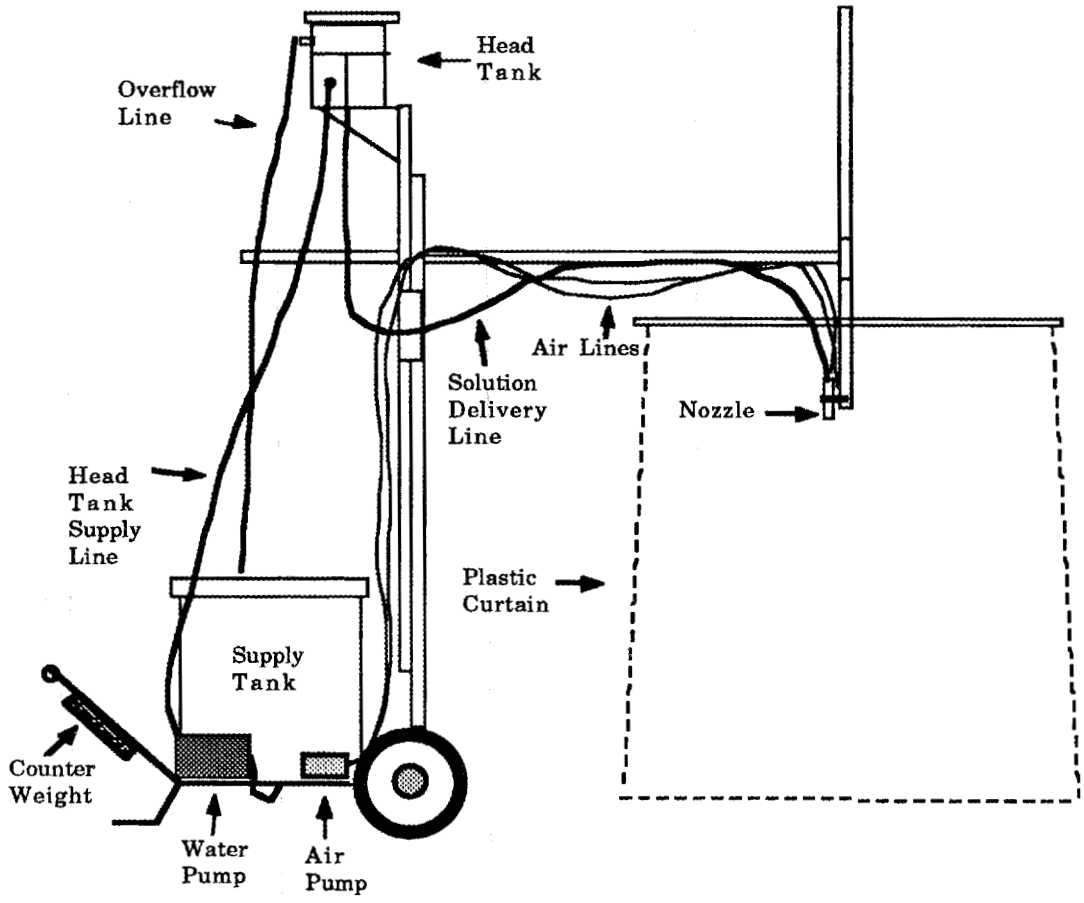

Fig. 2.1. Diagram of high-intensity simulator (Simulator 2).

Each simulator was equipped with a single Spraying Systems Fulljet WSQ[a] style nozzle connected to a coupling attached to the end of the hose that supplied the simulated rain. The coupling contained two fittings that injected air into the water just before it reached the nozzle (Shelton et al. 1985). Air was supplied to the nozzles by a small electric pump. The size, intensity, terminal velocity, and distribution pattern of the droplets were controlled by adjusting the air and water pressure. The nozzles produced a wide angle, square spray pattern that covered an area slightly larger than 1 m^2 from a height of approximately 1.5 m.

A plastic curtain was attached to a square frame surrounding the nozzle on each simulator. The purpose of the curtain was to keep wind from deflecting the trajectory of the rain droplets and to reduce the spread of contamination. The bottom of the curtain was anchored to the ground with spikes, and the perimeter was sufficiently large that droplets striking the curtain did not splatter into the area where samples were collected.

2.1.3.2 Calibration

The simulators were calibrated in a laboratory at The University of Tennesssee, Knoxville, before being used in the study. During the calibration procedure, the droplet size, velocity, and distribution pattern were measured over the range of intensities specified in the experimental protocol. The droplet size and velocity tests were run with a Particle Measuring Systems Ground Based Precipitation Probe (laser) interfaced with an IBM PC computer using hardware and software developed at The University of Tennessee, Knoxville. Distribution uniformity coefficients were determined by the Christiansen (1942) method, and rain intensity was calculated from the average volume collected in an array of 7.6-cm-diam containers exposed for a given period of time.

For the moderate-intensity rain simulator (Simulator 1) the geometric mean of the drop size was 1.7 mm (geo. s.d. = 1.5) with a terminal velocity of

[a] Mention of manufacturer or trade name is for information only and does not constitute an endorsement of the product.

5 ± 0.8 m/s. The distribution of the spray pattern for 42 containers densely situated within an area of 2440 cm^2 was described by a coefficient of variation of 0.17. The coefficient of variation for the 42 containers widely spaced over an area of 1 m^2 was 0.37. For the high-intensity rain simulator (Simulator 2) the geometric mean of the drop size was 2.5 mm (geo. s.d. = 1.7) with a terminal velocity of 7 ± 1 m/s. The coefficient of variation of the spray distribution for an area of 2440 cm^2 was 0.15. For a 1-m^2 area, the coefficient of variation of the spray distribution was 0.56.

Immediately before starting a series of applications, each simulator was calibrated to deliver a chosen intensity of simulated rain. The calibration was performed with a specially constructed stainless steel collection pan that covered a 0.33-m^2 circle. The simulator was run for 2 min and the volume of water that collected in the pan was used to calculate the intensity of the rain. The calculated intensity was compared with the desired intensity; if not correct, the height of the nozzle was adjusted until the desired intensity was obtained.

After obtaining the desired intensity, at least three calibration trials were made for each simulator. The variability among the calibration trials was usually around 10% and did not exceed 20%. The average value of the trials was used as the intensity value for the applications of simulated rain made that day.

2.1.3.3 Application of Simulated Rain

After the calibration was completed, the simulators were run until empty and then moved to the experimental plots. The simulators were positioned so that their nozzles were centered over a 0.33-m^2 sampling ring at the same height used during the calibration.

The amount of rain deposited on the plots ranged from 1 to 30 mm. Total deposition was controlled by the duration of the application. Solution could be added to the simulator tank while it was in operation so that an individual application was not interrupted. A wooden paddle was used to stir the solution every few minutes to ensure that the simulated rain was well mixed at all times.

2.1.4 Preparation of Simulated Rain

The simulated rain contained five gamma-emitting radionuclides. Iodine-131 and ^{7}Be were in solution. The other radionuclides, ^{141}Ce, ^{95}Nb, and ^{85}Sr, were contained in three size classes (3, 9, and 25 μm, respectively) of insoluble polystyrene microspheres.[b] The radionuclides were incorporated in the spheres by an annealing process at temperatures above 400°C. According to the manufacturer, the microspheres are nonbiodegradable and essentially no isotope leaching occurs in most common solvents. The density of the spheres is reported as 1.23 ± 0.05 g/cc.

The ^{7}Be was added to the simulated rain as $^{7}BeCl_2$. Iodine-131 was in the periodate (IO_4^-) form in all but the last (September) applications. Periodate was used initially because of concerns that at pH 5.4 iodide (I^-) might volatilize; however, questions arose as to whether results obtained with IO_4^- would be representative of I^-, the predominant form of ^{131}I in weapons fallout. As a result, a test was run to see if $^{131}I^-$ could be used in the September applications (Sect. 2.1.8). The test showed no evidence that volatilization of I^- would be a problem; therefore, $^{131}I^-$ was used in the September applications.

Prior to each experiment, a stock solution containing known quantities of all five radionuclides was prepared. Aliquots of this stock solution were transferred to small polyethylene bottles and used to tag the simulated rain in the field.

Processed (tap) water was used to prepare the simulated rain used in most applications. The pH of the water was adjusted to 5.4 to 5.6 with H_2SO_4. Because tap water contains higher concentrations of ions and has more buffering capacity than normal rainwater, a decision was made to use distilled rather than processed water for the final (September) series of applications. A comparison between the results with processed water and the results with distilled water is given in Appendix I.

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[b] Purchased from the Medical Products Division of 3M Corporation, St. Paul, MN.

The quantity of each radioisotope in the simulated rain varied from one application series to another. The level of activity of the different radionuclides depended on a number of factors including the counting efficiency and half-life of the radionuclide and the quantity of the radionuclide on hand. For the different radioisotopes, the level of activity in the simulated rain ranged from 4×10^2 to 5×10^5 Bq/L (Table A.V.1).

2.1.5 Interactions Between Microspheres and Soluble Radionuclides

A test was conducted to determine whether either ^{131}I or ^{7}Be in solution would adsorb to the microspheres. If adsorption occurred, separate experiments would be needed for the soluble radionuclides and the particles.

Nonlabeled microspheres (25 μm) were used for the adsorption test. Approximately 40 mg of microspheres (~4×10^6 spheres) were placed in a plastic centrifuge tube. Solutions of ^{131}I and ^{7}Be were added to the microspheres and the volume brought to 10 mL with distilled water adjusted to pH 5.5. The final activities of ^{131}I and ^{7}Be were 396 and 500 Bq/mL, respectively. The tube was stoppered and shaken vigorously several times during a 1.5h period and then centrifuged. The liquid was removed with a Pasteur pipette and saved for counting. Approximately 10 mL of water was added to the spheres in the tube, and the tube was shaken again. After centrifugation, the rinse water was removed and saved for counting. The spheres were transferred to a clean tube before being counted for radioactivity.

The results from this test showed that only 0.015 and 2.05% of the ^{131}I and ^{7}Be, respectively, remained with the microspheres. The test was run a second time using approximately four times as much ^{131}I and ^{7}Be and a second rinse. After the second rinse, 0.50 and 0.52% of the ^{131}I and ^{7}Be, respectively, remained with the spheres. These results demonstrated that the soluble radionuclides and microspheres could be combined in the simulated rain because they did not interact significantly.

2.1.6 Interception Experiments

Four series of applications of simulated rain were conducted during the summer of 1987 to investigate the initial interception and retention of rain-deposited materials by pasture vegetation. The applications were made late in May, June, July, and September. With the exception of the September series, applications were made on eight 1-m^2 plots of fescue, clover, and mixed vegetation for a total of 24 plots. In September, only eight plots each of clover and fescue were used.

Sampling began 1 h after the application of the simulated rain. First, a 22.4 by 22.4-cm wire frame (500-cm^2 area) was placed within the 0.33m^2 sampling ring to designate a subplot where samples were taken to determine the mass balance of the plot. Vegetation in the upper (>5-cm) and lower (0- to 5-cm) portions of the canopy and the soil to a depth of 5 cm were collected from the subplot. Last, the vegetation remaining within the 0.33m^2 ring that was >5 cm tall was collected as a third vegetation sample. The vegetation was cut with battery-operated grass clippers. Vegetation samples from the subplots were placed in containers in the field for radioassay, whereas soil samples and large vegetation samples were placed in plastic bags and transferred to counting containers in the laboratory.

2.1.7 Rapid Root Uptake Experiment

A test was conducted to determine whether ^{131}I and ^{7}Be that infiltrated the soil during the interception experiment would be translocated via the roots to the upper vegetation during the 1-h wait between the end of the rain application and the start of sampling. If translocation occurred, the results of the interception experiment could have been biased.

The rapid root uptake test was run on three fescue and two clover plots at approximately 1 p.m. on a clear day when the temperature was ~27°C and soil moisture was low. Each plot was 500 cm^2 and was circumscribed by a metal frame driven approximately 5 cm into the soil. Lengths of perforated tubing were placed on the soil inside the metal frame. This tubing was connected by a tee to one of four lines attached to the bottom of a container held approximately 40 cm above the soil. A solution containing 2.7 Bq/mL $^{131}I^-$

and 26 Bq/mL $^{7}BeCl_2$ was slowly poured into the container so that it ran through the perforated tubing onto the soil. After the solution soaked into the soil, the apparatus was removed so that the plots could be sampled 1 h later. New tubing was used for the each plot to avoid external contamination of the vegetation.

The tagging solutions were prepared with distilled water, and the pH was adjusted to 5.5. Each plot received 500 mL of solution, that is, the equivalent of 10 mm of rain. One hour after the application, the vegetation was collected by cutting it with scissors. One sample contained the vegetation >5 cm tall, another the vegetation <5 cm tall. The soil to a depth of 5 cm was also collected. The samples were analyzed on a dry weight and/or area basis.

The results for this experiment are given in Appendix II. Table A.II.1 shows concentration ratios (CR = Bq/kg veg per Bq/kg soil) and area concentration factors (AF = Bq/kg veg per Bq/m^2 soil) for the upper vegetation. The AFs are directly comparable to the mass interception factors (Bq/kg veg per Bq/m^2 applied) used to quantify initial interception and retention. The AFs are substantially lower than the mass interception factors (Table A.VII.1); thus during the 1-h interval, neither ^{131}I nor ^{7}Be is transferred from soil to vegetation via root uptake in amounts that would influence the determination of initial interception and retention of these isotopes in simulated rain.

2.1.8 Comparison of Different Chemical Forms of ^{131}I

Prior to the last series of applications in September, a test was conducted to determine whether it would be feasible to use the iodide form of ^{131}I in the simulated rain, and, if so, what effect the use of a different chemical form of ^{131}I in the simulated rain would have on the results of the interception study.

Solutions of ^{131}I as iodide (I^-), iodate (IO_3^-), and periodate (IO_4^-) were prepared from the same stock of ^{131}I by personnel in the Analytical Chemistry Division of ORNL. Each solution contained the same level of radioactivity, and all were adjusted to a pH of 5.4. Solutions of simulated rain

were prepared from each chemical form of ^{131}I together with ^{7}Be by using distilled water adjusted to pH 5.4.

Two applications were made for each form of ^{131}I on plots of vegetation that were about 80% Johnson grass and the remainder fescue. The grass was approximately 40 cm tall with some taller seed stalks. All applications were made with Simulator 1, which was calibrated to deliver rain with an intensity of 2.5 cm/h to the 0.33-m^2 sampling area. After each application, all the grass within the 0.33-m^2 area was clipped 5 cm above the soil and analyzed for ^{131}I and ^{7}Be on a dry weight basis.

The replicate applications of simulated rain were made on successive days. On the first day, the order of application was iodide, periodate, and iodate, and on the next day the order was reversed. Each plot received 14.3 mm of simulated rain in a continuous application. The simulator was run until empty on each plot and refilled with a solution containing a different chemical form of ^{131}I for the next plot. Samples of the rain solution were collected at the start and continuously during each application. The initial sample was collected in a catch bottle held beneath the simulator nozzle. The continuously collected sample was collected in a small bucket placed next to the sampling area. The grass was sampled 1 h following the application, and the water in the bucket was removed at the same time. The purpose of letting the simulated rain remain in the open bucket was to see if the iodide was lost by volatilization during the experiment.

The results for this experiment are presented in Appendix III. Concentration ratios for vegetation to rain are shown in Table A.III.1 and Fig. A.III.1. They indicate more variability in the vegetation interception of ^{131}I from one day to the next than among the different chemical forms. Despite the differences in the values for ^{131}I for the 2 days, with one exception, the values for ^{7}Be were relatively constant over both days. A comparison of the concentration of ^{131}I in simulated rain collected in bottles with samples left in the open buckets showed no evidence of volatilization by any of the different chemical forms of ^{131}I.

2.1.9 Postdeposition Retention Experiments

2.1.9.1 Plot Description and Application Procedures

Four 1-m^2 plots were used to study the postdeposition retention of ^{131}I, ^{7}Be, and insoluble particles by pasture vegetation. Two plots each of fescue and mixed vegetation were tagged on May 26 and 28, respectively. Vegetation on one plot of each vegetation type was clipped approximately 15 cm above the ground several days before the application of the simulated rain to provide two biomass densities. The simulator nozzle was positioned so that the entire $1m^2$ plot was uniformly wetted. The quantity of rain applied to the plots varied from 1.4 to 15 mm, and the intensity ranged from 1.62 to 10 cm/h; consequently, the initial activities of the radionuclides on the vegetation varied considerably.

2.1.9.2 Sampling Procedures

The first postdeposition retention samples were taken 1 h after the completion of the application of simulated rain. Subsequently, the fescue plots were sampled on days 6, 9, 14, 17, 20, 24, and 34 after application and the mixed vegetation on days 4, 7, 12, 15, 18, 22, and 32. During each sampling period, three samples of vegetation were taken from randomly chosen sites within the 1-m^2 plots. Each sample represented an area of 100 cm^2, and the sites where samples were removed were marked with small stakes to avoid resampling. A rain gauge located near the retention plots measured the rain received by the plots (Appendix X, Table A.X.1). Data on the vegetation collected from the retention plots were analyzed on a dry weight and on an area basis.

2.1.10 Gummed Paper and Intermittent Rain Experiments

The purpose of the gummed paper experiment was to measure the efficiency of gummed paper in retaining ^{131}I, ^{7}Be, and particles deposited in simulated rain. A series of rain applications was made with each simulator to measure the effects of rain intensity and amount on the collection efficiency of the gummed paper. The gummed paper and holding frames were

supplied by Environmental Measurements Laboratory, New York, New York. The area of the paper exposed to the simulated rain was 639 cm^2.

The two simulators were first calibrated for a 0.33-m^2 area as described previously. Next, the intensity of the rain falling on the area occupied by the gummed paper was measured. To accomplish this task, the upper portion of a gummed paper frame was positioned on a 25-cm-high support in the center of the 0.33-m^2 catch pan. The 25-cm height was chosen to allow adequate distance between the simulator nozzle and the frame to achieve the desired intensity and at the same time prevent rain from splashing from the pan. Water deposited inside the frame was collected in a tray and measured to determine the intensity of the simulated rain that would strike the gummed paper.

The site of the gummed paper experiment was the center of two fescue plots. The efficiency of the gummed paper was measured at two intensities (2 and 10.4 cm/h) and four rain amounts (2.5, 5, 10, and 20 mm). Replicates were used for each treatment except the 2-cm/h, 20-mm application. Because of time limitations, the simulated rain was not allowed to evaporate before the gummed paper was collected. Instead, the standing water was poured into a container for radioassay, and then the paper was removed. The paper was folded several times and placed in a different container. After each application, the base plate of the holding frame was wiped with paper towels moistened with 4 *N* HCl, and the top frame was rinsed with HCl to avoid cross contamination from one application to another.

The gummed paper experiment provided an opportunity to collect a series of grass samples that were exposed to intermittent applications of simulated rain. Vegetation surrounding the gummed paper apparatus was sampled after a cumulative 15, 25, 35, 55, and 68 or 75 mm of simulated rain were applied. Approximately 20 to 30 min elapsed between rain applications. The vegetation was clipped at approximately 5 cm from the ground at several locations within the 0.33-m^2 sampling ring but outside the influence of the gummed paper holder. Data on the vegetation samples are reported on a dry weight basis.

2.1.11 Sample Preparation

When practical, samples were placed directly in containers for radioassay as they were collected; however, it was more convenient to place large samples in plastic bags in the field and then transfer them to counting containers in the laboratory. The counting containers were sealed in clean plastic bags during the radioassay to prevent contamination of personnel and equipment. Samples were dried at 60°C after counting and weighed while in the containers.

2.2 NATURAL DEPOSITION OF ^{7}Be

2.2.1 Continuous Exposure to ^{7}Be Deposition

Grass that was exposed to wet and dry deposition was collected from a site near the Environmental Sciences Division facilities to investigate the vegetation interception and retention of cosmogenic ^{7}Be. The dominant species of vegetation in the plots was Kentucky 31 fescue. A rain gauge was located at the site, and rainwater as well as vegetation was collected for radioassay. The grass was clipped 5 cm from the soil and counted overnight on a germanium detector. Usually, the grass was collected within an hour after the rain stopped; but when it rained after working hours, samples were collected the following morning. The vegetation was dried and weighed after radioassay.

Rainwater was collected in a plastic bucket. The water was quantified and transferred to a container for ^{7}Be analysis. The collection bucket was rinsed several times with 4 *N* HCl and the rinse added to the sample prior to radioassay.

2.2.2 Vegetation Exposure to Individual Storm Events

Greenhouse-grown Kentucky 31 fescue was used to determine the vegetation interception of cosmogenic ^{7}Be on an individual storm basis. The grass was grown in potting soil in plastic containers (53 x 40 x 18 cm) under natural lighting. Air entering the greenhouse passed through activated

charcoal filters; thus, the vegetation was protected from ^{7}Be deposition during growth.

At the start of a rain event, three or four containers of grass were placed on an outdoor stand to expose the grass to ^{7}Be from wet deposition. The amount of rain that fell was measured, and rainwater was collected for radioassay. When the rain ended, the grass >5 cm tall was collected and counted overnight on a germanium detector.

During the summer, the greenhouse was open to nonfiltered outside air to help control the temperature. Because the outside air was a possible source of ^{7}Be contamination, grass from containers that had not been placed outside was counted to determine the background level of ^{7}Be. Assays of grass that grew back after being sampled did not show significant levels of ^{7}Be as a result of root uptake; therefore, the containers of grass were reused.

2.2.3 Air Monitoring

The greenhouse experiment was accompanied by air monitoring for ^{7}Be. A high-volume air sampler (General Metal Works, Inc.[c] model GMWL-2000 H) equipped with an 8- by 10-in. Whatman cellulose filter (GMW-41) was used to monitor ^{7}Be in the air during each storm event. Measurements were also made during dry periods. The ^{7}Be activity on the filter was converted to becquerels per cubic meter of air.

2.3 COUNTING EQUIPMENT

All samples were counted on an intrinsic germanium detector connected to a Nuclear Data[c] 6600 analyzer. The detector had a relative photopeak efficiency[d] of >25%. A variety of container types and sizes was used to accommodate the samples. Efficiency curves were established for each type

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[c] Mention of manufacturer or trade name is for information only and does not constitute an endorsement of the product.

[d] Relative photopeak efficiency is the photopeak count rate of this detector compared to a 3- by 3-in. NaI(Tl) detector's photopeak count rate for the ^{60}Co 1.33-MeV gamma peak with the source placed 25 cm from the end-cap face of the detector.

of container to account for the effects of counting geometry on counting efficiency. The performance of the detection system was checked several times throughout the study by participation in a quality control program conducted by the U.S. Environmental Protection Agency.

Most samples were counted a sufficient length of time to produce a counting error of ≤5% for each radiotracer; however, when the activity of one or more radioisotopes was very low, the samples were counted overnight (16 h) or over a weekend (approximately 65 h). The maximum counting error for overnight and weekend counts was always less than 30% and usually less than 20%. Samples analyzed for cosmogenic ^{7}Be were counted overnight. The minimum level of detection for samples counted for cosmogenic ^{7}Be was 7 to 10 Bq/kg dry weight, with a counting error of 30 to 50%. The analyzer was programmed to identify the different radionuclides by their energy spectra, correct for background and radioactive decay, and convert counts to unit of activity per unit sample. The results for each sample were printed on paper.

2.4 DATA PROCESSING AND ANALYSIS

Data were first recorded on a worksheet and then transferred to a computer for analysis. Entries were checked for errors before the data were analyzed. Statistical analyses were run on a mainframe data analysis system known as SAS (SAS Institute, Inc., Cary, North Carolina). John J. Beauchamp of the Engineering Physics and Mathematics Division of ORNL was consulted for statistical advice during the planning and data analysis stages of the study. Data used in most statistical analyses are given in the appendices.

3. RESULTS

3.1 INTERCEPTION OF MATERIALS IN RAIN BY PASTURE VEGETATION

The primary objective of this study was to quantitatively determine the fraction of soluble and insoluble radioactive materials in rain that would be initially intercepted and retained on pasture vegetation within 1 h after a precipitation event. To achieve this objective, different procedures were applied for the insoluble microspheres than for ^{131}I and ^{7}Be.

Analysis of the inventory of deposited activity in the 0.05-m^2 subplots indicated that the microspheres were partially retained in the mechanical rain simulators (Appendix III). Thus, the deposition of the microspheres onto the 0.33-m^2 sampling circles was lower than expected assuming homogeneous dilution of the isotopes and no retention within the simulators. Simulator retention of the microspheres appears to have been on the order of only 10 to 30% for Simulator 1, but it was as high as 50 to 80% for Simulator 2. The presence of extra tubing along with continuous circulation of water between the supply tank and head tank in Simulator 2 most likely enhanced particle adsorption onto surfaces. Although aliquots of the simulated rain were taken before and after rain applications, a reliable estimate of the concentration of the microspheres in the aliquot samples could not be determined due to rapid settling of the spheres on the walls and bottoms of the aliquot bottles, preventing a consistent determination of a proper counting geometry.

For these reasons, the vegetation collected in the 0.33-m^2 sampling circles (outside the 0.05-m^2 subplots) was not used to estimate the initial interception and retention of the microspheres. Instead, the amount of activity measured in the subplot vegetation (cut above the height of 5 cm from the soil surface) was divided by the total inventory measured in all vegetation and soil collected from the subplot. In this study, data from all subplots were used except for clover plots 1 through 8. These subplots were excluded from the analysis of the microspheres because of inconsistencies associated with the sampling of soil.

For ^{131}I and ^{7}Be, the fraction initially intercepted and retained by edible pasture vegetation was determined by taking the amount of activity deposited in vegetation sampled above the height of 5 cm from the soil surface in the 0.33-m^2 sampling circles and dividing this amount by the total deposition estimated for this area. The total amount of ^{131}I and ^{7}Be deposited in the sampling circles was estimated by multiplying the calculated concentrations in simulated rain by the amount of rain applied to the circles. This procedure was adopted because the calculated concentrations of ^{131}I and ^{7}Be were confirmed by aliquot measurements (Appendix IV). In addition, subplot retention of ^{131}I and ^{7}Be was affected by runoff of water (Appendix III), thus precluding the use of the subplot inventory for determining vegetation interception and initial retention of these soluble substances. Unlike ^{131}I and ^{7}Be the retention of the insoluble microspheres in the subplots was not appreciably affected by water runoff because of rapid settling of these materials on the surfaces of vegetation and soil.

In determining the interception and initial retention by vegetation, the influence of rain amount, intensity, standing biomass, and vegetation type was analyzed by using a multivariate linear regression of the logtransformed data. The analysis was performed with the General Linear Model (GLM) procedure from a commercial statistical software package (SAS 1985). The concentrations of radioisotopes measured in all samples taken during the interception experiment are listed in Appendix V along with the plot number, vegetation type, sample type, sample dry weight, and the values of rain amount and intensity.

3.1.1 Interception Fraction

The amount of material in rain initially intercepted and retained by vegetation with respect to the total amount of material deposited in rain is referred to as the "interception fraction" r. This is the primary factor of interest in this study. The individual values of the interception fraction for vegetation sampled above 5 cm from the soil are plotted as a function of the amount and intensity of simulated rain in Figs. 3.1 through 3.5 for soluble ^{131}I and ^{7}Be and the insoluble microspheres. The absolute values of the interception fraction and standing crop biomass are presented in Appendix VI in Tables A.VI.1 and A.VI.4, respectively.

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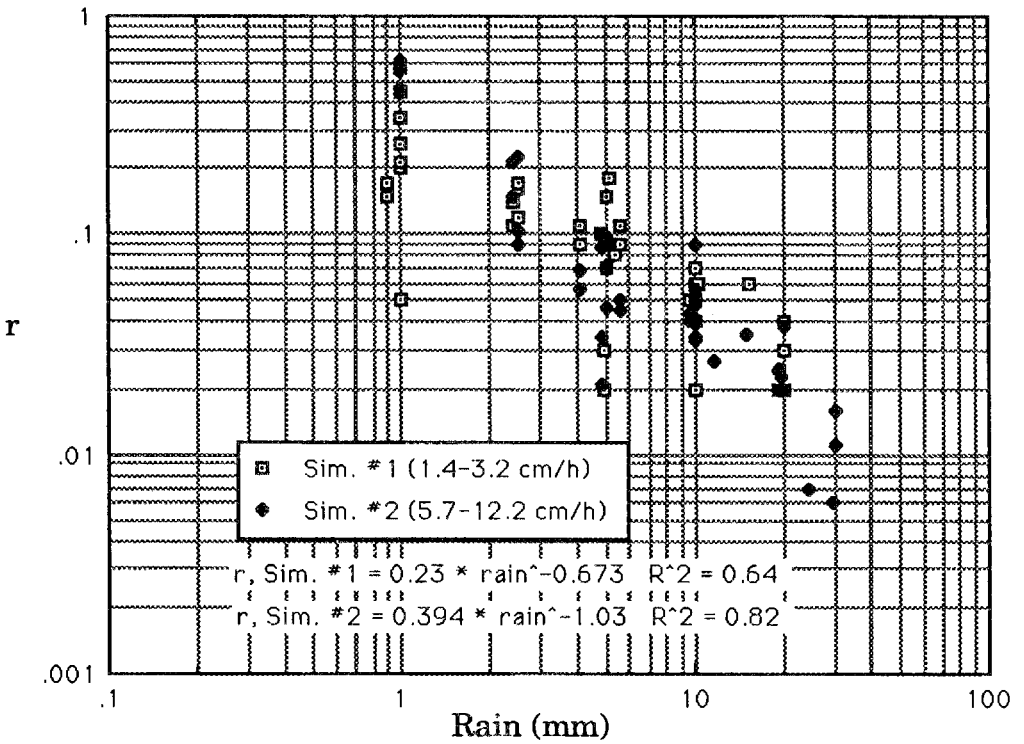

Fig. 3.1. Individual values of the interception fraction (r) for ^{131}I as a function of the amount and intensity of simulated rain.

ORNL-DWG 89-11584

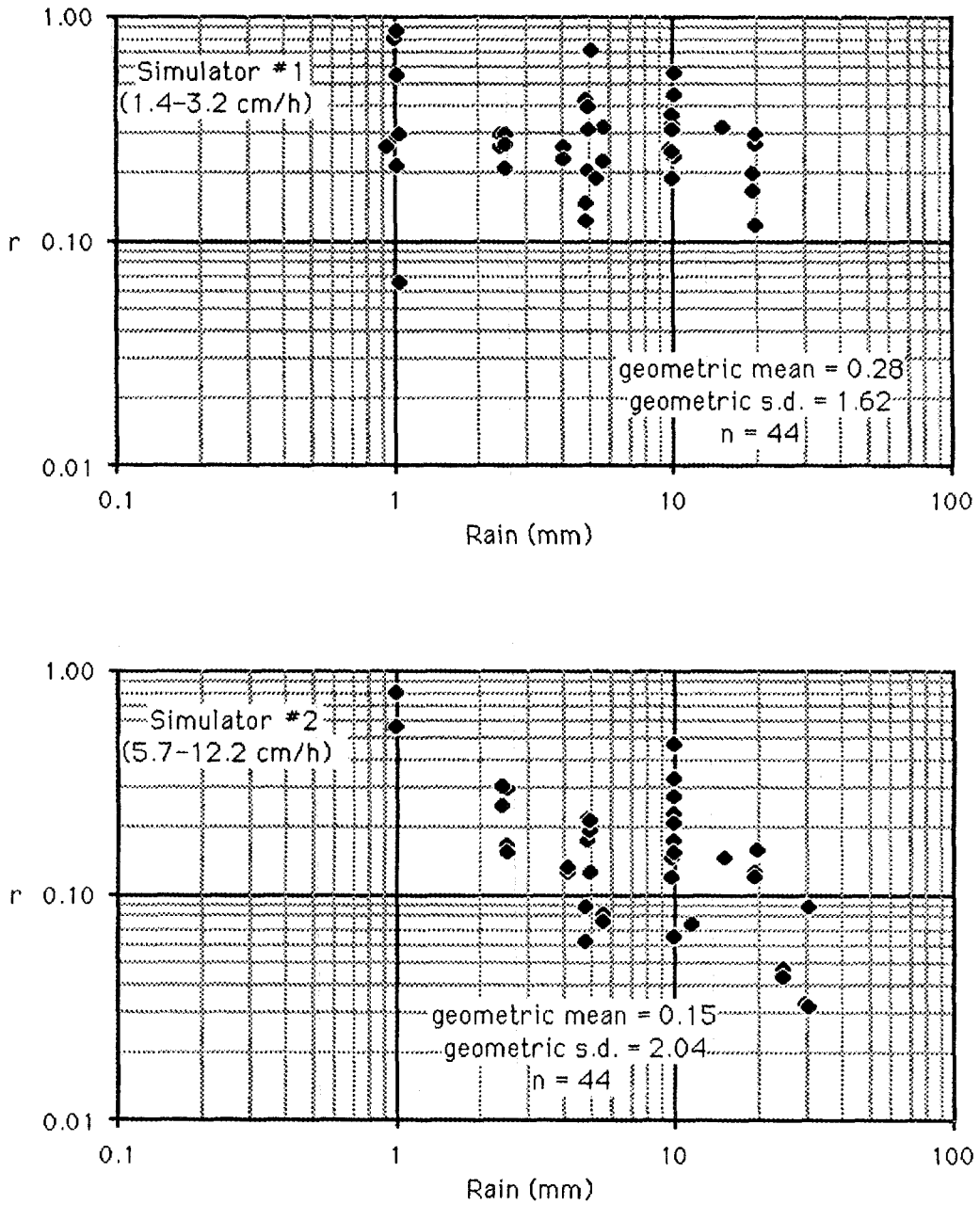

Fig. 3.2. Individual values of the interception fraction (r) for ^{7}Be as a function of the amount and intensity of simulated rain.

ORNL-DWG 89-11585

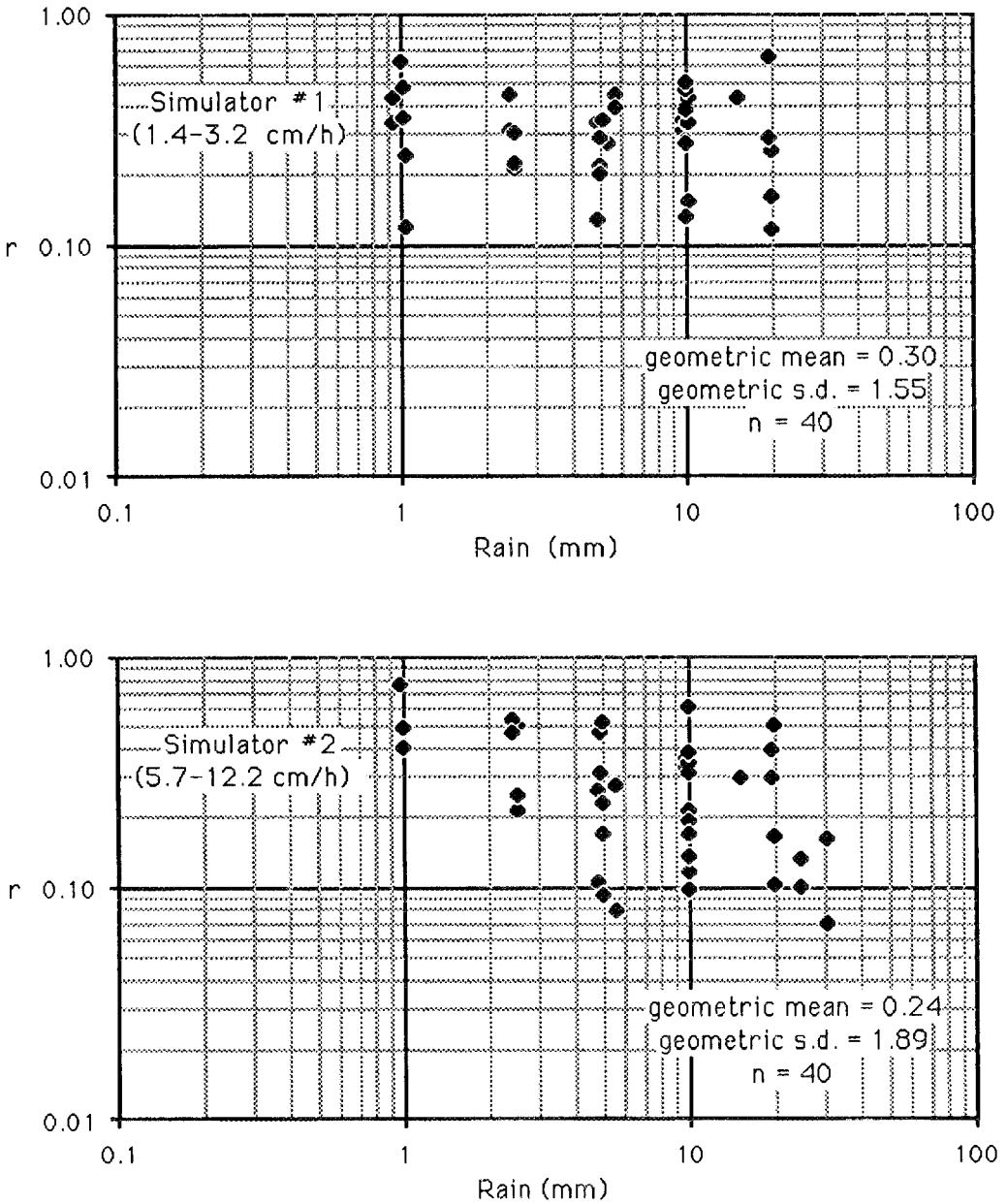

Fig. 3.3. Individual values of the interception fraction (r) for 3-μm particles as a function of the amount and intensity of simulated rain.

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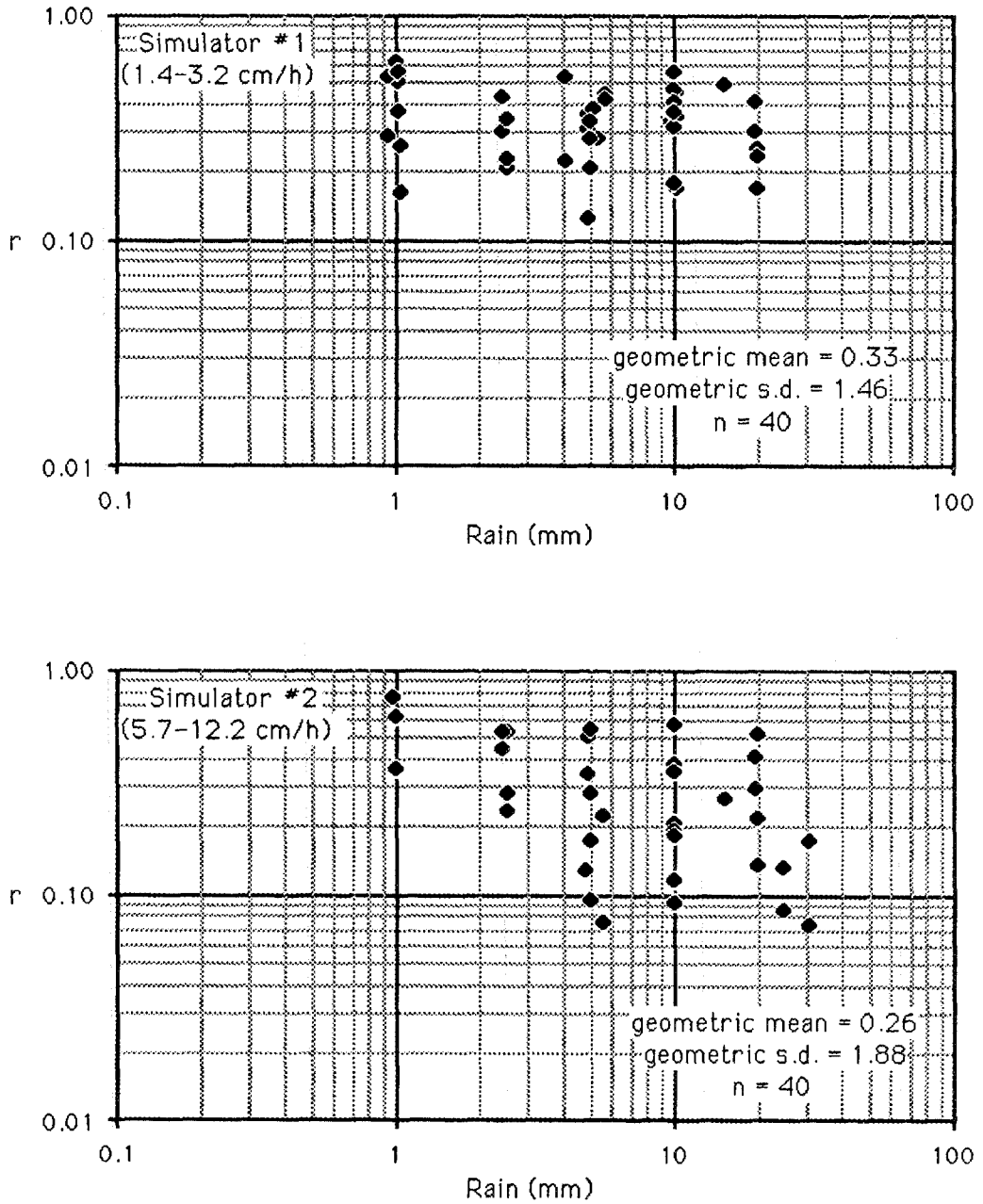

Fig. 3.4. Individual values of the interception fraction (r) for 9-μm particles as a function of the amount and intensity of simulated rain.

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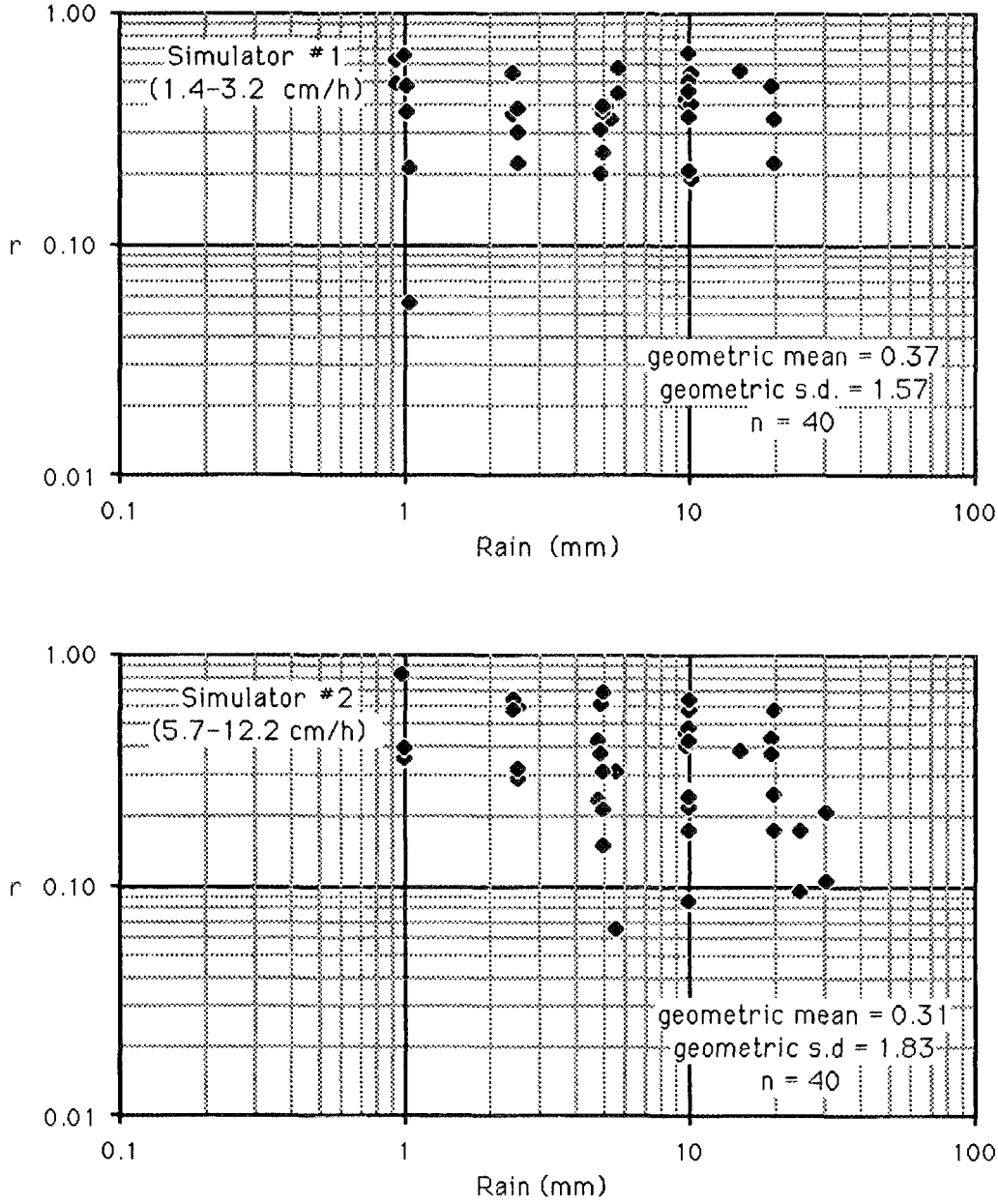

Fig. 3.5. Individual values of the interception fraction (r) for 25-μm particles as a function of the amount and intensity of simulated rain.

A summary of the results of a multiple linear regression of the logtransformed values of the interception fractions against the covariates' vegetation type, and the logtransformed values of standing biomass, rain amount, and rain intensity is given in Table 3.1. In this table, the extent of influence of a covariate is given by the sign and magnitude of the regression coefficients (K_1 through K_4). The relative importance of a covariate is given as the ratio of the Type III sum of squares for the logtransformed values of the covariate to the corrected total sum of squares for the logtransformed values of the interception fraction.

The results show marked differences between soluble ^{131}I and all other substances. For soluble ^{131}I, interception fractions were highest (~0.15 to 0.6) at low rainfall amounts and high values of biomass (Table 3.1; Fig. 3.1) but decreased as a direct inverse function of rain amount (to values as low as 0.006). Rain amount was the most influential variable on the interception fraction, followed by biomass. No significant effect was observed for differences in rain intensity. Among the vegetation types, the highest values were obtained for fescue (Appendix VI); however, once normalized for differences in biomass, the influence of vegetation type was not appreciable. Only clover produced significantly different values from the other vegetation types. For ^{131}I, the effect of vegetation type was small compared to the influence of biomass and rain amount.

Biomass had the same influence on the interception fraction for ^{7}Be and the insoluble microspheres as it had on the interception fraction for ^{131}I. However, the interception fractions for ^{7}Be and the microspheres were more affected by biomass than the amount of rain (Table 3.1). For ^{7}Be and the insoluble microspheres, the values of the interception fraction generally ranged from about 0.1 to 0.6. For these substances, decreasing values of the interception fraction with increasing rain amounts were apparent at only the highest intensities of rain application (Figs. 3.2-3.5). For the microspheres, the influence of the intensity of rain application was of only minor importance as compared with rain amount and biomass. For ^{7}Be, the influence of rain intensity was about equal to the influence of rain amount.

Table 3.1. Multiple regression of the values for the interception fraction (r) with standing biomass, Y (kg_{dry}/m^2); amount of rain, P (mm); and intensity of rain, I (cm/h).

The regression equation is $r = K_1 \bullet Y^{K_2} \bullet P^{K_3} \bullet I^{K_4}$, where K_1 is a function of each type of vegetation.

	K_1			K_2	K_3	K_4	(R^2)[a]
Substance	Clover	Fescue	Mixed	(Biomass)	(Rain)	(Intensity)	
Microspheres							
3-μm	1.78	1.81	1.54	0.701[b]	-0.207[b]	-0.119[b]	0.598[b]
	(1.61)[c]	(1.61)	(1.61)	(59.5)	(11.7)	(2.50)	
9-μm	1.86	1.83	1.51[bd]	0.671[b]	-0.204[b]	-0.124[b]	0.747[b]
	(2.70)	(2.70)	(2.70)	(58.6)	(12.1)	(2.92)	
25-μm	1.87	1.95	1.38[bd]	0.697[b]	-0.124[b]	-0.089	0.686[b]
	(7.29)	(7.29)	(7.29)	(62.0)	(4.38)	(1.50)	
^{131}I	1.54[bd]	1.28	1.19	0.697[b]	-0.909[b]	-0.049	0.911[b]
	(1.23)	(1.23)	(1.23)	(15.7)	(72.3)	(0.138)	
^{7}Be	2.29	2.51	1.80[bd]	0.695[b]	-0.290[b]	-0.341[b]	0.696[b]
	(3.70)	(3.70)	(3.70)	(31.8)	(14.9)	(13.9)	

a (R^2) is the regression coefficient of determination for the logtransformed data; it is not to be confused with the symbol used in this report for the interception fraction r.

b Statistically significant, $p < 0.05$.

c The value in parentheses is the percentage of the total variability in the logtransformed data explained by the parameter in the presence of all other factors [the ratio of Type III sum of squares to the corrected total sum of squares for each parameter (SAS 1985)].

d This type of vegetation was significantly different, $p < 0.05$, from the other two.

As with ^{131}I, the influence of vegetation type was always substantially less important than the influence of biomass for ^{7}Be and the microspheres. For ^{7}Be and the 3- and 9-μm microspheres, however, vegetation type was less important than either the amount or intensity of rain application. For ^{7}Be and the microspheres, mixed pasture was the vegetation type determined to be significantly different from either clover or fescue (Table 3.1).

3.1.2 Mass Interception Factor

It is often desirable to normalize for the effects of biomass because of its strong influence in determining the amount of material initially intercepted and retained by vegetation. This normalization provides the "mass interception factor" (r/Y) which is defined as the fraction of the total deposit initially intercepted and retained per unit mass of vegetation. The individual r/Y values for all substances deposited on vegetation collected above the height of 5 cm from the soil surface are plotted as a function of the amount and intensity of rain in Figs. 3.6 through 3.10. The absolute values are given in Appendix VII. The results of multiple linear regressions of the mass interception factors with vegetation type, standing biomass, and rain amount and intensity are given in Table 3.2.

For ^{131}I, the mass interception factor is nearly a sole function of the amount of rain with values decreasing from about 2.5 m^2/kg (dry wt) at 1 mm of rain to less than 0.1 m^2/kg at 30 mm of rain (Fig. 3.6). Biomass and vegetation type are the only remaining variables of importance, but the effect of these variables is minor in comparison to the amount of rain (Table 3.2). The lack of influence of the intensity of rain application is more apparent for the mass interception factor (Fig. 3.6) than for the interception fraction (Fig. 3.1).

For ^{7}Be and the microspheres, the values of the mass interception factor are consistently larger than for ^{131}I at rain amounts above 1 mm. Values of r/Y range from 2 to 6 m^2/kg (dry wt) at 1 mm of rain to 0.5 to 3 m^2/kg at 20 mm. The negative influence of rain amount is readily apparent at all intensities of rain application (Figs. 3.7-3.10). However, for ^{7}Be and the microspheres, rain amount is still not a dominant controlling variable

(Table 3.2). With the exception of ^{7}Be, the influence of rain amount is about equal to or less than the influence of biomass. For ^{7}Be, the influence of rain amount is about equal to that of rain intensity.

Despite the fact that the mass interception factor is normalized for biomass, biomass is still among the two most important variables influencing the mass interception factor of the microspheres. Unlike the interception fraction, increasing values of biomass bring about decreasing values of the mass interception factor, indicating the effect of tissue dilution of concentrations reported in units of mass. The effect of differences in vegetation type is only slightly more pronounced for the mass interception factor than for the results of the interception fraction; however, the extent of this effect, as indicated by the regression coefficient K_1 in Table 3.2, is exactly the same.

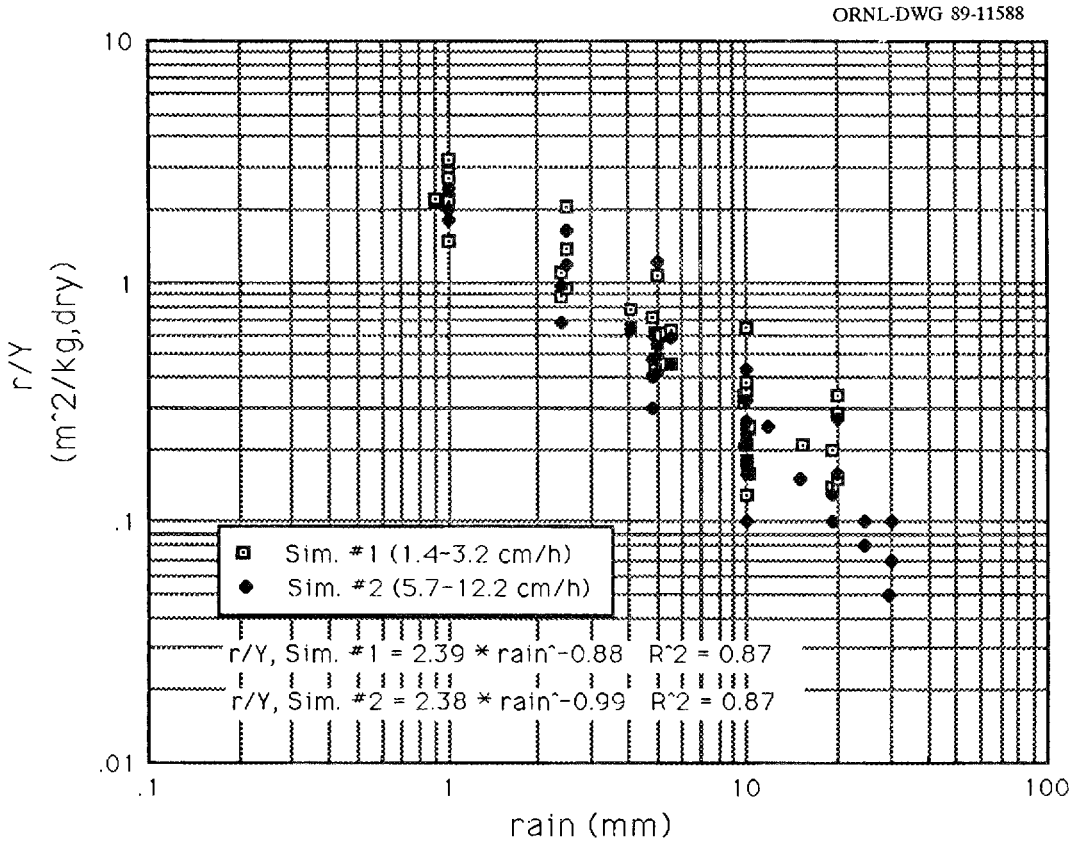

Fig. 3.6. Individual values of the mass interception factor (r/Y) for ^{131}I as a function of the amount and intensity of simulated rain.

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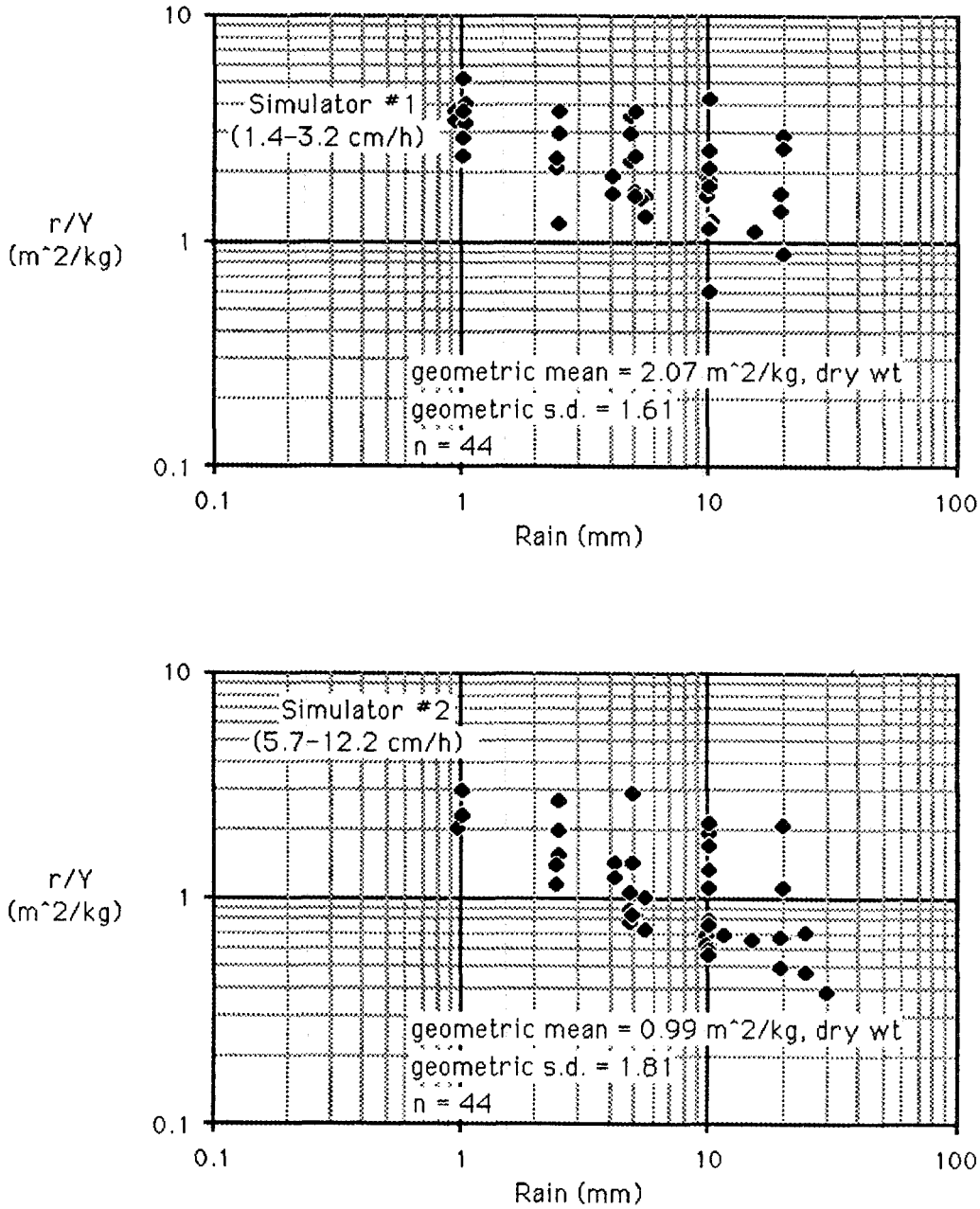

Fig. 3.7. Individual values of the mass interception factor (r/Y) for ^{7}Be as a function of the amount and intensity of simulated rain.

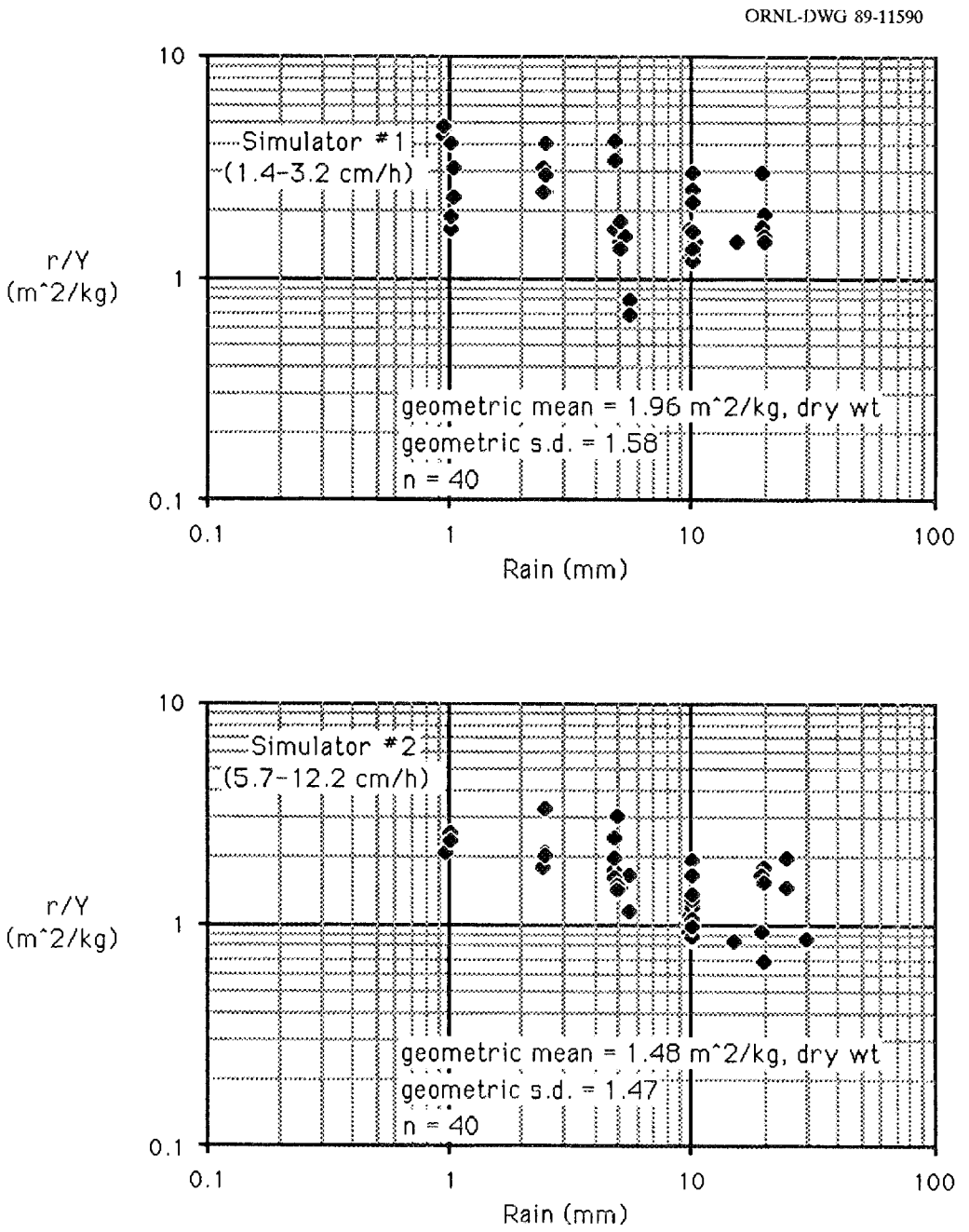

Fig. 3.8. Individual values of the mass interception factor (r/Y) for 3-μm particles as a function of the amount and intensity of simulated rain.

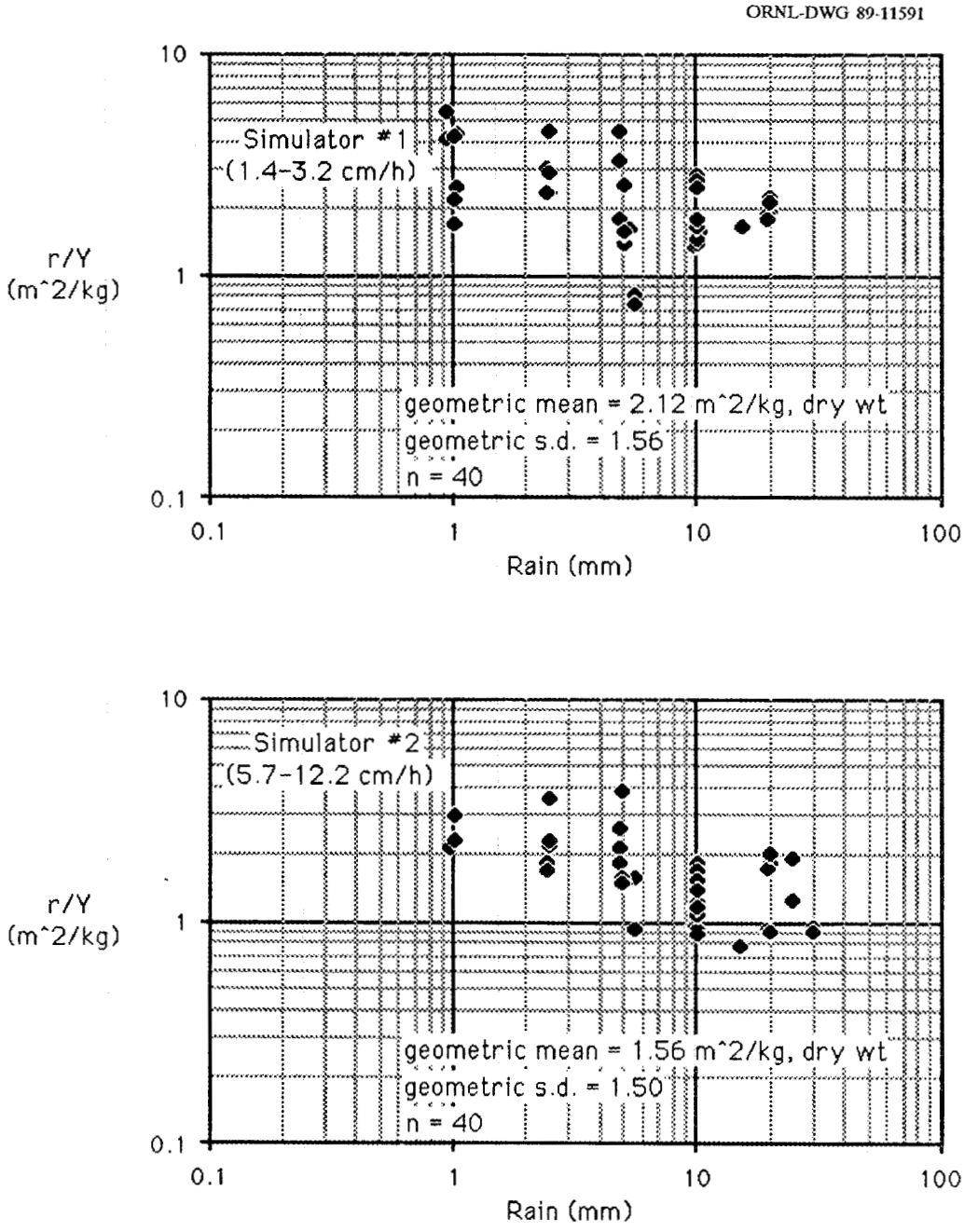

Fig. 3.9. Individual values of the mass interception factor (r/Y) for 9-μm particles as a function of the amount and intensity of simulated rain.

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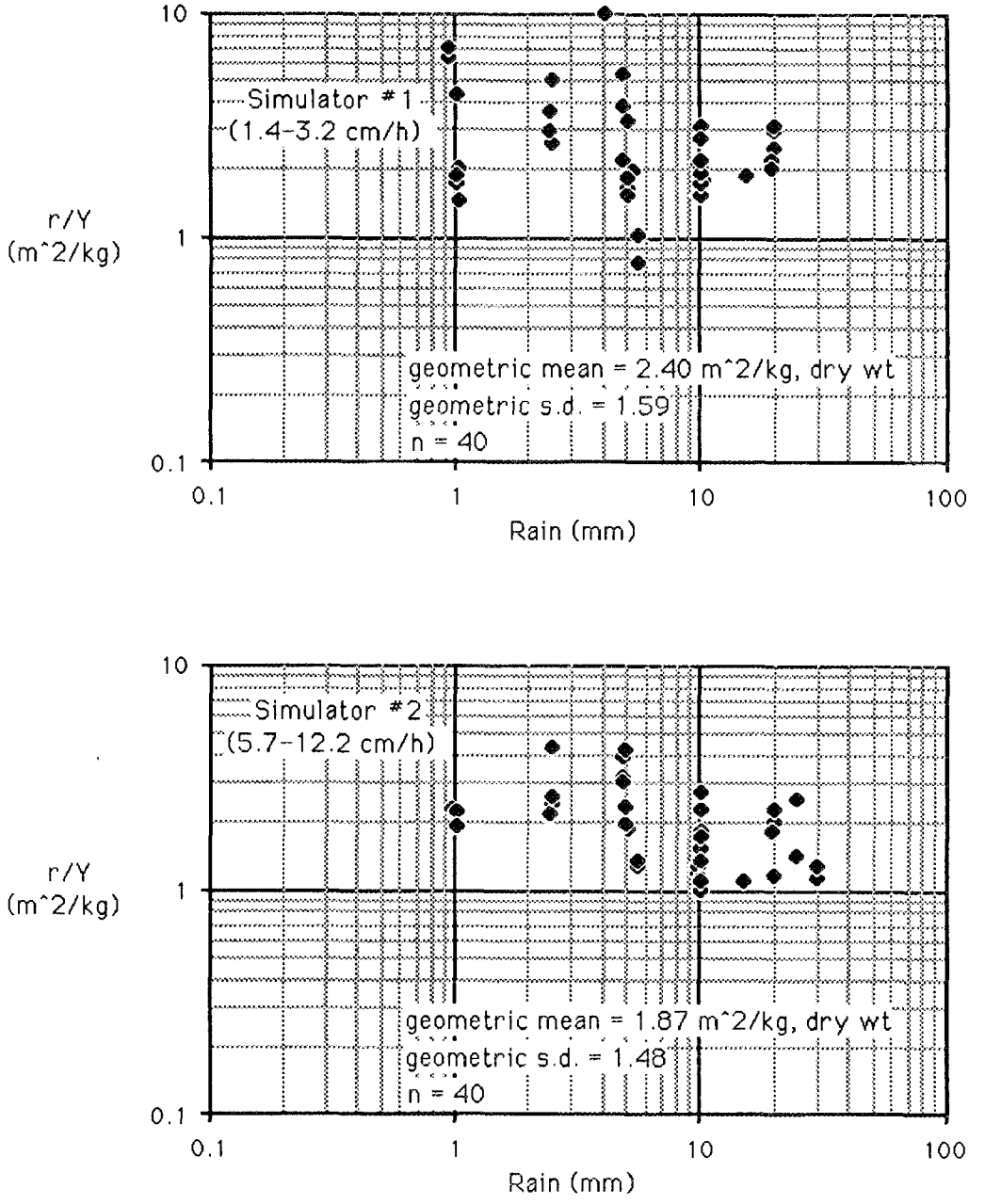

Fig. 3.10. Individual values of the mass interception factor (r/Y) for 25-μm particles as a function of the amount and intensity of simulated rain.

Table 3.2. Multiple regression of the values for r/Y with standing biomass, Y (kg_{dry}/m^2); amount of rain, P (mm); and intensity of rain, I (cm/h).

The regression equation is $r/Y = K_1 \bullet Y^{K_2} \bullet P^{K_3} \bullet I^{K_4}$, where K_1 is a function of each type of vegetation.

	K_1			K_2	K_3	K_4	R^2
Substance	Clover	Fescue	Mixed	(Biomass)	(Rain)	(Intensity)	
Microspheres							
3-µm	1.78	1.81	1.54	-0.299[a]	-0.207[a]	-0.119[a]	0.601[a]
	(2.51)[b]	(2.51)	(2.51)	(16.8)	(18.1)	(3.88)	
9-µm	1.86	1.83	1.51[ac]	-0.329[a]	-0.204[a]	-0.124[a]	0.647[a]
	(3.76)	(3.76)	(3.76)	(19.6)	(17.0)	(4.08)	
25-µm	1.87	1.95	1.38[ac]	-0.303[a]	-0.124[a]	-0.089	0.546[a]
	(10.6)	(10.6)	(10.6)	(17.0)	(6.32)	(2.15)	
^{131}I	1.54[ac]	1.28	1.19	-0.303[a]	-0.909[a]	-0.049	0.916[a]
	(1.16)	(1.16)	(1.16)	(2.80)	(68.2)	(0.131)	
^{7}Be	2.29	2.51	1.80[ac]	-0.305[a]	-0.290[a]	-0.341[a]	0.668[a]
	(4.04)	(4.04)	(4.04)	(6.67)	(16.3)	(15.2)	

[a] Statistically significant, $p < 0.05$.

[b] The value in parentheses is the percentage of the total variability in the logtransformed data explained by the parameter in the presence of all other factors [the ratio of Type III sum of squares to the corrected total sum of squares for each parameter (SAS 1985)].

[c] This type of vegetation was significantly different, $p < 0.05$, from the other two.

3.1.3 Applications of Intermittent Rain

In a separate experiment, simulated rain was applied intermittently to fescue with approximately 30 min elapsing between the end of one application of rain and the beginning of another. Intermittent rain was applied by each rain simulator in increasing increments with fescue sampled at random from within two 0.33-m^2 circles after cumulative amounts of rain in each circle reached 15, 25, 35, 55, and 75 mm (applications using Simulator 1 were terminated at 68.9 mm of rain). An exception to the 30-min application interval was a 12-h period that occurred between samples taken on September 30 and October 1. Detailed results are presented in Appendix VIII.

To estimate mass interception factors, the deposition per unit area of the radioactive substances was calculated by multiplying the deposition of simulated rain per unit area times the estimated concentration of each substance in the rain. The concentration of the microspheres was corrected by a factor to account for retention in the simulators. This correction factor was the reciprocal of the geometric mean of the ratio of the measured to the expected inventory of microspheres deposited in each 0.05-m^2 subplot ($n = 40$) of the previous experiment (Appendix III). Although the actual simulator retention of the microspheres is unknown, the extent of this uncertainty, based on the variability of these ratios, is not expected to exceed a factor of 2.

In the intermittent rain experiment, mass interception factors for each substance were nearly constant regardless of how much rain was applied (Fig. 3.11). For rain applied at about 2 cm/h, the geometric mean of the mass interception factor for the microspheres varied from 1.88 m^2/kg, dry wt for the-25 μm microspheres to 0.76 m^2/kg, dry wt for the 9-μm microspheres. An increase in the intensity of rain to 12 cm/h resulted in a reduction in the mass interception factor for the microspheres by about a factor of 2.

For ^{131}I, the change in rain intensity had a less pronounced effect. Values of r/Y produced by the moderate-intensity simulator ranged from 0.5 m^2/kg, dry wt at 15 mm of rain to 0.29 m^2/kg for rain in excess of 25 mm. Values of r/Y produced by the high-intensity simulator ranged from 0.26 m^2/kg at 15 mm of rain to about 0.20 m^2/kg for rain in excess of 25 mm. No effect was

observed between the intensity of rain application and the mass interception factor for ^7Be, with the mass interception factor remaining constant at about 2.7 m^2/kg.

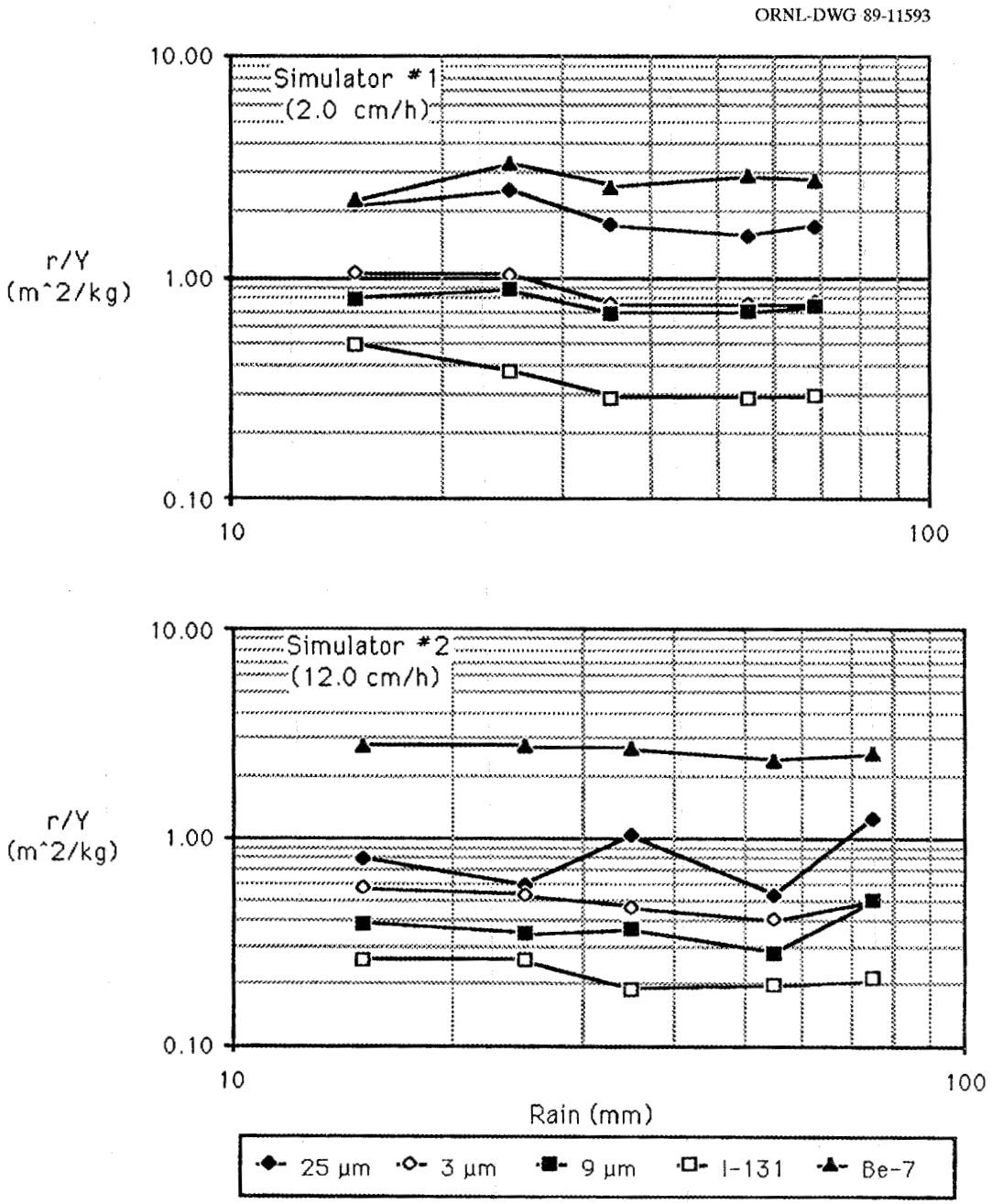

Fig. 3.11. Individual values of r/Y for composite samples of fescue receiving intermittent rain applications.

3.2 GUMMED PAPER

The collection efficiency of gummed paper was determined in a manner similar to the interception fraction for vegetation. The intensity of the rain application for each simulator, however, was specifically calibrated for the 0.064-m^2 area of the gummed paper. To account for retention of the microspheres in the simulators, their total estimated deposition was calculated through use of a correction factor (as described in Sect. 3.1.3).

The collection efficiency of gummed paper (including the activity collected in water standing on the paper) was highest for the microspheres and lowest for ^{7}Be and ^{131}I (Fig. 3.12). Contrary to the results for vegetation, the collection efficiencies of ^{131}I and ^{7}Be were nearly identical. Values for ^{131}I and ^{7}Be were negatively correlated with the amount of rain and were unaffected by rain intensity (Table 3.3). The values for ^{131}I and ^{7}Be ranged from about 0.3 at 2.5 mm of rain to 0.04 to 0.06 at 20 mm of rain.

Average values of the collection efficiency for the microspheres ranged from between 0.2 to about 0.5 for the 3-μm and 9-μm microspheres to about 0.5 to 0.8 for the 25-μm microspheres. With the exception of the 3-μm particles, the influence of the amount and intensity of rain on the collection efficiency of the microspheres was essentially negligible. This implies that the 25-μm and 9-μm microspheres rapidly settled onto the surface of the gummed paper and, that once settled, they were not readily removed by additional rain. The positive correlation with rain intensity indicated in Table 3.2 for the 3-μm microspheres is counterintuitive and probably results from an error in the estimate of the suspected retention of this material in Simulator 2.

Analysis of the standing water present on the gummed paper after the application of simulated rain indicated that nearly all of the 25-μm particles (>95%) and most of the 9-μm particles (>70%) had settled on the gummed paper (Appendix IX). By contrast, only 30% of the 3-μm particles, 13% of the ^{131}I, and 7.9% of the ^{7}Be were adsorbed. These results imply that large errors could be introduced to the estimate of the wet deposition of small particles and soluble ^{131}I and ^{7}Be if the standing water were to be discarded

prior to analysis of the gummed paper. After evaporation of the standing water, however, the materials in the standing water should be completely retained on the paper. Therefore, the analysis of collection efficiencies included the activity of the standing water and activity of the gummed paper combined.

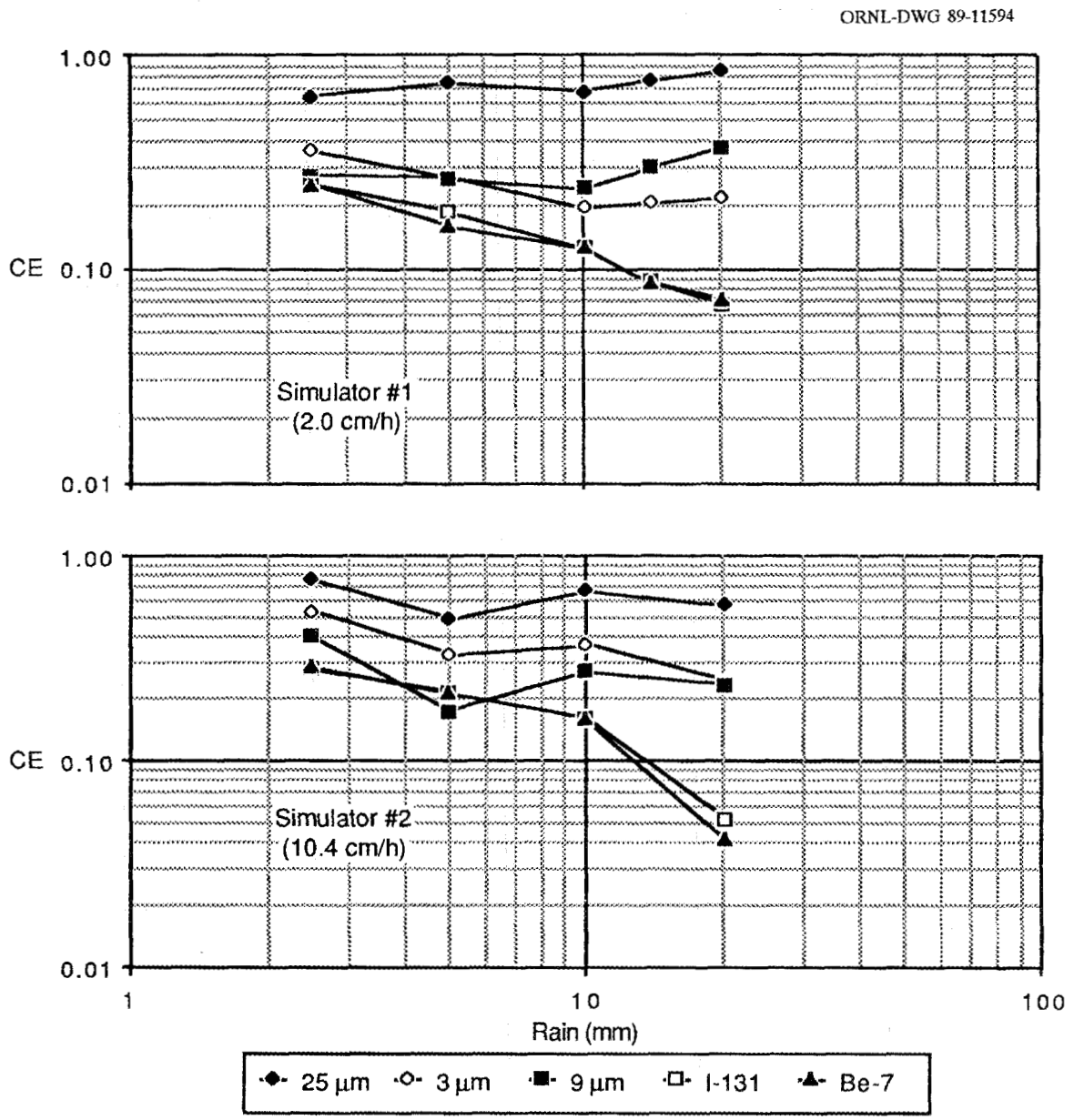

Fig. 3.12 Average values of the collection efficiency (CE) of ^{131}I, ^{7}Be, and the microspheres by gummed paper (for each value, n = 2).

Table 3.3. Multiple regression of the gummed paper collection efficiency (CE) with the amount P (mm) and intensity I (cm/h) of rain.

The regression equation is $CE = K_1 \cdot I^{K_2} \cdot P^{K_3}$.

Substance	K_1	K_2 (Intensity)	K_3 (Rain)	R^2
Microspheres				
3-μm	0.399[a]	0.246[a]	0.315[a]	0.646[a]
		(28.8)[b]	(38.3)	
9-μm	0.329	-0.061	-0.070	0.054
		(2.52)	(2.70)	
25-μm	1.01	-0.180	-0.117	0.123
		(8.90)	(3.02)	
^{131}I	0.526[a]	0.001	-0.677[a]	0.724[a]
		(0.0001)	(72.3)	
^{7}Be	0.563	-0.015	-0.726[a]	0.685[a]
		(0.035)	(68.3)	

[a] Statistically significant, $p < 0.05$.

[b] The value in parentheses is the percentage of the total variability in the logtransformed data explained by the parameter in the presence of all other factors [the ratio of Type III sum of squares to the corrected total sum of squares for each parameter (SAS 1985)].

3.3 USE OF ^{7}Be AS A TRACER FOR INITIAL INTERCEPTION

Despite obvious chemical and physical differences between ^{7}Be and the other substances used in this experiment, a secondary objective of this study was to determine the extent to which naturally occurring ^{7}Be could be used to quantify the transfer of materials from rain to vegetation. The data on the interception fractions and mass interception factors in Sects. 3.1.1 and 3.1.2 indicate relatively close agreement between for the microspheres and ^{7}Be, but large differences are observed for ^{131}I. The extent to which variability of the mass interception factor for ^{7}Be can be used to explain the variability in the mass interception for ^{131}I and the microspheres was investigated through simple logarithmic regressions. These results are presented in Figs. 3.13 through 3.16. The vegetation used for this analysis was the material >5 cm tall that was collected from the entire 0.33-m^2 sampling area. For the microspheres, the assumption was made that deposition per unit area in the subplots was representative of the deposition per unit area in the 0.33-m^2 sampling area.

These figures show a moderate to strong correlation between the values of ^{7}Be and those for the other substances, with most values being well within a factor of 2 of the regression line. The coefficients of determination (R^2) of these regressions indicate that ^{7}Be was successful in explaining 62% of the variability in r/Y for ^{131}I and between 39 and 46% of the variability in r/Y for the microspheres. The larger value of R^2 for the regression of ^{131}I against ^{7}Be is because of the common influence that the amount of rain had in determining the values of r/Y for both of these radionuclides. The smaller values of R^2 for the regression of the microspheres against ^{7}Be were partly influenced by differences in the determination of the deposition of the microspheres than for ^{131}I or ^{7}Be (see Sect. 3.1). In addition, the amount of rain was a weak controlling variable for both ^{7}Be and the microspheres.

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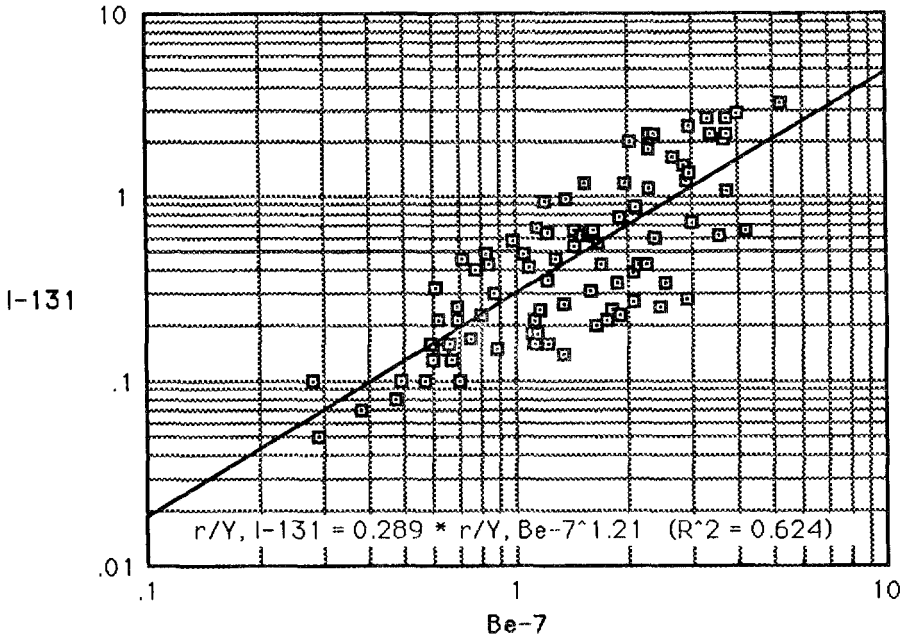

Fig. 3.13. Regression of the mass interception factor r/Y for ^{131}I with the r/Y for ^{7}Be.

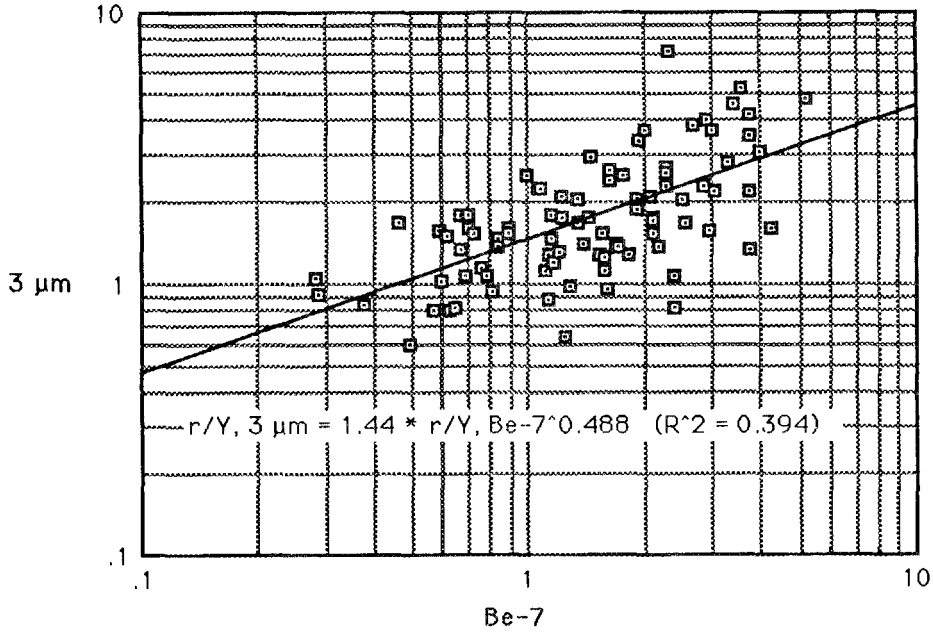

Fig. 3.14. Regression of the mass interception factor r/Y for the 3-µm particles with the r/Y for ^{7}Be.

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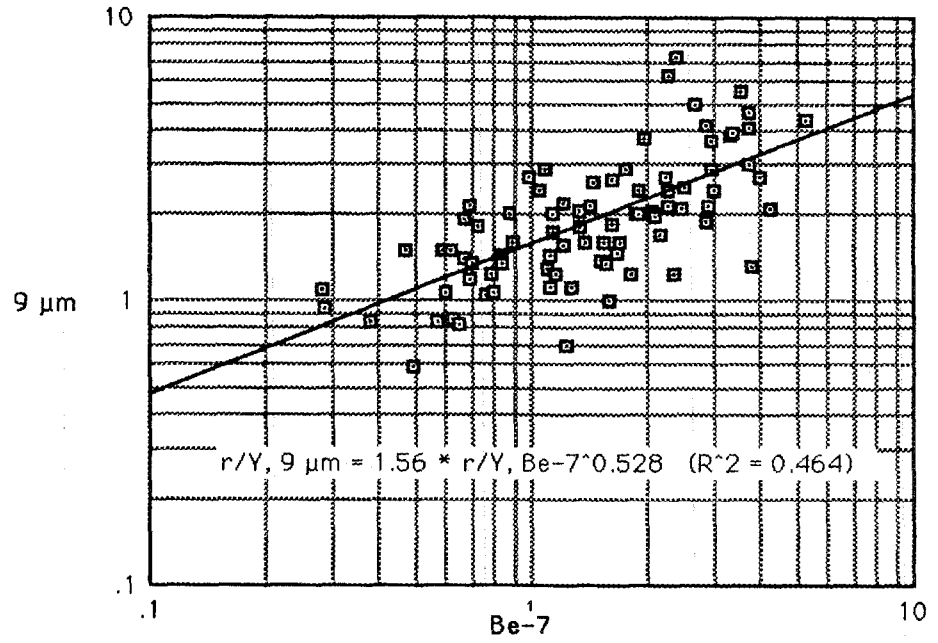

Fig. 3.15. Regression of the mass interception factor r/Y for the 9-µm particles with the r/Y for ^{7}Be.

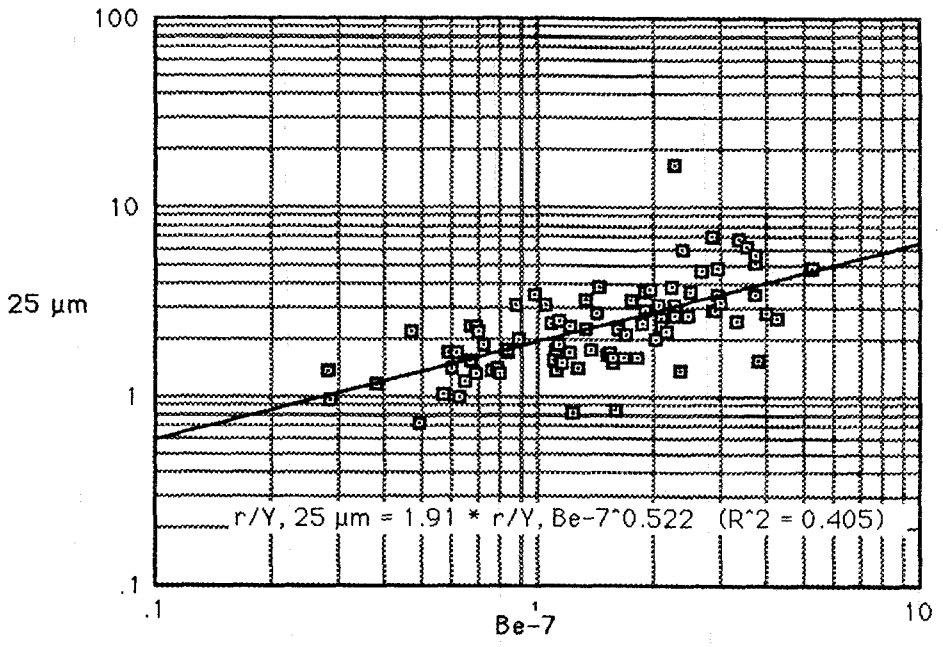

Fig. 3.16. Regression of the mass interception factor r/Y for the 25-µm particles with the r/Y for ^{7}Be.

3.4 POSTDEPOSITION RETENTION

After the materials were applied to vegetation via simulated rain, their concentrations were monitored in four plots over a period of almost five weeks (Appendix X). The decrease of the concentrations with time is an indication of the postdeposition retention of these materials by vegetation. The process of dilution of the radioactive materials by the addition of new tissue after the period of initial deposition (growth dilution) is included in the estimate of postdeposition retention when concentrations are analyzed on a mass basis. However, the process of growth dilution is excluded from the estimate of postdeposition retention when concentrations are analyzed on the basis of the amount in vegetation per unit ground area.

The results indicate no significant differences ($p > 0.05$) between the postdeposition retention by vegetation of ^{131}I, ^{7}Be, and the insoluble microspheres. Environmental half-times (including the effect of growth dilution) were derived from a simple exponential regression of the radioactive decay-corrected vegetation concentrations with time. These values ranged from 7.3 to 15.4 days and showed more variability among plots than within plots (Figs. 3.17 and 3.18 and Table 3.4). Environmental half-times that excluded the effects of growth dilution ranged from 7.5 to 17.6 days (Table 3.4). Thus, growth dilution appeared to be of minor importance. Although plots 18 and 28 were clipped to produce a low biomass density prior to the application of simulated rain, only plot 18 showed a noticeable effect due to growth dilution.

These results indicate that once insoluble and soluble radionuclides are deposited by rain on the surfaces of vegetation, the reduction of concentrations on vegetation are subject to the effect of similar processes. Attempts to correlate the removal of deposited materials with subsequent uncontaminated natural rain events have been unsuccessful. The results obtained from this experiment are not appreciably different from numerous past attempts to quantify the postdeposition retention of a variety of radionuclides deposited on vegetation through both wet and dry processes.

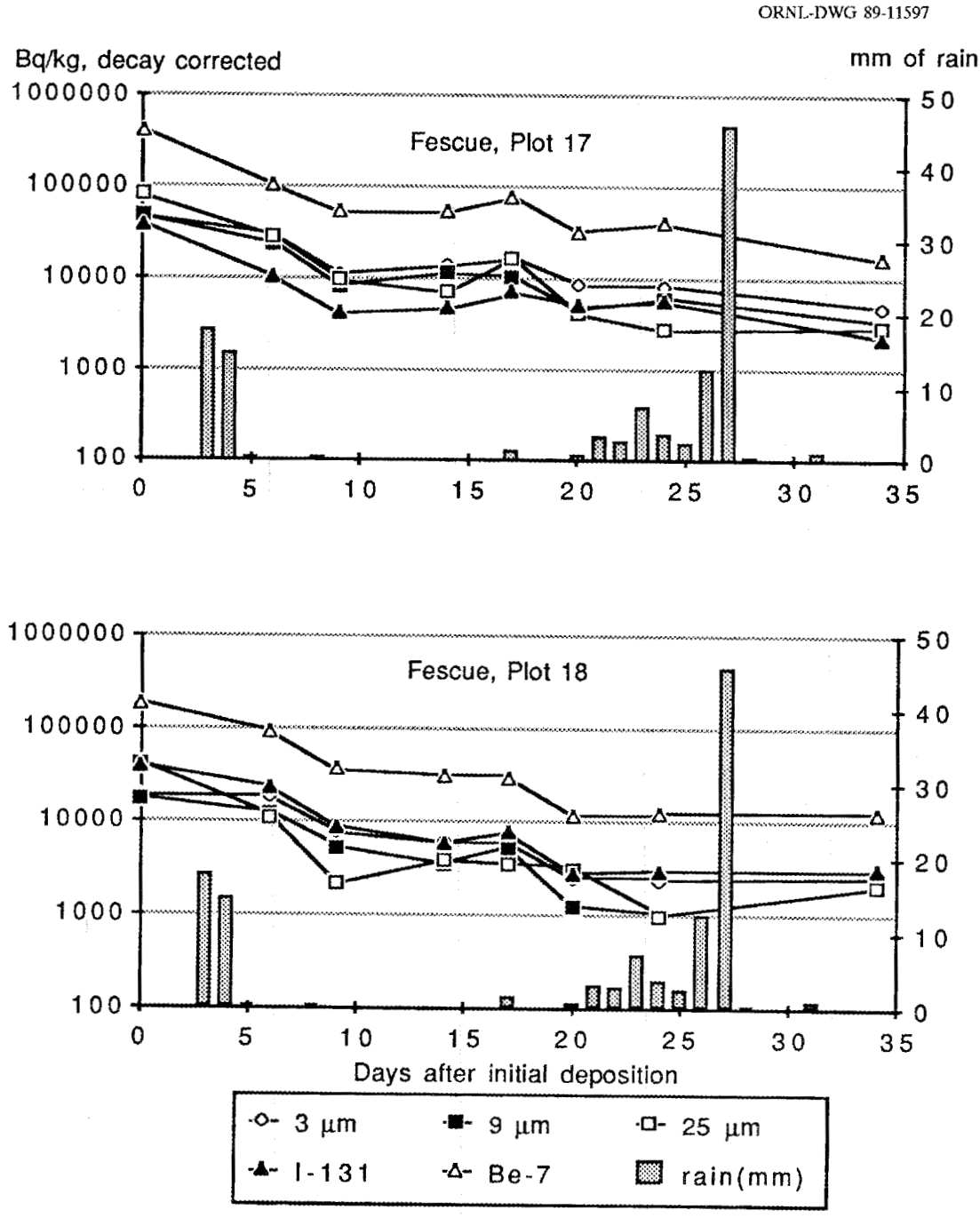

Fig. 3.17. Postdeposition retention for fescue plots 17 and 18.

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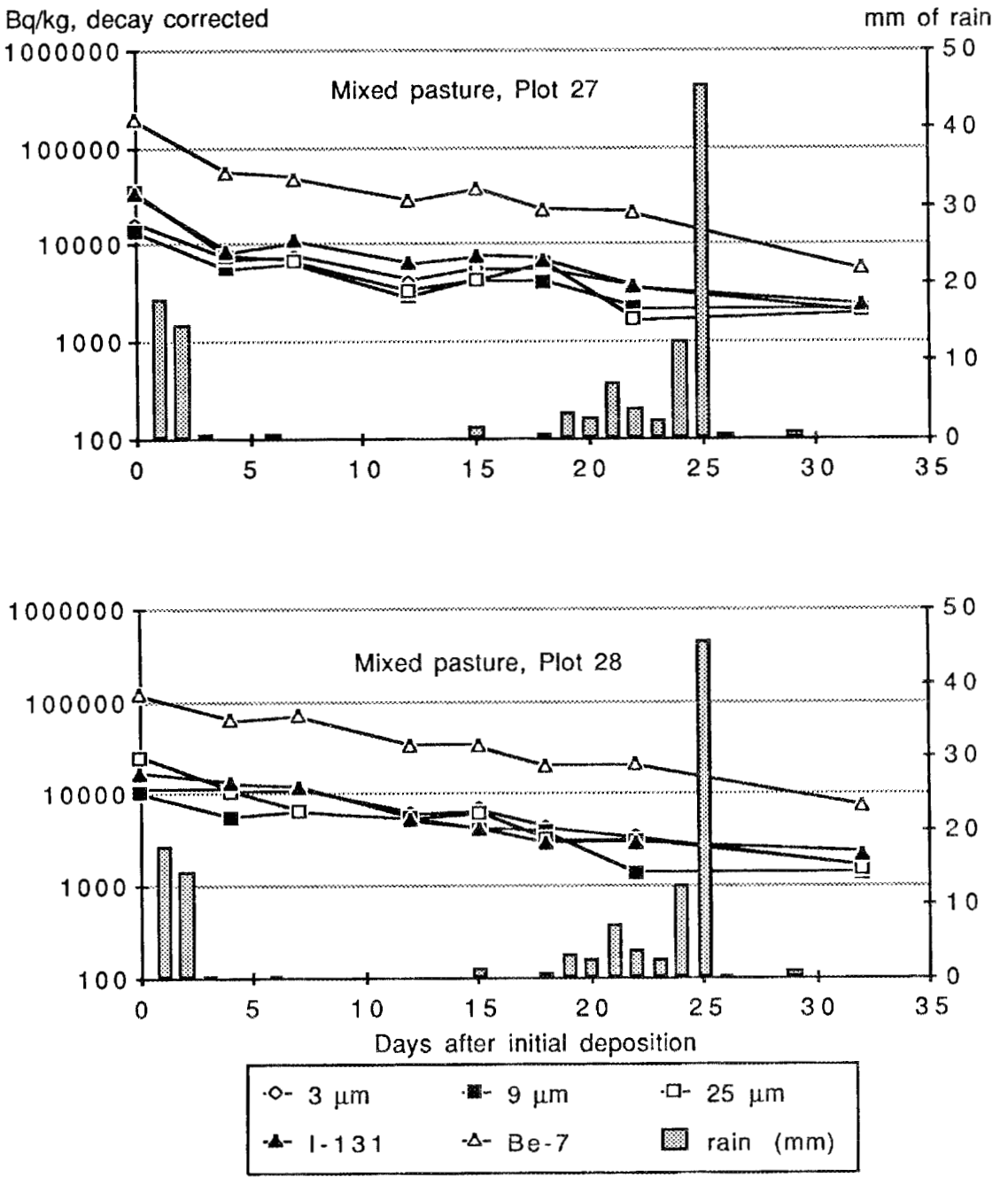

Fig. 3.18. Postdeposition retention for mixed vegetation plots 27 and 28.

Table 3.4. Environmental half-times for the postdeposition retention of radioactive substances deposited on vegetation.

Vegetation type	Plot No.	Substance	Environmental Half-time With Growth Dilution[a] (days)	R^2	Environmental Half-time Without Growth Dilution[b] (days)	R^2
Fescue	17	25-μm	7.3	0.77	7.5	0.77
Fescue	17	3-μm	11.3	0.83	11.8	0.83
Fescue	17	9-μm	9.4	0.82	9.8	0.88
Fescue	17	^{131}I	11.2	0.65	11.8	0.77
Fescue	17	^{7}Be	8.9	0.79	9.2	0.90
Fescue	18	25-μm	8.3	0.59	13.9	0.39
Fescue	18	3-μm	9.7	0.82	15.6	0.64
Fescue	18	9-μm	8.7	0.71	13.5	0.54
Fescue	18	^{131}I	8.5	0.80	12.6	0.70
Fescue	18	^{7}Be	8.2	0.82	11.9	0.77
Mixed	27	25-μm	9.7	0.64	10.7	0.54
Mixed	27	3-μm	14.3	0.80	16.1	0.60
Mixed	27	9-μm	15.1	0.67	17.2	0.44
Mixed	27	^{131}I	15.4	0.53	17.6	0.31
Mixed	27	^{7}Be	7.9	0.89	8.4	0.85
Mixed	28	25-μm	9.0	0.90	8.9	0.83
Mixed	28	3-μm	10.8	0.95	10.8	0.91
Mixed	28	9-μm	10.9	0.87	10.9	0.73
Mixed	28	^{131}I	9.8	0.90	9.8	0.90
Mixed	28	^{7}Be	8.5	0.97	8.5	0.92

[a]Environmental half-time = $\ln 2/\lambda$, where λ is determined from the slope of the exponential regression of decay-corrected concentrations with time.

[b]Environmental half-times without growth dilution are based on analysis of concentrations per unit ground area rather than concentration per unit mass.

3.5 NATURAL DEPOSITION OF ^7Be

The comparison of the initial interception and retention by fescue of ^7Be deposited in simulated rain with values obtained from exposing greenhouse-grown fescue to cosmogenic ^7Be in natural rain events is illustrated in Fig. 3.19. This comparison shows that the values of the mass interception factor (r/Y) are in reasonable agreement. The closest agreement to the interception of naturally deposited ^7Be was with the data obtained using Simulator 1, which produced rain intensities ranging from 1.4 to 3.2 cm/h. Somewhat lower interception values than those occurring from natural deposition were obtained with Simulator 2, which produced rain intensities from 5.7 to 12.2 cm/h.

For natural rain events, ^7Be was monitored in air as well as in rain. The vegetation-to-air concentration ratio ($CR_{veg/air}$) varied between approximately 9,000 and 80,000 $m^3/kg_{dry\ wt}$ and increased with increasing amounts of rain (Fig. 3.20). The rain-to-air concentration ratio ($CR_{rain/air}$) decreased logarithmically with increasing rain (Fig. 3.21) according to a power function of -0.513 per millimeter of rain. This relationship indicates the effect of enhanced precipitation scavenging of ^7Be in the cloud forming layer of the troposphere with respect to ^7Be in air at ground level.

As compared with greenhouse-grown fescue that was exposed only to single natural rain events, plots of uncut, unprotected lawn grass exposed continuously to the wet and dry deposition of cosmogenic ^7Be exhibited higher values of the concentration ratio between vegetation and rain $CR_{veg/rain}$ (in liters per kilogram of dry weight) with no obvious trends occurring with increasing rain amounts (Fig. 3.22).

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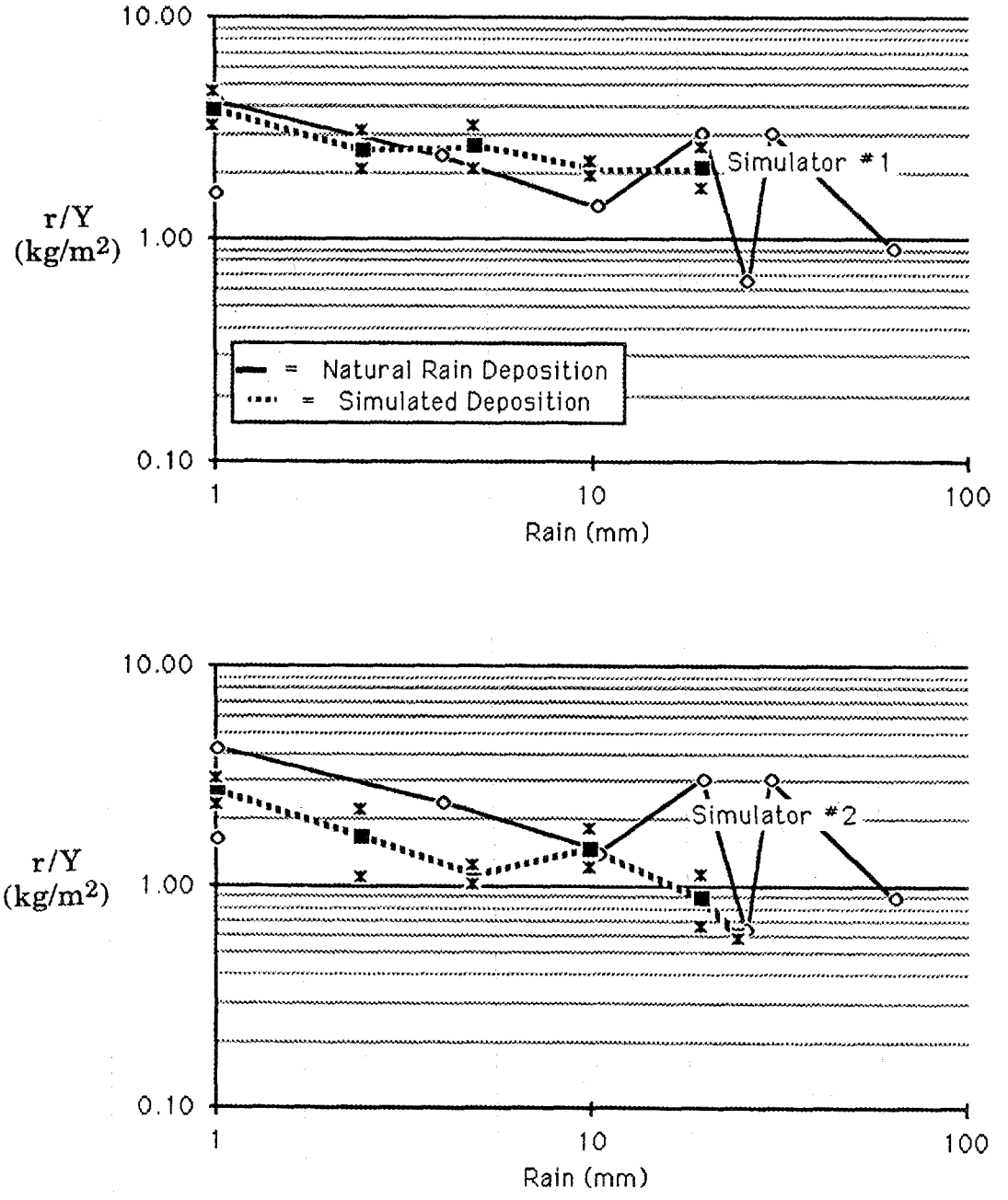

Fig. 3.19. A comparison of r/Y for fescue receiving ^{7}Be in simulated rain (means and standard errors) with fescue receiving cosmogenic ^{7}Be in natural rain.

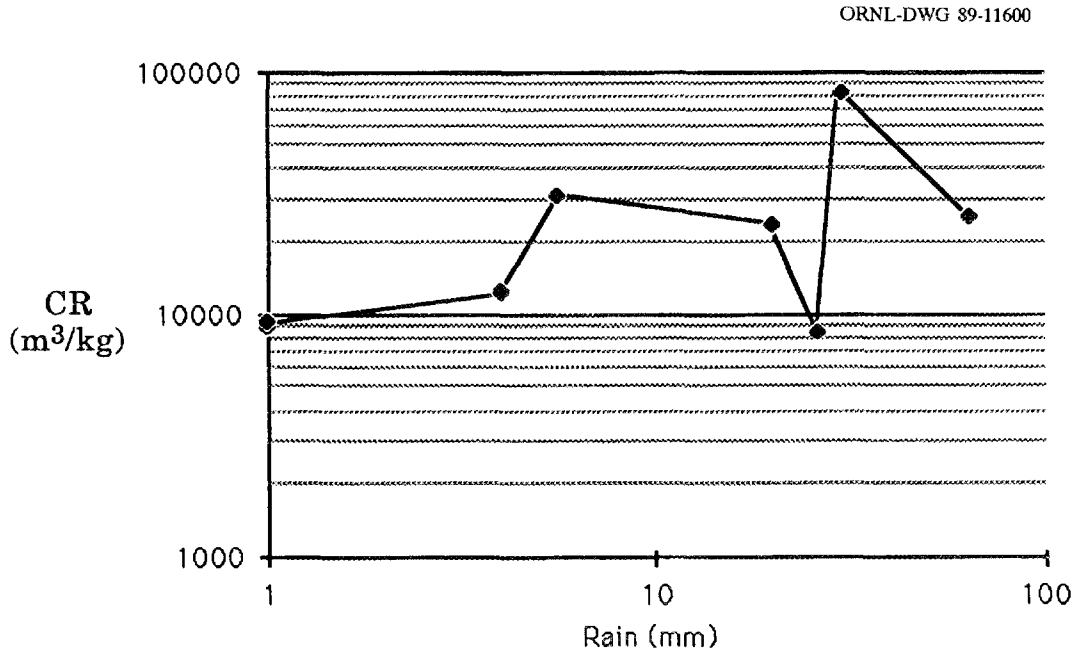

Fig. 3.20. The vegetation-to-air concentration ratio ($CR_{veg/air}$) for fescue receiving cosmogenic ^7Be in natural rain.

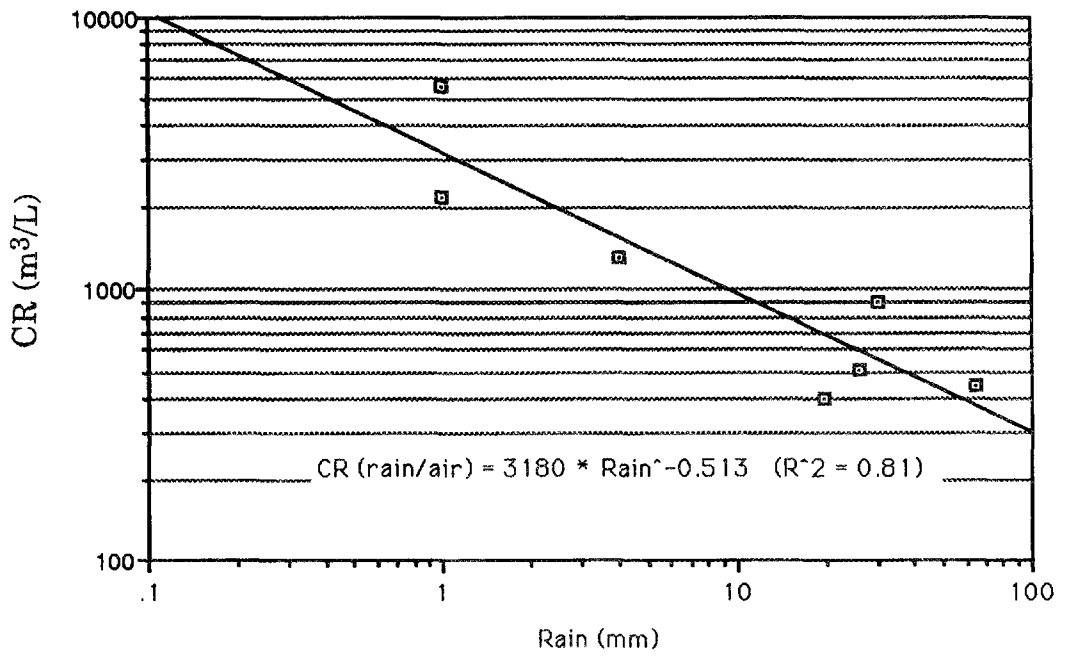

Fig. 3.21. The rain-to-air concentration ratio ($CR_{rain/air}$) for cosmogenic ^7Be.

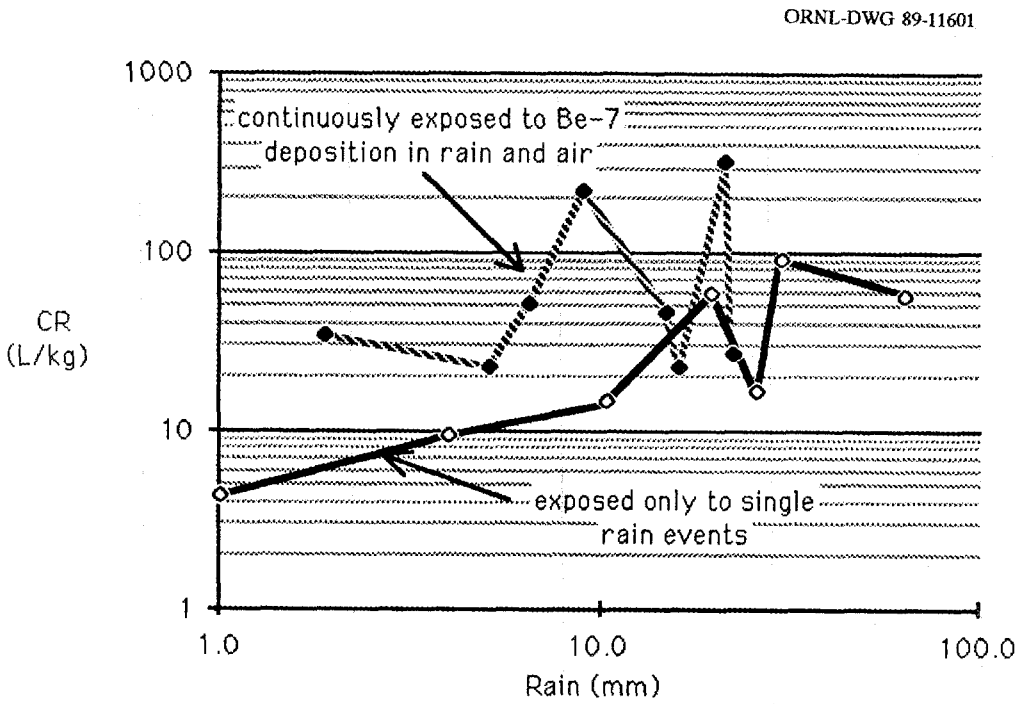

Fig. 3.22. A comparison of $CR_{veg/rain}$ (L/kg) for unprotected lawn plots exposed continuously to wet and dry deposition of cosmogenic ^{7}Be with greenhouse-protected fescue exposed to individual rain events.

4. DISCUSSION

4.1 INTERCEPTION AND INITIAL RETENTION OF ^{131}I BY PASTURE VEGETATION

The results from this study indicate that soluble ^{131}I is transferred less readily from rain to vegetation than either a reactive cation such as $^{7}Be^{2+}$ or insoluble particles. During a continuous application of rain, ^{131}I appears to be lost from the plant with the runoff of water, regardless of the intensity of rain application. Thus, the interception and initial retention by vegetation of ^{131}I deposited in a single rain event are inversely related to the amount of rain applied.

For the other materials, there appears to be a strong attraction from the rain droplet to plant surfaces. Rapid settling out of the rain droplet and adsorption on the plant surface appears to be the processes controlling interception and initial retention of the microspheres, while chemical adsorption on the plant surface appears to be the process of importance for ^{7}Be. The distinction between these processes is indicated by the relative similarity in the efficiency with which the particles were intercepted and retained by vegetation and gummed paper as opposed to substantially different results for ^{7}Be.

In literature reviews conducted by Anspaugh (1987) and Voillequé (1986), values of the initial interception and retention of ^{131}I by pasture vegetation have been reported that are substantially larger than values obtained in this study for soluble ^{131}I. Their reported values are similar, however, to the results for the insoluble microspheres and ^{7}Be. For example, Voillequé reported a median value of 0.35 for the interception fraction (r) for ^{131}I with a geometric standard deviation of 2.9. The median value of the mass interception factor (r/Y) was 1.8 m^2/kg with a geometric standard deviation of 2.3. No appreciable difference was reported by Voillequé for the vegetation interception of ^{131}I and other radionuclides in fallout.

In this study, the geometric means of r for the microspheres and ^{7}Be ranged from 0.15 to 0.37 with geometric standard deviations ranging from 1.46 to 2.04, depending on the substance and intensity of application. The geometric

means of r/Y for these substances ranged from 0.99 to 2.40 m^2/kg with geometric standard deviations ranging from 1.47 to 1.81. By contrast, the geometric mean of r for ^{131}I applied continuously in a single application of simulated rain was 0.064 (n = 88) with a geometric standard deviation of 2.63. The geometric mean for r/Y for ^{131}I was 0.45 m^2/kg with a geometric standard deviation of 2.71.

The large values of the geometric standard deviations of r and r/Y for ^{131}I are due to the strong negative relationship that these quantities have with the amount of rain. For ^{131}I, the geometric standard deviation for r/Y is larger than that for r because it is more directly affected by the amount of rain applied and less affected by the amount of standing biomass of vegetation (compare Fig. 3.1 with Fig. 3.6 in Section 3.1). Because of the inverse dependency of r and r/Y with rain amount, a relatively constant relationship was observed for the ^{131}I vegetation-to-rain concentration ratio ($CR_{veg/rain}$) (Fig. 4.1).

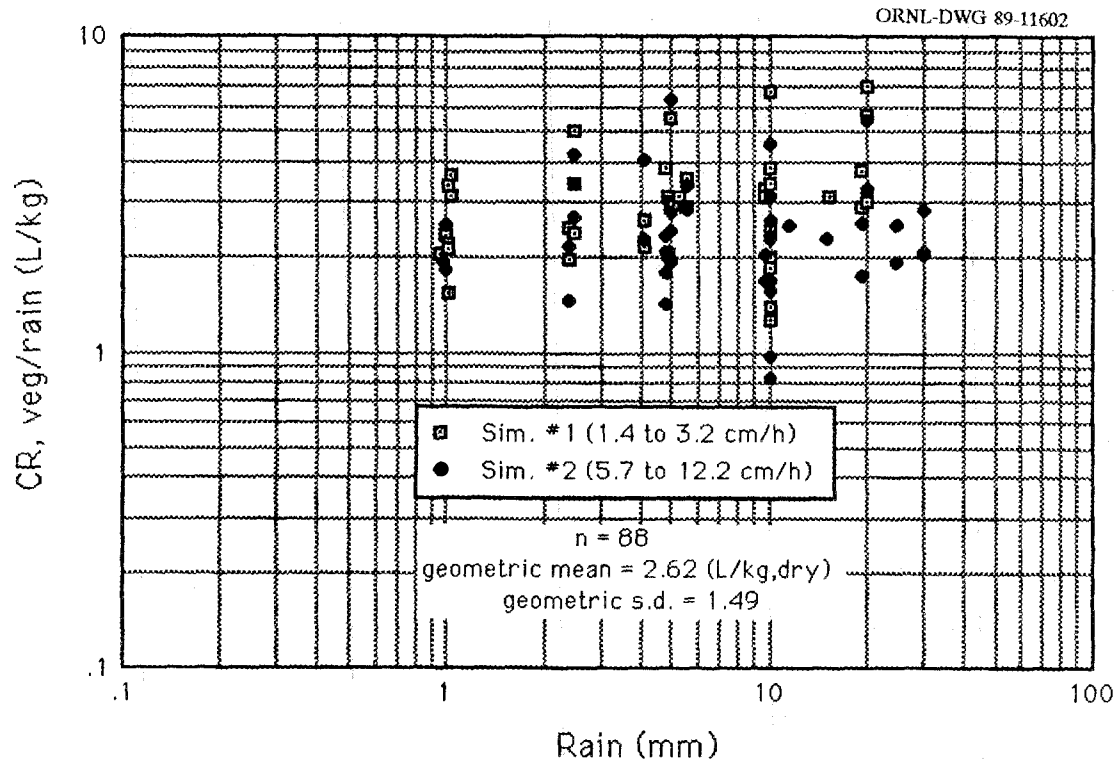

Fig. 4.1. Individual values of $CR_{veg/rain}$ for ^{131}I as a function of the amount and intensity of simulated rain.

When plotted against the amount of simulated rain, the values of r/Y for soluble ^{131}I were also substantially less than predicted by the model of Horton as modified by Voillequé (1986). The Horton model is based on the initial interception and retention of water by vegetation as a function of the rainfall storage capacity per unit biomass density of vegetation (S), the amount of rain deposited per storm (P_s), and the in-storm evaporation fraction per unit biomass density (E). Voillequé modified this model to fit literature values of the mass interception factor. The modified model used by Voillequé is

$$r/Y = (S/P_s) + E$$

where S and E are, respectively, 16 mm m^2/kg and 1.3 m^2/kg, and P_s is the millimeters of rain applied in a given storm event.

When the data for the intermittent simulated rain experiments were combined with those of continuous simulated rain applications, the relative trends for ^{131}I were consistent with the trends in the predictions of the modified Horton model. The predicted values were, however, almost one order of magnitude higher than the observed values (Fig. 4.2). The observed values of r/Y for ^{131}I decreased as an inverse function of rain amount to about 15 to 20 mm of rain. Beyond this amount, they were nearly constant. This is an indication that the results of the intermittent simulated rain experiment may be influenced by the evaporation of water droplets on the surface of vegetation that occurred both during a given simulated rain application as well as between applications.

A comparison of the values of r/Y for the microspheres and ^{7}Be with the modified Horton model shows less of a dependency with increasing rain amount at low volumes of rain (Fig. 4.3). At moderate intensities when rain exceeded 10 mm, the model approximated the values for all of these substances to within a factor of about 2. At high intensities, close agreement was evident for only the 25-μm microspheres and ^{7}Be. At high intensities of rain application, all other particles exhibited values that were less than the model predictions.

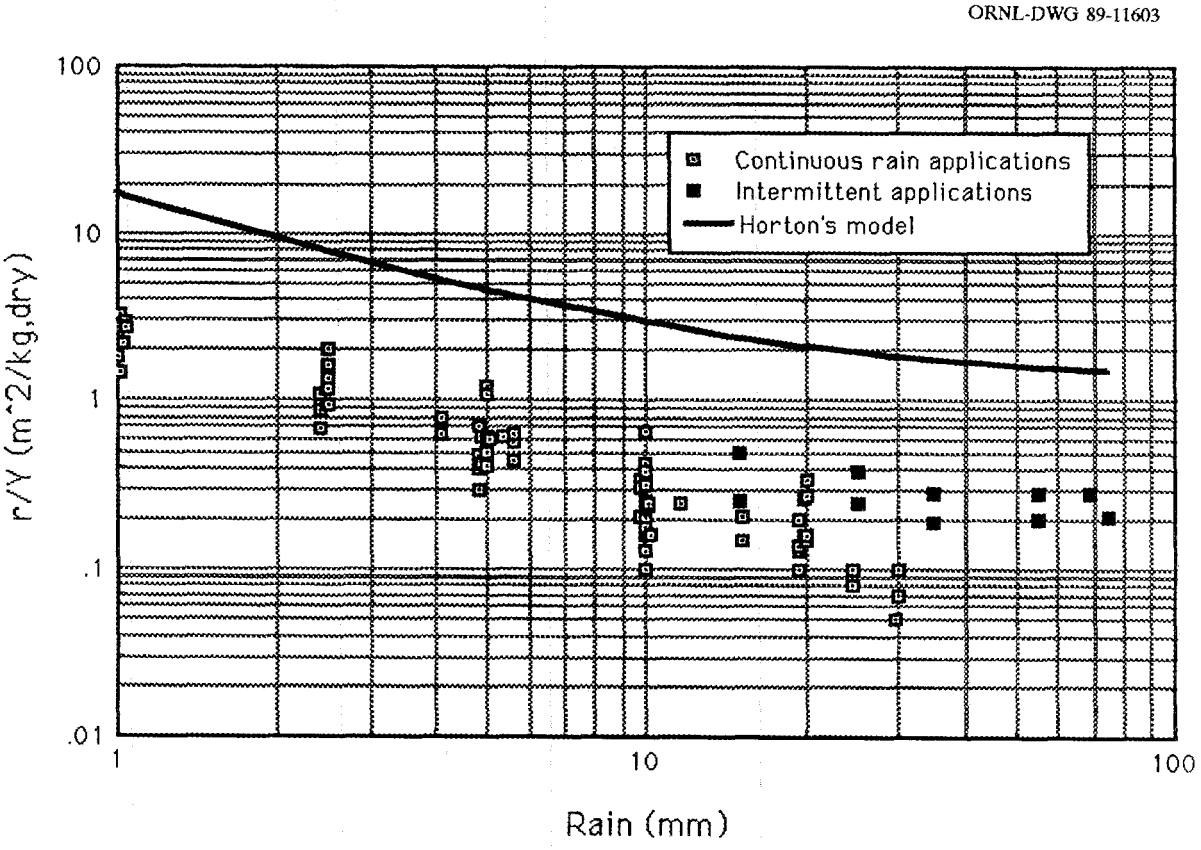

Fig. 4.2. A comparison of the predictions of the mass interception factor r/Y (m^2/kg_{dry}) from Horton's modified model (Voillequé 1986) with the experimental values for ^{131}I on fescue from continuous and intermittent applications of simulated rain.

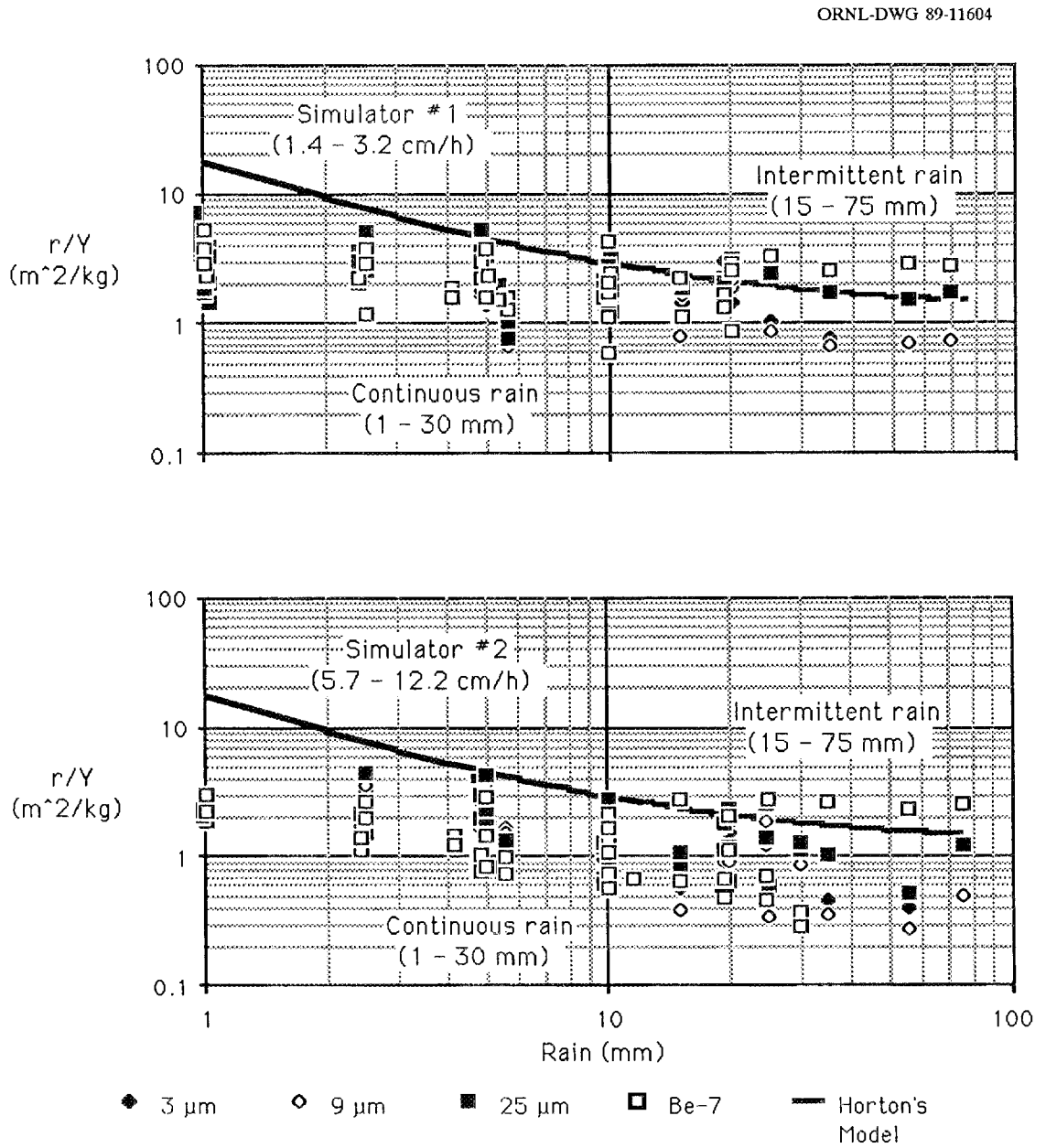

Fig. 4.3. A comparison of the predictions of r/Y from Horton's modified model (Voillequé 1986) with the experimental values for ^{7}Be and the microspheres for Simulators 1 and 2.

The higher values reported in the literature for interception and initial retention of weapons fallout ^{131}I by vegetation may possibly be due to the amount of ^{131}I in rain associated with insoluble particulate matter or to a significant amount of dry deposition occurring simultaneously with wet deposition. The relationship between dry and wet deposition should be affected by the amount of gaseous ^{131}I present as elemental iodine vapor. Dry deposition will be of increased importance with increasing amounts of elemental ^{131}I because of the high deposition velocities associated with this chemical form (Hoffman 1977). High values of initial interception and retention reported for wet-deposited ^{131}I may also be the result of a preponderance of experiments that used low amounts of rain (<2 mm).

4.2 POSTDEPOSITION RETENTION BY PASTURE VEGETATION

The results obtained from this study on the postdeposition retention of wet-deposited ^{131}I by pasture vegetation are not substantially different from observations made in the past for ^{131}I deposited through either wet or dry processes. Literature values of environmental half-times (based on exponential regression of decay-corrected concentrations per unit mass) for I_2 vapor deposited on growing herbaceous vegetation have a geometric mean of 6.8 days and a geometric standard deviation of 1.3 (Miller and Hoffman 1983). Particulate forms of iodine have an environmental half-time with a geometric mean of 8.2 days and a geometric standard deviation of 1.8. Other types of particulate substances were associated with a geometric mean of 12 days and a geometric standard deviation of 1.5. These values are also simular to the 12-day half-time for Pu-bearing particles on corn leaves reported by Pinder (1985), although Pinder's value has been corrected for the effects of growth dilution. The environmental half-times obtained from this study (without growth dilution) varied from 7.2 to 15.4 days for all substances monitored in four individual plots of vegetation. Correcting for growth dilution produced a range from 7.5 to 17.6 days.

The environmental half-times obtained in this study for ^{7}Be were relatively constant, ranging from 7.9 to 8.9 days. Although these values are comparable to those obtained for the other substances, they are appreciably less than the values of 36.5 and 38.5 days reported by Mahoney (1984) for ^{7}Be applied to vegetation growing in the same approximate location as the field site used in this study. The first of the values reported by Mahoney was observed during the winter when there was little growth of vegetation.

There is no apparent difference in the postdeposition retention of iodine versus that for the insoluble particles or ^{7}Be. Surprisingly, growth dilution and wash-off by rain were not identified as major factors contributing to the reduction of concentrations with time. Once a deposit has dried, the deposited material is not readily desorbed by subsequent rain, regardless of whether this material was initially deposited in a soluble or insoluble form.

The difficulty in correlating the removal of initially deposited materials from vegetation by precipitation has been reported by others (Markee 1971, Heinemann and Vogt 1979, and Millard et al. 1978). In one study, no wash-off was observed even after 209 mm of uncontaminated water was applied to vegetation 4.5 hours after initial deposition of ^{131}I (Douglas et al. 1971). It was also reported that only 50% of the initial deposit of Chernobyl fallout ^{131}I was removed from vegetation by aggressive washing during the first week after deposition. Subsequent washings conducted the following week produced a negligible removal of activity (Schwibach 1986).

If wash-off and growth dilution are not responsible for the reduction of an initial deposit with time, one can only speculate as to what are the important controlling processes. Other removal mechanisms may be surface abrasion and leaf bending from wind action, leading to tissue senescence of growing vegetation. With the information available at this time, one can only allude to the need for further studies to determine the dominant processes governing postdeposition retention.

4.3 INITIAL INTERCEPTION AND RETENTION BY GUMMED PAPER

In the reconstruction of the exposure of the public to deposition of ^{131}I resulting from atmospheric weapons testing at the Nevada Test Site in the 1950s, the primary source of information on the location and amount of ^{131}I deposition will be determined by data derived from the analysis of gummed film paper. It was therefore of interest to determine the collection efficiency of gummed paper to the wet deposition of soluble ^{131}I, ^{7}Be, and the three size classes of particles. We observed that ^{7}Be and ^{131}I behaved in a similar manner on gummed paper. The collection efficiency for these substances decreased markedly with increasing rain, with a negligible effect produced by rain intensity. The microspheres, on the other hand, behaved differently. With the exception of the 3-μm size class, the microspheres were not appreciably affected by differences in the amount of rain.

During the 1950s the standing water on the gummed paper was discarded prior to analysis. Such a practice resulted in an underestimate of the amount of material actually deposited. This underestimate is of greater significance in determining the deposition of soluble ^{7}Be and ^{131}I than for the larger-sized particles. The practice of discarding the standing water may be less important than indicated by our experiments if substantial evaporation occurred prior to collection of the gummed paper.

The close relationship between ^{7}Be and ^{131}I on gummed paper is contrary to our observations for vegetation but consistent with observations made by Beck et al. (1986), who monitored wet deposits of cosmogenic ^{7}Be and Chernobyl fallout ^{131}I on the same type of paper. Voillequé (1986) suspected that this observed similarity in the behavior of ^{131}I and ^{7}Be on gummed paper was simply due to rapid saturation and runoff; however, this process should be equally as valid for wet deposition on vegetation. The difference in the behavior of ^{7}Be on gummed paper and vegetation is probably the result of the presence of sites on the plant surface available for cation exchange.

We had also assumed that an increase in pH of rain could occur when rain droplets came into contact with the surface of a leaf. Given that simulated rain was applied at pH 5.4 to 5.6, a slight increase in pH could cause soluble

^{7}Be to precipitate. This assumption could not be confirmed, as exposing simulated rain composed of either process water or distilled water to strips of gummed paper and blades of fescue showed no substantial shift in pH from either material.

4.4 ^{7}Be AS A TRACER

Cosmogenic ^{7}Be has the potential for use as a tracer of atmospheric processes. It resides on ambient aerosols and is scavenged by rain in much the same manner as rain scavenges other material associated with submicron particles in the cloud-forming layer of the lower troposphere. In humid climates, the transfer of ^{7}Be from the atmosphere to vegetation is dominated by wet deposition (Bondietti et al. 1984). The advantage of using cosmogenic ^{7}Be as a tracer is that

1. direct measurements of deposition to vegetation during natural events are possible;

2. the processes of deposition and the rates of removal are natural and not biased by experimental design; and

3. measurements can be made under a variety of conditions, at any time, and to complex canopies.

The disadvantage is that ^{7}Be is chemically different from soluble or insoluble forms of ^{131}I.

Mahoney (1984) reported that the initial interception and retention of $^{7}Be^{2+}$ in rain by pasture vegetation may be substantially different than that for $^{131}I^{-}$. In the laboratory, Mahoney found that the adsorption by fescue leaves of ^{7}Be in solution was similar to that for ^{137}Cs, but was one to two orders of magnitude greater than for $^{131}I^{-}$. Voillequé (1986) in his review of these findings concluded that the use of ^{7}Be as an analog for $^{131}I^{-}$ in fresh fallout would be questionable.

Results of the present study confirmed that the initial interception and retention of $^{131}I^{-}$, $^{131}IO_3^{-}$, and $^{131}IO_4^{-}$ by pasture vegetation were much less than for $^{7}Be^{2+}$. However, moderate to strong correlations were obtained when

comparing values of initial interception and retention for ^{131}I and the insoluble microspheres with those for ^{7}Be (see Sect. 3.3). The strong correlation between ^{7}Be and ^{131}I was due to the common influence of vegetation biomass and rain on the interception and initial retention of these substances.

When simulated rain was applied intermittently, the values of r/Y for ^{7}Be were in nearly a constant relationship with ^{131}I and the microspheres, with the values for ^{7}Be being about one order of magnitude higher than those for ^{131}I. In addition, postdeposition retention of ^{7}Be and ^{131}I on vegetation was practically indistinguishable for both substances. In the laboratory, Mahoney (1984) found that desorption of ^{7}Be, ^{131}I, and ^{137}Cs from fescue leaves was comparable after immersion in rainwater (pH 4.5), with the fraction removed from the plant ranging from 48 to 66% after a time period of 1 to 2 h. Despite obvious differences in the interception and initial retention of ^{7}Be and ^{131}I by pasture vegetation, strong correlations between wet-deposited $^{7}Be^{2+}$ and $^{131}I^{-}$ indicate the presence of common processes affecting both substances.

5. CONCLUSIONS

Vegetation interception and initial retention values for soluble forms of ^{131}I in rain are much less than those for insoluble particles and reactive cations such as ^{7}Be. For simulated rain applied continuously from 1 to about 20 mm, the concentration of soluble forms of ^{131}I in and on vegetation is in apparent equilibrium with the concentration in rain, with the rate of desorption from the plant surface balancing the rate of adsorption. Thus, the interception fraction r and the mass interception factor r/Y for ^{131}I are inversely proportional to the amount of rain, and the vegetation-to-rain concentration ratio $CR_{veg/rain}$ is relatively constant at about 2.5 to 3.3 L/kg. The application of intermittent rain, however, produced values of r/Y that were nearly constant (0.35 m^2/kg at moderate intensity and 0.22 m^2/kg at high rainfall intensity). The corresponding $CR_{veg/rain}$ resulting from intermittent rain applications would therefore increase in proportion to the amount of simulated rain applied. The effect observed with intermittent rain probably reflects the process of cumulative evaporation of water on the plant surface during and between rain events.

Once wet deposits have dried, the deposited materials are readily retained by vegetation. These deposits are not efficiently desorbed by subsequent rain. The rates of postdeposition loss are similar for soluble ^{131}I and ^{7}Be and the different size classes of insoluble microspheres. Environmental half-times, which ranged from approximately 7 to 17 days, are comparable to an extensive number of reported values for a large variety of different materials initially deposited through either wet or dry processes. The predominant mechanisms of weathering loss of deposited materials remain to be identified.

Biomass density is more important than vegetation type in affecting interception and initial retention for either soluble or insoluble forms of deposited substances. Values of r increased markedly, while values of r/Y tended to decrease slightly with increasing biomass. When normalized for biomass, differences in vegetation type, although statistically significant, were never a major controlling variable for any of the substances considered in this study. For pasture vegetation sampled above the height of 5 cm,

biomass is most likely an indicator of leaf area and canopy cover, which are factors directly influencing the measurement of interception.

No substantial differences are expected for different chemical forms of dissolved ^{131}I. Furthermore, rapid translocation of wet-deposited ^{131}I and ^{7}Be from the soil via the roots should not be important in determining the concentration in the edible portions of pasture vegetation immediately following a deposition event.

The values of vegetation interception and initial retention of ^{7}Be may have potential for quantifying the rain-to-vegetation transfer of insoluble particles and soluble ^{131}I despite differences in the chemical and physical forms of these substances. Regression analyses showed moderate to strong correlations between these substances and ^{7}Be. Observations for the insoluble particles and ^{131}I were generally well within a factor of 2.0 of the line of regression. The direct use of ^{7}Be measurements directly to quantify the rain-to-vegetation transfer of the other materials, however, would likely approximate the transfer of insoluble particles but would substantially overestimate the transfer of soluble ^{131}I at high amounts of either continuous or intermittent rain.

The results of our experiments should improve the usefulness of gummed paper as a data source for reconstructing the total deposition of ^{131}I from detonations that occurred at the Nevada Test Site. Collection efficiencies for gummed paper are lowest for soluble ^{131}I and ^{7}Be and decrease with increasing amounts of rain. The highest collection efficiencies occur for the insoluble particles, with the highest values being for the largest particle size (25 μm).

The 1950's practice of discarding standing water from gummed paper may have resulted in an underestimate of the total deposition for ^{7}Be and ^{131}I. If this practice occurred soon after fresh deposition of fallout ^{131}I in rain, the results of our experiments indicate that the deposition estimates for the soluble forms of ^{131}I should be corrected. The bias introduced by discarding standing water from the gummed paper is also a problem for the smaller size classes of insoluble microspheres; however, this bias is negligible for the largest size class.

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APPENDIX I.

A COMPARISON OF RESULTS OF VEGETATION INTERCEPTION AND INITIAL RETENTION WHEN SIMULATED RAIN WAS COMPOSED OF PROCESSED VERSUS DISTILLED WATER

The applications of simulated rain during the September 1987 series of experiments involved the use of distilled, rather than processed, water and the use of ^{131}I as iodide rather than periodate. A comparison of results for the mass interception factor r/Y for the use of distilled versus processed water for ^{131}I, ^{7}Be, and the three size classes of microspheres is shown in Figs. A.I.1 through A.I.5, respectively.

For ^{131}I, these comparisons show that the inverse relationship of r/Y with increasing amounts of simulated rain produced by distilled and processed water is nearly identical, with the values produced by distilled water being higher by 51% (Fig. A.I.1). These similarities are noteworthy in light of the differences in the chemical form of ^{131}I and the differences in the biomass of vegetation as well as differences in the conditions of temperature and humidity that prevailed during the periods in which processed water and distilled water were used for simulated rain.

For ^{7}Be, the values of r/Y produced with distilled water decreased only slightly with increasing amounts of simulated rain; however, with processed water, the decrease with increasing rain was only somewhat more pronounced (Fig. A.I.2). These results indicate that the use of distilled water only slightly enhances the potential for cation adsorption to the plant surface. The differences in these results, however, are not large enough to draw any definite conclusions.

For the microspheres, the values of r/Y were not noticeably different for distilled and processed water (Figs. A.I.3 through A.I.5). Distilled water produced only a slight increase in the tendency towards a decrease in r/Y with increasing amounts of rain, but the differences are too small to attribute any influence of distilled versus processed water.

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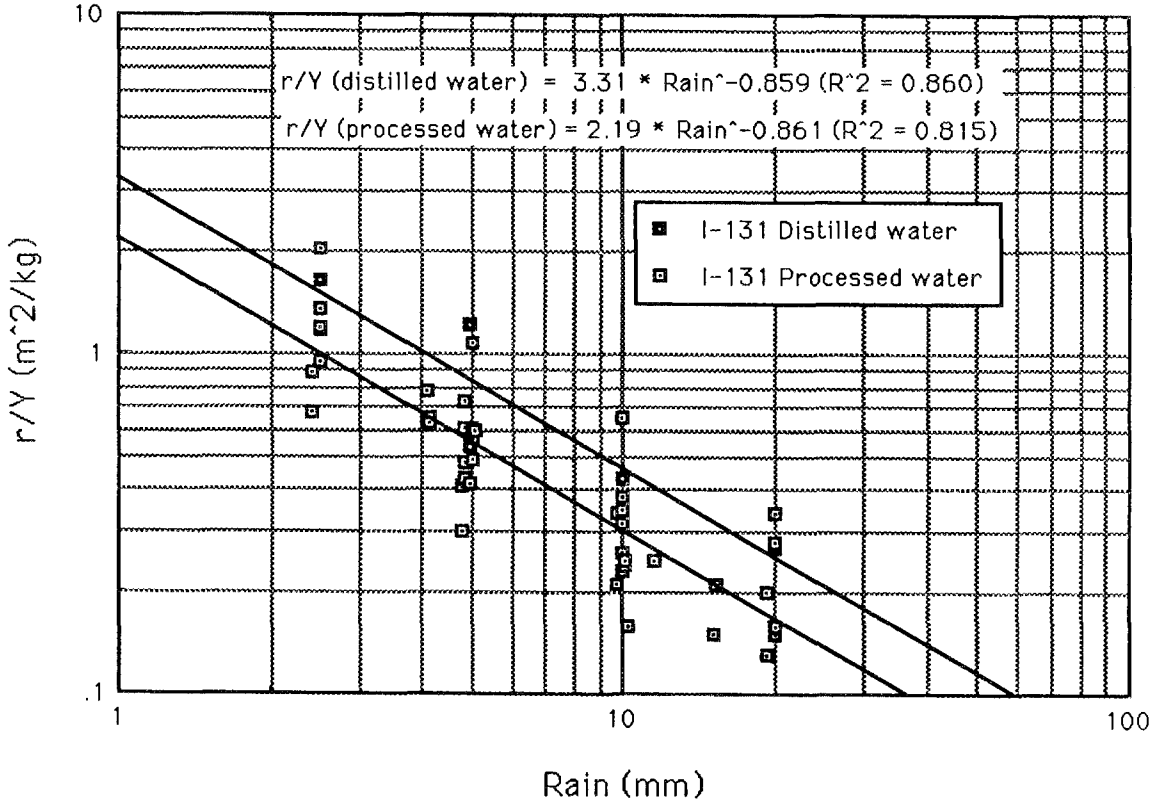

Fig. A.I.1. A comparison between mass interception factors for ^{131}I produced using processed versus distilled water in simulated rain.

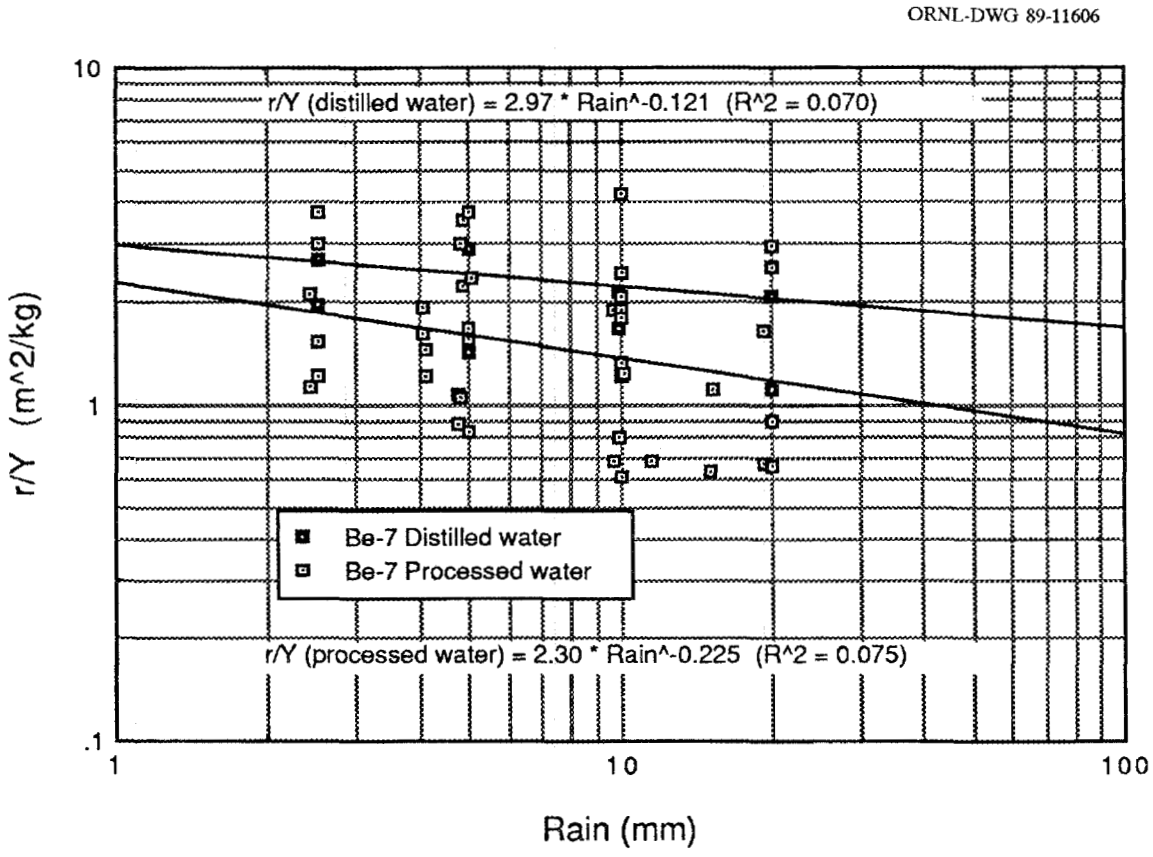

Fig. A.I.2. A comparison between mass interception factors for ^{7}Be produced using processed versus distilled water in simulated rain.

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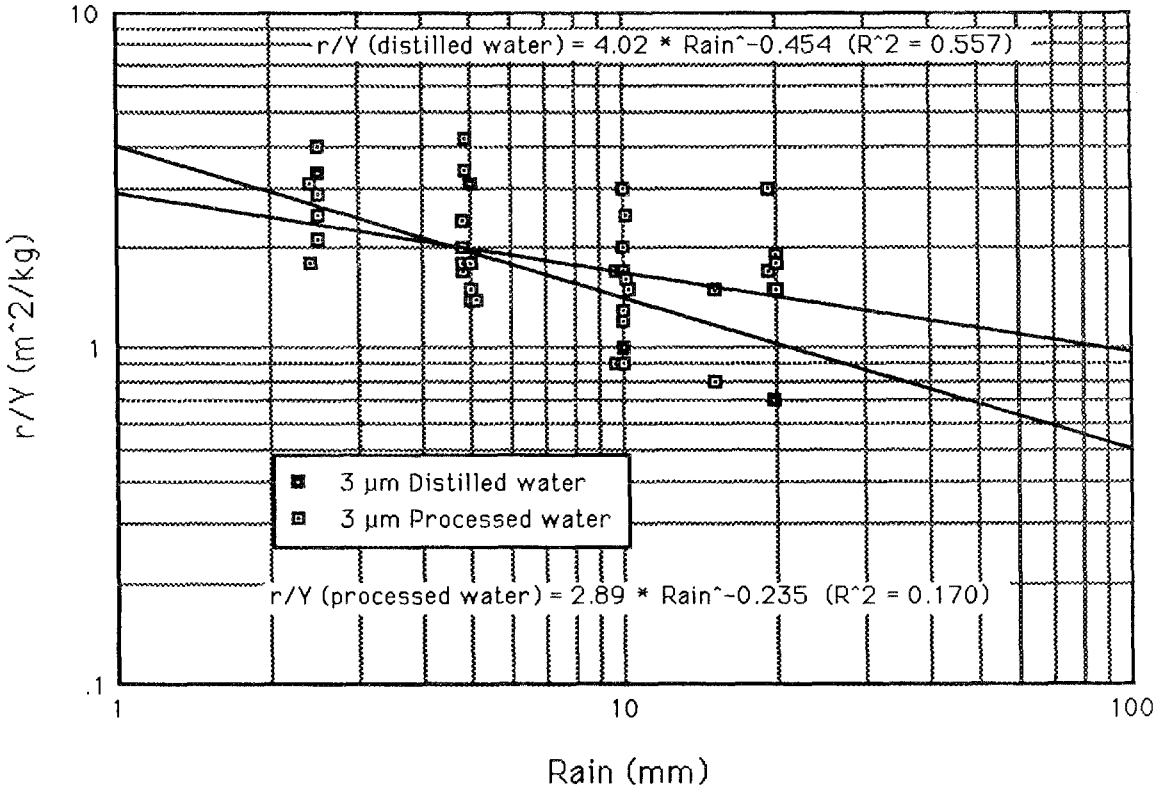

Fig. A.I.3. A comparison between mass interception factors produced using processed versus distilled water for 3-µm microspheres.

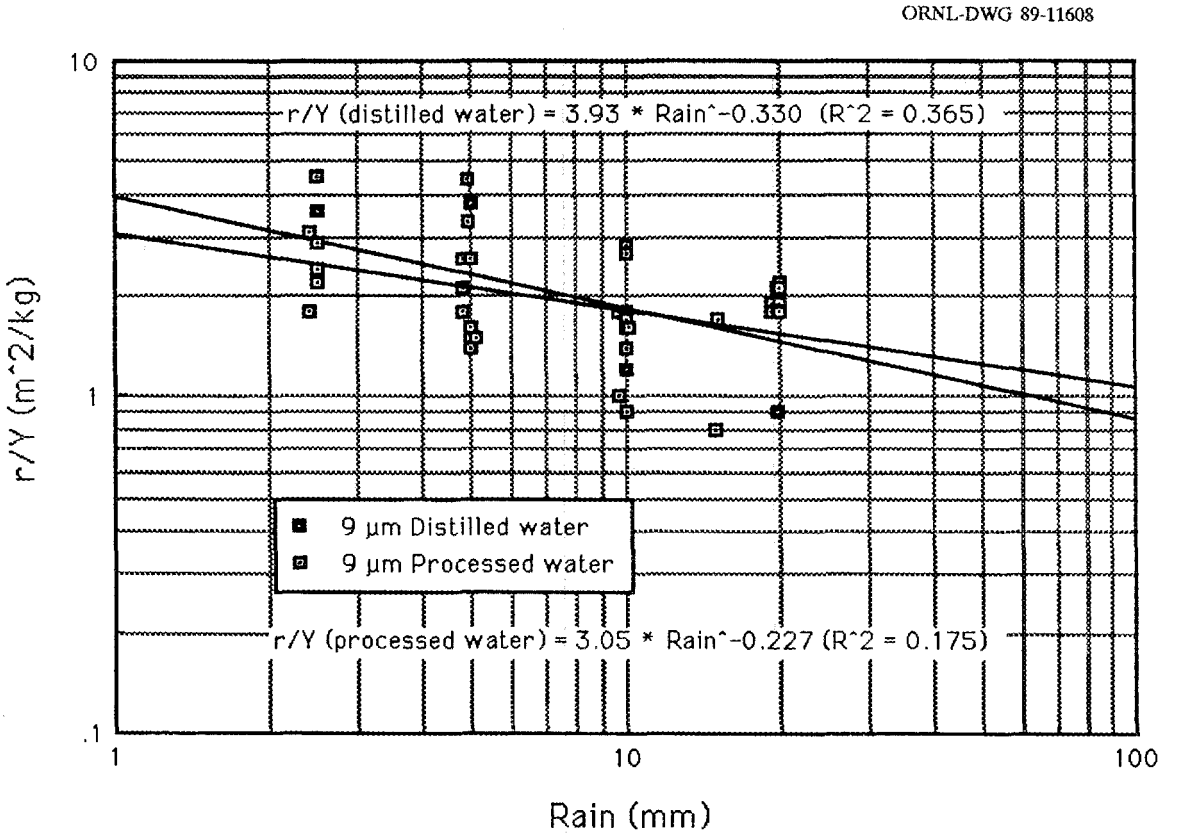

Fig. A.I.4. A comparison between mass interception factors produced using processed versus distilled water for 9-µm microspheres.

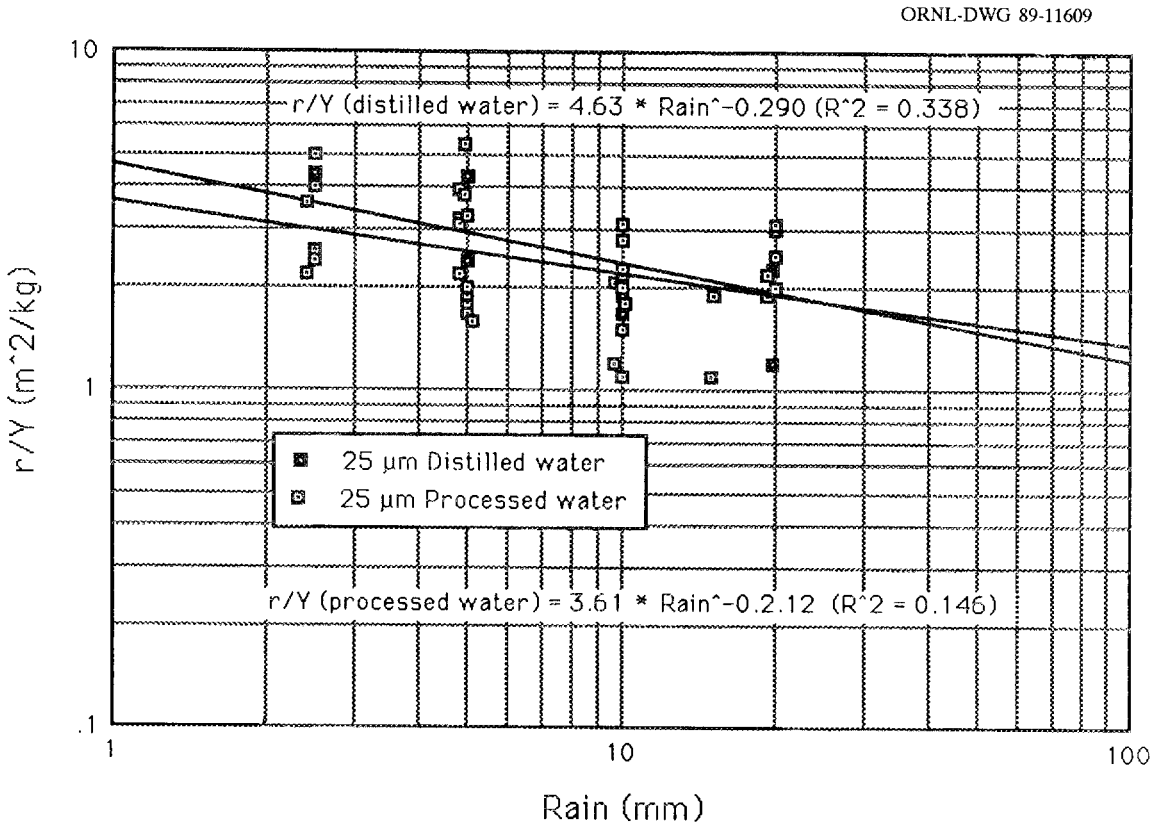

Fig. A.I.5. A comparison between mass interception factors produced using processed versus distilled water for 25-µm microspheres.

APPENDIX II.

THE UPTAKE OF ^{7}Be AND ^{131}I FROM SOIL TO THE EDIBILE TISSUES OF PASTURE VEGETATION

The results of an experiment to determine the potential for ^{131}I and ^{7}Be to be rapidly translocated within 1 h from the soil to the upper portions of the vegetation canopy via root uptake are presented in Table A.II.1. This table lists values of concentration ratios ($CR_{veg/soil}$) and area concentration factors ($AF_{veg/soil}$) for the upper vegetation (taller than 5 cm). The AFs, which are in units of square meters per kilogram, are directly comparable to the mass interception factors r/Y used in this study to quantify interception and initial retention by pasture vegetation. The AF is defined as the amount of radioactivity that is applied per unit ground area that is transferred to a given dry mass of vegetation taller than 5 cm above the soil surface.

In comparison to values reported for r/Y (see Appendix VII), the values for AF are substantially lower for both ^{131}I and ^{7}Be. Thus, neither ^{131}I nor ^{7}Be is transferred from soil to vegetation via root uptake in amounts that would influence the quantitative determination of interception and initial retention of these isotopes in rain.

Table A.II.1. A comparison of vegetation/soil concentration ratios (CR) and area concentration factors (AF) determined 1 h after ^{7}Be and ^{131}I were applied to the soil surface.

	Concentration Ratio CR = (Bq/kg veg)/(Bq/kg soil)		Area Concentration Factor[a] AF = (Bq/kg veg)/(Bq/m^2 soil)	
Sample	^{131}I	^{7}Be	^{131}I	^{7}Be
Clover A	Not Detected	4.21E-02	Not Detected	2.84E-03
Clover B	Not Detected	9.08E-02	Not Detected	4.45E-03
Fescue A	Not Detected	1.96E-01	Not Detected	9.06E-03
Fescue B	Not Detected	6.22E-01	Not Detected	2.38E-02
Fescue C	Not Detected	1.10E-01	Not Detected	5.36E-03

[a] The Area Concentration Factor (AF) is a quantity chosen to be directly comparable to the mass interception factor (r/Y). Both quantities refer to the amount of the radioisotope applied per unit area of ground that is observed per unit mass (dry weight) of plant tissue collected above 5 cm from the soil surface.

APPENDIX III.

COMPARISON OF RESULTS OF THE CONCENTRATION OF ^{131}I AND ^{7}Be ON VEGETATION WHEN USING DIFFERENT CHEMICAL FORMS OF ^{131}I IN DISTILLED WATER

The rain to vegetation transfers of different chemical forms of ^{131}I and for ^{7}Be are presented in Table A.III.1 and Fig. A.III.1 as vegetation-to-rain concentration ratios $CR_{veg/rain}$ (L/kg_{dry}). The chemical forms used for ^{131}I were iodide (I^-), iodate (IO_3^-) and periodate (IO_4^-). These chemical forms, along with a solution of $^{7}Be^{2+}$, were introduced into distilled water adjusted to a pH of 5.4. The amount of simulated rain applied to each of six 0.33-m^2 plots was 14.3 mm.

For the different chemical forms of ^{131}I, the results indicate more variability in $CR_{veg/rain}$ values from one day to the next than occurred among the $CR_{veg/rain}$ values for the different chemical forms within a particular day. No discernable volatilization of any of the chemical forms of ^{131}I was detected. With one exception, the values for ^{7}Be were relatively constant over the course of all applications. We conclude from these results that the different chemical forms of soluble ^{131}I would not result in appreciably different values of pasture vegetation interception and initial retention of soluble ^{131}I in rain.

Table A.III.1. Concentration ratios ($CR_{veg/rain}$) for ^{7}Be and different chemical forms of ^{131}I applied in simulated rain to mixed pasture vegetation.

Replicate No.	Chemical Form	Concentration Ratio (L/kg)		Average CR (L/kg)	
		^{131}I	^{7}Be	^{131}I	^{7}Be
1	Iodide	3.3	17.7	4.8	29.1
2	Iodide	5.8	37.0		
1	Periodate	3.1	57.1	3.4	58.9
2	Periodate	3.8	61.3		
1	Iodate	3.2	67.2	3.6	72.0
2	Iodate	4.0	76.2		
1	Iodate	2.0	65.6	2.0	69.0
2	Iodate	2.0	71.8		
1	Periodate	2.1	60.3	2.1	63.7
2	Periodate	2.0	67.1		
1	Iodide	2.7	61.2	2.7	62.6
2	Iodide	2.6	64.3		

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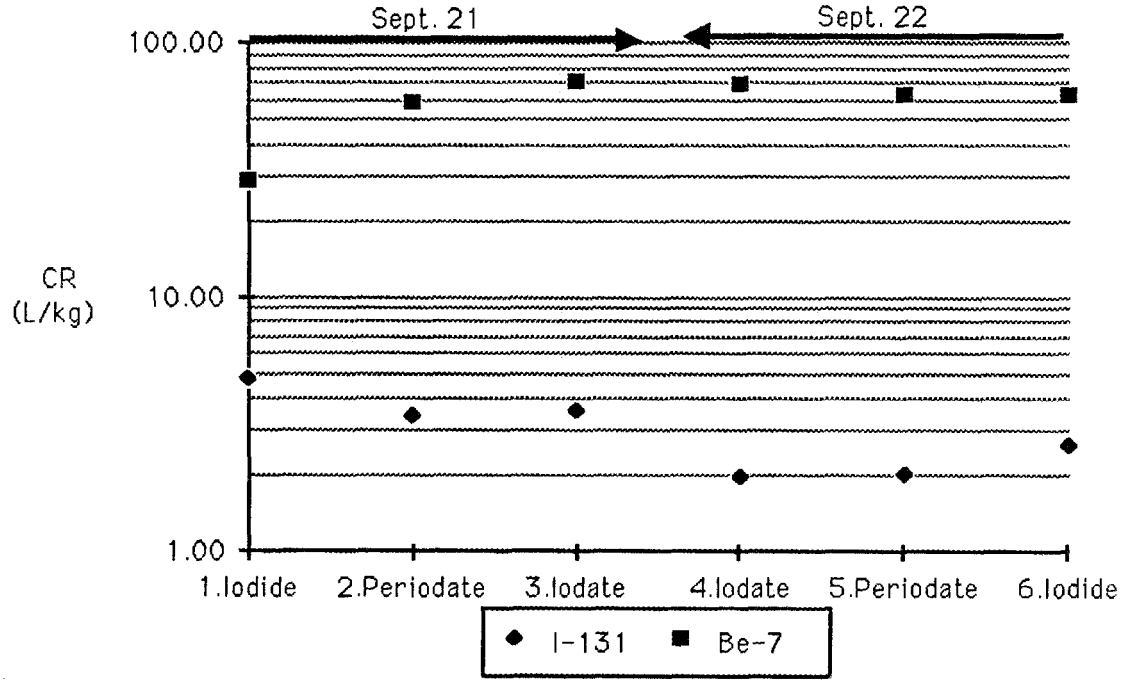

Fig. A.III.1. Concentration ratios ($CR_{veg/rain}$) for ^{7}Be and different chemical forms of ^{131}I applied in simulated rain to mixed pasture vegetation.

APPENDIX IV.

RESULTS OF ALIQUOTS AND A COMPARISON OF MEASURED VERSUS CALCULATED DEPOSITION IN SUBPLOTS

A.IV.1 Analysis of Deposition in the Subplots

In the following figures (Figs. A.IV.1 through A.IV.5), the measured subplot inventories of ^{131}I, ^{7}Be, and the microspheres are compared with the amounts calculated in the subplots on the basis of the calibrated amount of water applied per unit area of ground and the assumption of no retention of materials in the simulators. In Figs. A.IV.1 and A.IV.2, the ratios of the subplot inventory to the calculated deposition (SP/C) for ^{131}I and ^{7}Be show values near unity at low amounts of rainfall; however, as the amount of rain increases above 4 mm, the SP/C ratios for ^{131}I decrease markedly. This effect is also seen for ^{7}Be at the highest intensity of rain application. This is evidence that these radioisotopes are affected by the runoff of water from the plots. Water runoff was observed visually, and the data for ^{131}I agree well with theoretical calculations of runoff of water for Captina silt loam performed by R. D. von Bernuth at The University of Tennessee, Knoxville.

The SP/C ratios for the microspheres were always less than unity (Figs. A.IV.3 through A.IV.5) and, with the exception of the 3-μm size class at high-intensity rain applications, the ratios remained relatively constant. Appreciably lower SP/C ratios, however, occurred for the highest intensity rain applications. The consistency of these SP/C ratios with increasing amounts of rain indicates that the microspheres were settling out of water before runoff occurred from the subplots. The failure of the SP/C ratios for the microspheres to reach unity at even the lowest amounts of rain application is an indication of retention of the microspheres within the rain simulators. The retention of microspheres in the simulators was confirmed by visual inspection and by radiometric analysis.

A.IV.2 Results of Aliquot Samples for ^{7}Be and ^{131}I

The results of the aliquot samples taken for ^{7}Be and ^{131}I are given in Tables A.IV.1 and A.IV.2. These results show that there is relatively close agreement between the measured concentrations of these substances and the calculated concentrations based on the assumption of complete dilution with water. There is a tendency for aliquots taken before the application of simulated rain to be less than aliquots taken after the application. This tendency is, however, not uniformly consistent and is generally less than 20%.

No aliquot results are given for the microspheres because of problems encountered with the determination of a consistent counting geometry due to rapid settling of the microspheres on the walls and bottoms of the aliquot bottles.

ORNL-DWG 89-11611

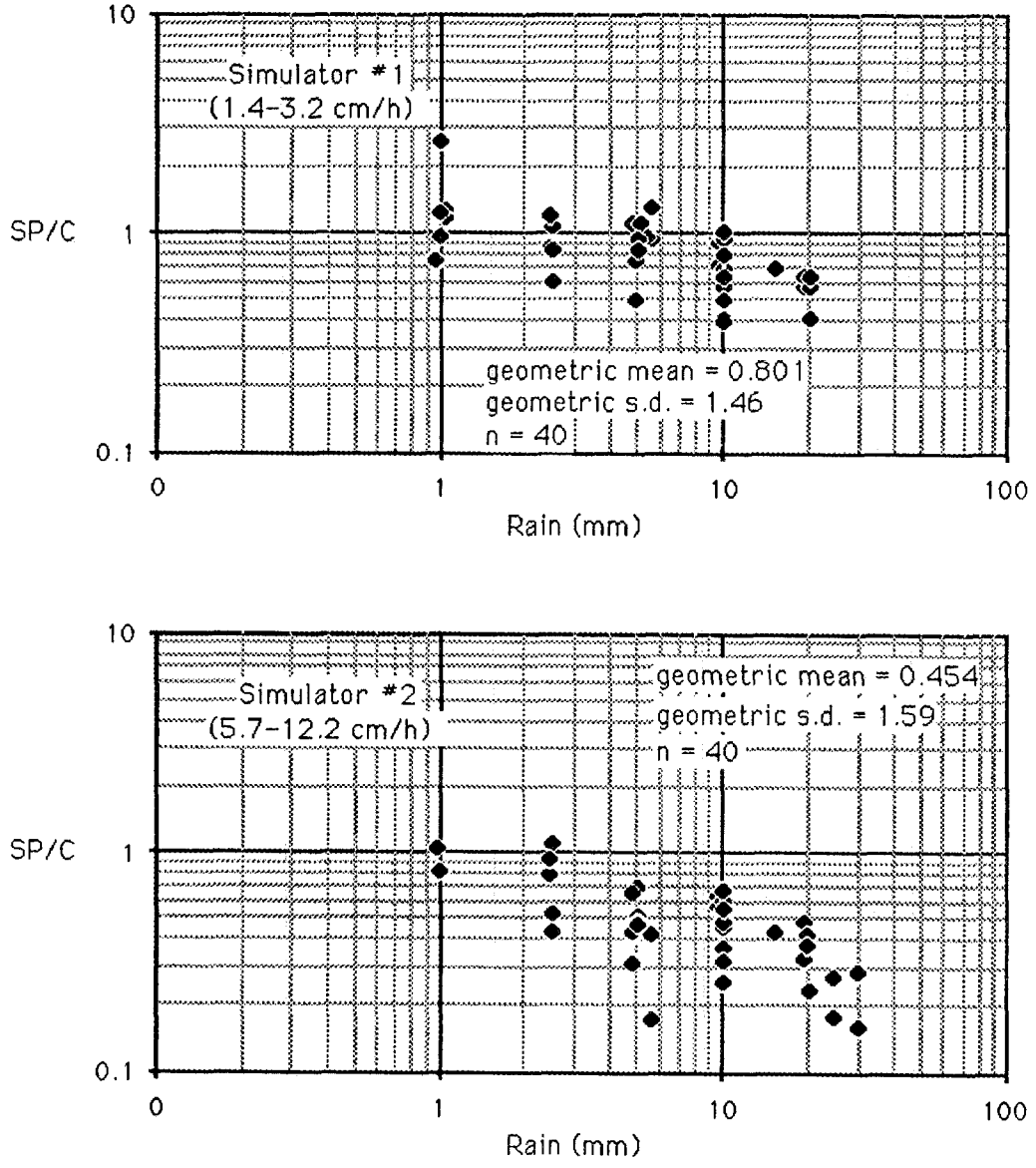

Fig. A.IV.1. The ratio of the total measured activity of ^{131}I deposited per unit area in the 0.05-m^2 subplots (SP) to the per unit area deposition calculated (C) on the basis of the amount of water applied to each 0.33-m^2 field plot.

ORNL-DWG 89-11612

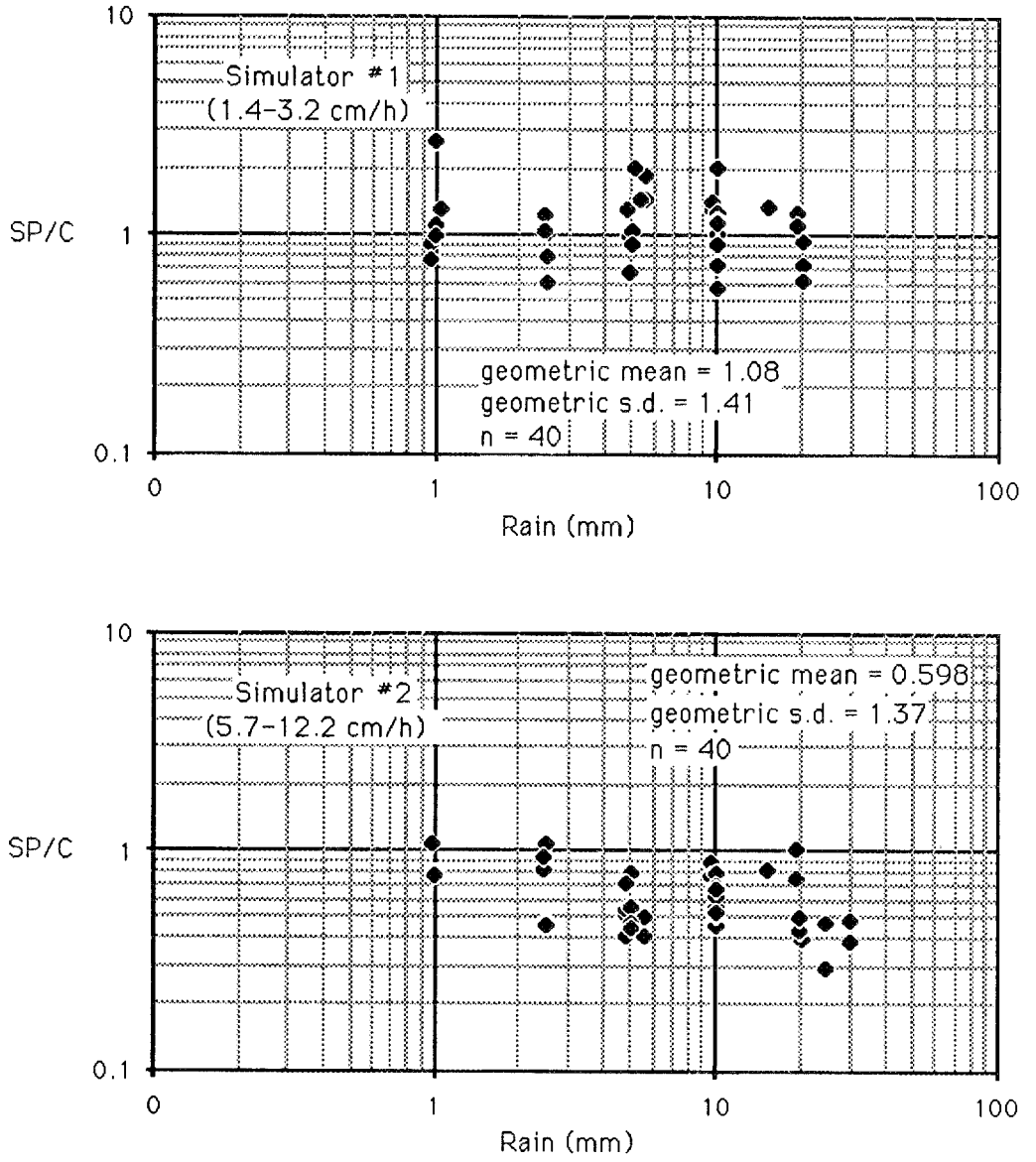

Fig. A.IV.2. The ratio of the total measured activity of ^{7}Be deposited per unit area in the 0.05-m^2 subplots (SP) to the per unit area deposition calculated (C) on the basis of the amount of water applied to each 0.33-m^2 field plot.

ORNL-DWG 89-11613

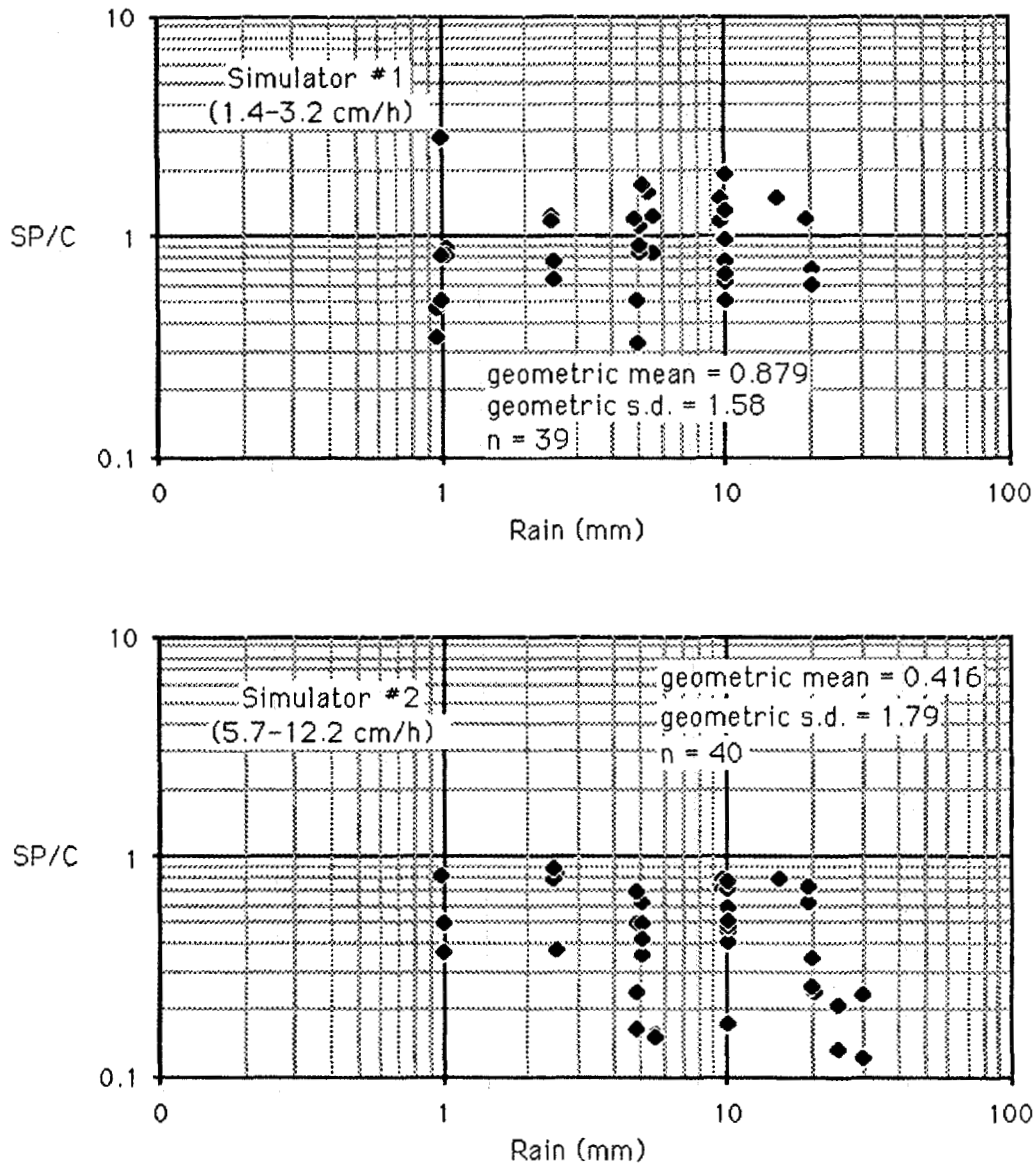

Fig. A.IV.3. The ratio of the total measured activity of the 3-μm microspheres deposited per unit area in the 0.05-m^2 subplots (SP) to the per unit area deposition calculated (C) on the basis of the amount of water applied to each 0.33-m^2 field plot.

ORNL-DWG 89-11702

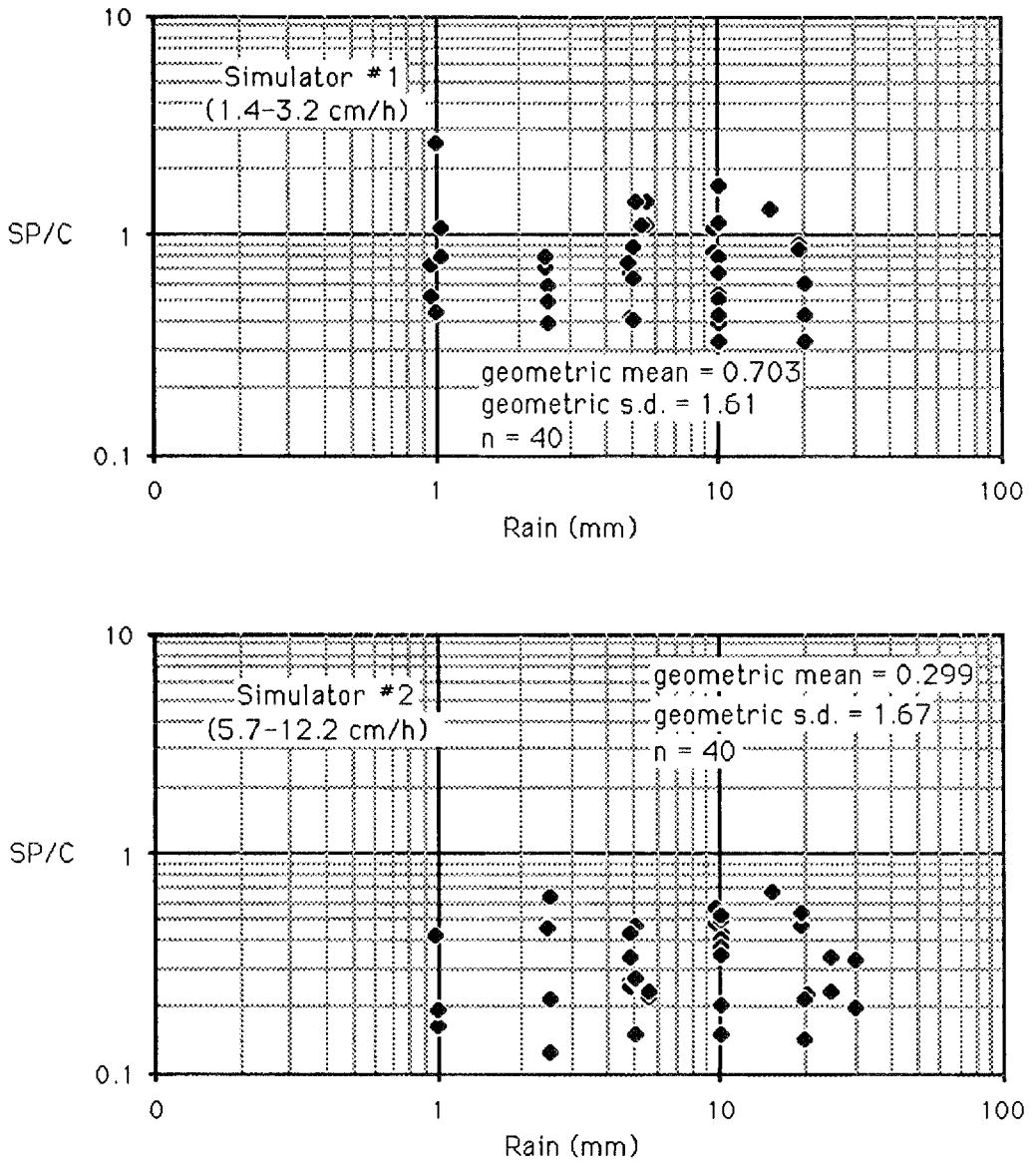

Fig. A.IV.4. The ratio of the total measured activity of the 9-μm microspheres deposited per unit area in the 0.05-m^2 subplots (SP) to the per unit area deposition calculated (C) on the basis of the amount of water applied to each 0.33-m^2 field plot.

ORNL-DWG 89-11703

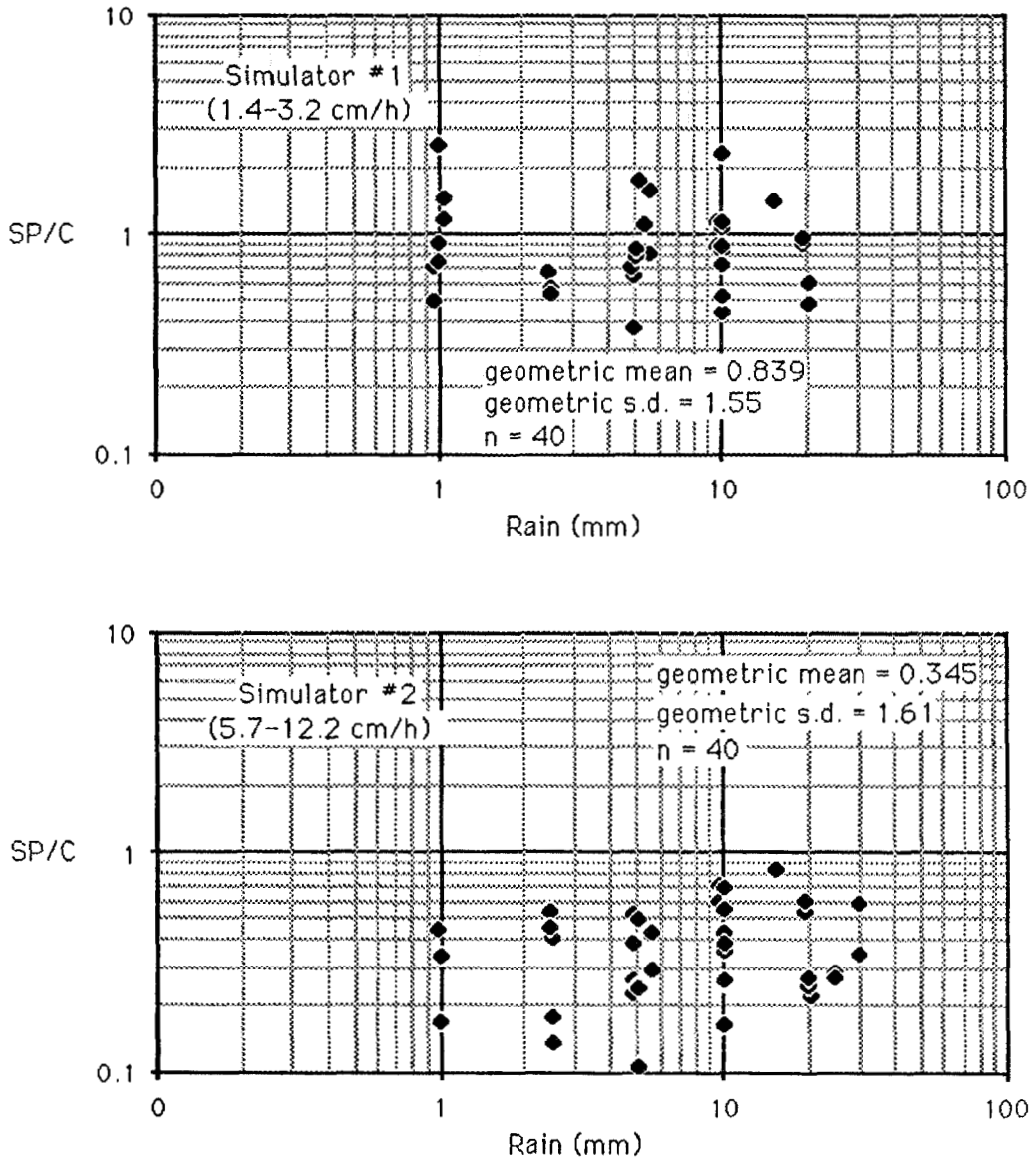

Fig. A.IV.5. The ratio of the total measured activity of the 25-μm microspheres deposited per unit area in the 0.05-m^2 subplots (SP) to the per unit area deposition calculated (C) on the basis of the amount of water applied to each 0.33-m^2 field plot.

Table A.IV.1. Ratios of measured activity of ^{131}I and ^{7}Be in aliquots of simulated rain to calculated activity for the June application series.

Date	Plot No.	Sample Taken	Measured/Calculated Ratios ^{131}I	^{7}Be
6/22/87	29	Before[a]	0.93	1.27
6/22/87	29	After[b]	1.05	1.16
6/22/87	30	Before	0.74	1.44
6/22/87	30	After	0.94	1.31
6/22/87	31	Before	1.05	1.21
6/22/87	31	After	1.01	1.06
6/22/87	32	Before	1.07	1.40
6/22/87	32	After	1.03	1.16
6/22/87	33	Before	0.98	1.05
6/22/87	33	After	0.94	1.16
6/22/87	34	Before	1.03	1.22
6/22/87	34	After	1.02	1.10
6/22/87	35	Before	0.99	1.08
6/22/87	35	After	1.02	1.08
6/22/87	36	Before	0.97	1.07
6/22/87	36	After	0.99	1.11
6/24/87	37	Before	1.04	1.04
6/24/87	37	After	1.00	1.01
6/24/87	38	Before	1.09	0.91
6/24/87	38	After	1.08	0.95
6/24/87	39	Before	1.05	0.98
6/24/87	39	After	1.20	1.09
6/24/87	40	Before	0.95	0.86
6/24/87	40	After	1.06	0.98
6/24/87	41	Before	1.05	1.04
6/24/87	41	After	0.95	0.88
6/24/87	42	Before	1.10	1.08
6/24/87	42	After	0.98	0.87
6/24/87	43	Before	1.05	1.02
6/24/87	43	After	1.06	1.01
6/24/87	44	Before	0.94	0.89
6/24/87	44	After	1.14	0.99

Table A.IV.1 (cont.)

Date	Plot No.	Sample Taken	Measured/Calculated Ratios ^{131}I	^{7}Be
6/24/87	45	Before	1.05	0.95
6/24/87	45	After	1.05	1.00
6/24/87	46	Before	1.01	0.92
6/24/87	46	After	1.12	1.03
6/24/87	47	Before	1.05	0.98
6/24/87	47	After	1.16	1.08
6/24/87	48	Before	1.02	0.94
6/24/87	48	After	0.95	0.83
6/24/87	49	Before	1.01	0.97
6/24/87	49	After	0.99	0.85
6/24/87	50	Before	1.00	0.91
6/24/87	50	After	1.12	1.00
6/24/87	51	Before	1.07	0.94
6/24/87	51	After	1.18	1.07
6/24/87	52	Before	1.05	0.92
6/24/87	52	After	1.00	0.93
		Mean	1.03	1.04
		Std. dev.	0.08	0.14

[a] A 500-mL aliquot of solution taken from simulator nozzle before application was started.

[b] A 500-mL aliquot of solution taken from simulator nozzle immediately after termination of simulated rain application.

Table A.IV.2. Ratios of measured activity of ^{131}I and ^{7}Be in aliquots of simulated rain to calculated activity for the September application series.

Date	Plot No.	Sample Taken	Measured/Calculated Ratios ^{131}I	^{7}Be
9/23/87	77	Before[a]	0.73	0.89
9/23/87	77	After[b]	0.91	0.89
9/23/87	78	Before	0.93	0.90
9/23/87	78	After	0.89	0.86
9/23/87	79	Before	1.00	0.91
9/23/87	79	After	0.94	0.84
9/23/87	80	Before	0.98	0.96
9/23/87	80	After	1.05	0.82
9/23/87	81	Before	0.94	0.90
9/23/87	81	After	0.92	0.78
9/23/87	82	Before	1.05	0.97
9/23/87	82	After	0.86	0.79
9/23/87	83	Before	0.97	0.92
9/23/87	83	After	0.95	1.76
9/23/87	84	Before	1.06	0.92
9/23/87	84	After	0.96	0.87
9/23/87	85	Before	1.02	0.92
9/23/87	85	After	0.91	1.10
9/23/87	86	Before	0.94	0.86
9/23/87	86	After	0.86	0.81
9/23/87	87	Before	0.99	0.99
9/23/87	87	After	1.01	0.95
9/23/87	88	Before	1.02	1.14
9/23/87	88	After	0.96	1.47
9/23/87	89	Before	1.09	1.07
9/23/87	89	After	0.94	0.56
9/23/87	90	Before	0.94	0.90
9/23/87	90	After	0.70	0.69
9/23/87	91	Before	1.11	0.97
9/23/87	91	After	0.86	0.51
9/23/87	92	Before	1.05	1.12
9/23/87	92	After	0.89	1.51
		Mean	0.95	0.95
		Std. dev.	0.09	0.25

Table A.IV.2 (cont.)

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[a] A 500-mL aliquot of rain solution taken from simulator nozzle before application was started.

[b] Sample taken from a bucket placed on the ground outside the 0.33-m^2 sampling area and collected 1 h after application of simulated rain.

APPENDIX V.

CONCENTRATION OF RADIONUCLIDES IN SIMULATED RAIN APPLIED TO FIELD PLOTS AND IN SAMPLES COLLECTED DURING INTERCEPTION STUDY

Table A.V.1. Concentration of radionuclides (Bq/kg dry wt) in samples collected during interception study.

Vegetation				Intensity	Rain	Sample	Mass	Bq/kg				
Date	Type	Sim	Plot	(cm/h)	(mm)	Type	(kg, dry)	25 μm	3 μm	9 μm	^{131}I	^{7}Be
5/21/87	Clover	1	1	1.75	1.02	>5 cm A[a]	0.0015	6.26E+03	1.57E+04	1.50E+04	2.62E+04	2.81E+05
5/21/87	Clover	1	1	1.75	1.02	<5 cm [b]	0.0020	ND	6.37E+03	5.51E+03	1.33E+04	1.17E+05
5/21/87	Clover	1	1	1.75	1.02	Soil[c]	0.5093	9.03E+00	1.95E+01	1.77E+01	5.45E+01	3.89E+02
5/21/87	Clover	1	1	1.75	1.02	>5 cm B[d]	0.0296	4.60E+03	6.21E+03	4.86E+03	1.17E+04	1.09E+05
5/21/87	Clover	1	3	1.75	1.02	>5 cm A	0.0025	6.56E+03	1.19E+04	8.15E+03	2.11E+04	2.04E+05
5/21/87	Clover	1	3	1.75	1.02	<5 cm	0.0029	2.16E+03	3.71E+03	2.68E+03	8.38E+03	6.48E+04
5/21/87	Clover	1	3	1.75	1.02	Soil	0.5093	ND	9.84E+00	2.41E+01	3.05E+01	2.29E+02
5/21/87	Clover	1	3	1.75	1.02	>5 cm B	0.0377	2.44E+03	ND	5.69E+03	1.18E+04	1.17E+05
5/22/87	Clover	1	5	1.36	4.08	>5 cm A	0.0043	2.02E+04	1.70E+04	1.77E+04	1.98E+04	4.22E+05
5/22/87	Clover	1	5	1.36	4.08	<5 cm	0.0024	1.92E+03	7.99E+03	1.81E+04	9.15E+03	2.30E+05
5/22/87	Clover	1	5	1.36	4.08	Soil	1.1155	6.96E+00	1.46E+01	2.08E+01	1.36E+02	8.55E+02
5/22/87	Clover	1	5	1.36	4.08	>5 cm B	0.0408	5.82E+03	6.15E+03	5.84E+03	5.97E+03	1.48E+05
5/22/87	Clover	1	5	1.36	4.08	Weeds[e]	0.0027	2.18E+04	3.26E+04	4.30E+04	2.21E+04	7.16E+05
5/22/87	Clover	1	7	1.36	4.08	>5 cm A	0.0029	2.37E+04	4.98E+04	9.27E+03	2.24E+04	4.45E+05
5/22/87	Clover	1	7	1.36	4.08	<5 cm	0.0029	1.15E+04	3.07E+04	1.30E+04	1.13E+04	3.17E+05
5/22/87	Clover	1	7	1.36	4.08	Soil	0.6802	2.42E+01	1.49E+02	8.01E+01	3.77E+02	2.94E+03
5/22/87	Clover	1	7	1.36	4.08	>5 cm B	0.0440	4.49E+03	1.38E+04	6.16E+03	4.96E+03	1.27E+05
5/22/87	Clover	1	7	1.36	4.08	Weeds	0.0021	3.83E+03	2.13E+04	7.37E+03	4.75E+03	1.97E+05
5/26/87	Fescue	1	10	1.62	4.86	>5 cm A	0.0019	3.42E+04	2.07E+04	3.66E+04	6.56E+03	2.26E+05
5/26/87	Fescue	1	10	1.62	4.86	<5 cm	0.0065	1.85E+04	1.41E+04	2.65E+04	5.01E+03	1.42E+05
5/26/87	Fescue	1	10	1.62	4.86	Soil	0.8206	1.67E+02	2.14E+02	3.79E+02	5.22E+02	3.22E+03
5/26/87	Fescue	1	10	1.62	4.86	>5 cm B	0.0162	2.38E+04	1.60E+04	2.97E+04	5.25E+03	1.80E+05
5/26/87	Fescue	1	10	1.62	4.86	Weeds	0.0027	5.32E+04	2.94E+04	6.82E+04	8.61E+03	2.30E+05
5/26/87	Fescue	1	12	1.62	0.95	>5 cm A	0.0049	8.86E+03	4.83E+03	9.06E+03	5.35E+03	6.48E+04
5/26/87	Fescue	1	12	1.62	0.95	<5 cm	0.0054	3.55E+03	3.42E+03	4.72E+03	4.18E+03	4.32E+04
5/26/87	Fescue	1	12	1.62	0.95	Soil	1.1007	6.29E+00	1.16E+01	1.24E+01	3.76E+01	1.60E+02
5/26/87	Fescue	1	12	1.62	0.95	>5 cm B	0.0188	7.50E+03	4.60E+03	6.26E+03	5.34E+03	5.78E+04
5/26/87	Fescue	1	12	1.62	0.95	Weeds	0.0008	7.56E+03	3.49E+03	9.19E+03	3.13E+03	4.60E+04
5/26/87	Fescue	1	14	1.62	4.86	>5 cm A	0.0041	1.42E+04	1.64E+04	3.11E+04	6.59E+03	2.03E+05
5/26/87	Fescue	1	14	1.62	4.86	<5 cm	0.0059	1.40E+04	1.11E+04	1.69E+04	6.53E+03	1.39E+05
5/26/87	Fescue	1	14	1.62	4.86	Soil	1.0177	4.54E+01	6.26E+01	1.22E+02	2.42E+02	1.09E+03
5/26/87	Fescue	1	14	1.62	4.86	>5 cm B	0.0097	2.66E+04	2.26E+04	4.16E+04	8.06E+03	3.27E+05
5/26/87	Fescue	1	14	1.62	4.86	Weeds	0.0027	6.33E+04	2.20E+04	4.11E+04	1.15E+04	3.08E+05
5/26/87	Fescue	1	16	1.62	0.95	>5 cm A	0.0035	6.72E+03	3.96E+03	9.80E+03	6.06E+03	5.38E+04
5/26/87	Fescue	1	16	1.62	0.95	<5 cm	0.0046	1.56E+03	2.57E+03	8.39E+03	4.50E+03	3.91E+04
5/26/87	Fescue	1	16	1.62	0.95	Soil	0.7950	2.13E+01	1.90E+01	5.59E+01	6.27E+01	3.17E+02
5/26/87	Fescue	1	16	1.62	0.95	>5 cm B	0.0225	6.46E+03	3.73E+03	9.11E+03	5.33E+03	5.41E+04
5/26/87	Fescue	1	16	1.62	0.95	Weeds	0.0092	9.93E+03	4.28E+03	1.26E+04	6.37E+03	7.66E+04
5/28/87	Mixed	1	20	1.87	1.04	>5 cm A	0.0053	6.25E+03	4.92E+03	9.02E+03	5.48E+03	5.36E+04
5/28/87	Mixed	1	20	1.87	1.04	<5 cm	0.0180	5.10E+03	3.21E+03	4.87E+03	4.06E+03	3.14E+04
5/28/87	Mixed	1	20	1.87	1.04	Soil	0.5824	4.91E+01	4.10E+01	7.64E+01	7.25E+01	4.29E+02
5/28/87	Mixed	1	20	1.87	1.04	>5 cm B	0.0194	9.01E+03	7.11E+03	9.96E+03	6.75E+03	7.19E+04
5/28/87	Mixed	1	22	1.87	5.61	>5 cm A	0.0280	2.15E+04	1.33E+04	2.11E+04	7.57E+03	1.28E+05
5/28/87	Mixed	1	22	1.87	5.61	<5 cm	0.1107	3.77E+03	3.51E+03	5.73E+03	3.48E+03	3.81E+04
5/28/87	Mixed	1	22	1.87	5.61	Soil	1.2666	2.91E+01	5.29E+01	6.20E+01	1.56E+02	6.32E+02
5/28/87	Mixed	1	22	1.87	5.61	>5 cm B	0.0190	4.37E+04	1.98E+04	3.28E+04	7.91E+03	1.72E+05

Table A.V.1 (cont.)

Vegetation				Intensity	Rain	Sample	Mass	Bq/kg				
Date	Type	Sim	Plot	(cm/h)	(mm)	Type	(kg, dry)	25 µm	3 µm	9 µm	^{131}I	^{7}Be
5/28/87	Mixed	1	24	1.87	1.04	>5 cm A	0.0019	3.57E+03	6.42E+03	1.15E+04	5.72E+03	4.62E+04
5/28/87	Mixed	1	24	1.87	1.04	<5 cm	0.0278	2.60E+03	2.79E+03	3.06E+03	3.67E+03	3.21E+04
5/28/87	Mixed	1	24	1.87	1.04	Soil	1.0684	4.10E+01	1.07E+01	2.46E+01	1.78E+01	1.15E+02
5/28/87	Mixed	1	24	1.87	1.04	>5 cm B	0.0037	9.18E+03	6.72E+03	1.23E+04	7.88E+03	7.64E+04
5/28/87	Mixed	1	26	1.87	5.61	>5 cm A	0.0287	1.37E+04	7.66E+03	1.49E+04	3.93E+03	8.08E+04
5/28/87	Mixed	1	26	1.87	5.61	<5 cm	0.0655	6.47E+03	4.08E+03	7.19E+03	4.00E+03	4.98E+04
5/28/87	Mixed	1	26	1.87	5.61	Soil	0.9197	7.64E+01	7.43E+01	1.15E+02	2.09E+02	1.24E+03
5/28/87	Mixed	1	26	1.87	5.61	>5 cm B	0.0545	3.19E+04	1.24E+04	2.65E+04	6.41E+03	1.37E+05
6/22/87	Clover	1	29	3.00	20.00	>5 cm A	0.0067	8.68E+05	5.65E+05	5.20E+05	1.08E+04	5.25E+05
6/22/87	Clover	1	29	3.00	20.00	<5 cm	0.0165	4.35E+05	3.25E+05	3.28E+05	1.04E+04	3.97E+05
6/22/87	Clover	1	29	3.00	20.00	Soil	0.8524	5.00E+03	6.44E+03	5.43E+03	1.28E+03	1.43E+04
6/22/87	Clover	1	29	3.00	20.00	>5 cm B	0.0370	6.71E+05	4.29E+05	4.21E+05	9.84E+03	4.12E+05
6/22/87	Clover	1	29	3.00	20.00	Weeds	0.0055	6.20E+05	3.52E+05	3.79E+05	8.49E+03	3.81E+05
6/22/87	Clover	1	31	3.00	10.00	>5 cm A	0.0082	4.68E+05	3.83E+05	3.46E+05	1.24E+04	3.42E+05
6/22/87	Clover	1	31	3.00	10.00	<5 cm	0.0051	2.68E+05	1.75E+05	2.09E+05	1.18E+04	2.06E+05
6/22/87	Clover	1	31	3.00	10.00	Soil	1.2201	1.91E+03	1.92E+03	1.82E+03	5.45E+02	4.21E+03
6/22/87	Clover	1	31	3.00	10.00	>5 cm B	0.0437	3.39E+05	2.47E+05	2.52E+05	1.13E+04	2.85E+05
6/22/87	Clover	1	31	3.00	10.00	Weeds	0.0033	4.84E+05	2.84E+05	2.93E+05	1.18E+04	3.19E+05
6/22/87	Clover	1	33	3.00	5.00	>5 cm A	0.0075	2.10E+05	1.67E+05	1.40E+05	8.37E+03	1.66E+05
6/22/87	Clover	1	33	3.00	5.00	<5 cm	0.0174	1.84E+05	1.51E+05	1.44E+05	1.77E+04	2.44E+05
6/22/87	Clover	1	33	3.00	5.00	Soil	1.0289	1.41E+03	1.69E+03	1.42E+03	5.10E+02	2.76E+03
6/22/87	Clover	1	33	3.00	5.00	>5 cm B	0.0330	1.99E+05	1.55E+05	1.48E+05	9.46E+03	2.10E+05
6/22/87	Clover	1	33	3.00	5.00	Weeds	0.0084	2.34E+05	1.51E+05	1.37E+05	1.20E+04	2.54E+05
6/22/87	Clover	1	35	3.00	2.50	>5 cm A	0.0044	1.11E+05	9.78E+04	7.80E+04	6.49E+03	9.27E+04
6/22/87	Clover	1	35	3.00	2.50	<5 cm	0.0156	9.07E+04	6.97E+04	6.18E+04	1.41E+04	1.15E+05
6/22/87	Clover	1	35	3.00	2.50	Soil	1.0019	2.31E+02	4.77E+02	3.38E+02	1.91E+02	8.91E+02
6/22/87	Clover	1	35	3.00	2.50	>5 cm B	0.0528	6.98E+04	4.81E+04	4.98E+04	7.86E+03	7.11E+04
6/22/87	Clover	1	35	3.00	2.50	Weeds	0.0065	1.97E+05	1.14E+05	9.62E+04	9.09E+03	1.88E+05
6/24/87	Fescue	1	37	2.90	2.42	>5 cm A	0.0050	1.53E+05	1.57E+05	1.05E+05	8.95E+03	1.37E+05
6/24/87	Fescue	1	37	2.90	2.42	<5 cm	0.0083	6.25E+04	6.33E+04	4.38E+04	4.51E+03	5.73E+04
6/24/87	Fescue	1	37	2.90	2.42	Soil	1.2067	6.77E+02	1.01E+03	6.69E+02	2.68E+02	1.63E+03
6/24/87	Fescue	1	37	2.90	2.42	>5 cm B	0.0361	9.16E+04	7.68E+04	6.14E+04	5.46E+03	1.03E+05
6/24/87	Fescue	1	37	2.90	2.42	Weeds	0.0067	1.17E+05	7.20E+04	6.25E+04	3.93E+03	6.52E+04
6/24/87	Fescue	1	39	2.90	4.83	>5 cm A	0.0087	1.93E+05	1.67E+05	1.27E+05	5.38E+03	1.87E+05
6/24/87	Fescue	1	39	2.90	4.83	<5 cm	0.0151	7.91E+04	8.13E+04	6.17E+04	4.49E+03	9.17E+04
6/24/87	Fescue	1	39	2.90	4.83	Soil	1.5836	9.33E+02	1.44E+03	9.39E+02	3.89E+02	2.24E+03
6/24/87	Fescue	1	39	2.90	4.83	>5 cm B	0.0383	2.97E+05	2.30E+05	1.84E+05	1.07E+04	3.35E+05
6/24/87	Fescue	1	39	2.90	4.83	Weeds	0.0049	2.04E+05	1.48E+05	1.32E+05	5.12E+03	1.59E+05
6/24/87	Fescue	1	41	2.90	9.67	>5 cm A	0.0095	4.59E+05	3.19E+05	2.80E+05	8.96E+03	3.25E+05
6/24/87	Fescue	1	41	2.90	9.67	<5 cm	0.0084	2.35E+05	1.73E+05	1.43E+05	5.38E+03	1.69E+05
6/24/87	Fescue	1	41	2.90	9.67	Soil	1.1275	3.98E+03	4.55E+03	3.51E+03	9.62E+02	7.84E+03
6/24/87	Fescue	1	41	2.90	9.67	>5 cm B	0.0369	5.58E+05	3.68E+05	3.27E+05	9.19E+03	4.03E+05
6/24/87	Fescue	1	41	2.90	9.67	Weeds	0.0072	4.89E+05	2.48E+05	2.55E+05	4.53E+03	2.11E+05
6/24/87	Fescue	1	43	2.90	19.33	>5 cm A	0.0110	9.82E+05	7.45E+05	6.40E+05	1.13E+04	6.17E+05
6/24/87	Fescue	1	43	2.90	19.33	<5 cm	0.0113	4.22E+05	3.70E+05	3.06E+05	6.53E+03	3.69E+05
6/24/87	Fescue	1	43	2.90	19.33	Soil	1.1369	5.86E+03	ND	5.85E+03	1.17E+03	1.34E+04
6/24/87	Fescue	1	43	2.90	19.33	>5 cm B	0.0293	1.01E+06	6.14E+05	6.39E+05	1.05E+04	6.87E+05
6/24/87	Fescue	1	43	2.90	19.33	Weeds	0.0028	1.22E+06	7.03E+05	6.45E+05	1.07E+04	6.59E+05
6/24/87	Mixed	1	45	2.90	19.33	>5 cm A	0.0085	9.61E+05	6.76E+05	5.81E+05	6.85E+03	5.99E+05
6/24/87	Mixed	1	45	2.90	19.33	<5 cm	0.0226	4.61E+05	3.25E+05	2.87E+05	8.58E+03	3.12E+05
6/24/87	Mixed	1	45	2.90	19.33	Soil	0.8924	5.31E+03	7.47E+03	5.47E+03	1.63E+03	1.19E+04
6/24/87	Mixed	1	45	2.90	19.33	>5 cm B	0.0328	1.11E+06	6.66E+05	6.02E+05	7.95E+03	5.35E+05
6/24/87	Mixed	1	47	2.90	9.67	>5 cm A	0.0136	4.32E+05	3.15E+05	2.78E+05	7.57E+03	2.98E+05
6/24/87	Mixed	1	47	2.90	9.67	<5 cm	0.0310	1.83E+05	1.58E+05	1.28E+05	9.26E+03	1.91E+05
6/24/87	Mixed	1	47	2.90	9.67	Soil	0.7073	3.26E+03	4.54E+03	3.46E+03	8.09E+02	6.33E+03
6/24/87	Mixed	1	47	2.90	9.67	>5 cm B	0.0400	4.59E+05	3.12E+05	2.75E+05	8.69E+03	3.32E+05

Table A.V.1 (cont.)

Vegetation				Intensity	Rain	Sample	Mass	Bq/kg				
Date	Type	Sim	Plot	(cm/h)	(mm)	Type	(kg, dry)	25 μm	3 μm	9 μm	^{131}I	^{7}Be
6/24/87	Mixed	1	49	2.90	5.32	>5 cm A	0.0089	2.92E+05	2.20E+05	1.83E+05	1.12E+04	2.23E+05
6/24/87	Mixed	1	49	2.90	5.32	<5 cm	0.0215	1.36E+05	1.25E+05	1.02E+05	1.01E+04	1.36E+05
6/24/87	Mixed	1	49	2.90	5.32	Soil	0.6099	3.16E+03	3.96E+03	3.11E+03	6.46E+02	5.35E+03
6/24/87	Mixed	1	49	2.90	5.32	>5 cm B	0.0323	2.35E+05	1.67E+05	1.52E+05	8.58E+03	1.58E+05
6/24/87	Mixed	1	51	2.90	2.42	>5 cm A	0.0092	1.23E+05	1.15E+05	8.89E+04	9.00E+03	1.24E+05
6/24/87	Mixed	1	51	2.90	2.42	<5 cm	0.0318	1.83E+04	2.45E+04	1.83E+04	2.93E+03	2.45E+04
6/24/87	Mixed	1	51	2.90	2.42	Soil	0.8721	3.90E+02	6.27E+02	5.27E+02	1.31E+02	8.37E+02
6/24/87	Mixed	1	51	2.90	2.42	>5 cm B	0.0347	1.27E+05	1.08E+05	9.20E+04	6.82E+03	1.15E+05
7/29/87	Clover	1	54	1.40	15.21	>5 cm A	0.0148	4.89E+05	2.64E+05	2.20E+05	1.04E+04	2.68E+05
7/29/87	Clover	1	54	1.40	15.21	<5 cm	0.0187	2.21E+05	1.31E+05	1.04E+05	8.00E+03	2.22E+05
7/29/87	Clover	1	54	1.40	15.21	Soil	0.6813	2.26E+03	3.87E+03	2.11E+03	1.55E+03	8.82E+03
7/29/87	Clover	1	54	1.40	15.21	>5 cm B	0.0802	4.55E+05	2.22E+05	1.83E+05	8.06E+03	2.28E+05
7/29/87	Clover	1	56	1.40	10.15	>5 cm A	0.0114	5.14E+05	2.28E+05	1.79E+05	9.71E+03	4.09E+05
7/29/87	Clover	1	56	1.40	10.15	<5 cm	0.0193	3.02E+05	1.44E+05	1.12E+05	1.01E+04	2.56E+05
7/29/87	Clover	1	56	1.40	10.15	Soil	1.3449	1.96E+03	1.72E+03	1.10E+03	6.76E+02	3.35E+03
7/29/87	Clover	1	56	1.40	10.15	>5 cm B	0.1101	2.07E+05	8.39E+04	6.97E+04	3.62E+03	1.47E+05
7/29/87	Clover	1	58	1.40	5.06	>5 cm A	0.0127	1.69E+05	9.46E+04	7.23E+04	9.02E+03	2.21E+05
7/29/87	Clover	1	58	1.40	5.06	<5 cm	0.0275	7.30E+04	4.68E+04	3.20E+04	5.49E+03	8.42E+04
7/29/87	Clover	1	58	1.40	5.06	Soil	1.3478	9.57E+02	7.15E+02	4.20E+02	3.44E+02	1.35E+03
7/29/87	Clover	1	58	1.40	5.06	>5 cm B	0.0860	1.45E+05	7.06E+04	5.60E+04	7.71E+03	1.56E+05
7/29/87	Clover	1	60	1.40	1.00	>5 cm A	0.0184	5.45E+04	3.77E+04	2.93E+04	9.63E+03	6.13E+04
7/29/87	Clover	1	60	1.40	1.00	<5 cm	0.0178	2.09E+04	1.76E+04	1.33E+04	5.82E+03	2.58E+04
7/29/87	Clover	1	60	1.40	1.00	Soil	0.9476	1.84E+02	1.21E+02	8.62E+01	6.17E+01	2.43E+02
7/29/87	Clover	1	60	1.40	1.00	>5 cm B	0.0531	4.63E+04	2.75E+04	2.01E+04	6.09E+03	4.83E+04
8/4/87	Fescue	1	62	1.59	1.01	>5 cm A	0.0044	4.47E+04	2.26E+04	1.08E+04	3.93E+03	6.11E+04
8/4/87	Fescue	1	62	1.59	1.01	<5 cm	0.0262	6.84E+03	3.34E+03	1.63E+03	9.63E+02	8.24E+03
8/4/87	Fescue	1	62	1.59	1.01	Soil	1.2308	1.16E+02	7.76E+01	3.06E+01	4.42E+01	1.77E+02
8/4/87	Fescue	1	62	1.59	1.01	>5 cm B	0.0310	4.99E+04	2.78E+04	1.12E+04	5.16E+03	6.72E+04
8/4/87	Fescue	1	64	1.59	10.07	>5 cm A	0.0136	2.54E+05	8.31E+04	3.90E+04	3.98E+03	2.97E+05
8/4/87	Fescue	1	64	1.59	10.07	<5 cm	0.0285	6.16E+04	2.56E+04	1.16E+04	2.65E+03	7.13E+04
8/4/87	Fescue	1	64	1.59	10.07	Soil	0.9716	1.05E+03	7.79E+02	3.02E+02	4.27E+02	2.01E+03
8/4/87	Fescue	1	64	1.59	10.07	>5 cm B	0.0881	1.90E+05	6.49E+04	2.71E+04	3.66E+03	2.23E+05
8/4/87	Fescue	1	64	1.59	10.07	Weeds	0.0050	2.17E+05	6.98E+04	3.16E+04	3.62E+03	1.91E+05
8/4/87	Fescue	1	66	1.59	1.01	>5 cm A	0.0128	1.59E+04	6.73E+03	5.52E+03	1.65E+03	2.61E+04
8/4/87	Fescue	1	66	1.59	1.01	<5 cm	0.0094	8.22E+03	3.23E+03	2.53E+03	1.07E+03	1.19E+04
8/4/87	Fescue	1	66	1.59	1.01	Soil	0.8653	1.64E+02	7.04E+01	3.72E+01	5.04E+01	2.21E+02
8/4/87	Fescue	1	66	1.59	1.01	>5 cm B	0.0886	2.53E+04	8.36E+03	4.69E+03	2.39E+03	3.79E+04
8/4/87	Fescue	1	68	1.59	10.07	>5 cm A	0.0031	3.83E+05	1.37E+05	7.98E+04	5.15E+03	4.01E+05
8/4/87	Fescue	1	68	1.59	10.07	<5 cm	0.0106	1.99E+05	7.41E+04	4.01E+04	3.14E+03	1.93E+05
8/4/87	Fescue	1	68	1.59	10.07	Soil	1.2440	2.25E+03	1.22E+03	6.39E+02	4.59E+02	2.60E+03
8/4/87	Fescue	1	68	1.59	10.07	>5 cm B	0.0291	3.24E+05	1.09E+05	6.06E+04	3.82E+03	3.08E+05
7/27/87	Mixed	1	69	2.40	10.00	>5 cm A	0.0143	2.78E+05	2.06E+05	1.42E+05	7.93E+02	2.29E+05
7/27/87	Mixed	1	69	2.40	10.00	<5 cm	0.0163	9.96E+04	8.76E+04	5.69E+04	8.78E+02	1.30E+05
7/27/87	Mixed	1	69	2.40	10.00	Soil	0.9740	2.36E+03	1.98E+03	1.36E+03	7.27E+01	4.69E+03
7/27/87	Mixed	1	69	2.40	10.00	>5 cm B	0.1257	2.19E+05	1.20E+05	8.52E+04	5.11E+02	1.19E+05
7/27/87	Mixed	1	71	2.40	10.00	>5 cm A	0.0149	3.28E+05	2.12E+05	1.69E+05	9.62E+02	2.86E+05
7/27/87	Mixed	1	71	2.40	10.00	<5 cm	0.0266	1.04E+05	8.64E+04	6.72E+04	9.25E+02	1.28E+05
7/27/87	Mixed	1	71	2.40	10.00	Soil	0.4824	6.25E+03	5.62E+03	3.76E+03	1.60E+02	1.01E+04
7/27/87	Mixed	1	71	2.40	10.00	>5 cm B	0.0756	3.25E+05	1.95E+05	1.47E+05	9.76E+02	2.46E+05
7/27/87	Mixed	1	73	2.40	10.00	>5 cm A	0.0194	2.44E+05	1.28E+05	1.06E+05	6.94E+02	1.89E+05
7/27/87	Mixed	1	73	2.40	10.00	<5 cm	0.0387	3.18E+04	2.74E+04	1.90E+04	4.06E+02	3.56E+04
7/27/87	Mixed	1	73	2.40	10.00	Soil	1.2761	8.07E+02	1.08E+03	6.62E+02	5.45E+01	2.32E+03
7/27/87	Mixed	1	73	2.40	10.00	>5 cm B	0.0759	3.85E+05	1.90E+05	1.57E+05	7.46E+02	2.62E+05

Table A.V.1 (cont.)

Vegetation				Intensity	Rain	Sample	Mass	Bq/kg				
Date	Type	Sim	Plot	(cm/h)	(mm)	Type	(kg, dry)	25 µm	3 µm	9 µm	^{131}I	^{7}Be
7/27/87	Mixed	1	75	2.40	10.00	>5 cm A	0.0065	2.29E+05	1.41E+05	8.92E+04	1.24E+03	4.61E+05
7/27/87	Mixed	1	75	2.40	10.00	<5 cm	0.0194	8.27E+04	6.01E+04	3.38E+04	7.56E+02	8.69E+04
7/27/87	Mixed	1	75	2.40	10.00	Soil	0.6003	1.83E+03	1.89E+03	9.13E+02	9.67E+01	2.49E+03
7/27/87	Mixed	1	75	2.40	10.00	>5 cm B	0.0633	2.77E+05	1.61E+05	1.06E+05	8.05E+02	3.72E+05
9/23/87	Clover	1	78	3.20	20.00	>5 cm A	0.0038	6.75E+05	2.99E+05	3.65E+05	1.67E+04	1.25E+06
9/23/87	Clover	1	78	3.20	20.00	<5 cm	0.0192	2.93E+05	1.74E+05	1.69E+05	2.33E+04	3.03E+05
9/23/87	Clover	1	78	3.20	20.00	Soil	2.4347	1.27E+03	2.19E+03	1.45E+03	5.00E+02	1.84E+03
9/23/87	Clover	1	78	3.20	20.00	>5 cm B	0.0272	6.46E+05	3.07E+05	3.47E+05	1.70E+04	1.21E+06
9/23/87	Clover	1	80	3.20	10.00	>5 cm A	0.0054	3.32E+05	1.84E+05	1.61E+05	1.74E+04	7.43E+05
9/23/87	Clover	1	80	3.20	10.00	<5 cm	0.0086	2.60E+05	1.51E+05	1.19E+05	2.11E+04	2.77E+05
9/23/87	Clover	1	80	3.20	10.00	Soil	1.6878	2.63E+03	3.14E+03	1.78E+03	7.35E+02	3.16E+03
9/23/87	Clover	1	80	3.20	10.00	>5 cm B	0.0190	4.77E+05	2.59E+05	2.17E+05	2.02E+04	9.14E+05
9/23/87	Clover	1	82	3.20	5.00	>5 cm A	0.0056	2.50E+05	1.22E+05	9.96E+04	1.47E+04	3.78E+05
9/23/87	Clover	1	82	3.20	5.00	<5 cm	0.0064	1.56E+05	1.10E+05	7.55E+04	1.78E+04	2.05E+05
9/23/87	Clover	1	82	3.20	5.00	Soil	2.3418	5.78E+02	8.39E+02	3.89E+02	2.13E+02	8.51E+02
9/23/87	Clover	1	82	3.20	5.00	>5 cm B	0.0227	2.59E+05	1.51E+05	1.22E+05	1.67E+04	3.91E+05
9/23/87	Clover	1	84	3.20	2.50	>5 cm A	0.0038	1.36E+05	1.22E+05	8.62E+04	1.65E+04	2.25E+05
9/23/87	Clover	1	84	3.20	2.50	<5 cm	0.0255	2.24E+04	2.18E+04	1.32E+04	5.10E+03	2.81E+04
9/23/87	Clover	1	84	3.20	2.50	Soil	1.9650	1.31E+02	2.60E+02	1.48E+02	6.31E+01	2.52E+02
9/23/87	Clover	1	84	3.20	2.50	>5 cm B	0.0232	1.40E+05	1.04E+05	8.87E+04	1.53E+04	1.88E+05
9/23/87	Fescue	1	85	3.20	20.00	>5 cm A	0.0056	5.70E+05	2.77E+05	2.66E+05	1.87E+04	9.88E+05
9/23/87	Fescue	1	85	3.20	20.00	<5 cm	0.0061	5.11E+05	3.05E+05	2.60E+05	2.83E+04	5.10E+05
9/23/87	Fescue	1	85	3.20	20.00	Soil	1.6586	1.70E+03	3.64E+03	1.91E+03	9.94E+02	2.46E+03
9/23/87	Fescue	1	85	3.20	20.00	>5 cm B	0.0336	6.64E+05	3.25E+05	3.20E+05	2.08E+04	1.06E+06
9/23/87	Fescue	1	87	3.20	10.00	>5 cm A	0.0103	2.21E+05	1.42E+05	1.46E+05	1.08E+04	3.80E+05
9/23/87	Fescue	1	87	3.20	10.00	<5 cm	0.0180	9.48E+04	8.15E+04	7.23E+04	1.16E+04	1.10E+05
9/23/87	Fescue	1	87	3.20	10.00	Soil	1.1419	8.59E+02	2.05E+03	1.09E+03	5.46E+02	1.48E+03
9/23/87	Fescue	1	87	3.20	10.00	>5 cm B	0.0400	2.65E+05	1.64E+05	1.71E+05	1.15E+04	4.52E+05
9/23/87	Fescue	1	89	3.20	5.00	>5 cm A	0.0107	1.51E+05	9.86E+04	9.65E+04	1.09E+04	2.12E+05
9/23/87	Fescue	1	89	3.20	5.00	<5 cm	0.0130	1.11E+05	7.08E+04	6.76E+04	9.06E+03	9.72E+04
9/23/87	Fescue	1	89	3.20	5.00	Soil	1.3317	7.66E+02	1.23E+03	8.48E+02	3.00E+02	9.00E+02
9/23/87	Fescue	1	89	3.20	5.00	>5 cm B	0.0713	1.21E+05	7.85E+04	8.08E+04	8.99E+03	1.58E+05
9/23/87	Fescue	1	91	3.20	2.50	>5 cm A	0.0039	1.03E+05	7.29E+04	6.95E+04	9.64E+03	1.27E+05
9/23/87	Fescue	1	91	3.20	2.50	<5 cm	0.0182	2.98E+04	2.63E+04	2.61E+04	3.06E+03	3.29E+04
9/23/87	Fescue	1	91	3.20	2.50	Soil	1.5298	2.32E+02	3.29E+02	2.88E+02	8.78E+01	3.06E+02
9/23/87	Fescue	1	91	3.20	2.50	>5 cm B	0.0264	1.28E+05	9.47E+04	8.98E+04	1.04E+04	1.59E+05
5/22/87	Clover	2	2	9.91	29.73	>5 cm A	0.0179	3.62E+03	5.55E+03	3.53E+03	1.52E+03	7.62E+04
5/22/87	Clover	2	2	9.91	29.73	<5 cm	0.0081	2.67E+04	3.78E+04	2.59E+04	9.25E+03	5.44E+05
5/22/87	Clover	2	2	9.91	29.73	Soil	0.7244	1.43E+02	3.98E+02	2.71E+02	7.37E+02	8.97E+03
5/22/87	Clover	2	2	9.91	29.73	>5 cm B	0.0207	1.07E+04	1.86E+04	1.35E+04	4.75E+03	2.87E+05
5/22/87	Clover	2	2	9.91	29.73	Weeds	0.0141	2.32E+04	2.12E+04	1.88E+04	5.25E+03	4.18E+05
5/22/87	Clover	2	4	9.91	4.13	>5 cm A	0.0029	1.71E+04	2.62E+04	1.65E+04	1.45E+04	2.69E+05
5/22/87	Clover	2	4	9.91	4.13	<5 cm	0.0050	9.57E+03	1.25E+04	4.87E+03	5.44E+03	1.21E+05
5/22/87	Clover	2	4	9.91	4.13	Soil	0.6164	6.28E+01	1.43E+02	8.69E+01	2.28E+02	2.24E+03
5/22/87	Clover	2	4	9.91	4.13	>5 cm B	0.0261	9.54E+03	1.17E+04	5.46E+03	5.24E+03	1.17E+05
5/22/87	Clover	2	4	9.91	4.13	Weeds	0.0110	1.52E+04	1.24E+04	6.08E+03	6.60E+03	2.29E+05
5/22/87	Clover	2	6	9.91	4.13	>5 cm A	0.0158	4.35E+03	4.56E+03	2.73E+03	1.74E+03	4.21E+04
5/22/87	Clover	2	6	9.91	4.13	<5 cm	0.0051	1.50E+04	2.29E+04	9.53E+03	1.05E+04	2.09E+05
5/22/87	Clover	2	6	9.91	4.13	Soil	0.5388	1.06E+02	2.45E+02	1.51E+02	3.80E+02	4.06E+03
5/22/87	Clover	2	6	9.91	4.13	>5 cm B	0.0204	1.35E+04	1.65E+04	1.14E+04	9.29E+03	1.65E+05
5/22/87	Clover	2	6	9.91	4.13	Weeds	0.0041	2.20E+04	2.81E+04	1.09E+04	9.75E+03	2.52E+05

Table A.V.1 (cont.)

Vegetation				Intensity	Rain	Sample	Mass	Bq/kg				
Date	Type	Sim	Plot	(cm/h)	(mm)	Type	(kg, dry)	25 µm	3 µm	9 µm	^{131}I	^{7}Be
5/22/87	Clover	2	8	9.91	11.56	>5 cm A	0.0036	3.34E+04	3.12E+04	1.67E+04	1.53E+04	2.94E+05
5/22/87	Clover	2	8	9.91	11.56	<5 cm	0.0135	9.93E+03	1.09E+04	6.33E+03	4.65E+03	1.21E+05
5/22/87	Clover	2	8	9.91	11.56	Soil	0.8133	2.10E+02	3.01E+02	1.36E+02	5.34E+02	6.88E+03
5/22/87	Clover	2	8	9.91	11.56	>5 cm B	0.0318	1.88E+04	1.67E+04	1.05E+04	5.76E+03	1.65E+05
5/22/87	Clover	2	8	9.91	11.56	Weeds	0.0022	1.27E+04	1.31E+04	9.54E+03	5.43E+03	1.53E+05
5/26/87	Fescue	2	9	8.20	4.78	>5 cm A	0.0030	1.01E+04	5.05E+03	8.99E+03	3.67E+03	8.77E+04
5/26/87	Fescue	2	9	8.20	4.78	<5 cm	0.0051	5.00E+03	5.69E+03	1.09E+04	4.48E+03	8.11E+04
5/26/87	Fescue	2	9	8.20	4.78	Soil	0.6945	1.05E+02	1.43E+02	1.85E+02	3.29E+02	1.96E+03
5/26/87	Fescue	2	9	8.20	4.78	>5 cm B	0.0206	7.59E+03	4.55E+03	8.37E+03	3.68E+03	6.85E+04
5/26/87	Fescue	2	9	8.20	4.78	Weeds	0.0017	1.88E+04	8.85E+03	1.72E+04	4.60E+03	1.01E+05
5/26/87	Fescue	2	11	8.20	24.60	>5 cm A	0.0034	3.70E+04	2.53E+04	5.46E+04	7.20E+03	2.65E+05
5/26/87	Fescue	2	11	8.20	24.60	<5 cm	0.0060	3.24E+04	2.54E+04	6.08E+04	4.92E+03	2.86E+05
5/26/87	Fescue	2	11	8.20	24.60	Soil	0.9120	4.38E+02	4.44E+02	9.42E+02	8.79E+02	7.88E+03
5/26/87	Fescue	2	11	8.20	24.60	>5 cm B	0.0188	3.11E+04	2.00E+04	3.52E+04	6.54E+03	2.96E+05
5/26/87	Fescue	2	11	8.20	24.60	Weeds	0.0037	4.45E+04	3.06E+04	5.58E+04	7.00E+03	2.44E+05
5/26/87	Fescue	2	13	8.20	4.78	>5 cm A	0.0067	1.22E+04	3.85E+03	1.06E+04	4.16E+03	7.59E+04
5/26/87	Fescue	2	13	8.20	4.78	<5 cm	0.0058	9.23E+03	5.44E+03	9.94E+03	4.37E+03	6.82E+04
5/26/87	Fescue	2	13	8.20	4.78	Soil	0.8720	6.38E+01	4.65E+01	8.44E+01	1.62E+02	8.37E+02
5/26/87	Fescue	2	13	8.20	4.78	>5 cm B	0.0207	8.47E+03	4.50E+03	1.21E+04	5.40E+03	9.06E+04
5/26/87	Fescue	2	13	8.20	4.78	Weeds	0.0019	1.27E+04	4.98E+03	1.12E+04	6.12E+03	9.49E+04
5/26/87	Fescue	2	15	8.20	24.60	>5 cm A	0.0034	1.92E+04	1.18E+04	2.49E+04	5.28E+03	1.67E+05
5/26/87	Fescue	2	15	8.20	24.60	<5 cm	0.0060	3.67E+04	1.94E+04	4.53E+04	5.01E+03	2.20E+05
5/26/87	Fescue	2	15	8.20	24.60	Soil	0.7970	4.92E+02	3.04E+02	7.94E+02	6.57E+02	5.31E+03
5/26/87	Fescue	2	15	8.20	24.60	>5 cm B	0.0280	3.13E+04	1.34E+04	3.04E+04	5.02E+03	1.96E+05
5/26/87	Fescue	2	15	8.20	24.60	Weeds	0.0020	3.25E+04	1.46E+04	3.68E+04	5.06E+03	1.77E+05
5/28/87	Mixed	2	19	10.00	30.00	>5 cm A	0.0092	3.98E+04	1.50E+04	3.10E+04	4.97E+03	2.01E+05
5/28/87	Mixed	2	19	10.00	30.00	<5 cm	0.0312	2.84E+04	1.28E+04	2.34E+04	5.43E+03	1.58E+05
5/28/87	Mixed	2	19	10.00	30.00	Soil	0.3306	1.56E+03	9.24E+02	1.80E+03	9.17E+02	1.53E+04
5/28/87	Mixed	2	19	10.00	30.00	>5 cm B	0.0692	4.14E+04	1.40E+04	2.66E+04	4.47E+03	1.84E+05
5/28/87	Mixed	2	21	10.00	5.55	>5 cm A	0.0121	6.17E+03	2.32E+03	3.72E+03	3.83E+03	4.72E+04
5/28/87	Mixed	2	21	10.00	5.55	<5 cm	0.0242	5.82E+03	2.26E+03	4.42E+03	5.57E+03	4.82E+04
5/28/87	Mixed	2	21	10.00	5.55	Soil	1.0081	2.43E+01	1.81E+01	4.70E+01	7.46E+01	5.02E+02
5/28/87	Mixed	2	21	10.00	5.55	>5 cm B	0.0256	1.06E+04	3.44E+03	8.99E+03	6.19E+03	7.48E+04
5/28/87	Mixed	2	23	10.00	30.00	>5 cm A	0.0041	2.68E+04	7.52E+03	1.74E+04	6.53E+03	1.27E+05
5/28/87	Mixed	2	23	10.00	30.00	<5 cm	0.0905	9.27E+03	3.52E+03	8.26E+03	4.18E+03	6.93E+04
5/28/87	Mixed	2	23	10.00	30.00	Soil	1.0516	8.20E+01	8.39E+01	1.44E+02	4.95E+02	2.49E+03
5/28/87	Mixed	2	23	10.00	30.00	>5 cm B	0.0337	2.91E+04	9.33E+03	2.16E+04	6.20E+03	1.41E+05
5/28/87	Mixed	2	25	10.00	5.55	>5 cm A	0.0024	4.54E+03	3.36E+03	6.76E+03	4.83E+03	5.89E+04
5/28/87	Mixed	2	25	10.00	5.55	<5 cm	0.0595	1.97E+03	1.31E+03	2.86E+03	2.53E+02	2.31E+04
5/28/87	Mixed	2	25	10.00	5.55	Soil	0.9313	4.00E+01	1.61E+01	3.19E+01	8.52E+01	3.50E+02
5/28/87	Mixed	2	25	10.00	5.55	>5 cm B	0.0233	1.23E+04	5.22E+03	1.22E+04	7.31E+03	9.35E+04
6/22/87	Clover	2	30	12.00	20.00	>5 cm A	0.0142	2.65E+05	1.77E+05	1.92E+05	9.54E+03	2.87E+05
6/22/87	Clover	2	30	12.00	20.00	<5 cm	0.0040	1.88E+05	1.28E+05	1.60E+05	9.10E+03	2.54E+05
6/22/87	Clover	2	30	12.00	20.00	Soil	1.1563	1.71E+03	1.65E+03	1.60E+03	5.17E+02	3.82E+03
6/22/87	Clover	2	30	12.00	20.00	>5 cm B	0.0654	3.15E+05	1.78E+05	2.04E+05	1.07E+04	3.25E+05
6/22/87	Clover	2	30	12.00	20.00	Weeds	0.0036	2.79E+05	1.34E+05	1.72E+05	6.12E+03	3.11E+05
6/22/87	Clover	2	32	12.00	10.00	>5 cm A	0.0055	2.86E+05	1.80E+05	1.82E+05	1.18E+04	1.90E+05
6/22/87	Clover	2	32	12.00	10.00	<5 cm	0.0059	2.86E+05	2.20E+05	2.37E+05	1.28E+04	3.44E+05
6/22/87	Clover	2	32	12.00	10.00	Soil	1.2258	2.37E+03	1.91E+03	2.08E+03	5.57E+02	5.09E+03
6/22/87	Clover	2	32	12.00	10.00	>5 cm B	0.0304	2.00E+05	1.29E+05	1.42E+05	1.02E+04	1.40E+05
6/22/87	Clover	2	32	12.00	10.00	Weeds	0.0030	1.50E+05	5.89E+04	7.33E+04	4.41E+03	1.06E+05
6/22/87	Clover	2	34	12.00	5.00	>5 cm A	0.0058	6.78E+04	9.34E+04	8.02E+04	8.34E+03	9.12E+04
6/22/87	Clover	2	34	12.00	5.00	<5 cm	0.0116	8.25E+04	1.35E+05	1.21E+05	1.57E+04	1.97E+05
6/22/87	Clover	2	34	12.00	5.00	Soil	1.2370	3.76E+02	8.41E+02	6.44E+02	2.71E+02	1.59E+03
6/22/87	Clover	2	34	12.00	5.00	>5 cm B	0.0428	6.21E+04	9.08E+04	7.61E+04	8.08E+03	1.01E+05
6/22/87	Clover	2	34	12.00	5.00	Weeds	0.0017	4.64E+04	6.93E+04	7.08E+04	7.83E+03	1.33E+05

Table A.V.1 (cont.)

Vegetation				Intensity	Rain	Sample	Mass	Bq/kg				
Date	Type	Sim	Plot	(cm/h)	(mm)	Type	(kg, dry)	25 µm	3 µm	9 µm	^{131}I	^{7}Be
6/22/87	Clover	2	36	12.00	2.50	>5 cm A	0.0122	7.12E+04	8.94E+04	7.90E+04	1.39E+04	1.33E+05
6/22/87	Clover	2	36	12.00	2.50	<5 cm	0.0070	4.73E+04	7.03E+04	5.55E+04	1.53E+04	1.30E+05
6/22/87	Clover	2	36	12.00	2.50	Soil	0.9840	2.75E+02	5.48E+02	4.39E+02	1.85E+02	7.04E+02
6/22/87	Clover	2	36	12.00	2.50	>5 cm B	0.0511	4.60E+04	5.90E+04	5.15E+04	8.82E+03	8.40E+04
6/22/87	Clover	2	36	12.00	2.50	Weeds	0.0017	6.15E+04	5.94E+04	5.22E+04	7.16E+03	9.34E+04
6/24/87	Fescue	2	38	11.60	2.42	>5 cm A	0.0147	7.14E+04	5.95E+04	4.03E+04	6.44E+03	6.77E+04
6/24/87	Fescue	2	38	11.60	2.42	<5 cm	0.0071	2.80E+04	2.58E+04	2.23E+04	2.38E+03	2.59E+04
6/24/87	Fescue	2	38	11.60	2.42	Soil	0.7652	5.24E+02	7.59E+02	4.67E+02	2.00E+02	1.14E+03
6/24/87	Fescue	2	38	11.60	2.42	>5 cm B	0.0582	6.02E+04	4.49E+04	3.80E+04	4.06E+03	5.56E+04
6/24/87	Fescue	2	38	11.60	2.42	Weeds	0.0028	8.21E+04	4.99E+04	4.72E+04	3.92E+03	7.52E+04
6/24/87	Fescue	2	40	11.60	4.83	>5 cm A	0.0097	8.61E+04	9.92E+04	8.39E+04	6.22E+03	1.07E+05
6/24/87	Fescue	2	40	11.60	4.83	<5 cm	0.0050	3.72E+04	5.08E+04	4.16E+04	3.72E+03	5.32E+04
6/24/87	Fescue	2	40	11.60	4.83	Soil	1.4424	2.59E+02	5.88E+02	3.97E+02	1.48E+02	9.78E+02
6/24/87	Fescue	2	40	11.60	4.83	>5 cm B	0.0603	8.45E+04	9.04E+04	7.75E+04	6.45E+03	1.07E+05
6/24/87	Fescue	2	40	11.60	4.83	Weeds	0.0069	9.21E+04	7.85E+04	7.35E+04	4.22E+03	7.94E+04
6/24/87	Fescue	2	42	11.60	9.67	>5 cm A	0.0193	2.04E+05	1.21E+05	1.05E+05	5.51E+03	1.29E+05
6/24/87	Fescue	2	42	11.60	9.67	<5 cm	0.0069	2.09E+05	1.40E+05	1.35E+05	3.96E+03	9.73E+04
6/24/87	Fescue	2	42	11.60	9.67	Soil	1.5989	2.01E+03	1.98E+03	1.55E+03	4.43E+02	3.70E+03
6/24/87	Fescue	2	42	11.60	9.67	>5 cm B	0.0510	2.36E+05	1.43E+05	1.38E+05	5.62E+03	1.46E+05
6/24/87	Fescue	2	42	11.60	9.67	Weeds	0.0078	3.36E+05	1.43E+05	1.61E+05	4.60E+03	1.44E+05
6/24/87	Fescue	2	44	11.60	19.33	>5 cm A	0.0118	4.89E+05	3.36E+05	3.16E+05	5.30E+03	2.95E+05
6/24/87	Fescue	2	44	11.60	19.33	<5 cm	0.0070	3.55E+05	2.54E+05	2.36E+05	5.00E+03	1.99E+05
6/24/87	Fescue	2	44	11.60	19.33	Soil	1.5082	3.28E+03	2.87E+03	2.40E+03	5.22E+02	6.80E+03
6/24/87	Fescue	2	44	11.60	19.33	>5 cm B	0.0512	3.96E+05	2.54E+05	2.39E+05	7.14E+03	2.67E+05
6/24/87	Fescue	2	44	11.60	19.33	Weeds	0.0079	4.73E+05	2.04E+05	2.38E+05	3.55E+03	2.17E+05
6/24/87	Mixed	2	46	11.60	19.33	>5 cm A	0.0161	3.44E+05	2.23E+05	1.90E+05	8.00E+03	2.64E+05
6/24/87	Mixed	2	46	11.60	19.33	<5 cm	0.0285	2.17E+05	1.51E+05	1.37E+05	8.31E+03	2.21E+05
6/24/87	Mixed	2	46	11.60	19.33	Soil	0.8232	3.86E+03	4.96E+03	3.99E+03	1.12E+03	1.20E+04
6/24/87	Mixed	2	46	11.60	19.33	>5 cm B	0.0643	1.84E+05	1.21E+05	1.01E+05	4.90E+03	1.85E+05
6/24/87	Mixed	2	48	11.60	9.67	>5 cm A	0.0155	1.91E+05	1.26E+05	1.07E+05	8.63E+03	1.60E+05
6/24/87	Mixed	2	48	11.60	9.67	<5 cm	0.0419	7.55E+04	5.53E+04	4.42E+04	4.25E+03	6.73E+04
6/24/87	Mixed	2	48	11.60	9.67	Soil	0.9424	1.30E+03	1.69E+03	1.10E+03	4.82E+02	2.65E+03
6/24/87	Mixed	2	48	11.60	9.67	>5 cm B	0.0477	1.34E+05	8.28E+04	6.94E+04	4.72E+03	1.17E+05
6/24/87	Mixed	2	50	11.60	4.83	>5 cm A	0.0095	1.28E+05	9.39E+04	7.45E+04	8.25E+03	1.20E+05
6/24/87	Mixed	2	50	11.60	4.83	<5 cm	0.0257	6.00E+04	5.10E+04	3.71E+04	7.13E+03	5.91E+04
6/24/87	Mixed	2	50	11.60	4.83	Soil	0.8678	5.46E+02	7.62E+02	4.43E+02	1.98E+02	1.12E+03
6/24/87	Mixed	2	50	11.60	4.83	>5 cm B	0.0642	8.57E+04	5.63E+04	4.68E+04	4.98E+03	7.39E+04
6/24/87	Mixed	2	52	11.60	2.42	>5 cm A	0.0131	6.14E+04	6.44E+04	3.75E+04	8.36E+03	8.40E+04
6/24/87	Mixed	2	52	11.60	2.42	<5 cm	0.0274	1.73E+04	2.50E+04	1.63E+04	4.17E+03	3.12E+04
6/24/87	Mixed	2	52	11.60	2.42	Soil	0.8227	1.62E+02	3.50E+02	1.86E+02	1.09E+02	5.08E+02
6/24/87	Mixed	2	52	11.60	2.42	>5 cm B	0.0613	4.70E+04	4.82E+04	3.39E+04	5.99E+03	6.75E+04
7/29/87	Clover	2	53	6.50	15.06	>5 cm A	0.0176	1.67E+05	7.77E+04	5.13E+04	6.12E+03	1.39E+05
7/29/87	Clover	2	53	6.50	15.06	<5 cm	0.0310	1.03E+05	5.80E+04	4.26E+04	6.80E+03	1.04E+05
7/29/87	Clover	2	53	6.50	15.06	Soil	0.9186	1.59E+03	1.61E+03	1.21E+03	5.60E+02	3.09E+03
7/29/87	Clover	2	53	6.50	15.06	>5 cm B	0.0585	1.88E+05	7.57E+04	5.70E+04	5.93E+03	1.32E+05
7/29/87	Clover	2	55	6.50	9.97	>5 cm A	0.0112	9.46E+04	4.71E+04	2.52E+04	5.81E+03	9.69E+04
7/29/87	Clover	2	55	6.50	9.97	<5 cm	0.0396	6.30E+04	3.40E+04	1.92E+04	6.60E+03	6.82E+04
7/29/87	Clover	2	55	6.50	9.97	Soil	1.3986	4.60E+02	6.02E+02	2.18E+02	3.19E+02	1.15E+03
7/29/87	Clover	2	55	6.50	9.97	>5 cm B	0.0619	1.14E+05	5.13E+04	2.95E+04	5.94E+03	1.12E+05
7/29/87	Clover	2	57	6.50	4.98	>5 cm A	0.0174	5.95E+04	2.91E+04	1.36E+04	7.24E+03	6.20E+04
7/29/87	Clover	2	57	6.50	4.98	<5 cm	0.0148	1.64E+04	1.48E+04	5.39E+03	4.06E+03	2.72E+04
7/29/87	Clover	2	57	6.50	4.98	Soil	1.5266	1.41E+02	1.55E+02	7.64E+01	9.45E+01	2.77E+02
7/29/87	Clover	2	57	6.50	4.98	>5 cm B	0.0597	5.16E+04	2.54E+04	1.11E+04	4.98E+03	5.61E+04

Table A.V.1 (cont.)

Vegetation				Intensity	Rain	Sample	Mass	Bq/kg				
Date	Type	Sim	Plot	(cm/h)	(mm)	Type	(kg, dry)	25 µm	3 µm	9 µm	^{131}I	^{7}Be
7/29/87	Clover	2	59	6.50	0.98	>5 cm A	0.0178	1.22E+04	1.34E+04	5.87E+03	5.37E+03	3.06E+04
7/29/87	Clover	2	59	6.50	0.98	<5 cm	0.0144	1.66E+03	3.56E+03	1.43E+03	1.57E+03	6.71E+03
7/29/87	Clover	2	59	6.50	0.98	Soil	0.4501	5.24E+01	6.07E+01	2.55E+01	2.84E+01	1.64E+02
7/29/87	Clover	2	59	6.50	0.98	>5 cm B	0.0734	1.02E+04	1.34E+04	5.43E+03	5.06E+03	2.67E+04
8/4/87	Fescue	2	61	6.00	1.00	>5 cm A	0.0079	8.59E+03	6.57E+03	2.16E+03	2.70E+03	2.90E+04
8/4/87	Fescue	2	61	6.00	1.00	<5 cm	0.0094	5.75E+03	3.62E+03	1.50E+03	1.69E+03	1.38E+04
8/4/87	Fescue	2	61	6.00	1.00	Soil	1.1221	5.93E+01	3.73E+01	1.38E+01	2.26E+01	1.34E+02
8/4/87	Fescue	2	61	6.00	1.00	>5 cm B	0.0556	1.39E+04	9.73E+03	2.80E+03	3.92E+03	3.90E+04
8/4/87	Fescue	2	63	6.00	10.00	>5 cm A	0.0105	5.23E+04	2.01E+04	6.28E+03	3.56E+03	1.13E+05
8/4/87	Fescue	2	63	6.00	10.00	<5 cm	0.0088	1.48E+04	9.77E+03	4.54E+03	2.85E+03	4.73E+04
8/4/87	Fescue	2	63	6.00	10.00	Soil	0.9211	2.87E+02	3.37E+02	8.26E+01	3.25E+02	1.38E+03
8/4/87	Fescue	2	63	6.00	10.00	>5 cm B	0.1057	6.31E+04	2.56E+04	7.72E+03	4.03E+03	1.75E+05
8/4/87	Fescue	2	65	6.00	1.00	>5 cm A	0.0103	3.64E+03	8.24E+03	3.34E+03	2.50E+03	2.35E+04
8/4/87	Fescue	2	65	6.00	1.00	<5 cm	0.0080	3.67E+03	4.39E+03	1.07E+03	1.70E+03	1.12E+04
8/4/87	Fescue	2	65	6.00	1.00	Soil	1.3402	2.11E+01	4.00E+01	9.40E+00	1.77E+01	1.14E+02
8/4/87	Fescue	2	65	6.00	1.00	>5 cm B	0.1058	5.27E+03	8.84E+03	2.29E+03	2.83E+03	2.96E+04
8/4/87	Fescue	2	67	6.00	10.00	>5 cm A	0.0071	7.45E+04	3.36E+04	1.17E+04	2.83E+03	1.27E+05
8/4/87	Fescue	2	67	6.00	10.00	<5 cm	0.0117	7.70E+04	3.25E+04	9.38E+03	2.58E+03	1.12E+05
8/4/87	Fescue	2	67	6.00	10.00	Soil	1.0416	9.53E+02	7.47E+02	2.30E+02	2.90E+02	1.98E+03
8/4/87	Fescue	2	67	6.00	10.00	>5 cm B	0.0412	1.53E+05	6.07E+04	1.83E+04	3.60E+03	2.63E+05
7/27/87	Mixed	2	70	5.70	9.98	>5 cm A	0.0234	8.98E+04	1.15E+05	6.57E+04	7.04E+02	1.07E+05
7/27/87	Mixed	2	70	5.70	9.98	<5 cm	0.0177	2.41E+04	3.77E+04	2.53E+04	4.66E+02	4.51E+04
7/27/87	Mixed	2	70	5.70	9.98	Soil	0.5469	1.47E+03	2.00E+03	1.22E+03	4.85E+01	3.98E+03
7/27/87	Mixed	2	70	5.70	9.98	>5 cm B	0.0941	1.20E+05	1.45E+05	8.34E+04	6.37E+02	1.32E+05
7/27/87	Mixed	2	72	5.70	9.98	>5 cm A	0.0043	4.82E+04	9.94E+04	4.73E+04	8.02E+02	1.61E+05
7/27/87	Mixed	2	72	5.70	9.98	<5 cm	0.0369	3.53E+04	4.34E+04	2.72E+04	5.26E+02	6.63E+04
7/27/87	Mixed	2	72	5.70	9.98	Soil	0.7816	1.16E+03	2.10E+03	1.23E+03	6.50E+01	3.67E+03
7/27/87	Mixed	2	72	5.70	9.98	>5 cm B	0.0878	6.74E+04	8.30E+04	4.54E+04	6.94E+02	1.63E+05
7/27/87	Mixed	2	74	5.70	9.98	>5 cm A	0.0217	1.18E+05	8.58E+04	4.97E+04	3.27E+02	1.28E+05
7/27/87	Mixed	2	74	5.70	9.98	<5 cm	0.0235	6.31E+04	6.05E+04	3.36E+04	8.10E+02	6.94E+04
7/27/87	Mixed	2	74	5.70	9.98	Soil	0.6268	2.03E+03	2.51E+03	1.51E+03	6.09E+01	4.81E+03
7/27/87	Mixed	2	74	5.70	9.98	>5 cm B	0.1164	1.08E+05	7.69E+04	4.65E+04	3.94E+02	1.21E+05
7/27/87	Mixed	2	76	5.70	9.98	>5 cm A	0.0116	9.20E+04	1.02E+05	6.10E+04	1.16E+03	2.38E+05
7/27/87	Mixed	2	76	5.70	9.98	<5 cm	0.0274	2.90E+04	4.44E+04	2.47E+04	6.57E+02	7.17E+04
7/27/87	Mixed	2	76	5.70	9.98	Soil	1.0861	5.75E+02	1.23E+03	5.66E+02	6.05E+01	1.74E+03
7/27/87	Mixed	2	76	5.70	9.98	>5 cm B	0.0865	7.72E+04	8.08E+04	5.02E+04	6.84E+02	2.40E+05
9/23/87	Clover	2	77	12.20	19.93	>5 cm A	0.0054	2.17E+05	1.24E+05	1.11E+05	1.59E+04	4.27E+05
9/23/87	Clover	2	77	12.20	19.93	<5 cm	0.0016	2.11E+05	1.15E+05	1.10E+05	1.39E+04	6.26E+05
9/23/87	Clover	2	77	12.20	19.93	Soil	1.9620	1.61E+03	1.61E+03	9.77E+02	5.95E+02	2.92E+03
9/23/87	Clover	2	77	12.20	19.93	>5 cm B	0.0195	3.01E+05	1.43E+05	1.13E+05	1.64E+04	9.90E+05
9/23/87	Clover	2	79	12.20	9.96	>5 cm A	0.0065	1.24E+05	8.04E+04	5.40E+04	9.68E+03	3.33E+05
9/23/87	Clover	2	79	12.20	9.96	<5 cm	0.0239	5.51E+04	4.26E+04	2.60E+04	1.01E+04	7.75E+04
9/23/87	Clover	2	79	12.20	9.96	Soil	1.8656	6.57E+02	1.24E+03	5.09E+02	3.79E+02	1.57E+03
9/23/87	Clover	2	79	12.20	9.96	>5 cm B	0.0256	1.55E+05	1.11E+05	6.90E+04	1.39E+04	4.81E+05
9/23/87	Clover	2	81	12.20	4.98	>5 cm A	0.0037	4.33E+04	8.73E+04	5.50E+04	1.41E+04	2.08E+05
9/23/87	Clover	2	81	12.20	4.98	<5 cm	0.0299	7.14E+03	1.78E+04	9.34E+03	4.97E+03	3.23E+04
9/23/87	Clover	2	81	12.20	4.98	Soil	2.1986	6.08E+01	2.54E+02	1.07E+02	7.13E+01	3.19E+02
9/23/87	Clover	2	81	12.20	4.98	>5 cm B	0.0213	7.58E+04	1.19E+05	6.06E+04	1.90E+04	3.16E+05
9/23/87	Clover	2	83	12.20	2.50	>5 cm A	0.0033	3.73E+04	4.78E+04	2.15E+04	1.04E+04	1.29E+05
9/23/87	Clover	2	83	12.20	2.50	<5 cm	0.0052	1.14E+04	3.09E+04	1.18E+04	7.81E+03	5.79E+04
9/23/87	Clover	2	83	12.20	2.50	Soil	1.4214	1.70E+02	2.90E+02	1.18E+02	8.47E+01	3.59E+02
9/23/87	Clover	2	83	12.20	2.50	>5 cm B	0.0176	4.01E+04	5.69E+04	3.11E+04	1.28E+04	1.42E+05

Table A.V.1 (cont.)

Vegetation				Intensity	Rain	Sample	Mass	Bq/kg				
Date	Type	Sim	Plot	(cm/h)	(mm)	Type	(kg, dry)	25 µm	3 µm	9 µm	^{131}I	^{7}Be
9/23/87	Fescue	2	86	12.20	19.93	>5 cm A	0.0076	1.20E+05	7.37E+04	7.48E+04	8.26E+03	4.72E+05
9/23/87	Fescue	2	86	12.20	19.93	<5 cm	0.0112	1.73E+05	1.14E+05	1.08E+05	1.23E+04	2.54E+05
9/23/87	Fescue	2	86	12.20	19.93	Soil	2.2651	1.02E+03	1.57E+03	1.05E+03	4.15E+02	1.66E+03
9/23/87	Fescue	2	86	12.20	19.93	>5 cm B	0.0392	1.49E+05	9.90E+04	9.53E+04	1.00E+04	4.64E+05
9/23/87	Fescue	2	88	12.20	9.96	>5 cm A	0.0050	1.27E+05	7.80E+04	7.68E+04	8.72E+03	2.59E+05
9/23/87	Fescue	2	88	12.20	9.96	<5 cm	0.0073	1.15E+05	7.45E+04	7.97E+04	9.03E+03	1.80E+05
9/23/87	Fescue	2	88	12.20	9.96	Soil	2.0123	1.08E+03	1.53E+03	1.17E+03	3.59E+02	1.42E+03
9/23/87	Fescue	2	88	12.20	9.96	>5 cm B	0.0252	1.61E+05	1.15E+05	1.13E+05	1.37E+04	3.71E+05
9/23/87	Fescue	2	90	12.20	4.98	>5 cm A	0.0032	5.44E+04	4.79E+04	3.83E+04	6.43E+03	1.34E+05
9/23/87	Fescue	2	90	12.20	4.98	<5 cm	0.0106	4.89E+04	5.40E+04	4.95E+04	7.54E+03	9.03E+04
9/23/87	Fescue	2	90	12.20	4.98	Soil	1.6364	2.77E+02	5.74E+02	3.82E+02	1.55E+02	5.66E+02
9/23/87	Fescue	2	90	12.20	4.98	>5 cm B	0.0259	6.53E+04	6.02E+04	5.72E+04	8.31E+03	1.51E+05
9/23/87	Fescue	2	92	12.20	2.50	>5 cm A	0.0061	1.71E+04	3.04E+04	2.35E+04	4.42E+03	6.36E+04
9/23/87	Fescue	2	92	12.20	2.50	<5 cm	0.0120	8.01E+03	2.31E+04	1.47E+04	4.84E+03	3.44E+04
9/23/87	Fescue	2	92	12.20	2.50	Soil	1.2264	1.03E+02	2.26E+02	1.56E+02	6.46E+01	3.25E+02
9/23/87	Fescue	2	92	12.20	2.50	>5 cm B	0.0197	2.65E+04	6.15E+04	4.25E+04	1.03E+04	1.16E+05

[a] >5 cm A = All vegetation greater than 5 cm tall from a 500-cm^2 subplot.
[b] <5 cm = All vegetation less than 5 cm tall from a 500-cm^2 subplot.
[c] All soil from a 500-cm^2 subplot to a depth of 5 cm.
[d] >5 cm B = All vegetation greater than 5 cm tall from a 0.33 m circle excluding 500-cm^2 subplot.
[e] All weeds greater than 5 cm tall taken from a 0.33 m circle excluding 500-cm^2 subplot.
ND = not detected.

Table A.V.2. Calculated concentration of radionuclides in simulated rain applied to field plots during interception study.

Date	Vegetation Type	Plot	Bq/L 25 μm[a b]	3 μm[a c]	9 μm[a d]	^{131}I	^{7}Be
5/21/87	Clover	1	4.55E+03	5.50E+03	7.61E+03	5.56E+03	5.01E+04
5/22/87	Clover	2	2.02E+03	2.41E+03	3.34E+03	2.29E+03	2.22E+04
5/21/87	Clover	3	4.55E+03	5.50E+03	7.61E+03	5.56E+03	5.01E+04
5/22/87	Clover	4	2.02E+03	2.41E+03	3.34E+03	2.29E+03	2.22E+04
5/22/87	Clover	5	2.02E+03	2.41E+03	3.34E+03	2.29E+03	2.22E+04
5/22/87	Clover	6	2.02E+03	2.41E+03	3.34E+03	2.29E+03	2.22E+04
5/22/87	Clover	7	2.02E+03	2.41E+03	3.34E+03	2.29E+03	2.22E+04
5/22/87	Clover	8	2.02E+03	2.41E+03	3.34E+03	2.29E+03	2.22E+04
5/26/87	Fescue	9	2.05E+03	2.48E+03	3.40E+03	2.59E+03	1.68E+04
5/26/87	Fescue	10	2.05E+03	2.48E+03	3.40E+03	2.59E+03	1.68E+04
5/26/87	Fescue	11	2.05E+03	2.48E+03	3.40E+03	2.59E+03	1.68E+04
5/26/87	Fescue	12	2.05E+03	2.48E+03	3.40E+03	2.59E+03	1.68E+04
5/26/87	Fescue	13	2.05E+03	2.48E+03	3.40E+03	2.59E+03	1.68E+04
5/26/87	Fescue	14	2.05E+03	2.48E+03	3.40E+03	2.59E+03	1.68E+04
5/26/87	Fescue	15	2.05E+03	2.48E+03	3.40E+03	2.59E+03	1.68E+04
5/26/87	Fescue	16	2.05E+03	2.48E+03	3.40E+03	2.59E+03	1.68E+04
5/28/87	Mixed	19	2.01E+03	2.37E+03	3.27E+03	2.18E+03	1.64E+04
5/28/87	Mixed	20	2.01E+03	2.37E+03	3.27E+03	2.18E+03	1.64E+04
5/28/87	Mixed	21	2.01E+03	2.37E+03	3.27E+03	2.18E+03	1.64E+04
5/28/87	Mixed	22	2.01E+03	2.37E+03	3.27E+03	2.18E+03	1.64E+04
5/28/87	Mixed	23	2.01E+03	2.37E+03	3.27E+03	2.18E+03	1.64E+04
5/28/87	Mixed	24	2.01E+03	2.37E+03	3.27E+03	2.18E+03	1.64E+04
5/28/87	Mixed	25	2.01E+03	2.37E+03	3.27E+03	2.18E+03	1.64E+04
5/28/87	Mixed	26	2.01E+03	2.37E+03	3.27E+03	2.18E+03	1.64E+04
6/22/87	Clover	29	2.89E+04	2.05E+04	2.26E+04	3.30E+03	2.41E+04
6/22/87	Clover	30	2.89E+04	2.05E+04	2.26E+04	3.30E+03	2.41E+04
6/22/87	Clover	31	2.89E+04	2.05E+04	2.26E+04	3.30E+03	2.41E+04
6/22/87	Clover	32	2.89E+04	2.05E+04	2.26E+04	3.30E+03	2.41E+04
6/22/87	Clover	33	2.89E+04	2.05E+04	2.26E+04	3.30E+03	2.41E+04
6/22/87	Clover	34	2.89E+04	2.05E+04	2.26E+04	3.30E+03	2.41E+04
6/22/87	Clover	35	2.89E+04	2.05E+04	2.26E+04	3.30E+03	2.41E+04
6/22/87	Clover	36	2.89E+04	2.05E+04	2.26E+04	3.30E+03	2.41E+04

Table A.V.2 (cont.)

Date	Vegetation Type	Plot	Bq/L 25 µm	3 µm	9 µm	^{131}I	^{7}Be
6/24/87	Fescue	37	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
6/24/87	Fescue	38	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
6/24/87	Fescue	39	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
6/24/87	Fescue	40	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
6/24/87	Fescue	41	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
6/24/87	Fescue	42	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
6/24/87	Fescue	43	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
6/24/87	Fescue	44	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
6/24/87	Mixed	45	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
6/24/87	Mixed	46	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
6/24/87	Mixed	47	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
6/24/87	Mixed	48	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
6/24/87	Mixed	49	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
6/24/87	Mixed	50	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
6/24/87	Mixed	51	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
6/24/87	Mixed	52	2.54E+04	1.70E+04	1.96E+04	2.77E+03	2.11E+04
7/29/87	Clover	53	1.21E+04	7.89E+03	6.66E+03	2.59E+03	1.37E+04
7/29/87	Clover	54	1.21E+04	7.89E+03	6.66E+03	2.59E+03	1.37E+04
7/29/87	Clover	55	1.21E+04	7.89E+03	6.66E+03	2.59E+03	1.37E+04
7/29/87	Clover	56	1.21E+04	7.89E+03	6.66E+03	2.59E+03	1.37E+04
7/29/87	Clover	57	1.21E+04	7.89E+03	6.66E+03	2.59E+03	1.37E+04
7/29/87	Clover	58	1.21E+04	7.89E+03	6.66E+03	2.59E+03	1.37E+04
7/29/87	Clover	59	1.21E+04	7.89E+03	6.66E+03	2.59E+03	1.37E+04
7/29/87	Clover	60	1.21E+04	7.89E+03	6.66E+03	2.59E+03	1.37E+04
8/4/87	Fescue	61	1.13E+04	6.93E+03	5.74E+03	1.55E+03	1.27E+04
8/4/87	Fescue	62	1.13E+04	6.93E+03	5.74E+03	1.55E+03	1.27E+04
8/4/87	Fescue	63	1.13E+04	6.93E+03	5.74E+03	1.55E+03	1.27E+04
8/4/87	Fescue	64	1.13E+04	6.93E+03	5.74E+03	1.55E+03	1.27E+04
8/4/87	Fescue	65	1.13E+04	6.93E+03	5.74E+03	1.55E+03	1.27E+04
8/4/87	Fescue	66	1.13E+04	6.93E+03	5.74E+03	1.55E+03	1.27E+04
8/4/87	Fescue	67	1.13E+04	6.93E+03	5.74E+03	1.55E+03	1.27E+04
8/4/87	Fescue	68	1.13E+04	6.93E+03	5.74E+03	1.55E+03	1.27E+04
7/27/87	Mixed	69	1.90E+04	1.27E+04	1.08E+04	4.03E+02	2.17E+04
7/27/87	Mixed	70	1.90E+04	1.27E+04	1.08E+04	4.03E+02	2.17E+04
7/27/87	Mixed	71	1.90E+04	1.27E+04	1.08E+04	4.03E+02	2.17E+04
7/27/87	Mixed	72	1.90E+04	1.27E+04	1.08E+04	4.03E+02	2.17E+04

Table A.V.2 (cont.)

Date	Vegetation Type	Plot	Bq/L 25 µm	3 µm	9 µm	^{131}I	^{7}Be
7/27/87	Mixed	73	1.90E+04	1.27E+04	1.08E+04	4.03E+02	2.17E+04
7/27/87	Mixed	74	1.90E+04	1.27E+04	1.08E+04	4.03E+02	2.17E+04
7/27/87	Mixed	75	1.90E+04	1.27E+04	1.08E+04	4.03E+02	2.17E+04
7/27/87	Mixed	76	1.90E+04	1.27E+04	1.08E+04	4.03E+02	2.17E+04
9/23/87	Clover	77	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04
9/23/87	Clover	78	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04
9/23/87	Clover	79	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04
9/23/87	Clover	80	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04
9/23/87	Clover	81	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04
9/23/87	Clover	82	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04
9/23/87	Clover	83	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04
9/23/87	Clover	84	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04
9/23/87	Fescue	85	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04
9/23/87	Fescue	86	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04
9/23/87	Fescue	87	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04
9/23/87	Fescue	88	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04
9/23/87	Fescue	89	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04
9/23/87	Fescue	90	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04
9/23/87	Fescue	91	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04
9/23/87	Fescue	92	1.90E+04	1.58E+04	1.90E+04	3.01E+03	2.08E+04

[a] Values for microspheres are calculated based on simple dilution with water; they have not been adjusted to account for the effect of retention of the microspheres in the simulator.
[b] 25-µm microspheres were labeled with ^{85}Sr.
[c] 3-µm microspheres were labeled with ^{141}Ce.
[d] 9-µm microspheres were labeled with ^{95}Nb.

APPENDIX VI.

INTERCEPTION FRACTIONS FOR VEGETATION AND SOIL COLLECTED DURING INTERCEPTION STUDY

Table A.VI.1. Interception fractions (r) for vegetation >5 cm above soil.

Vegetation Type	Sim	Plot	Intensity (cm/h)	Rain (mm)	Interception Fraction (r) 25 μm[a]	3 μm[a]	9 μm[a]	^{131}I[b]	^{7}Be[b]
Clover	1	1	1.75	1.02	c	c	c	0.204	0.214
Clover	1	3	1.75	1.02	c	c	c	0.263	0.288
Clover	1	5	1.36	4.08	c	c	c	0.106	0.261
Clover	1	7	1.36	4.08	c	c	c	0.091	0.229
Fescue	1	10	1.62	4.86	0.202	0.128	0.126	0.023	0.123
Fescue	1	12	1.62	0.95	0.625	0.431	0.532	0.155	0.265
Fescue	1	14	1.62	4.86	0.312	0.342	0.363	0.025	0.147
Fescue	1	16	1.62	0.95	0.494	0.340	0.292	0.173	0.265
Mixed	1	20	1.87	1.04	0.216	0.242	0.266	0.212	0.296
Mixed	1	22	1.87	5.61	0.570	0.449	0.453	0.089	0.224
Mixed	1	24	1.87	1.04	0.055	0.120	0.164	0.053	0.065
Mixed	1	26	1.87	5.61	0.443	0.396	0.425	0.113	0.320
Clover	1	29	3.00	20.00	0.337	0.258	0.258	0.020	0.117
Clover	1	31	3.00	10.00	0.509	0.492	0.463	0.054	0.190
Clover	1	33	3.00	5.00	0.252	0.222	0.210	0.068	0.204
Clover	1	35	3.00	2.50	0.228	0.216	0.208	0.162	0.207
Fescue	1	37	2.90	2.42	0.364	0.310	0.309	0.108	0.260
Fescue	1	39	2.90	4.83	0.386	0.293	0.314	0.102	0.426
Fescue	1	41	2.90	9.67	0.403	0.315	0.340	0.047	0.264
Fescue	1	43	2.90	19.33	0.486	0.662	0.411	0.024	0.198
Mixed	1	45	2.90	19.33	0.350	0.291	0.303	0.018	0.166
Mixed	1	47	2.90	9.67	0.424	0.346	0.370	0.050	0.255
Mixed	1	49	2.90	5.32	0.349	0.277	0.285	0.077	0.189
Mixed	1	51	2.90	2.42	0.552	0.444	0.440	0.143	0.301
Clover	1	54	1.40	15.21	0.561	0.434	0.491	0.061	0.319
Clover	1	56	1.40	10.15	0.409	0.338	0.358	0.058	0.449
Clover	1	58	1.40	5.06	0.394	0.348	0.388	0.178	0.702
Clover	1	60	1.40	1.00	0.647	0.618	0.628	0.577	0.804
Fescue	1	62	1.59	1.01	0.379	0.352	0.372	0.342	0.552
Fescue	1	64	1.59	10.07	0.554	0.432	0.459	0.073	0.556
Fescue	1	66	1.59	1.01	0.481	0.486	0.557	0.449	0.867
Fescue	1	68	1.59	10.07	0.195	0.156	0.169	0.024	0.240
Mixed	1	69	2.40	10.00	0.503	0.467	0.474	0.056	0.252
Mixed	1	71	2.40	10.00	0.458	0.387	0.412	0.066	0.316
Mixed	1	73	2.40	10.00	0.677	0.504	0.565	0.052	0.326
Mixed	1	75	2.40	10.00	0.355	0.285	0.325	0.044	0.367

Table A.VI.1 (cont.)

Vegetation Type	Sim	Plot	Intensity (cm/h)	Rain (mm)	Interception Fraction (r) 25 µm	3 µm	9 µm	^{131}I	^{7}Be
Clover	1	78	3.20	20.00	0.227	0.116	0.170	0.026	0.272
Clover	1	80	3.20	10.00	0.211	0.131	0.178	0.048	0.308
Clover	1	82	3.20	5.00	0.373	0.203	0.286	0.092	0.316
Clover	1	84	3.20	2.50	0.384	0.303	0.344	0.166	0.300
Fescue	1	85	3.20	20.00	0.350	0.164	0.238	0.040	0.297
Fescue	1	87	3.20	10.00	0.459	0.277	0.371	0.057	0.317
Fescue	1	89	3.20	5.00	0.396	0.292	0.339	0.151	0.389
Fescue	1	91	3.20	2.50	0.308	0.224	0.228	0.124	0.270
Clover	2	2	9.91	29.73	0.168	0.143	0.134	0.006	0.033
Clover	2	4	9.91	4.13	0.364	0.336	0.381	0.057	0.126
Clover	2	6	9.91	4.13	0.340	0.225	0.249	0.069	0.132
Clover	2	8	9.91	11.56	0.283	0.223	0.235	0.027	0.074
Fescue	2	9	8.20	4.78	0.235	0.106	0.128	0.021	0.062
Fescue	2	11	8.20	24.60	0.175	0.134	0.132	0.007	0.047
Fescue	2	13	8.20	4.78	0.427	0.264	0.351	0.034	0.089
Fescue	2	15	8.20	24.60	0.096	0.101	0.085	0.007	0.044
Mixed	2	19	10.00	30.00	0.207	0.164	0.177	0.016	0.089
Mixed	2	21	10.00	5.55	0.311	0.278	0.226	0.051	0.082
Mixed	2	23	10.00	30.00	0.106	0.070	0.073	0.011	0.032
Mixed	2	25	10.00	5.55	0.066	0.080	0.075	0.045	0.076
Clover	2	30	12.00	20.00	0.579	0.510	0.523	0.038	0.158
Clover	2	32	12.00	10.00	0.255	0.215	0.202	0.034	0.066
Clover	2	34	12.00	5.00	0.217	0.172	0.174	0.072	0.121
Clover	2	36	12.00	2.50	0.591	0.514	0.540	0.226	0.295
Fescue	2	38	11.60	2.42	0.636	0.534	0.535	0.148	0.249
Fescue	2	40	11.60	4.83	0.599	0.466	0.510	0.101	0.221
Fescue	2	42	11.60	9.67	0.459	0.361	0.372	0.044	0.146
Fescue	2	44	11.60	19.33	0.437	0.394	0.415	0.024	0.126
Mixed	2	46	11.60	19.33	0.372	0.300	0.299	0.025	0.119
Mixed	2	48	11.60	9.67	0.403	0.332	0.364	0.040	0.118
Mixed	2	50	11.60	4.83	0.376	0.312	0.346	0.089	0.173
Mixed	2	52	11.60	2.42	0.569	0.465	0.451	0.213	0.308
Clover	2	53	6.50	15.06	0.388	0.294	0.271	0.035	0.147
Clover	2	55	6.50	9.97	0.252	0.194	0.210	0.050	0.176
Clover	2	57	6.50	4.98	0.693	0.527	0.546	0.098	0.194
Clover	2	59	6.50	0.98	0.820	0.752	0.765	0.554	0.562

Table A.VI.1 (cont.)

Vegetation Type	Sim	Plot	Intensity (cm/h)	Rain (mm)	Interception Fraction (r) 25 µm	3 µm	9 µm	^{131}I	^{7}Be
Fescue	2	61	6.00	1.00	0.360	0.406	0.366	0.465	0.567
Fescue	2	63	6.00	10.00	0.582	0.347	0.362	0.090	0.466
Fescue	2	65	6.00	1.00	0.394	0.489	0.620	0.631	0.796
Fescue	2	67	6.00	10.00	0.218	0.171	0.193	0.033	0.277
Mixed	2	70	5.70	9.98	0.630	0.604	0.580	0.057	0.207
Mixed	2	72	5.70	9.98	0.086	0.116	0.094	0.048	0.208
Mixed	2	74	5.70	9.98	0.481	0.383	0.383	0.040	0.234
Mixed	2	76	5.70	9.98	0.429	0.317	0.354	0.054	0.326
Clover	2	77	12.20	19.93	0.251	0.167	0.222	0.020	0.156
Clover	2	79	12.20	9.96	0.241	0.136	0.183	0.042	0.209
Clover	2	81	12.20	4.98	0.316	0.229	0.283	0.092	0.216
Clover	2	83	12.20	2.50	0.290	0.216	0.236	0.103	0.168
Fescue	2	86	12.20	19.93	0.177	0.104	0.137	0.023	0.157
Fescue	2	88	12.20	9.96	0.174	0.097	0.116	0.039	0.154
Fescue	2	90	12.20	4.98	0.152	0.092	0.096	0.047	0.126
Fescue	2	92	12.20	2.50	0.319	0.251	0.280	0.091	0.154

[a] Microsphere values based on mass balance data from500-cm^2 subplots.
[b] ^{131}I and ^{7}Be values based on data from 0.33-m^2 plots.
[c] Data not included in analyses because of inconsistencies associated with soil samples.

Table A.VI.2. Interception fractions (r) for vegetation <5 cm above soil.

Vegetation Type	Sim	Plot	Intensity (cm/h)	Rain (mm)	Interception Fraction (r) 25 μm[a]	3 μm[a]	9 μm[a]	^{131}I[b]	^{7}Be[b]
Clover	1	1	1.75	1.02	c	c	c	0.093	0.122
Clover	1	3	1.75	1.02	c	c	c	0.086	0.397
Clover	1	5	1.36	4.08	c	c	c	0.047	0.666
Clover	1	7	1.36	4.08	c	c	c	0.070	0.092
Fescue	1	10	1.62	4.86	0.373	0.299	0.312	0.052	0.087
Fescue	1	12	1.62	0.95	0.276	0.337	0.306	0.184	0.595
Fescue	1	14	1.62	4.86	0.441	0.333	0.284	0.061	0.228
Fescue	1	16	1.62	0.95	0.151	0.290	0.329	0.169	0.275
Mixed	1	20	1.87	1.04	0.598	0.536	0.487	0.646	0.395
Mixed	1	22	1.87	5.61	0.395	0.470	0.487	0.629	0.144
Mixed	1	24	1.87	1.04	0.588	0.767	0.638	0.902	0.132
Mixed	1	26	1.87	5.61	0.478	0.481	0.469	0.429	0.128
Clover	1	29	3.00	20.00	0.416	0.366	0.400	0.052	0.042
Clover	1	31	3.00	10.00	0.181	0.140	0.174	0.036	0.379
Clover	1	33	3.00	5.00	0.514	0.467	0.499	0.374	0.048
Clover	1	35	3.00	2.50	0.663	0.545	0.586	0.533	0.186
Fescue	1	37	2.90	2.42	0.247	0.208	0.215	0.112	0.338
Fescue	1	39	2.90	4.83	0.275	0.247	0.264	0.101	0.175
Fescue	1	41	2.90	9.67	0.182	0.151	0.154	0.034	0.226
Fescue	1	43	2.90	19.33	0.214	0.338	0.201	0.028	0.201
Mixed	1	45	2.90	19.33	0.447	0.372	0.398	0.072	0.187
Mixed	1	47	2.90	9.67	0.409	0.395	0.390	0.214	0.139
Mixed	1	49	2.90	5.32	0.392	0.381	0.382	0.295	0.149
Mixed	1	51	2.90	2.42	0.283	0.327	0.313	0.278	0.242
Clover	1	54	1.40	15.21	0.320	0.272	0.293	0.076	0.066
Clover	1	56	1.40	10.15	0.408	0.362	0.381	0.148	0.206
Clover	1	58	1.40	5.06	0.369	0.373	0.372	0.230	0.083
Clover	1	60	1.40	1.00	0.240	0.279	0.277	0.796	0.064
Fescue	1	62	1.59	1.01	0.345	0.310	0.333	0.324	0.052
Fescue	1	64	1.59	10.07	0.282	0.279	0.286	0.097	0.068
Fescue	1	66	1.59	1.01	0.183	0.171	0.188	0.129	0.127
Fescue	1	68	1.59	10.07	0.346	0.288	0.290	0.043	0.158
Mixed	1	70	5.70	9.98	0.128	0.150	0.169	0.041	0.917
Mixed	1	72	5.70	9.98	0.539	0.436	0.463	0.097	0.710
Mixed	1	74	5.70	9.98	0.279	0.293	0.281	0.095	0.580
Mixed	1	76	5.70	9.98	0.319	0.325	0.338	0.090	0.306

Table A.VI.2 (cont.)

Vegetation Type	Sim	Plot	Intensity (cm/h)	Rain (mm)	Interception Fraction (r) 25 µm	3 µm	9 µm	^{131}I	^{7}Be
Clover	1	78	3.20	20.00	0.499	0.341	0.397	0.148	0.226
Clover	1	80	3.20	10.00	0.264	0.171	0.209	0.121	0.182
Clover	1	82	3.20	5.00	0.266	0.210	0.248	0.152	0.315
Clover	1	84	3.20	2.50	0.425	0.363	0.352	0.346	0.156
Fescue	1	85	3.20	20.00	0.341	0.197	0.254	0.057	0.200
Fescue	1	87	3.20	10.00	0.344	0.279	0.321	0.138	0.255
Fescue	1	89	3.20	5.00	0.355	0.254	0.289	0.156	0.309
Fescue	1	91	3.20	2.50	0.418	0.378	0.400	0.148	0.298
Clover	2	2	9.91	29.73	0.562	0.441	0.448	0.022	0.204
Clover	2	4	9.91	4.13	0.351	0.276	0.193	0.058	0.708
Clover	2	6	9.91	4.13	0.377	0.364	0.281	0.113	0.666
Clover	2	8	9.91	11.56	0.315	0.291	0.334	0.047	0.073
Fescue	2	9	8.20	4.78	0.198	0.202	0.264	0.037	0.272
Fescue	2	11	8.20	24.60	0.270	0.236	0.259	0.009	0.705
Fescue	2	13	8.20	4.78	0.281	0.322	0.285	0.041	0.279
Fescue	2	15	8.20	24.60	0.325	0.292	0.275	0.009	0.251
Mixed	2	19	10.00	30.00	0.502	0.474	0.453	0.052	0.313
Mixed	2	21	10.00	5.55	0.587	0.542	0.537	0.223	0.118
Mixed	2	23	10.00	30.00	0.811	0.728	0.770	0.116	0.134
Mixed	2	25	10.00	5.55	0.709	0.772	0.787	0.025	0.233
Clover	2	30	12.00	20.00	0.116	0.104	0.123	0.011	0.169
Clover	2	32	12.00	10.00	0.274	0.280	0.283	0.046	0.301
Clover	2	34	12.00	5.00	0.527	0.498	0.528	0.222	0.178
Clover	2	36	12.00	2.50	0.225	0.232	0.218	0.260	0.116
Fescue	2	38	11.60	2.42	0.120	0.112	0.143	0.050	0.318
Fescue	2	40	11.60	4.83	0.133	0.123	0.130	0.028	0.320
Fescue	2	42	11.60	9.67	0.167	0.150	0.171	0.020	0.293
Fescue	2	44	11.60	19.33	0.188	0.177	0.184	0.013	0.226
Mixed	2	46	11.60	19.33	0.414	0.359	0.380	0.088	0.272
Mixed	2	48	11.60	9.67	0.431	0.396	0.408	0.133	0.205
Mixed	2	50	11.60	4.83	0.478	0.458	0.466	0.274	0.190
Mixed	2	52	11.60	2.42	0.336	0.377	0.409	0.341	0.230
Clover	2	53	6.50	15.06	0.420	0.387	0.396	0.108	0.205
Clover	2	55	6.50	9.97	0.594	0.496	0.564	0.202	0.141
Clover	2	57	6.50	4.98	0.163	0.228	0.184	0.093	0.103
Clover	2	59	6.50	0.98	0.091	0.162	0.151	0.179	0.098

Table A.VI.2 (cont.)

Vegetation Type	Sim	Plot	Intensity (cm/h)	Rain (mm)	Interception Fraction (r) 25 µm	3 µm	9 µm	^{131}I	^{7}Be
Fescue	2	61	6.00	1.00	0.287	0.266	0.302	0.205	0.072
Fescue	2	63	6.00	10.00	0.138	0.142	0.220	0.032	0.066
Fescue	2	65	6.00	1.00	0.308	0.202	0.154	0.176	0.137
Fescue	2	67	6.00	10.00	0.372	0.272	0.254	0.039	0.184
Mixed	2	69	2.40	10.00	0.205	0.227	0.216	0.071	0.664
Mixed	2	71	2.40	10.00	0.260	0.282	0.292	0.122	1.047
Mixed	2	73	2.40	10.00	0.176	0.216	0.203	0.078	0.346
Mixed	2	75	2.40	10.00	0.383	0.363	0.368	0.073	0.523
Clover	2	77	12.20	19.93	0.072	0.046	0.065	0.007	0.074
Clover	2	79	12.20	9.96	0.393	0.264	0.323	0.161	0.151
Clover	2	81	12.20	4.98	0.421	0.376	0.388	0.198	0.196
Clover	2	83	12.20	2.50	0.140	0.220	0.205	0.108	0.127
Fescue	2	86	12.20	19.93	0.376	0.237	0.290	0.046	0.257
Fescue	2	88	12.20	9.96	0.230	0.136	0.176	0.044	0.302
Fescue	2	90	12.20	4.98	0.452	0.344	0.412	0.107	0.276
Fescue	2	92	12.20	2.50	0.294	0.375	0.345	0.154	0.336

[a] Microsphere values based on mass balance data from 500-cm^2 subplots.
[b] ^{131}I and ^{7}Be values based on data from 0.33-m^2 plots.
[c] Data not included in analyses because of inconsistencies associated with soil samples.

Table A.VI.3. Interception fractions (r) for top 5 cm of soil.

Vegetation Type	Sim	Plot	Intensity (cm/h)	Rain (mm)	Interception Fraction (r) 25 μm[a]	3 μm[a]	9 μm[a]	^{131}I[b]	^{7}Be[b]
Clover	1	1	1.75	1.02	c	c	c	0.098	0.077
Clover	1	3	1.75	1.02	c	c	c	0.055	0.046
Clover	1	5	1.36	4.08	c	c	c	0.325	0.211
Clover	1	7	1.36	4.08	c	c	c	0.550	0.443
Fescue	1	10	1.62	4.86	0.425	0.573	0.563	0.680	0.646
Fescue	1	12	1.62	0.95	0.100	0.232	0.163	0.338	0.221
Fescue	1	14	1.62	4.86	0.247	0.324	0.353	0.391	0.272
Fescue	1	16	1.62	0.95	0.355	0.370	0.379	0.407	0.317
Mixed	1	20	1.87	1.04	0.186	0.222	0.247	0.373	0.294
Mixed	1	22	1.87	5.61	0.035	0.081	0.060	0.322	0.174
Mixed	1	24	1.87	1.04	0.357	0.113	0.198	0.168	0.145
Mixed	1	26	1.87	5.61	0.079	0.123	0.106	0.314	0.247
Clover	1	29	3.00	20.00	0.247	0.375	0.342	0.332	0.505
Clover	1	31	3.00	10.00	0.310	0.368	0.363	0.404	0.427
Clover	1	33	3.00	5.00	0.233	0.310	0.291	0.637	0.472
Clover	1	35	3.00	2.50	0.108	0.239	0.206	0.464	0.297
Fescue	1	37	2.90	2.42	0.389	0.482	0.476	0.966	0.769
Fescue	1	39	2.90	4.83	0.340	0.460	0.422	0.920	0.694
Fescue	1	41	2.90	9.67	0.415	0.533	0.506	0.809	0.866
Fescue	1	43	2.90	19.33	0.300	0.000	0.388	0.496	0.746
Mixed	1	45	2.90	19.33	0.203	0.337	0.299	0.542	0.522
Mixed	1	47	2.90	9.67	0.167	0.259	0.240	0.427	0.439
Mixed	1	49	2.90	5.32	0.259	0.342	0.332	0.534	0.581
Mixed	1	51	2.90	2.42	0.165	0.229	0.247	0.341	0.286
Clover	1	54	1.40	15.21	0.119	0.293	0.216	0.534	0.575
Clover	1	56	1.40	10.15	0.184	0.300	0.261	0.691	0.647
Clover	1	58	1.40	5.06	0.237	0.279	0.239	0.706	0.524
Clover	1	60	1.40	1.00	0.113	0.102	0.095	0.449	0.335
Fescue	1	62	1.59	1.01	0.275	0.338	0.295	0.698	0.341
Fescue	1	64	1.59	10.07	0.164	0.289	0.255	0.532	0.306
Fescue	1	66	1.59	1.01	0.337	0.344	0.254	0.560	0.299
Fescue	1	68	1.59	10.07	0.460	0.556	0.542	0.733	0.505
Mixed	1	69	2.40	10.00	0.291	0.306	0.309	0.351	0.421
Mixed	1	71	2.40	10.00	0.282	0.332	0.296	0.382	0.451
Mixed	1	73	2.40	10.00	0.147	0.280	0.233	0.345	0.274
Mixed	1	75	2.40	10.00	0.262	0.352	0.307	0.288	0.138

Table A.VI.3 (cont.)

Vegetation Type	Sim	Plot	Intensity (cm/h)	Rain (mm)	Interception Fraction (r) 25 µm	3 µm	9 µm	^{131}I	^{7}Be
Clover	1	78	3.20	20.00	0.274	0.543	0.433	0.405	0.215
Clover	1	80	3.20	10.00	0.524	0.698	0.613	0.824	0.512
Clover	1	82	3.20	5.00	0.361	0.586	0.467	0.663	0.382
Clover	1	84	3.20	2.50	0.191	0.333	0.304	0.330	0.190
Fescue	1	85	3.20	20.00	0.309	0.639	0.508	0.548	0.196
Fescue	1	87	3.20	10.00	0.198	0.444	0.308	0.415	0.162
Fescue	1	89	3.20	5.00	0.250	0.454	0.371	0.530	0.230
Fescue	1	91	3.20	2.50	0.274	0.398	0.372	0.357	0.180
Clover	2	2	9.91	29.73	0.269	0.415	0.418	0.157	0.197
Clover	2	4	9.91	4.13	0.284	0.388	0.426	0.297	0.302
Clover	2	6	9.91	4.13	0.283	0.411	0.470	0.433	0.478
Clover	2	8	9.91	11.56	0.402	0.486	0.431	0.329	0.437
Fescue	2	9	8.20	4.78	0.567	0.692	0.609	0.368	0.338
Fescue	2	11	8.20	24.60	0.555	0.630	0.609	0.251	0.347
Fescue	2	13	8.20	4.78	0.292	0.414	0.364	0.228	0.181
Fescue	2	15	8.20	24.60	0.578	0.607	0.639	0.164	0.205
Mixed	2	19	10.00	30.00	0.291	0.362	0.369	0.093	0.205
Mixed	2	21	10.00	5.55	0.102	0.180	0.238	0.124	0.111
Mixed	2	23	10.00	30.00	0.083	0.202	0.156	0.159	0.107
Mixed	2	25	10.00	5.55	0.225	0.148	0.138	0.131	0.072
Clover	2	30	12.00	20.00	0.305	0.386	0.354	0.181	0.183
Clover	2	32	12.00	10.00	0.471	0.505	0.515	0.414	0.518
Clover	2	34	12.00	5.00	0.256	0.330	0.298	0.406	0.326
Clover	2	36	12.00	2.50	0.184	0.254	0.242	0.443	0.230
Fescue	2	38	11.60	2.42	0.243	0.354	0.322	0.456	0.342
Fescue	2	40	11.60	4.83	0.268	0.411	0.359	0.319	0.276
Fescue	2	42	11.60	9.67	0.374	0.490	0.457	0.529	0.580
Fescue	2	44	11.60	19.33	0.374	0.430	0.402	0.294	0.502
Mixed	2	46	11.60	19.33	0.213	0.341	0.321	0.344	0.484
Mixed	2	48	11.60	9.67	0.166	0.272	0.228	0.339	0.245
Mixed	2	50	11.60	4.83	0.147	0.231	0.188	0.257	0.190
Mixed	2	52	11.60	2.42	0.094	0.159	0.140	0.267	0.164
Clover	2	53	6.50	15.06	0.192	0.319	0.334	0.264	0.274
Clover	2	55	6.50	9.97	0.153	0.310	0.226	0.345	0.236
Clover	2	57	6.50	4.98	0.144	0.245	0.270	0.223	0.124
Clover	2	59	6.50	0.98	0.089	0.086	0.084	0.101	0.110

Table A.VI.3 (cont.)

Vegetation Type	Sim	Plot	Intensity (cm/h)	Rain (mm)	Interception Fraction (r) 25 µm	3 µm	9 µm	^{131}I	^{7}Be
Fescue	2	61	6.00	1.00	0.353	0.327	0.332	0.328	0.237
Fescue	2	63	6.00	10.00	0.280	0.511	0.418	0.387	0.200
Fescue	2	65	6.00	1.00	0.297	0.309	0.226	0.308	0.241
Fescue	2	67	6.00	10.00	0.410	0.557	0.553	0.391	0.325
Mixed	2	70	5.70	9.98	0.241	0.246	0.251	0.132	0.201
Mixed	2	72	5.70	9.98	0.375	0.447	0.443	0.253	0.265
Mixed	2	74	5.70	9.98	0.240	0.324	0.336	0.190	0.279
Mixed	2	76	5.70	9.98	0.251	0.358	0.307	0.327	0.174
Clover	2	77	12.20	19.93	0.677	0.787	0.712	0.389	0.276
Clover	2	79	12.20	9.96	0.366	0.600	0.494	0.472	0.282
Clover	2	81	12.20	4.98	0.263	0.395	0.329	0.209	0.135
Clover	2	83	12.20	2.50	0.570	0.564	0.559	0.320	0.196
Fescue	2	86	12.20	19.93	0.447	0.660	0.573	0.314	0.181
Fescue	2	88	12.20	9.96	0.596	0.767	0.708	0.482	0.275
Fescue	2	90	12.20	4.98	0.396	0.564	0.492	0.338	0.178
Fescue	2	92	12.20	2.50	0.387	0.374	0.375	0.211	0.153

[a] Microsphere values based on mass balance data from 500-cm^2 subplots.
[b] ^{131}I and ^{7}Be values based on data from 0.33-m^2 plots.
[c] Data not included in analyses because of inconsistencies associataed with soil samples.

Table A.VI.4. Calculated biomass (kg dry wt/m^2) for plots in interception experiment based on vegetation collected from 0.33-m^2 sampling rings and from 500-cm^2 subplots.

			0.33-m^2 Ring	500-cm^2 Subplot		
Date	Vegetation Type	Plot No.	>5 cm Veg (kg/m^2)	>5 cm Veg (kg/m^2)	<5 cm Veg (kg/m^2)	Total Veg (kg/m^2)
5/21/87	Clover	1	0.093	0.030	0.040	0.070
5/22/87	Clover	2	0.116	0.358	0.162	0.520
5/21/87	Clover	3	0.121	0.050	0.058	0.108
5/22/87	Clover	4	0.087	0.058	0.100	0.158
5/22/87	Clover	5	0.135	0.086	0.048	0.134
5/22/87	Clover	6	0.109	0.316	0.102	0.418
5/22/87	Clover	7	0.141	0.058	0.058	0.116
5/22/87	Clover	8	0.106	0.072	0.270	0.342
5/26/87	Fescue	9	0.071	0.060	0.102	0.162
5/26/87	Fescue	10	0.054	0.038	0.130	0.168
5/26/87	Fescue	11	0.067	0.068	0.120	0.188
5/26/87	Fescue	12	0.071	0.098	0.108	0.206
5/26/87	Fescue	13	0.082	0.134	0.116	0.250
5/26/87	Fescue	14	0.041	0.082	0.118	0.200
5/26/87	Fescue	15	0.094	0.068	0.120	0.188
5/26/87	Fescue	16	0.078	0.070	0.092	0.162
5/27/87	Mixed	19	0.235	0.184	0.624	0.808
5/27/87	Mixed	20	0.074	0.106	0.360	0.466
5/27/87	Mixed	21	0.113	0.242	0.484	0.726
5/27/87	Mixed	22	0.141	0.560	2.214	2.774
5/27/87	Mixed	23	0.113	0.082	1.810	1.892
5/27/87	Mixed	24	0.020	0.038	0.556	0.594
5/27/87	Mixed	25	0.077	0.048	1.190	1.238
5/27/87	Mixed	26	0.250	0.574	1.310	1.884
6/22/87	Clover	29	0.131	0.134	0.330	0.464
6/22/87	Clover	30	0.239	0.284	0.080	0.364
6/22/87	Clover	31	0.156	0.164	0.102	0.266
6/22/87	Clover	32	0.108	0.110	0.118	0.228
6/22/87	Clover	33	0.122	0.150	0.348	0.498
6/22/87	Clover	34	0.146	0.116	0.232	0.348
6/22/87	Clover	35	0.172	0.088	0.312	0.400
6/22/87	Clover	36	0.190	0.244	0.140	0.384
6/24/87	Fescue	37	0.123	0.100	0.166	0.266
6/24/87	Fescue	38	0.219	0.294	0.142	0.436
6/24/87	Fescue	39	0.141	0.174	0.302	0.476
6/24/87	Fescue	40	0.210	0.194	0.100	0.294
6/24/87	Fescue	41	0.139	0.190	0.168	0.358
6/24/87	Fescue	42	0.211	0.386	0.138	0.524
6/24/87	Fescue	43	0.121	0.220	0.226	0.446
6/24/87	Fescue	44	0.189	0.236	0.140	0.376

Table A.VI.4 (cont.)

Date	Vegetation Type	Plot No.	0.33-m² Ring >5 cm Veg (kg/m²)	500-cm² Subplot >5 cm Veg (kg/m²)	500-cm² Subplot <5 cm Veg (kg/m²)	500-cm² Subplot Total Veg (kg/m²)
6/24/87	Mixed	45	0.124	0.170	0.452	0.622
6/24/87	Mixed	46	0.241	0.322	0.570	0.892
6/24/87	Mixed	47	0.161	0.272	0.620	0.892
6/24/87	Mixed	48	0.190	0.310	0.838	1.148
6/24/87	Mixed	49	0.124	0.178	0.430	0.608
6/24/87	Mixed	50	0.221	0.190	0.514	0.704
6/24/87	Mixed	51	0.132	0.184	0.636	0.820
6/24/87	Mixed	52	0.223	0.262	0.548	0.810
7/29/87	Clover	53	0.228	0.352	0.620	0.972
7/29/87	Clover	54	0.285	0.296	0.374	0.670
7/29/87	Clover	55	0.219	0.224	0.792	1.016
7/29/87	Clover	56	0.365	0.228	0.386	0.614
7/29/87	Clover	57	0.231	0.348	0.296	0.644
7/29/87	Clover	58	0.296	0.254	0.550	0.804
7/29/87	Clover	59	0.274	0.356	0.288	0.644
7/29/87	Clover	60	0.215	0.368	0.356	0.724
8/4/87	Fescue	61	0.191	0.158	0.188	0.346
8/4/87	Fescue	62	0.106	0.088	0.524	0.612
8/4/87	Fescue	63	0.349	0.210	0.176	0.386
8/4/87	Fescue	64	0.305	0.272	0.570	0.842
8/4/87	Fescue	65	0.348	0.206	0.160	0.366
8/4/87	Fescue	66	0.304	0.256	0.188	0.444
8/4/87	Fescue	67	0.145	0.142	0.234	0.376
8/4/87	Fescue	68	0.097	0.062	0.212	0.274
7/27/87	Mixed	69	0.420	0.468	0.354	0.822
7/27/87	Mixed	70	0.353	0.286	0.326	0.612
7/27/87	Mixed	71	0.272	0.086	0.738	0.824
7/27/87	Mixed	72	0.276	0.298	0.532	0.830
7/27/87	Mixed	73	0.286	0.434	0.470	0.904
7/27/87	Mixed	74	0.414	0.388	0.774	1.162
7/27/87	Mixed	75	0.209	0.232	0.548	0.780
7/27/87	Mixed	76	0.294	0.130	0.388	0.518
9/23/87	Clover	77	0.075	0.108	0.032	0.140
9/23/87	Clover	78	0.093	0.076	0.384	0.460
9/23/87	Clover	79	0.096	0.130	0.478	0.608
9/23/87	Clover	80	0.073	0.108	0.172	0.280
9/23/87	Clover	81	0.075	0.074	0.598	0.672
9/23/87	Clover	82	0.085	0.112	0.128	0.240
9/23/87	Clover	83	0.063	0.066	0.104	0.170
9/23/87	Clover	84	0.081	0.076	0.510	0.586

Table A.VI.4 (cont.)

Date	Vegetation Type	Plot No.	0.33-m^2 Ring >5 cm Veg (kg/m^2)	500-cm^2 Subplot >5 cm Veg (kg/m^2)	500-cm^2 Subplot <5 cm Veg (kg/m^2)	500-cm^2 Subplot Total Veg (kg/m^2)
9/23/87	Fescue	85	0.118	0.112	0.122	0.234
9/23/87	Fescue	86	0.140	0.152	0.224	0.376
9/23/87	Fescue	87	0.151	0.206	0.360	0.566
9/23/87	Fescue	88	0.091	0.100	0.146	0.246
9/23/87	Fescue	89	0.246	0.214	0.260	0.474
9/23/87	Fescue	90	0.087	0.064	0.212	0.276
9/23/87	Fescue	91	0.091	0.078	0.364	0.442
9/23/87	Fescue	92	0.077	0.122	0.240	0.362

APPENDIX VII.

MASS INTERCEPTION FACTORS FOR VEGETATION >5 CM TALL COLLECTED DURING INTERCEPTION STUDY

Table A.VII.1. Mass interception factors (r/Y) for vegetation >5 cm above soil.

Date	Plot	Vegetation Type	Sim	Rain (mm)	Intensity (cm/h)	r/Y (m^2/kg) 25 µm	3 µm	9 µm	^{131}I	^{7}Be
5/21/87	1	Clover	1	1.0	1.75	22.37	16.96	17.61	2.19	2.29
5/21/87	3	Clover	1	1.0	1.75	14.48	13.06	10.08	2.18	2.39
5/22/87	5	Clover	1	4.1	1.36	10.18	7.83	6.21	0.78	1.93
5/22/87	7	Clover	1	4.1	1.36	10.00	7.43	3.89	0.65	1.63
5/26/87	10	Fescue	1	4.9	1.62	5.31	3.37	3.31	0.43	2.26
5/26/87	12	Fescue	1	0.9	1.62	6.37	4.40	5.43	2.18	3.73
5/26/87	14	Fescue	1	4.9	1.62	3.81	4.17	4.42	0.61	3.55
5/26/87	16	Fescue	1	0.9	1.62	7.06	4.86	4.18	2.22	3.40
5/27/87	20	Mixed	1	1.0	1.87	2.04	2.29	2.51	2.86	4.00
5/27/87	22	Mixed	1	5.6	1.87	1.02	0.80	0.81	0.63	1.59
5/27/87	24	Mixed	1	1.0	1.87	1.45	3.17	4.32	2.68	3.30
5/27/87	26	Mixed	1	5.6	1.87	0.77	0.69	0.74	0.45	1.28
6/22/87	29	Clover	1	20.0	3.0	2.52	1.93	1.92	0.15	0.89
6/22/87	31	Clover	1	10.0	3.0	3.10	3.00	2.82	0.35	1.22
6/22/87	33	Clover	1	5.0	3.0	1.68	1.48	1.40	0.56	1.68
6/22/87	35	Clover	1	2.5	3.0	2.59	2.45	2.37	0.94	1.21
6/24/87	37	Fescue	1	2.4	2.9	3.64	3.10	3.09	0.88	2.11
6/24/87	39	Fescue	1	4.8	2.9	2.22	1.68	1.80	0.72	3.02
6/24/87	41	Fescue	1	9.7	2.9	2.12	1.66	1.79	0.34	1.90
6/24/87	43	Fescue	1	19.3	2.9	2.21	3.01	1.87	0.20	1.64
6/24/87	45	Mixed	1	19.3	2.9	2.06	1.71	1.78	0.14	1.34
6/24/87	47	Mixed	1	9.7	2.9	1.56	1.27	1.36	0.31	1.59
6/24/87	49	Mixed	1	5.3	2.9	1.96	1.56	1.60	0.62	1.53
6/24/87	51	Mixed	1	2.4	2.9	3.00	2.42	2.39	1.09	2.29
7/29/87	54	Clover	1	15.2	1.4	1.89	1.47	1.66	0.21	1.12
7/29/87	56	Clover	1	10.2	1.4	1.79	1.48	1.57	0.16	1.23
7/29/87	58	Clover	1	5.1	1.4	1.55	1.37	1.53	0.60	2.37
7/29/87	60	Clover	1	1.0	1.4	1.76	1.68	1.71	2.69	3.75
8/4/87	62	Fescue	1	1.0	1.59	4.31	4.00	4.23	3.22	5.20
8/4/87	64	Fescue	1	10.1	1.59	2.04	1.59	1.69	0.24	1.82
8/4/87	66	Fescue	1	1.0	1.59	1.88	1.90	2.18	1.48	2.85
8/4/87	68	Fescue	1	10.1	1.59	3.14	2.51	2.72	0.25	2.48
7/27/87	69	Mixed	1	10.0	2.4	1.76	1.63	1.66	0.13	0.60
7/27/87	71	Mixed	1	10.0	2.4	1.54	1.30	1.38	0.24	1.16
7/27/87	73	Mixed	1	10.0	2.4	1.75	1.30	1.46	0.18	1.14
7/27/87	75	Mixed	1	10.0	2.4	2.73	2.19	2.50	0.21	1.75

Table A.VII.1 (cont.)

Date	Plot	Vegetation Type	Sim	Rain (mm)	Intensity (cm/h)	r/Y (m^2/kg) 25 µm	3 µm	9 µm	^{131}I	^{7}Be
9/23/87	78	Clover	1	20.0	3.2	2.99	1.52	2.24	0.28	2.92
9/23/87	80	Clover	1	10.0	3.2	1.96	1.21	1.65	0.65	4.20
9/23/87	82	Clover	1	5.0	3.2	3.33	1.82	2.55	1.08	3.73
9/23/87	84	Clover	1	2.5	3.2	5.05	3.99	4.52	2.05	3.70
9/23/87	85	Fescue	1	20.0	3.2	3.12	1.46	2.13	0.34	2.53
9/23/87	87	Fescue	1	10.0	3.2	2.23	1.34	1.80	0.38	2.10
9/23/87	89	Fescue	1	5.0	3.2	1.85	1.36	1.59	0.61	1.58
9/23/87	91	Fescue	1	2.5	3.2	3.95	2.88	2.93	1.36	2.97
5/22/87	2	Clover	2	29.7	9.91	0.47	0.40	0.38	0.05	0.29
5/22/87	4	Clover	2	4.1	9.91	6.28	5.79	6.57	0.65	1.45
5/22/87	6	Clover	2	4.1	9.91	1.08	0.71	0.79	0.63	1.22
5/22/87	8	Clover	2	11.6	9.91	3.93	3.10	3.26	0.25	0.69
5/26/87	9	Fescue	2	4.8	8.2	3.91	1.76	2.13	0.30	0.88
5/26/87	11	Fescue	2	24.6	8.2	2.57	1.97	1.94	0.10	0.70
5/26/87	13	Fescue	2	4.8	8.2	3.19	1.97	2.62	0.41	1.08
5/26/87	15	Fescue	2	24.6	8.2	1.42	1.48	1.26	0.08	0.47
5/27/87	19	Mixed	2	30.0	10.0	1.12	0.89	0.96	0.07	0.38
5/27/87	21	Mixed	2	5.6	10.0	1.29	1.15	0.93	0.45	0.72
5/27/87	23	Mixed	2	30.0	10.0	1.29	0.86	0.89	0.10	0.28
5/27/87	25	Mixed	2	5.6	10.0	1.37	1.67	1.57	0.58	0.99
6/22/87	30	Clover	2	20.0	12.0	2.04	1.80	1.84	0.16	0.66
6/22/87	32	Clover	2	10.0	12.0	2.32	1.95	1.84	0.32	0.61
6/22/87	34	Clover	2	5.0	12.0	1.87	1.48	1.50	0.49	0.83
6/22/87	36	Clover	2	2.5	12.0	2.42	2.11	2.21	1.19	1.55
6/24/87	38	Fescue	2	2.4	11.6	2.16	1.82	1.82	0.68	1.14
6/24/87	40	Fescue	2	4.8	11.6	3.09	2.40	2.63	0.48	1.05
6/24/87	42	Fescue	2	9.7	11.6	1.19	0.93	0.96	0.21	0.69
6/24/87	44	Fescue	2	19.3	11.6	1.85	1.67	1.76	0.13	0.67
6/24/87	46	Mixed	2	19.3	11.6	1.16	0.93	0.93	0.10	0.49
6/24/87	48	Mixed	2	9.7	11.6	1.30	1.07	1.17	0.21	0.62
6/24/87	50	Mixed	2	4.8	11.6	1.98	1.64	1.82	0.40	0.78
6/24/87	52	Mixed	2	2.4	11.6	2.17	1.77	1.72	0.96	1.38
7/29/87	53	Clover	2	15.1	6.5	1.10	0.84	0.77	0.15	0.64
7/29/87	55	Clover	2	10.0	6.5	1.13	0.87	0.94	0.23	0.80
7/29/87	57	Clover	2	5.0	6.5	1.99	1.51	1.57	0.42	0.84
7/29/87	59	Clover	2	1.0	6.5	2.30	2.11	2.15	2.02	2.05

Table A.VII.1 (cont.)

Date	Plot	Vegetation Type	Sim	Rain (mm)	Intensity (cm/h)	r/Y (m^2/kg) 25 µm	3 µm	9 µm	^{131}I	^{7}Be
8/4/87	61	Fescue	2	1.0	6.0	2.28	2.57	2.31	2.44	2.98
8/4/87	63	Fescue	2	10.0	6.0	2.77	1.65	1.73	0.26	1.34
8/4/87	65	Fescue	2	1.0	6.0	1.92	2.37	3.01	1.81	2.29
8/4/87	67	Fescue	2	10.0	6.0	1.54	1.20	1.36	0.23	1.92
7/27/87	70	Mixed	2	10.0	5.7	1.35	1.29	1.24	0.16	0.59
7/27/87	72	Mixed	2	10.0	5.7	1.00	1.35	1.09	0.17	0.75
7/27/87	74	Mixed	2	10.0	5.7	1.11	0.88	0.88	0.10	0.57
7/27/87	76	Mixed	2	10.0	5.7	1.85	1.37	1.53	0.18	1.11
9/23/87	77	Clover	2	19.9	12.2	2.32	1.55	2.06	0.27	2.09
9/23/87	79	Clover	2	10.0	12.2	1.86	1.05	1.40	0.43	2.17
9/23/87	81	Clover	2	5.0	12.2	4.27	3.09	3.83	1.22	2.89
9/23/87	83	Clover	2	2.5	12.2	4.40	3.27	3.58	1.65	2.68
9/23/87	86	Fescue	2	19.9	12.2	1.16	0.68	0.90	0.16	1.12
9/23/87	88	Fescue	2	10.0	12.2	1.74	0.97	1.16	0.43	1.70
9/23/87	90	Fescue	2	5.0	12.2	2.37	1.44	1.51	0.54	1.44
9/23/87	92	Fescue	2	2.5	12.2	2.61	2.06	2.30	1.18	1.99

APPENDIX VIII.

MASS INTERCEPTION FACTORS FOR FESCUE GRASS AFTER EXPOSURE TO INTERMITTENT RAIN

Table A.VIII.1. Mass interception factors (r/Y) for fescue >5 cm above soil after exposure to intermittent rain.

Date	Sim	Intensity (cm/h)	Rain (mm)	r/Y (m^2/kg) 25 μm[a]	3 μm[a]	9 μm[a]	^{131}I	^{7}Be
9/30/87	1	1.97	15.0	2.121	1.051	0.805	0.498	2.229
10/1/87	1	1.97	25.0	2.471	1.032	0.882	0.378	3.264
10/1/87	1	1.97	35.0	1.719	0.757	0.688	0.288	2.559
10/1/87	1	1.97	55.0	1.544	0.754	0.705	0.288	2.870
10/1/87	1	1.97	68.9	1.709	0.772	0.742	0.292	2.731
10/1/87	2	10.38	15.0	0.796	0.570	0.385	0.258	2.761
10/1/87	2	10.38	25.0	0.593	0.528	0.341	0.255	2.738
10/1/87	2	10.38	35.0	1.024	0.462	0.364	0.188	2.686
10/1/87	2	10.38	55.0	0.530	0.403	0.281	0.197	2.372
10/1/87	2	10.38	75.0	1.255	0.508	0.498	0.211	2.561

[a] Correction factors were applied to these data to account for the effect of simulator retention of the microspheres.

APPENDIX IX.

EFFICIENCY FACTORS FOR GUMMED PAPER

Table A.IX.1. Efficiency factors for gummed paper including standing water.

Simulator No.	Intensity (cm/h)	Rain (mm)	Rep	Efficiency Factor 25 μm[a]	3 μm[a]	9 μm[a]	^{131}I	^{7}Be
1	1.97	2.5	A	0.678	0.422	0.304	0.282	0.290
1	1.97	2.5	B	0.625	0.304	0.250	0.213	0.205
1	1.97	5.0	A	0.698	0.273	0.249	0.176	0.145
1	1.97	5.0	B	0.788	0.271	0.282	0.196	0.172
1	1.97	10.0	A	0.784	0.215	0.260	0.146	0.147
1	1.97	10.0	B	0.578	0.172	0.217	0.106	0.104
1	1.97	20.0	A	0.859	0.218	0.375	0.068	0.071
1	1.97	13.9	B	0.767	0.206	0.300	0.087	0.087
2	10.40	2.5	A	0.962	0.637	0.478	0.330	0.348
2	10.40	2.5	B	0.573	0.444	0.331	0.225	0.228
2	10.40	5.0	A	0.464	0.224	0.126	0.102	0.100
2	10.40	5.0	B	0.518	0.428	0.222	0.326	0.325
2	10.40	10.0	A	0.389	0.405	0.212	0.220	0.234
2	10.40	10.0	B	0.968	0.330	0.329	0.101	0.086
2	10.40	20.0	A	0.119	0.196	0.155	0.055	0.050
2	10.40	20.0	B	1.028	0.287	0.309	0.050	0.034

[a] Correction factors were applied to these data to account for the effect of simulator retention of the microspheres.

Table A.IX.2. Efficiency factors for gummed paper excluding standing water.

Simulator No.	Intensity (cm/h)	Rain (mm)	Rep	Efficiency Factor 25 μm[a]	3 μm[a]	9 μm[a]	^{131}I	^{7}Be
1	1.97	2.5	A	0.638	0.147	0.235	0.051	0.034
1	1.97	2.5	B	0.609	0.138	0.205	0.050	0.028
1	1.97	5.0	A	0.660	0.127	0.190	0.049	0.017
1	1.97	5.0	B	0.752	0.129	0.207	0.037	0.013
1	1.97	10.0	A	0.730	0.086	0.164	0.028	0.013
1	1.97	10.0	B	0.543	0.087	0.149	0.018	0.007
1	1.97	20.0	A	0.770	0.106	0.241	0.012	0.007
1	1.97	13.9	B	0.738	0.113	0.236	0.019	0.010
2	10.38	2.5	A	0.915	0.199	0.270	0.031	0.016
2	10.38	2.5	B	0.563	0.205	0.249	0.036	0.020
2	10.38	5.0	A	0.438	0.119	0.099	0.018	0.010
2	10.38	5.0	B	0.494	0.130	0.133	0.020	0.009
2	10.38	10.0	A	0.326	0.077	0.090	0.012	0.006
2	10.38	10.0	B	0.946	0.209	0.282	0.025	0.010
2	10.38	20.0	A	0.114	0.160	0.136	0.020	0.006
2	10.38	20.0	B	1.009	0.247	0.280	0.025	0.008

[a] Correction factors were applied to these data to account for the effect of simulator retention of the microspheres.

APPENDIX X.

POSTDEPOSITION RETENTION OF WET-DEPOSITED MATERIAL BY VEGETATION

Table A.X.1. Natural rainfall on retention plots.

Date	Postdeposition Day[a]		Rain (mm)
	Fescue Plots	Mixed Vegetation Plots	
5/29/87	3	1	18.03
5/30/87	4	2	14.73
5/31/87	5	3	0.51
6/03/87	8	6	0.51
6/12/87	17	15	1.52
6/13/87	18	16	7.62
6/15/87	20	18	0.76
6/16/87	21	19	3.30
6/17/87	22	20	2.79
6/18/87	23	21	7.37
6/19/87	24	22	3.81
6/20/87	25	23	2.54
6/21/87	26	24	12.70
6/22/87	27	25	45.72
6/23/87	28	26	0.51
6/26/87	31	29	1.02

[a] Indicates the day rainfall was measured, not necessarily the day it occurred.

Table A.X.2. Results of individual samples taken for the determination of postdeposition retention.

Date	Plot No.	Vegetation Type	Rep	Biomass Density[a] (kg dry/m^2)	Bq/kg dry wt 25 µm	3 µm	9 µm	^{131}I	^{7}Be
5/26/87	17	Fescue	1	0.16	9.37E+04	4.04E+04	4.28E+04	2.37E+04	3.30E+05
5/26/87	17	Fescue	2	0.19	6.37E+04	3.93E+04	4.20E+04	3.93E+04	3.91E+05
5/26/87	17	Fescue	3	0.20	8.04E+04	5.51E+04	5.57E+04	5.62E+04	4.76E+05
6/1/87	17	Fescue	1	0.31	2.44E+04	2.78E+04	2.80E+04	1.22E+04	9.98E+04
6/1/87	17	Fescue	2	0.51	2.27E+04	2.28E+04	1.61E+04	7.50E+03	6.61E+04
6/1/87	17	Fescue	3	0.32	4.09E+04	3.94E+04	2.93E+04	1.15E+04	1.53E+05
6/4/87	17	Fescue	1	0.29	1.39E+04	1.29E+04	9.11E+03	4.83E+03	5.70E+04
6/4/87	17	Fescue	2	0.44	5.76E+03	7.84E+03	4.74E+03	2.24E+03	4.44E+04
6/4/87	17	Fescue	3	0.43	1.04E+04	1.27E+04	1.26E+04	6.50E+03	5.59E+04
6/9/87	17	Fescue	1	0.37	8.98E+03	1.50E+04	1.21E+04	6.44E+03	7.23E+04
6/9/87	17	Fescue	2	0.27	1.16E+04	1.45E+04	1.34E+04	4.91E+03	3.72E+04
6/9/87	17	Fescue	3	0.19	3.23E+03	1.16E+04	9.06E+03	3.32E+03	5.23E+04
6/12/87	17	Fescue	1	0.30	1.97E+04	2.59E+04	1.80E+04	1.27E+04	1.10E+05
6/12/87	17	Fescue	2	0.28	9.97E+03	1.01E+04	5.81E+03	4.35E+03	5.01E+04
6/12/87	17	Fescue	3	0.35	2.27E+04	1.76E+04	1.09E+04	6.21E+03	8.33E+04
6/15/87	17	Fescue	1	0.36	4.11E+03	1.01E+04	5.85E+03	5.31E+03	3.59E+04
6/15/87	17	Fescue	2	0.38	5.06E+03	5.14E+03	3.59E+03	4.44E+03	1.74E+04
6/15/87	17	Fescue	3	0.24	3.51E+03	1.14E+04	4.40E+03	5.09E+03	5.04E+04
6/19/87	17	Fescue	1	0.30	9.02E+03	8.48E+03	9.29E+03	7.62E+03	4.60E+04
6/19/87	17	Fescue	2	0.20	4.16E+03	8.02E+03	5.38E+03	ND	3.55E+04
6/19/87	17	Fescue	3	0.21	5.36E+02	7.68E+03	4.34E+03	4.10E+03	3.69E+04
6/29/87	17	Fescue	1	0.30	1.53E+03	4.40E+03	3.73E+03	2.88E+03	2.21E+04
6/29/87	17	Fescue	2	0.34	2.84E+03	4.68E+03	2.32E+03	1.81E+03	1.17E+04
6/29/87	17	Fescue	3	0.25	6.41E+03	5.19E+03	3.86E+03	2.05E+03	1.61E+04
9/16/87[b]	17	Fescue	1	0.32	ND	1.11E+02	ND	ND	1.27E+03
9/16/87[b]	17	Fescue	2	0.45	9.38E+01	1.88E+02	1.14E+02	ND	1.63E+03
5/26/87	18	Fescue	1	0.15	4.08E+04	1.75E+04	2.41E+04	3.89E+04	1.67E+05
5/26/87	18	Fescue	2	0.09	4.27E+04	2.12E+04	1.91E+04	4.41E+04	1.99E+05
5/26/87	18	Fescue	3	0.12	4.13E+04	1.74E+04	1.14E+04	3.56E+04	1.83E+05
6/1/87	18	Fescue	1	0.12	2.56E+04	3.16E+04	1.91E+04	3.65E+04	1.39E+05
6/1/87	18	Fescue	2	0.17	7.91E+03	1.41E+04	1.13E+04	1.91E+04	8.38E+04
6/1/87	18	Fescue	3	0.29	6.72E+03	1.26E+04	8.33E+03	1.65E+04	6.26E+04
6/4/87	18	Fescue	1	0.20	1.63E+03	1.20E+04	7.30E+03	1.14E+04	4.11E+04
6/4/87	18	Fescue	2	0.17	1.98E+03	1.02E+04	7.67E+03	9.70E+03	4.62E+04
6/4/87	18	Fescue	3	0.27	3.01E+03	3.55E+03	2.58E+03	6.10E+03	2.31E+04

Table A.X.2 (cont.)

Date	Plot No.	Vegetation Type	Rep	Biomass (kg dry/m^2)	Bq/kg dry wt. 25 µm	3 µm	9 µm	^{131}I	^{7}Be
6/9/87	18	Fescue	1	0.32	3.40E+03	6.45E+03	2.98E+03	6.67E+03	3.76E+04
6/9/87	18	Fescue	2	0.18	3.04E+03	6.11E+03	3.09E+03	4.18E+03	2.73E+04
6/9/87	18	Fescue	3	0.21	5.38E+03	5.31E+03	4.34E+03	7.22E+03	2.77E+04
6/12/87	18	Fescue	1	0.40	5.26E+03	6.33E+03	7.48E+03	6.41E+03	2.49E+04
6/12/87	18	Fescue	2	0.32	2.15E+03	5.15E+03	3.06E+03	8.59E+03	2.68E+04
6/12/87	18	Fescue	3	0.36	3.54E+03	6.65E+03	5.99E+03	7.71E+03	3.82E+04
6/15/87	18	Fescue	1	0.31	3.71E+03	3.58E+03	1.20E+03	2.71E+03	1.63E+04
6/15/87	18	Fescue	2	0.44	2.53E+03	2.26E+03	6.01E+02	3.67E+03	1.04E+04
6/15/87	18	Fescue	3	0.30	ND	1.81E+03	2.47E+03	2.02E+03	9.26E+03
6/19/87	18	Fescue	1	0.27	3.29E+03	2.54E+03	2.48E+02	3.01E+03	1.44E+04
6/19/87	18	Fescue	2	0.35	2.91E+02	2.62E+03	3.98E+03	3.05E+03	1.18E+04
6/19/87	18	Fescue	3	0.17	ND	1.88E+03	ND	2.64E+03	1.04E+04
6/29/87	18	Fescue	1	0.20	ND	4.56E+03	4.69E+03	5.95E+03	1.68E+04
6/29/87	18	Fescue	2	0.32	3.26E+03	2.14E+03	5.50E+02	3.34E+03	1.22E+04
6/29/87	18	Fescue	3	0.41	1.30E+03	1.68E+03	3.04E+03	1.44E+03	8.28E+03
9/16/87[b]	18	Fescue	1	0.42	1.65E+02	1.23E+02	ND	ND	1.62E+03
9/16/87[b]	18	Fescue	2	0.46	6.07E+01	1.24E+02	4.55E+01	ND	1.93E+03
5/28/87	27	Mixed	1	0.43	3.29E+04	1.49E+04	1.01E+04	2.76E+04	1.65E+05
5/28/87	27	Mixed	2	0.25	3.77E+04	2.17E+04	1.84E+04	4.65E+04	2.54E+05
5/28/87	27	Mixed	3	0.28	3.46E+04	1.44E+04	1.37E+04	2.74E+04	1.80E+05
6/1/87	27	Mixed	1	0.28	8.67E+03	7.57E+03	6.81E+03	9.04E+03	6.18E+04
6/1/87	27	Mixed	2	0.22	5.24E+03	9.36E+03	7.68E+03	9.99E+03	6.72E+04
6/1/87	27	Mixed	3	0.20	9.33E+03	4.86E+03	3.31E+03	6.47E+03	4.05E+04
6/4/87	27	Mixed	1	0.51	1.36E+04	1.10E+04	9.00E+03	1.31E+04	6.40E+04
6/4/87	27	Mixed	2	0.39	4.20E+03	6.05E+03	5.52E+03	9.14E+03	3.66E+04
6/4/87	27	Mixed	3	0.60	4.93E+03	6.62E+03	5.09E+03	1.06E+04	4.52E+04
6/9/87	27	Mixed	1	0.61	1.73E+03	2.75E+03	1.50E+03	3.02E+03	2.04E+04
6/9/87	27	Mixed	2	0.49	1.94E+03	3.52E+03	1.90E+03	7.25E+03	2.33E+04
6/9/87	27	Mixed	3	0.47	1.10E+04	7.60E+03	8.45E+03	1.16E+04	4.62E+04
6/12/87	27	Mixed	1	0.32	4.82E+03	6.59E+03	3.36E+03	8.30E+03	4.15E+04
6/12/87	27	Mixed	2	0.23	4.85E+03	5.37E+03	3.43E+03	5.79E+03	3.97E+04
6/12/87	27	Mixed	3	0.34	3.24E+03	4.95E+03	6.92E+03	8.84E+03	3.16E+04
6/15/87	27	Mixed	1	0.25	4.06E+03	3.67E+03	2.96E+03	3.82E+03	1.59E+04
6/15/87	27	Mixed	2	0.35	6.60E+03	7.62E+03	6.30E+03	9.99E+03	2.37E+04
6/15/87	27	Mixed	3	0.23	1.02E+04	6.41E+03	3.92E+03	8.33E+03	3.10E+04
6/19/87	27	Mixed	1	0.26	6.06E+02	2.78E+03	1.78E+03	3.48E+03	1.71E+04
6/19/87	27	Mixed	2	0.21	ND	3.38E+03	1.73E+03	3.28E+03	2.02E+04
6/19/87	27	Mixed	3	0.27	4.65E+03	5.19E+03	3.42E+03	4.07E+03	2.82E+04

Table A.X.2 (cont.)

Date	Plot No.	Vegetation Type	Rep	Biomass (kg dry/m^2)	Bq/kg dry wt 25 µm	3 µm	9 µm	^{131}I	^{7}Be
6/29/87	27	Mixed	1	0.28	7.07E+02	9.94E+02	1.36E+03	2.21E+03	4.78E+03
6/29/87	27	Mixed	2	0.63	4.81E+03	3.68E+03	3.54E+03	1.76E+03	5.18E+03
6/29/87	27	Mixed	3	0.62	2.65E+03	2.26E+03	2.12E+03	3.32E+03	7.09E+03
9/16/87[b]	27	Mixed	1	0.42	3.32E+02	3.72E+02	3.13E+02	ND	3.44E+03
9/16/87[b]	27	Mixed	2	0.37	9.91E+03	5.11E+02	4.30E+02	ND	4.53E+03
5/28/87	28	Mixed	1	0.20	2.97E+04	1.56E+04	1.36E+04	3.08E+04	1.89E+05
5/28/87	28	Mixed	2	0.40	3.06E+04	9.79E+03	1.19E+04	1.30E+04	1.02E+05
5/28/87	28	Mixed	3	0.63	1.84E+04	9.37E+03	6.78E+03	1.15E+04	8.07E+04
6/1/87	28	Mixed	1	0.15	9.55E+03	1.14E+04	6.24E+03	1.26E+04	6.22E+04
6/1/87	28	Mixed	2	0.23	1.70E+04	1.39E+04	9.47E+03	1.24E+04	6.37E+04
6/1/87	28	Mixed	3	0.28	7.68E+03	8.32E+03	3.13E+03	1.37E+04	6.19E+04
6/4/87	28	Mixed	1	0.35	7.76E+03	1.10E+04	4.30E+03	8.79E+03	6.06E+04
6/4/87	28	Mixed	2	0.21	8.99E+03	1.50E+04	7.77E+03	1.59E+04	8.86E+04
6/4/87	28	Mixed	3	0.27	4.00E+03	8.46E+03	7.99E+03	1.19E+04	6.50E+04
6/9/87	28	Mixed	1	0.27	7.18E+03	5.06E+03	2.19E+03	7.76E+03	4.10E+04
6/9/87	28	Mixed	2	0.26	6.19E+03	5.91E+03	8.46E+03	3.76E+03	2.37E+04
6/9/87	28	Mixed	3	0.31	3.66E+03	7.81E+03	7.64E+03	5.18E+03	3.86E+04
6/12/87	28	Mixed	1	0.34	5.59E+03	5.80E+03	3.06E+03	3.27E+03	3.05E+04
6/12/87	28	Mixed	2	0.32	6.34E+03	7.05E+03	6.16E+03	7.58E+03	4.72E+04
6/12/87	28	Mixed	3	0.23	6.97E+03	7.67E+03	3.88E+03	3.00E+03	2.47E+04
6/15/87	28	Mixed	1	0.35	8.53E+02	4.03E+03	5.65E+03	2.26E+03	2.30E+04
6/15/87	28	Mixed	2	0.39	5.88E+03	3.16E+03	1.79E+03	3.90E+03	1.79E+04
6/15/87	28	Mixed	3	0.46	6.75E+03	6.32E+03	5.83E+03	ND	1.93E+04
6/19/87	28	Mixed	1	0.36	3.47E+03	2.92E+03	1.04E+03	3.03E+03	2.05E+04
6/19/87	28	Mixed	2	0.26	ND	4.70E+03	1.45E+03	5.62E+03	2.57E+04
6/19/87	28	Mixed	3	0.21	2.93E+03	2.94E+03	1.79E+03	1.51E+03	1.66E+04
6/29/87	28	Mixed	1	0.27	1.16E+03	1.64E+03	1.24E+03	ND	5.66E+03
6/29/87	28	Mixed	2	0.25	2.21E+03	2.46E+03	1.67E+03	5.07E+03	1.68E+04
6/29/87	28	Mixed	3	0.31	ND	1.10E+03	1.35E+03	9.96E+02	4.48E+03
9/16/87[b]	28	Mixed	1	0.46	ND	7.57E+01	8.24E+01	ND	1.18E+03
9/16/87[b]	28	Mixed	2	0.45	2.02E+02	6.39E+01	4.76E+01	ND	2.10E+03

[a] Sample area was 100 cm^2 except for 9/16/87 when samples were taken from 1500-cm^2 area.

[b] Samples taken on 9/16/87 not included in estimate of postdeposition retention.

ND = not detected.

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