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MONITORING OF RADIONUCLIDES IN THE VICINITIES OF FINNISH NUCLEAR POWER PLANTS IN 1995 AND 1996

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Keywords environmental radioactivity, nuclear power plants, terrestrial environment, aquatic environment

Abstract

Monitoring radioactive substances around Finnish nuclear power plants continued in 1995 and 1996 in accordance with regular environmental monitoring programmes. Altogether, some 1000 samples are analysed annually from the terrestrial and aquatic environs of the two power plants.

Trace amounts of activation products originating from airborne releases from the local power plants were detected in several air and deposition samples. At Loviisa, observations were made in twenty aerosol samples; at Olkiluoto they were made once during the reporting period. The concentrations were very low, from a few microbecquerels to a few tens of microbecquerels per cubic metre. A similar pattern was also tenable for the deposition samples. No traces of local discharge nuclides were detected in foodstuffs, drinking water, or garden products. In mushrooms and wild berries picked from the Loviisa area, only Chernobyl derived cesium isotopes and natural ^{40}K were found.

Local discharge nuclides were more abundant in the aquatic environment, especially in samples of indicator organisms, sinking matter, and sediments. The dominant artificial radionuclides in the vicinity of the power plants were still the cesium isotopes, especially ^{137}Cs but also ^{134}Cs, originating from the Chernobyl accident. In seawater, elevated ^{3}H concentrations were more frequent in Loviisa, but no traces of other discharge nuclides were detected. At Olkiluoto, small amounts of activation products were detected in seawater samples taken during the maintenance outages at the power plant. The concentrations of local discharge nuclides in indicator organisms and sinking matter were somewhat higher and their distribution range was wider in the sea area off Olkiluoto. However, the concentrations were so low that they did not increase the radiation burden in the environment. Small amounts of ^{60}Co originating from the local power plant were detected in sediments at a distance of about 15 km from Olkiluoto.

ILUS Erkki, IKÄHEIMONEN Tarja K, KLEMOLA Seppo. Suomen ydinvoimalaitosten ympäristön säteilyvalvonnan tulokset vuosilta 1995 ja 1996. STUK-A192. Helsinki 2002, 105 s.

Avainsanat ympäristön radioaktiivisuus, ydinvoimalaitokset, maaympäristö, vesiympäristö

Tiivistelmä

Suomen ydinvoimalaitosten ympäristön säteilyvalvonta jatkui vuosina 1995-1996 säännöllisten tarkkailuohjelmien mukaisesti. Kahden voimalaitospaikan maa- ja vesiympäristöstä otetaan ja analysoidaan yhteensä lähes tuhat näytettä vuodessa.

Pieniä määriä paikallisten voimalaitosten ilmapäästöistä peräisin olevia aktivoitumistuotteita havaittiin useissa lähialueelta otetuissa ilma- ja laskeumanäytteissä. Loviisassa havaintoja tehtiin kahdestakymmenestä ilmanäytteestä; Olkiluodossa kerran raporttijakson aikana. Radioaktiivisten aineiden pitoisuudet olivat erittäin pieniä, muutamasta mikrobecquerelistä muutamaan kymmeneen mikrobecquereliin kuutiometrissä ilmaa. Sama tendenssi oli näkyvissä myös laskeumanäytteissä. Elintarvikkeissa, talousvedessä ja puutarhatuotteissa ei esiintynyt paikallisista päästöistä lähtöisin olevia radioaktiivisia aineita. Loviisan voimalaitoksen ympäristöstä kerätyissä sienissä ja luonnonmarjoissa esiintyi vain Tshernobylin onnettomuudesta peräisin olevia kesium-isotooppeja ja luonnon kalium-40:a.

Vesiympäristössä oli runsaammin paikallisista päästöistä peräisin olevia radioaktiivisia aineita; erityisesti ns. indikaattorikasveissa ja -eläimissä, jotka keräävät tehokkaasti näitä aineita, sekä pohjalle laskeutuvassa aineksessa ja pohjasedimenteissä. Merkittävimmät keinotekoiset radioaktiiviset aineet voimalaitosten ympäristönäytteissä olivat edelleen Tshernobylin onnettomuudesta peräisin olevat cesiumin isotoopit; erityisesti cesium-137, mutta myös cesium-134. Kohonneita tritium-pitoisuuksia oli useammin Loviisan ympäristöstä otetuissa merivesinäytteissä, joissa toisaalta ei havaittu muita paikallisia päästönuklideja. Olkiluodossa jäähdytysveden purkupaikan edustalta otetuissa merivesinäytteissä esiintyi voimalaitoksen vuosihuoltojen yhteydessä pieniä määriä aktivoitumistuotteita. Myös indikaattoriorganismeissa ja pohjalle laskeutuvassa aineksessa havaittujen paikallisten päästönuklidien pitoisuudet olivat Olkiluodossa jonkin verran suuremmat ja niitä havaittiin laajemmalla alueella kuin Loviisassa. Pitoisuudet olivat kuitenkin niin pieniä, etteivät ne lisää luonnon säteilyrasitusta. Pieniä määriä koboltti-60:a havaittiin pohjasedimenteissä noin 15 kilometrin etäisyydellä Olkiluodon voimalaitoksesta.

Contents

1 Introduction

There are four nuclear power plant (NPP) units in Finland: two 445 MW_e pressurised water reactors at Loviisa, on the south coast, and two 710 MW_e boiling water reactors at Olkiluoto, on the west coast (rated power figures from 1995-1996). The units at Loviisa were commissioned in 1977 and 1980, and those at Olkiluoto in 1978 and 1980.

Surveillance of radioactive substances in the vicinities of the NPPs is carried out under permanent monitoring programmes in which some 1000 samples are taken annually from the two NPP sites. The aim is to confirm that the discharges from the power plants are within permissible release limits and to monitor their dispersion in the environment. Local circumstances and different dispersion directions on land and sea have been taken into account in planning the sampling network.

In order to provide reference data, the programmes commenced one year before the first reactor went into operation. Radioecological background studies were started in Loviisa in 1966 and in Olkiluoto in 1972. The results have been published in the Annual Reports of the STUK - Radiation and Nuclear Safety Authority since 1976.

This report presents the results of the 1995 and 1996 monitoring programmes. Apart from annual refuelling and maintenance outages, and other shutdowns, the power plants were in continuous commercial operation throughout the period.

The annual maintenance outages at the Loviisa power plant were in 1995 from 29 July to 5 September and in 1996 from 20 July to 14 October. The annual outages at the Olkiluoto plant were from 7 May to 1 June in 1995 and from 5 May to 8 June in 1996. In addition, the plant units at Loviisa were shut down for repair from 23 October to 20 November 1995, and there were also some shorter outages and breaks in power generation due to repair or low demands for electricity.

The annual load factors of the Loviisa 1 and 2 plant units were 87.8% and 79.2% in 1995 and 82.5% and 93.2% in 1996, respectively. The load factors for the Olkiluoto 1 and 2 units were 95.6% and 92.6% in 1995 and 92.4% and 95.1% in 1996, respectively [1,2]. For the first time, this Annual Report includes the annual discharge data from both power stations into the air and the sea during the report period.

The authors of the present report are each responsible for different parts of it. Erkki Ilus undertook the editing and was responsible for planning the

monitoring programmes and sampling. He also wrote the chapters on programmes and the aquatic environment. Tarja K. Ikäheimonen was responsible for the pretreatment of samples and radiochemical analyses and for writing the chapters on deposition, terrestrial environment, and foodstuffs. Seppo Klemola was responsible for gammaspectrometric analyses and wrote the chapters on air, measurements of environmental gamma radiation, and dose estimates.

2 Discharge data

The annual airborne and aquatic discharges (Bq) from the Loviisa and Olkiluoto nuclear power stations in 1995 and 1996 are given below. Only radionuclides with a longer half-life than one week are reported.

Loviisa

Annual airborne and aquatic discharges (Bq) from Loviisa nuclear power plant in 1995 and 1996.

	Airborne discharges		Aquatic discharges	
	1995	1996	1995	1996
H-3	1.9E+11	2.2E+11	1.2E+13	9.5E+12
C-14	1.3E+11	9.9E+10		
Cr-51	2.2E+07	2.6E+07		
Mn-54	1.2E+07	1.7E+07	1.4E+06	8.2E+05
Co-58	2.9E+07	3.0E+07	3.2E+06	5.1E+05
Fe-59	9.3E+06	9.9E+06		
Co-60	1.2E+07	2.8E+07	7.3E+06	4.2E+06
Zr-95	7.9E+06	3.8E+06		
Nb-95	4.5E+06	9.8E+06		
Ag-110m	3.3E+07	1.6E+07	9.2E+06	1.6E+06
Te-123m	5.8E+05			5.5E+04
Sb-124	2.2E+07	2.8E+07	3.2E+07	1.6E+07
I-131	7.7E+08	8.7E+05	9.5E+06	
Cs-134			4.3E+06	1.6E+07
Cs-137	4.3E+04	2.3E+05	5.6E+06	1.6E+07

Olkiluoto

Annual airborne and aquatic discharges (Bq) from Olkiluoto nuclear power plant in 1995-1996.

	Airborne discharges		Aquatic discharges	
	1995	1996	1995	1996
H-3	1.3E+11	2.1E+11	1.5E+12	2.9E+12
C-14	6.4E+11	6.5E+11		
Cr-51	2.2E+06		7.2E+08	8.8E+08
Mn-54	6.8E+06	2.5E+06	3.6E+09	1.9E+09
Co-58	4.1E+06	1.4E+06	1.6E+09	1.4E+09
Fe-59	1.3E+06		3.7E+06	
Co-60	1.2E+07	8.0E+06	8.1E+09	7.4E+09
Sr-89	2.5E+06	1.6E+06	2.3E+07	1.0E+08
Sr-90			8.4E+06	1.5E+07
Zr-95	1.2E+06		3.2E+08	9.0E+06
Nb-95	1.3E+06		5.5E+08	9.5E+06
Sb-124	5.2E+05			1.3E+07
Sb-125			7.1E+07	1.9E+07
I-131	3.9E+07	2.6E+07	6.1E+07	3.8E+08
Cs-134	2.0E+05		4.4E+09	3.3E+09
Cs-137	2.3E+05		4.9E+09	5.3E+09
Ce-141				3.3E+08
Ce-144			5.0E+06	
Pu-238		6.6E+03	7.4E+04	
Pu-239			1.8E+04	
Pu-239,Pu-240		7.5E+03		
Am-241		6.1E+03	2.7E+04	
Cm-242			1.0E+05	2.4E+04
Cm-244				1.6E+03

3 Monitoring programmes

The environmental monitoring programmes for the Loviisa and Olkiluoto nuclear power plants are presented on pages 11–13. The programmes are revised every five years on the basis of previously obtained experience. The attached programme was taken into use from the beginning of 1993.

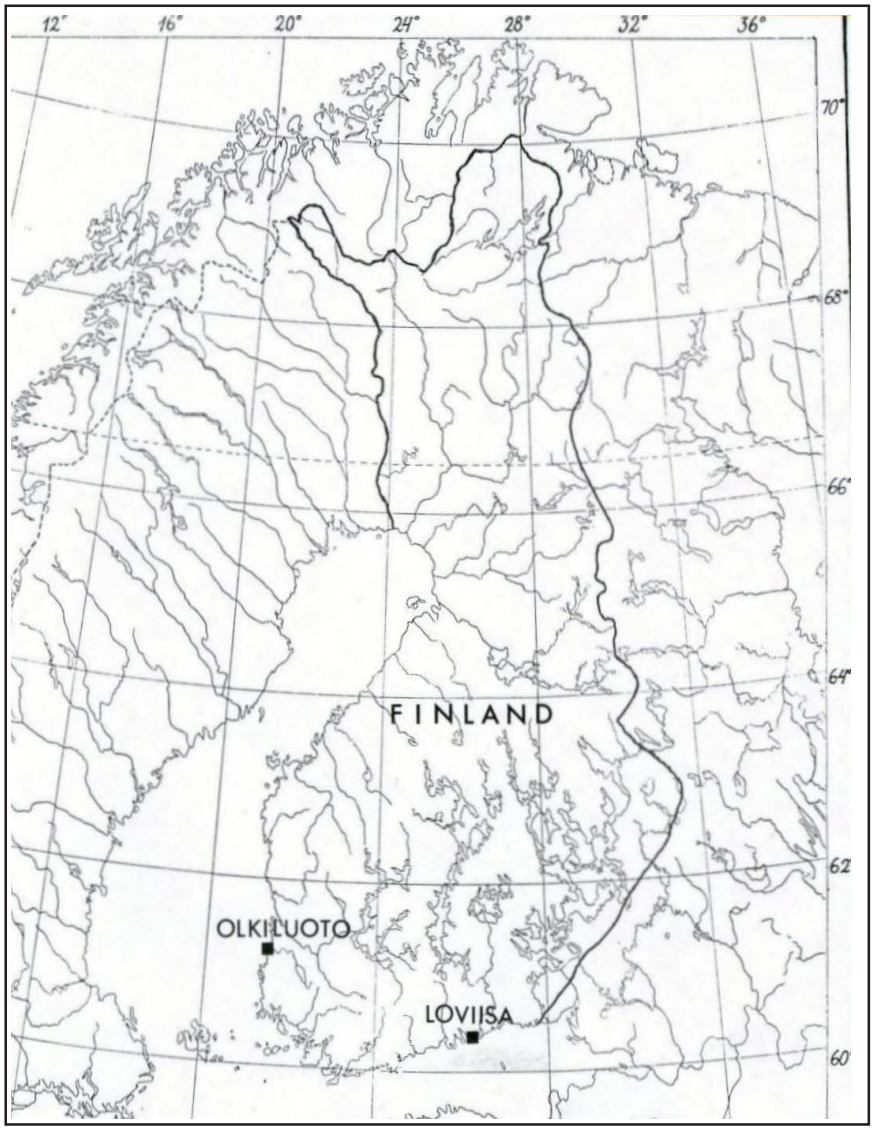

Figure 1. Location of Loviisa and Olkiluoto nuclear power stations.

Programmes for monitoring radionuclides in the environs of Finnish nuclear power plants

Monitoring object	Type of measuring equipment or samples and number of measurements or sampling stations	Measuring or sampling frequency	Analyses and frequencies
1. External radiation	a) Environmental dose rate meters at Loviisa (17) and Olkiluoto (14) at 0 - 10 km from the power plants	Continuous measurement and recording	Dose rate, min., max., mean, analogue plotter charts and/or digital hourly average values
	b) TLD dosemeter stations at Loviisa (10) and Olkiluoto (11) at 0 - 10 km from the power plants	Continuous measurement	Gamma dose, 4 times a year
	c) High-pressure ionization chamber measurements at TLD dosemeter stations	Once a year	Gamma dose, once a year
	d) Supplementary gammaspectrometric measurements	Twice a year	Gamma spectrum, twice a year
2. Airborne radioactive particles and iodine	a) Air sample collectors at Loviisa (4) and Olkiluoto (4) that can collect airborne radioactive particles and iodine (also iodine in the form of organic compounds), at 0 - 10 km from the power plants	Continuous collection, filters replaced twice a month, at one station once a week during refuelling	Gamma emitters, twice a month (once a week); ^{89}Sr and ^{90}Sr, 4 times a year
	b) Supplementary monitoring performed with a portable air sample collector	Once a week during refuelling	Gamma emitters, once a week during refuelling
3. Deposition	Rainwater collectors at Loviisa (4) and Olkiluoto (4), at 0 - 10 km from the power plants	Continuous collection	Gamma emitters and ^{3}H, 4 - 12 times a year; ^{89}Sr and ^{90}Sr, 4 times a year
4. Soil	Soil samples are drawn from the area of assumed maximum deposition to determine the accumulation of long-lived radionuclides	Once every four years	Gamma emitters and ^{90}Sr, vertical distribution

5. Terrestrial wild plants and natural products	a) Hair moss from 1 sampling site at Loviisa and Olkiluoto b) Wild berries and mushrooms grown in the vicinities of the power plants	Twice a year Once every four years	Gamma emitters twice a year and ^{89}Sr and ^{90}Sr, once a year Gamma emitters
6. Grazing grass	Collective sample representing farms producing milk, at 0 - 10 km from the power plants	Twice a growing season	Gamma emitters (especially ^{131}I) twice a growing season
7. Milk	a) Sample representing farms producing milk, at 0 - 10 km from the power plants b) Sample representing the whole production of the local dairy	Once a week Once a week	^{131}I, twice a month during the grazing season, once a month during the fodder season; gamma emitters, once a month. ^{89}Sr, ^{90}Sr and gamma emitters, once a month
8. Garden produce	a) Lettuce grown in both areas, at 0 - 10 km from the power plants b) Apples grown at Loviisa and black currants grown at Olkiluoto, at 0 - 10 km from the power plants	Twice a year Once a year	Gamma emitters, twice a year Gamma emitter, once a year
9. Grain	Rye and wheat samples, grown at less than 20 km from the power plants	Once a year	Gamma emitters, ^{89}Sr and ^{90}Sr, once a year
10. Meat	Beef samples from livestock raised at less than 40 km from the power plants. The samples represent the grazing season and the fodder season	Twice a year	Gamma emitters, twice a year
11. Drinking water	Representative samples of drinking water or raw water from the power plants and from the towns of Loviisa and Rauma	4 times a year	Gamma emitters and ^{3}H, 4 times a year; ^{89}Sr and ^{90}Sr, 2 - 4 times a year

12. Sea water	Samples from 5 stations in the surrounding sea areas of the power plants	3 - 4 times a year	Gamma emitters, ^{3}H, ^{89}Sr and ^{90}Sr, 3 - 4 times a year
13. Bottom sediments	a) Sinking matter collected by sediment traps at 4 stations in the surrounding sea areas of the power plants	Continuous collection	Gamma emitters, 4 times a year; ^{238}Pu and $^{239,240}Pu$, once a year
	b) Sediment samples are taken from several stations in the surrounding sea areas	Once every four years	Gamma emitters, ^{90}Sr, ^{238}Pu and $^{239,240}Pu$, vertical distribution
14. Aquatic indicator organisms	*a) Fucus vesiculosus* from 5 sampling sites at Loviisa and Olkiluoto	Twice a year	Gamma emitters twice a year; ^{89}Sr, ^{90}Sr, ^{238}Pu and $^{239,240}Pu$ once a year
	b) Filamentous green algae from 1 sampling site at Loviisa and Olkiluoto	Once a year	Gamma emitters, once a year
	c) *Saduria entomon* at Loviisa and *Macoma baltica* + *Mytilus edulis* at Olkiluoto from one sampling site	Once a year	Gamma emitters, ^{89}Sr and ^{90}Sr, once a year
15. Wild fish	Pike, perch, roach and Baltic herring from two sampling areas at Loviisa and Olkiluoto	Twice a year	Gamma emitters, twice a year; ^{89}Sr and ^{90}Sr once a year
16. Farmed fish	Young salmon and other fish from the fish farms of Olkiluoto and Loviisa	10 times a farming season	Gamma emitters, 10 times a year
Radioactivity in man is measured annually on about 12 persons living 1 - 10 km from either power plant.			

The location of the sampling stations, sites and areas are shown in Figs. 2-5. Soil and sediment surveys are carried out in both areas every 4 years. In 1995, the sediment survey was conducted in Olkiluoto and in 1996, the soil survey (combined with that of mushrooms and wild berries) was arranged in Loviisa. The sampling points and areas used in these surveys are presented in Figs. 6 and 7.

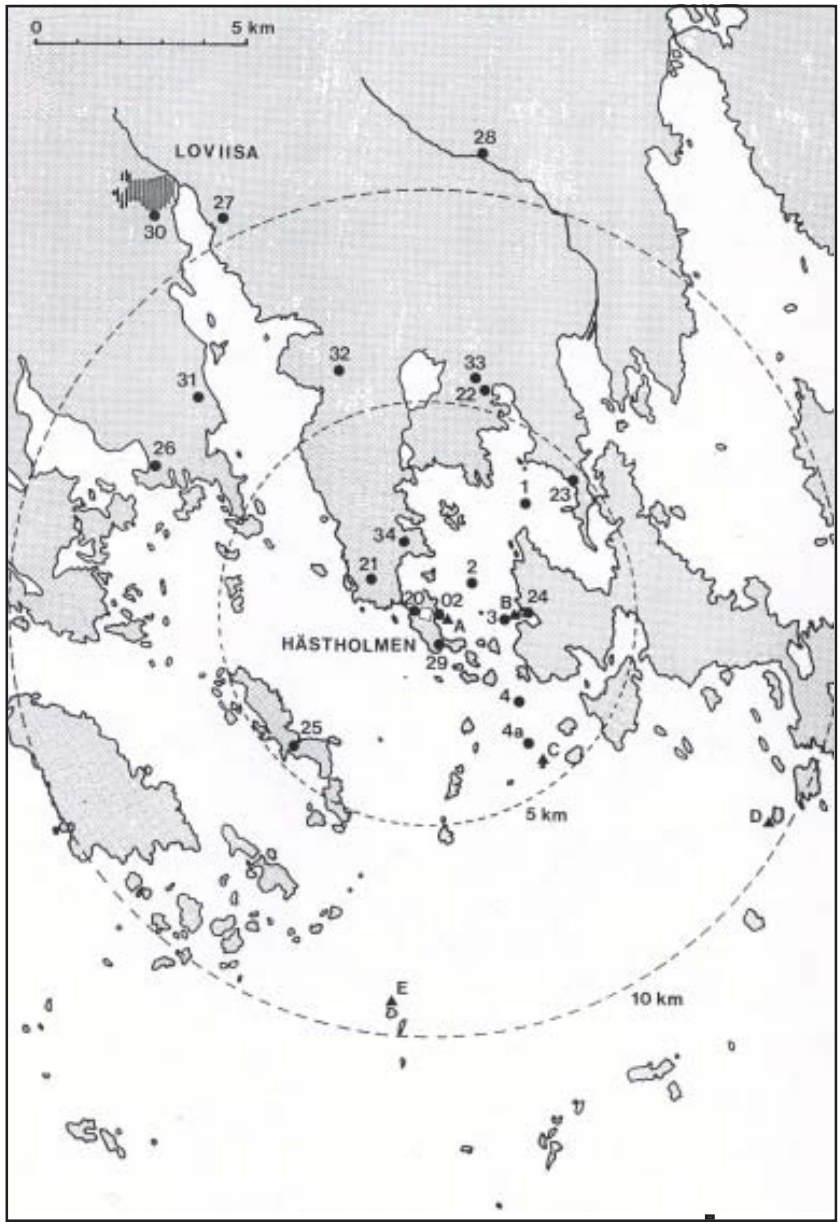

Figure 2. Sampling and measurement stations or sites in Loviisa: 20-29 TLD dosemeters; 34 direct gammaspectrometric measurements; 21, 22, 24, 27 air sample collectors, 33 supplementary air sampling; 20, 24, 27, 33 rain water collectors; 20, 30 drinking water; 22 lettuce and grazing grass; 31 apple; 32 hair moss;02, 1, 2, 4, R1 sea water; 1, 3, 4a, R1 sinking matter; A, B, C, D, E aquatic indicator organisms. Reference station R1 is located off the map, about 14 km west of the power plant.

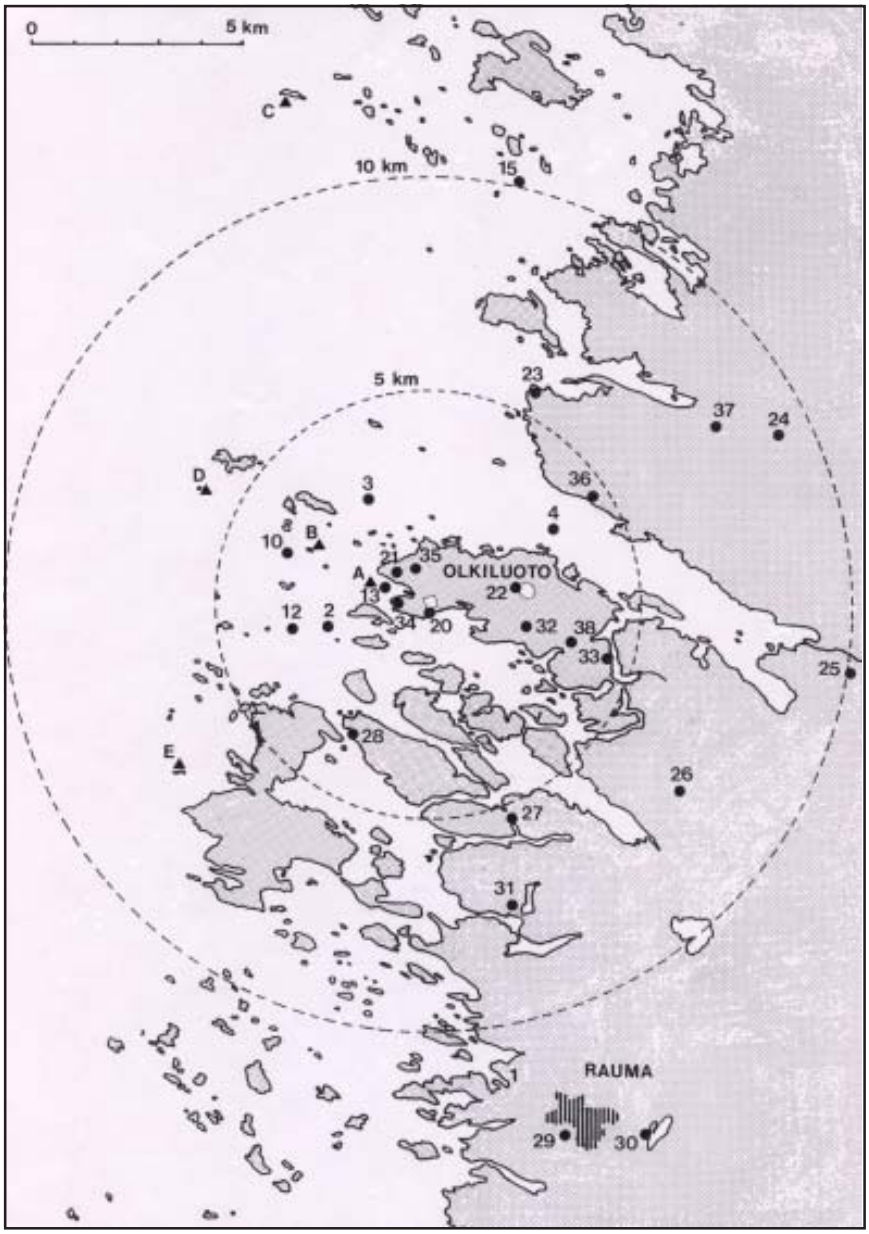

Figure 3. Sampling and measurement stations or sites in Olkiluoto:20-29, 34 TLD dosemeters; 36 (until 1996), 38 (since 1996) direct gammas-pectrometric measurements; 22, 26, 31, 37 air sample collectors; 33 supplementary air sampling; 21, 26, 31, 37 rainwater collectors; 35 dumping ground for exempted waste; 22, 30 drinking water, 26 lettuce and black currant; 32 hair moss, 2, 3, 10, 13, 15 sea water; 3, 4, 12, 15 sinking matter; A, B, C, D, E aquatic indicator organisms.

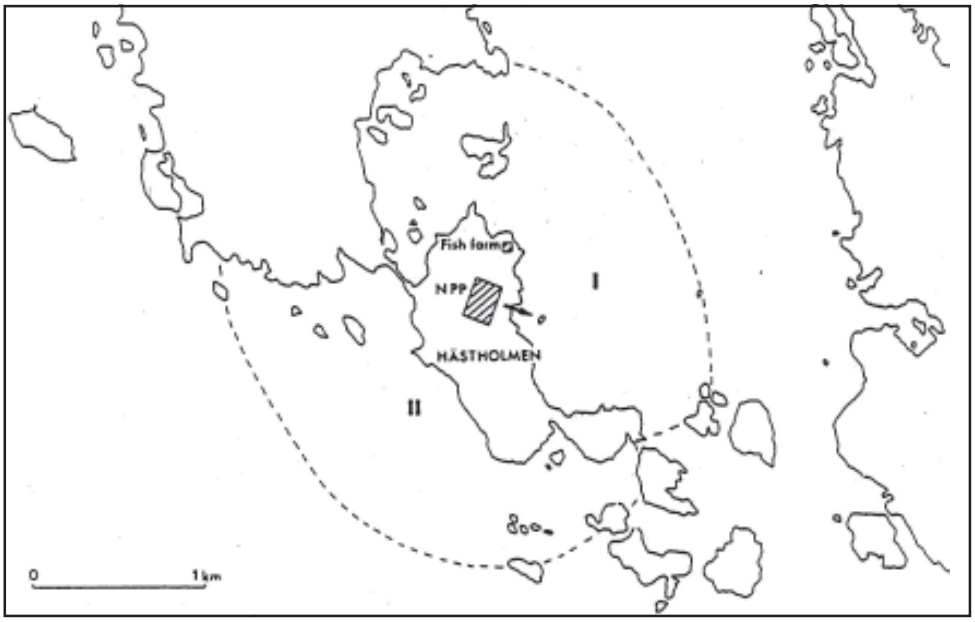

Figure 4. Fishing areas in Loviisa.

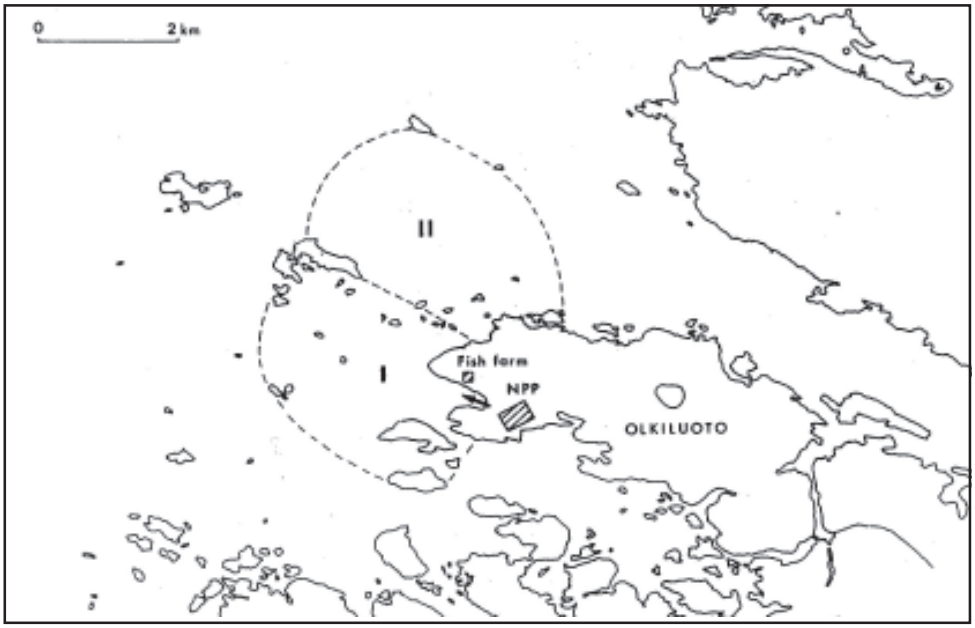

Figure 5. Fishing areas in Olkiluoto.

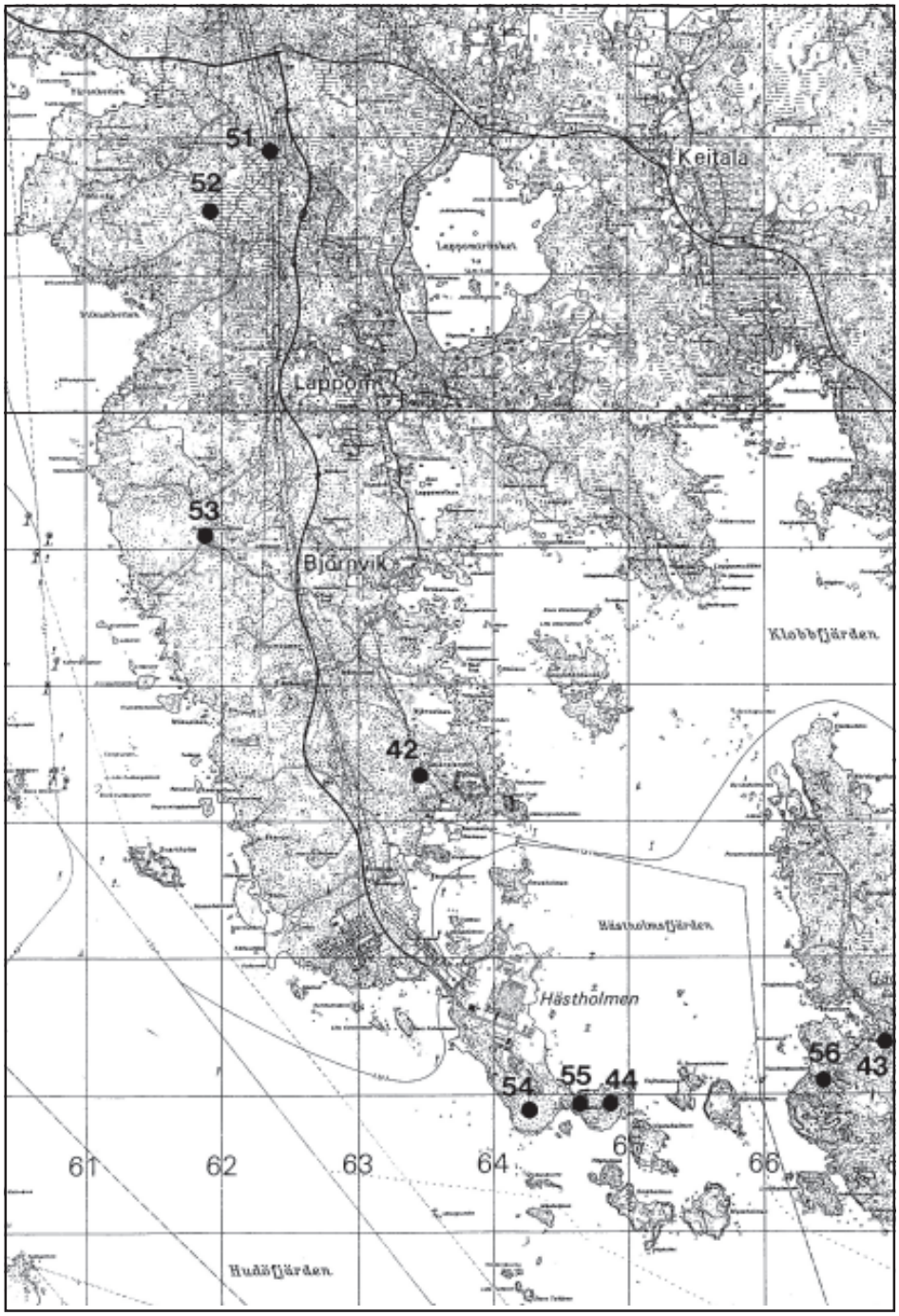

Figure 6. Sampling points and areas in the 1996 survey of soil, mushrooms and wild berries in Loviisa.

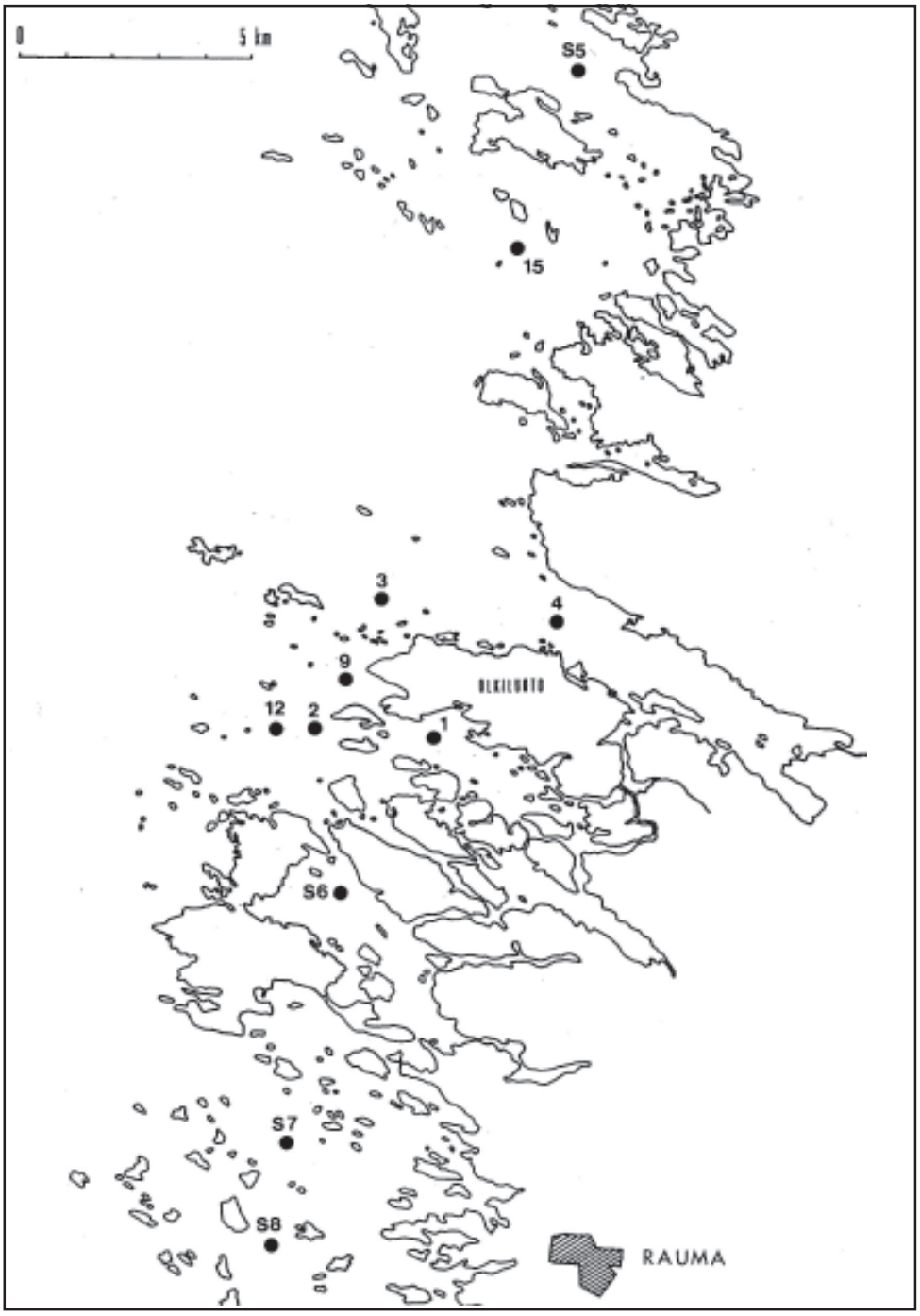

Figure 7. Sampling stations in the 1995 sediment survey in Olkiluoto.

4 Material and methods

The sampling and analysis methods used in the environmental monitoring at Loviisa and Olkiluoto have been described in our previous Annual Reports [3-8]. Only changes or additions to the earlier descriptions or deviations from the normal practice are recorded in this chapter.

In order to determine the quality of the sampling and analysis methods, in recent years our laboratory has participated in several intercomparisons that have been conducted by different organisations such as the International Atomic Energy Agency and its Marine Environment Laboratory, Nordic Nuclear Safety Research, Helsinki Commission, etc. Our results have been consistent with the reference values.

The overall uncertainty of the analysis results includes statistical, calibration and analytical uncertainties but not the uncertainty due to sampling, which is expressed as a relative error (%) at a 1 σ confidence level.

4.1 Air

No changes in sampling programme or methods; see the preceding Annual Reports [3-8].

4.2 Deposition and terrestrial environment

No changes in sampling programme or methods; see the preceding Annual Reports [3-8].

In the 1996 soil survey at Loviisa, the sampling points 42 and 43 were the same as in 1988 and 1992, whereas sampling point 44 was new (Fig. 6). The sampling sites 42 and 43 were small patches of old open fields or meadows with high grass (the ground has been lying fallow for many years). At sampling point 42, there was 20-cm thick turf with a layer of humus and hard clay underneath. At sampling point 43, the soil contained more roots, clay and sand and the clay turned hard at 16 cm. Sampling point 44 was an even smaller patch of meadow more in its natural state than the above-mentioned sampling points were. The type of soil was similar but damper than at sampling points 42 and 43.

The methods used in soil sampling have been described earlier [7]. The samples were analysed for gamma-emitting nuclides and ^{90}Sr. Strontium was leached out using hydrochloric acid extraction.

4.3 Aquatic environment

No changes in sampling programmes or methods occurred (see the preceding Annual Reports [3-8]). However, some sediment traps disappeared from Olkiluoto during the report period. The underwater winter-buoys carrying the traps were not found at the Stations Olkiluoto 12, Olkiluoto 4 and Olkiluoto 15 in spring 1995 (Table XXXVII). The reason for this was probably the dislocation of the buoys with drifting ice. In addition, the trap at Olkiluoto 3 disappeared during the late summer sampling period in 1995; the reason is unknown.

In the 1995 sediment survey at Olkiluoto, the basic sampling stations (1, 2, 3, 4, 9 and 12) were the same as in 1987 and 1991 but, in addition, samples were taken at five new stations (15, S5, S6, S7 and S8). The locations of the sampling stations are presented in Fig. 7. The ordinary samples were taken by a Gemini Twin Corer consisting of 2 parallel coring tubes with an inner diameter of 80 mm. The corer is described e.g. in Ilus et al. [9]. At Stations 3 and S7 with hard bed, the samples were taken by an Ekman-Birge grab.

One haul (2 parallel cores) was regularly taken by the Gemini at each station. The cores were sectioned into 5 cm thick subsamples and the parallel subsamples combined for analysis.

At most stations, the type of sediment was relatively compact sulphidic clay with a relatively thin soft mud layer on the surface. At all the stations, the surface layer was oxic. The sulphidic clay bottom was softest at Stations S6 and 2 and densest at Stations 1, 4 and 9. At Station 15, the surface sediment was sulphidic clay and turned to glacial clay at 15 cm's depth. At Station 3, the sediment was silt and fine sand and at Station S7, it was silt mixed with sulphidic clay.

4.4 Measurements of environmental gamma radiation

In 1995, the direct gammaspectrometric measurements at Olkiluoto were carried out at Station 36 but since 1996 they have been taken at Station 38 (Fig.3).

5 Results and discussion

5.1 Air

The activity concentrations of the gamma-emitting nuclides detected in ground-level air at Loviisa are given in Tables I-IV and those at Olkiluoto in Tables VI-IX. The radionuclide concentrations in the supplementary air samples at Loviisa and Olkiluoto are shown in Tables V and X, respectively.

Chernobyl-derived ^{137}Cs was the dominant artificial radionuclide in surface air in 1995 and 1996. It was detected in 96% of all samples. The variation of the ^{137}Cs concentration was not as strong as in previous years. The observed concentrations ranged from 1 to 12 mBq m^{-3} at Loviisa (Fig. 8) and from 1.4 to 23 mBq m^{-3} at Olkiluoto (Fig. 9).

^{137}Cs concentrations at various sampling stations showed a more or less similar pattern, indicating common changes in weather and resuspension conditions. Three filters from Olkiluoto and one from Loviisa contained three to five times more ^{137}Cs than the annual average while other filters from the same period did not show a similar increase. In these cases, it is assumed that the filter contained a 'hot' particle. Assuming that the entire cesium activity of a filter originates from a particle then the activities of these particles range from 0.2 to 0.5 Bq.

Concentrations of ^{134}Cs were well below the detection limit and the only observation, in 1995 at Olkiluoto, coincided with the highest ^{137}Cs concentration. The ratio of the concentrations was typical for Chernobyl fallout in 1995, i.e. 0.048.

A marked increase of ^{137}Cs concentration in June 1995 is common to both power plant sites. At the same time, the concentration of ^{7}Be also increased at all sampling sites, suggesting that the event was related to the air transfer from stratosphere to ground level.

There were no elevated beryllium concentrations during the smaller simultaneous increase in cesium concentrations in February 1996. These events were also detected at most monitoring stations in the nation-wide network [10,11].

In 1995 and 1996, the concentrations of ^{90}Sr were below the detection limit in both areas (Table XI).

Nuclides originating from the local power plant were detected in twenty aerosol samples at Loviisa. The most frequent of these observations were those of ^{58}Co and ^{60}Co, which were detected eleven times during the years 1995–1996. Other radionuclides of local origin were ^{54}Mn (eight observations), ^{110m}Ag (6), ^{124}Sb (3), ^{51}Cr (1) and ^{131}I (1). About half of these observations were made during

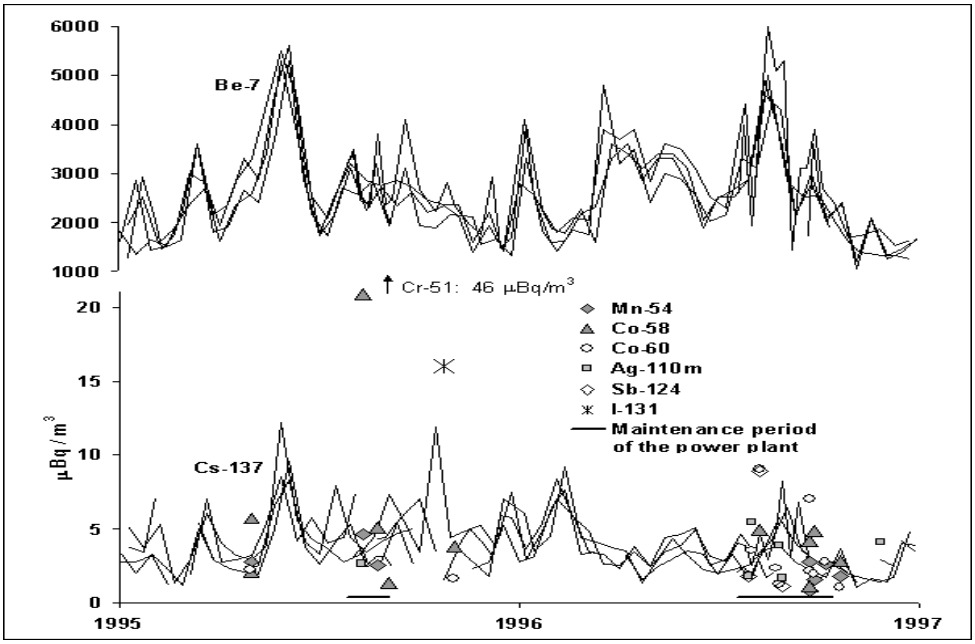

Figure 8. Concentrations of ^{7}Be and artificial nuclides detected in ground-level air (microBq m^{-3}) at four samling stations in the vicinity of Loviisa NPP in 1995-1996.

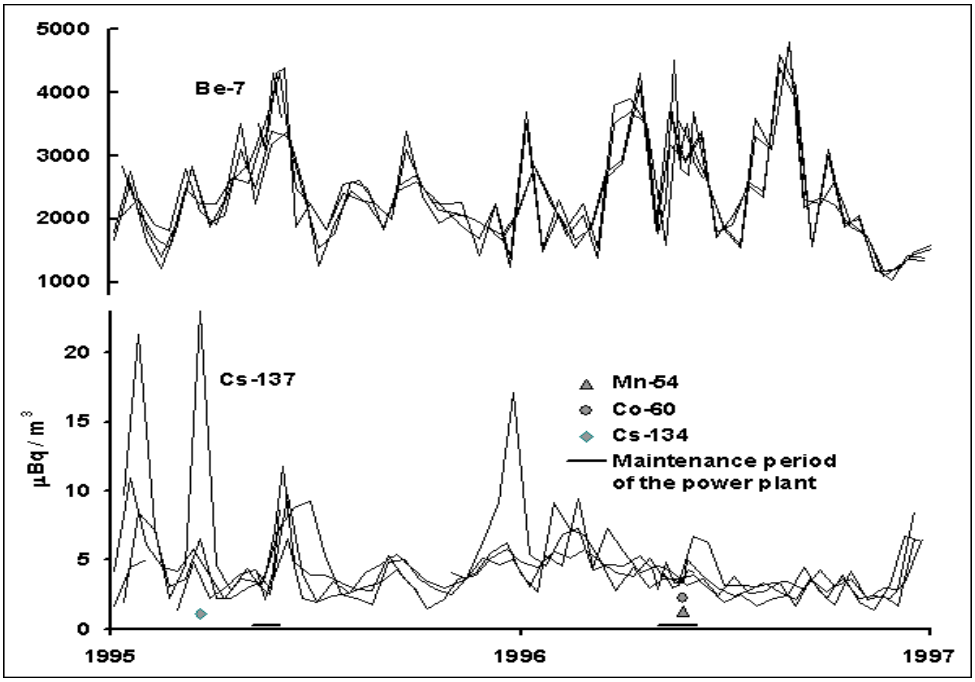

Figure 9. Concentrations of ^{7}Be and artificial nuclides detected in ground-level air (microBq m^{-3}) at four samling stations in the vicinity of Olkiluoto NPP in 1995-1996.

the maintenance periods of the Loviisa plant. In autumn 1996, when the power plant was undergoing a long annual maintenance, several nuclides of local origin were also detected in the deposition samples (see Chapter 5.2). Although the number of observations of traces from local releases were more than doubled from the previous reporting period [8], the concentrations remained very low, from a few microbecquerels (^{54}Mn, ^{110m}Ag) to a few tens of microbecquerels (^{51}Cr, ^{58}Co).

At Olkiluoto, nuclides of local origin were detected once. The only observation was made in May 1996 during the maintenance outage at the power plant. The filter from the period May 22 to May 30 contained small amounts of ^{54}Mn and ^{60}Co.

5.2 Deposition and terrestrial environment

Trace amounts of ^{54}Mn, ^{58}Co, ^{60}Co, and ^{110m}Ag originating from the local NPP were detected several times during 1995 and 1996 in deposition samples from the large-area collector in Loviisa (Table XII). In addition, traces of ^{51}Cr, ^{57}Co, ^{59}Fe, ^{95}Nb, and ^{124}Sb were observed in a sample collected in October 1996 during the final weeks of the maintenance period at the power plant. In analogous samples from Olkiluoto, ^{60}Co was found more rarely in both years (Table XIII) and ^{54}Mn was detected twice in 1995. The observations of ^{60}Co in the large-area collectors in Loviisa and Olkiluoto after 1977 and 1981 respectively are shown in Figs 10 and 11. ^{60}Co was detected more often in Loviisa than in Olkiluoto during the entire period.

Trace amounts of only ^{60}Co could be found in the samples collected at the Stations Loviisa 22 and Olkiluoto 26 partly because the amount of deposited material collected with small-area collectors is smaller (Table XV).

In April 1996, a slightly increased concentration of tritium (4 Bq l^{-1}) was detected in the rainwater sample collected at Station 20 in Loviisa. All other tritium concentrations in rainwater were below the detection limit (4 Bq l^{-1})

The annual total deposition of ^{137}Cs, calculated from the quarterly results of the quantitative 0.05 m^2 collectors, varied in Loviisa and Olkiluoto from 11 to 17 Bq m^{-2} (Table XV). The total amounts were slightly smaller than in the previous two-year period [8].

In the soil samples taken from Loviisa in 1996 (Table XVI), the highest concentrations of the Chernobyl-derived ^{90}Sr, ^{134}Cs and ^{137}Cs were located in the two uppermost layers (0-4 cm). Trace amounts of ^{125}Sb could also be found. No nuclides originating from the local power plant were detected in the soil samples.

Generally, the amounts of ^{90}Sr were low in the hair moss samples (Table XVII). Both in Olkiluoto and Loviisa the concentrations of ^{134}Cs and ^{137}Cs continued to decrease, but the levels of ^{137}Cs were still noticeably higher than those in the years before the Chernobyl accident [12]. The clearly higher cesium concentrations in Loviisa are probably due to the local habitat.

^{134}Cs and ^{137}Cs were the only artificial gamma-emitting radionuclides in grazing grass (Table XVIII). The concentrations of the cesium isotopes were almost at the same level in Olkiluoto and in Loviisa. The ditchwater samples taken from the exempted-waste dump in Olkiluoto generally contained ^{137}Cs from the Chernobyl fallout but in one case (October 1996), the higher value was probably due to local waste (Table XIX).

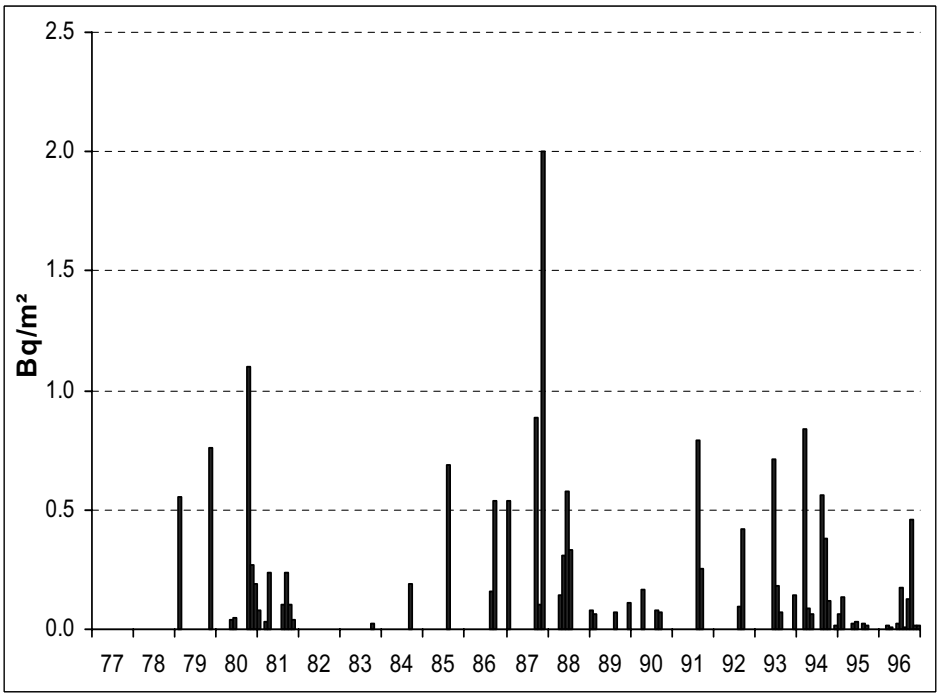

Figure 10. Observations of ^{60}Co in deposition samples at Station 20, Loviisa during 1977-1994.

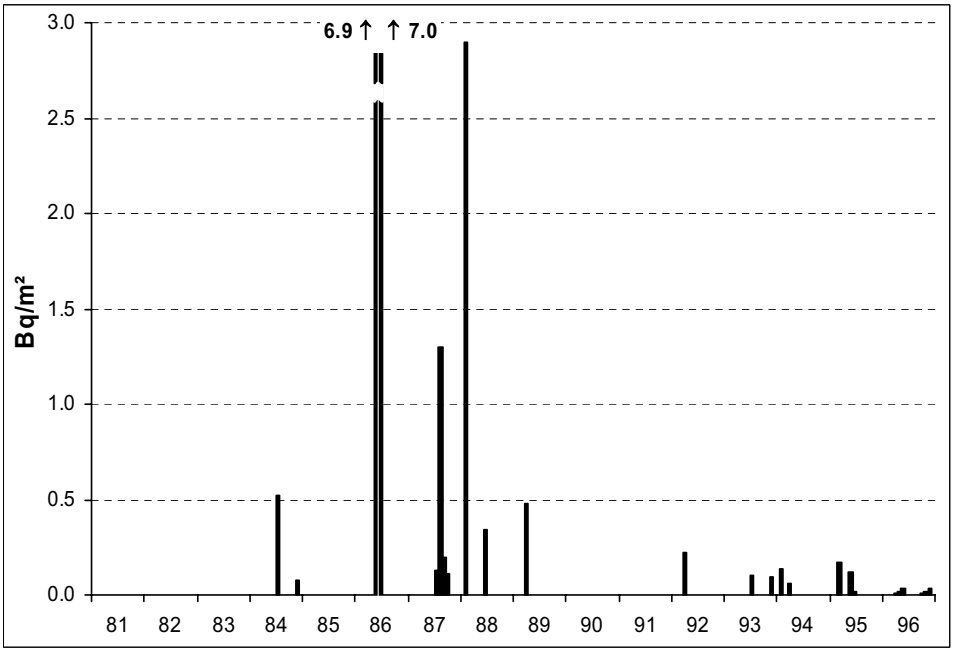

Figure 11. Observations of ^{60}Co in deposition samples at Station 21, Olkiluoto during 1981-1994.

5.3 Foodstuffs

No traces of fresh releases from the local NPPs were detected in the foodstuff samples. The artificial radionuclides detected were ^{90}Sr, ^{134}Cs, and ^{137}Cs, which originated from the Chernobyl accident and older global fallout.

In 1995, the annual mean concentrations of ^{90}Sr in milk samples representing the 0–40 km zone in Loviisa and the entire output of the local dairy in Olkiluoto were 0.055 Bq l^{-1} and 0.070 Bq l^{-1}; the respective concentrations in 1996 were 0.060 Bq l^{-1} and 0.065 Bq l^{-1} (Tables XX and XXI). The amounts of ^{90}Sr were approximately at the pre-Chernobyl level. The ^{137}Cs and ^{134}Cs contents in milk continued to decrease slowly. ^{134}Cs could still be seen occasionally in milk from the Loviisa area. ^{131}I was not detected in the milk samples taken weekly or monthly during 1995–1996 in either Loviisa or Olkiluoto.

The contents of ^{90}Sr in drinking water (Tables XXIIa and b) were at the same level as in the early 1980s. The ^{137}Cs contents generally continued to decrease slowly or were at the same level in water samples taken from the Loviisa and Olkiluoto NPPs, as well as in water samples taken from the town of Rauma.

Water supply in the town of Loviisa is groundwater, which explains the very low concentrations of artificial radionuclides in these samples. The reasons for the higher contents of cesium isotopes in the tap water of the Loviisa NPP have been discussed earlier [6].

The concentrations of tritium in all tap water samples were below the detection limit of the direct liquid scintillation counting measurement (4 kBq m^{-3}).

The levels of ^{90}Sr and ^{137}Cs in cereals have not changed significantly since 1992 (Table XXIII). The ^{137}Cs and ^{134}Cs contents in garden produce and beef (Tables XXIV and XXV) generally showed a decreasing trend compared with those of the previous years. ^{137}Cs concentrations in lettuce collected in autumn in both years at Olkiluoto were slightly higher than in other lettuce samples. This is probably due to the incomplete washing of lettuce leaves, which could have retained some soil contamination.

Only Chernobyl-derived gammanuclides, ^{134}Cs and ^{137}Cs, were found in mushrooms and wild berries picked from the Loviisa area (Table XXVI). The concentrations fell within the ranges reported for the same species in this fallout area after the Chernobyl accident [13]. As in general, the concentrations were highest in mushrooms of the genus *Russula*.

Fish samples are discussed in Chapter 5.4.3.

5.4 Aquatic environment

5.4.1 Seawater

Tritium in seawater originates generally from the atmospheric nuclear weapons tests conducted in the Northern Hemisphere during the late 1950s and early 1960s. The levels of fallout ^{3}H have subsequently decreased, but ^{3}H is still the most abundant radionuclide in seawater. A smaller fraction is formed in the upper atmosphere by the interaction of cosmic rays with the elements present there. However, ^{3}H is also produced in nuclear reactors, and consequently it is the predominant radionuclide both in airborne and liquid discharges from nuclear power plants.

In Finnish coastal waters the concentrations of fallout ^{3}H decreased from about 10–15 kBq m^{-3} to less than 5 kBq m^{-3} between the late 1970s and the mid 1990s. It is therefore obvious that local discharges have contributed to the values higher than 5 kBq m^{-3} in the Loviisa and Olkiluoto sea areas. During 1995–1996 the maximum concentration of ^{3}H was about 35 kBq m^{-3} in the

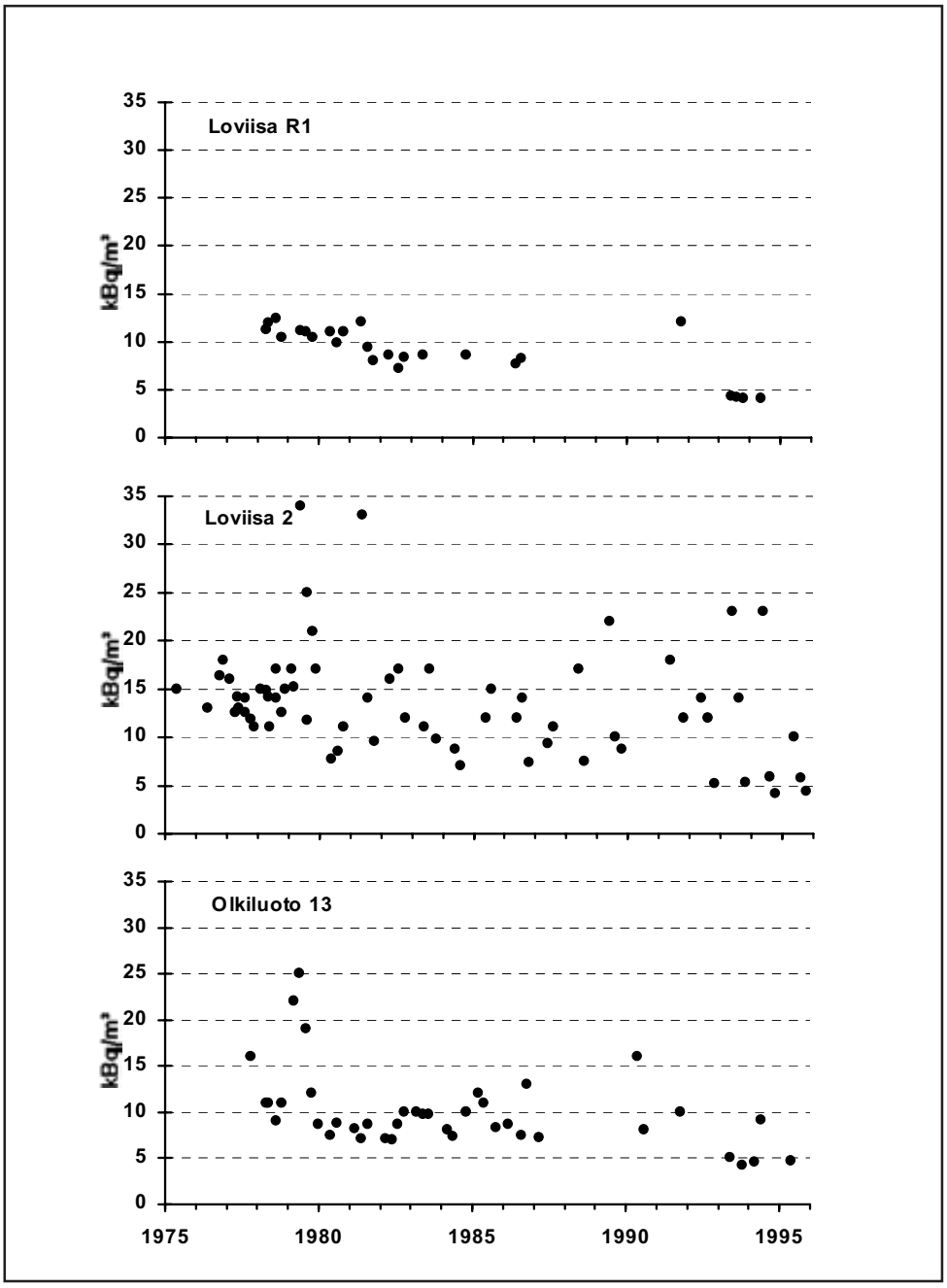

Figure 12. Tritium concentrations in seawater at stations Loviisa R1, Loviisa 2 and Olkiluoto 13 in 1976-1996 (detection limit 4 kBq m^{-3}).

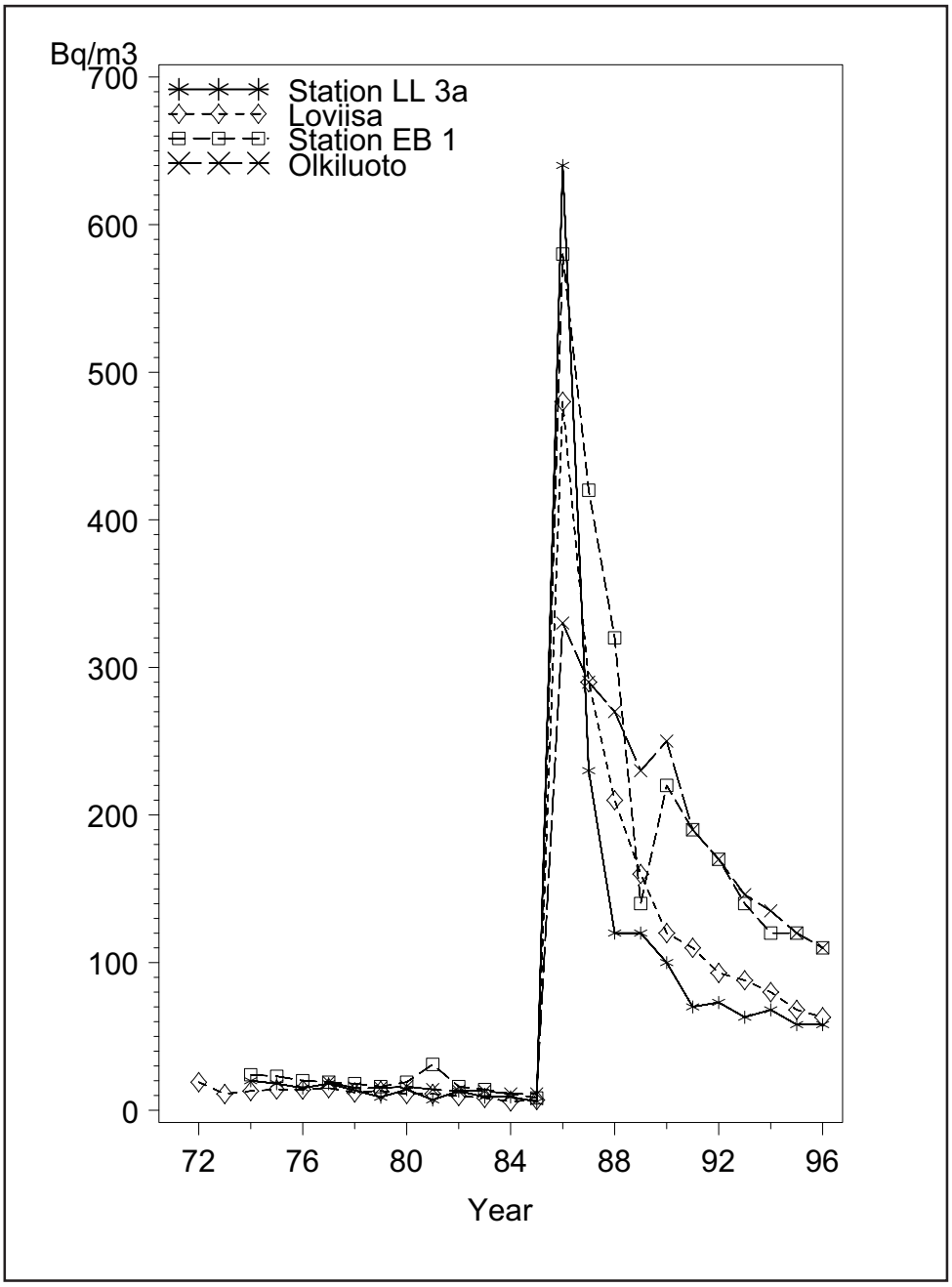

Figure 13. Late-summer mean concentrations of ^{137}Cs in surface sea water at Loviisa and Olkiluoto, and the nearest offshore stations LL3a (Gulf of Finland) and EB 1 (Bothnian Sea) in 1972-1996.

discharge areas of both nuclear power plants (Tables XXVII–XXVIII). Elevated ^{3}H concentrations were more frequent in Loviisa (Fig. 12), which is due to larger discharges, but also due to the slower exchange of water in the discharge area at Loviisa compared with that in the area off Olkiluoto. Besides ^{3}H, no distinct traces of other local discharge nuclides were detected in the seawater samples collected from Loviisa in 1995 and 1996. At Olkiluoto, small amounts of ^{60}Co, ^{54}Mn and ^{58}Co were detected especially in the seawater samples taken from the discharge area during the annual maintenance outages in spring (Tables XXVIIIa-b).

^{137}Cs and ^{134}Cs found in seawater in both areas mainly originated from the Chernobyl fallout and ^{90}Sr from the global fallout caused by atmospheric nuclear weapons tests. The average $^{134}Cs/^{137}Cs$ ratio in all seawater samples from Loviisa and Olkiluoto was 0.03 ± 0.01 in 1996.

During the 2-year period (1995–1996) the mean ^{137}Cs concentration of seawater was 61 (36–81 Bq m^{-3} in Loviisa and 109 (93-126 Bq m^{-3}) in Olkiluoto. Since the Chernobyl accident in 1986, cesium concentrations have decreased more rapidly in Loviisa and in the whole Gulf of Finland than in Olkiluoto and the Bothnian Sea [6]. In Figure 13, Station LL3a represents the open sea in front of Loviisa and Station EB1 that in front of Olkiluoto. From 1986 to 1996, the decrease in ^{137}Cs values was about 87% in Loviisa, but only 67% in Olkiluoto. The main reason for the different decreasing rates of cesium levels is the more effective water exchange between the Gulf of Finland and the Baltic Proper than that between the Bothnian Sea and the Baltic Proper. Furthermore in the Loviisa area, the archipelago retards the exchange of water more than in Olkiluoto and consequently the exit rate of cesium from seawater in the discharge area. The ^{90}Sr concentrations in seawater ranged from 10 to 16 Bq m^{-3} in Loviisa and from 7 to 17 Bq m^{-3} in Olkiluoto, being at the same order of magnitude as generally in the Baltic Sea [14].

5.4.2 Indicator organisms

The bladder-wrack, *Fucus vesiculosus*, and the filamentous green alga *Cladophora glomerata* are used as aquatic indicator organisms in both areas, as well as the relict crustacean *Saduria entomon* in Loviisa and the bivalve mussels *Mytilus edulis* and *Macoma baltica* in Olkiluoto. Indicator organisms effectively accumulate radionuclides from water and sediments, thus promoting to detect small traces of radionuclides in the environment.

Activity concentrations of Chernobyl-derived cesium accumulated in indicator organisms continued to decrease in both areas. However, in Loviisa

the cesium concentrations in *Fucus vesiculosus* have decreased slower than those in seawater, while in Olkiluoto the concentrations have decreased parallel with seawater. Thus, the concentrations in *Fucus* are still at the same level in Loviisa and Olkiluoto, although the concentrations in seawater are clearly lower in Loviisa. In 1996, the mean ^{137}Cs concentration of all *Fucus* samples collected from Loviisa was 69 (40-130) Bq kg^{-1} dry wt., while the mean value was 67 (42-118) Bq kg^{-1} dry wt. in Olkiluoto (Tables XXIXb and XXXb). As before, a clear difference occurred between the cesium values of the outermost and innermost sampling sites in both areas, the values being highest at the innermost sites. The potential contribution of the thermal effect caused by the cooling water of the power plants to the areal differences has been discussed in our previous reports, as well as that of low water-salinity, high turbidity and other hydrographic characteristics typical for the discharge areas [6,7]. Nevertheless, the ^{137}Cs discharges from the power plants may also give some rise to the concentrations in the vicinity of the discharge points.

Fucus accumulates cesium more effectively than *Cladophora* and the benthic animals. In 1995 and 1996 the activity concentrations of ^{137}Cs in *Cladophora* were 25-40 Bq kg^{-1} dry wt. in Loviisa and 37-57 Bq kg^{-1} dry wt. in Olkiluoto (Tables XXIX and XXX). In the *Saduria* from Loviisa, the concentrations were 36-42 Bq kg^{-1} dry wt. and in the *Macoma* from Olkiluoto, 18-22 Bq kg^{-1} dry wt. In the *Mytilus* from Olkiluoto, the ^{137}Cs concentrations were about 5 Bq kg^{-1} dry wt. (Table XXXI).

Differently from the cesium isotopes, ^{90}Sr and ^{239,240}Pu originate mainly from nuclear weapons tests. The activity concentrations of ^{90}Sr in *Fucus* ranged from 10 to 14 Bq kg^{-1} dry wt. in both areas. In benthic animals, the ^{90}Sr concentrations were somewhat higher (15-20 Bq kg^{-1} dry wt.). The activity concentrations of ^{239,240}Pu were 0.11-0.18 Bq kg^{-1} dry wt. in the *Fucus* samples collected from Loviisa and 0.04-0.06 Bq kg^{-1} dry wt. in those from Olkiluoto. In a *Fucus* survey conducted during the early 1980s along the Finnish coast, the mean concentrations of ^{239,240}Pu were 0.26 and 0.15 Bq kg^{-1} dry wt. in the Gulf of Finland and in the Bothnian Sea, respectively [15,16].

The other radionuclides detected in the indicator organisms originated from local discharges; i.e. ^{54}Mn, ^{58}Co, ^{60}Co, ^{95}Zr, ^{95}Nb, ^{110m}Ag and ^{124}Sb in Loviisa and ^{51}Cr, ^{54}Mn, ^{57}Co, ^{58}Co, ^{60}Co ^{65}Zn, ^{95}Zr, ^{124}Sb, ^{125}Sb and ^{131}I in Olkiluoto. ^{57}Co, ^{65}Zn, ^{95}Zr, ^{125}Sb, and ^{131}I were detected only in the *Fucus* samples collected near to the cooling water outlet at Olkiluoto and ^{110m}Ag only from the *Fucus* and *Saduria* samples taken from the area close to the outlet at Loviisa.

In general, the activity concentrations of the above-mentioned local discharge nuclides were somewhat higher in the Olkiluoto area than in Loviisa

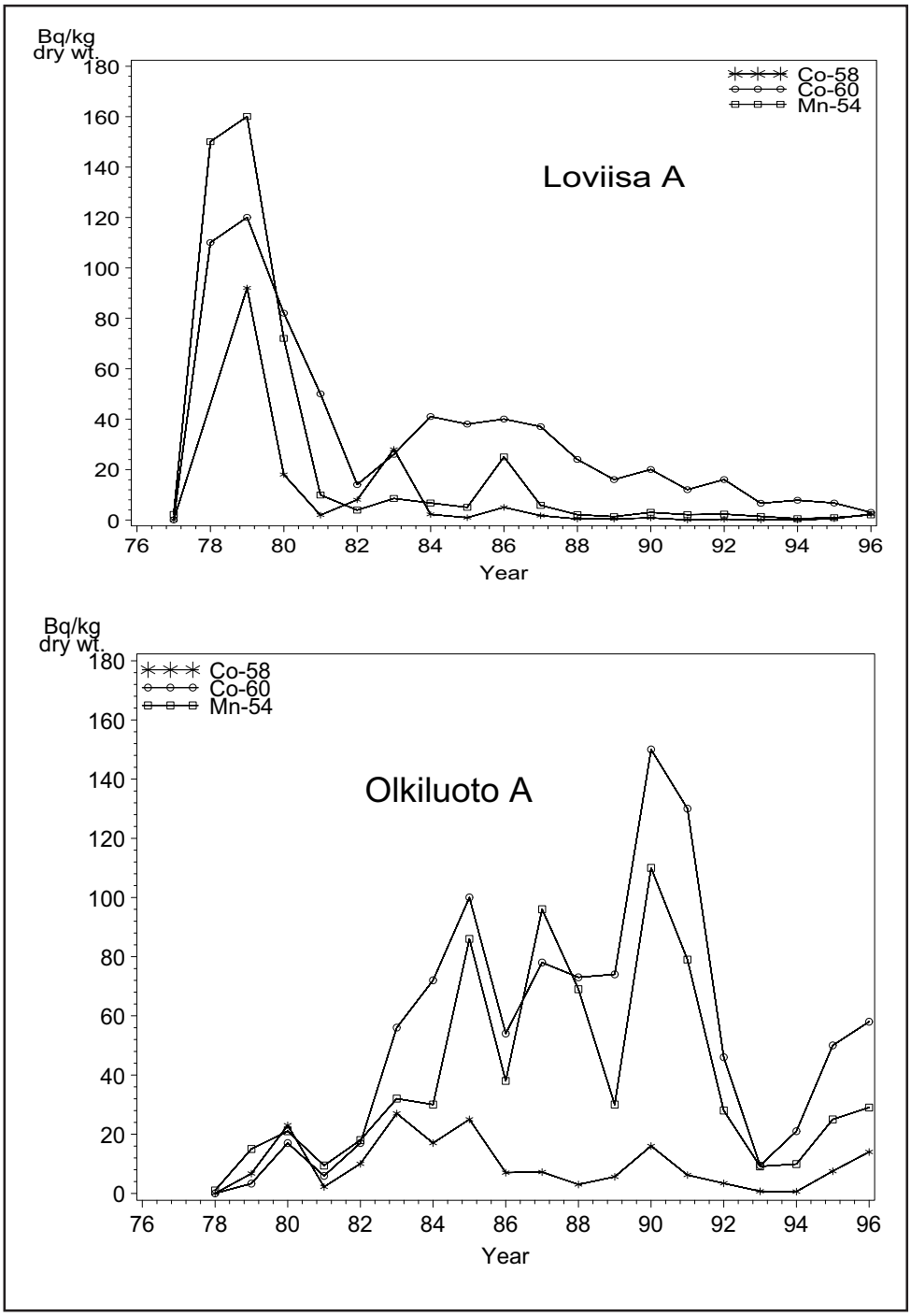

Figure 14. Annual mean concentrations of ^{54}Mn, ^{58}Co and ^{60}Co in *Fucus vesiculosus* at sampling stations Loviisa A and Olkiluoto A in 1977-1996.

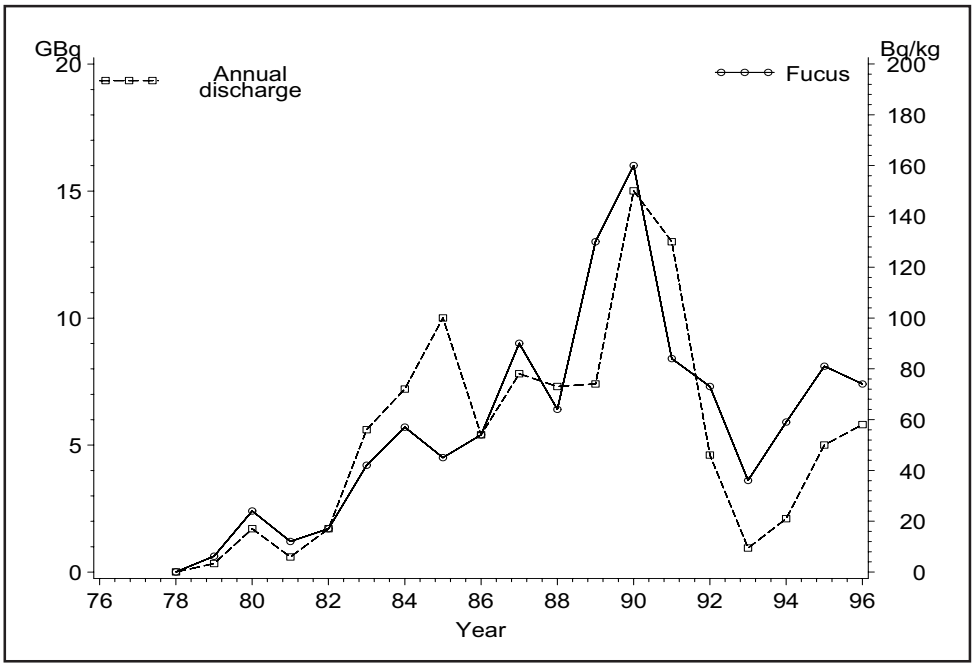

Figure 15. Annual aquatic discharges of ^{60}Co from Olkiluoto NPP and annual mean concentrations of ^{60}Co in *Fucus vesiculosus* at sampling station Olkiluoto A in 1978-1996.

(Fig. 14). Figure 15 shows good agreement between the ^{60}Co discharges and the nuclide concentrations in *Fucus*. In 1996, the highest ^{60}Co concentration found in indicator organisms was 86 Bq kg^{-1} dry wt. in *Fucus vesiculosus* sampled near to the cooling water outlet at Olkiluoto. The mean concentration of ^{60}Co was 58 Bq kg^{-1} dry wt. at the inner most sampling site Olkiluoto A and 1.6 Bq kg^{-1} dry wt. at the outer most sampling site Olkiluoto C (Table XXXb). In Loviisa, the corresponding mean was at the inner most site 3 Bq kg^{-1} dry wt. but at the outer most site, the values were below the detection limit (Table XXIXb).

When comparing the indicator value of the above-mentioned organisms, it seems clear that *Fucus* is the best indicator for most of the nuclides (^{60}Co, ^{58}Co, ^{124}Sb, ^{125}Sb, ^{51}Cr, ^{57}Co, ^{65}Zn, ^{95}Zr, ^{95}Nb and ^{131}I) detected in environmental samples monitored in the sea areas off Loviisa and Olkiluoto. However, *Saduria* is the best indicator for ^{110m}Ag, but it also seems to be a good indicator for ^{60}Co and ^{54}Mn. In one case, the ^{54}Mn concentration was higher in the *Cladophora* sample than in the *Fucus* sample taken from the same area during the same period (Table XXXa). In general, the indicator value of *Mytilus* and *Macoma* seems to be lower than that of *Fucus*, *Saduria,* and *Cladophora*, but both of them have their own 'ecological niche' in the monitoring programmes representing different types of filter-feeders.

5.4.3 Fish

The cesium concentrations in the fish samples taken from Loviisa and Olkiluoto were consistent with those of seawater, the concentrations being in all the fish species somewhat higher in Olkiluoto than in Loviisa (Tables XXXII-XXXIII). In general, the differences between the fish species were the same as previously: the concentrations were highest in perch and lowest in roach. However, in pike perch caught from Loviisa the cesium concentrations were almost as high as in perch.

In 1996, the highest ^{137}Cs concentration in perch was 66 Bq kg^{-1} fresh wt. in Olkiluoto and 40 Bq kg^{-1} fresh wt. in Loviisa. The activity concentrations of ^{90}Sr, ^{134}Cs and ^{137}Cs in pike and Baltic herring were in both areas at the same level as on the Finnish coast in general (perch and roach are not monitored regularly). Local discharge nuclides were not detected in the fish samples taken from Loviisa and Olkiluoto in 1995 and 1996.

In the fish samples taken from the fish farms operating in association with the Loviisa and Olkiluoto NPPs, the activity concentrations of ^{137}Cs were clearly lower than in the free-living fish, and ^{134}Cs was no longer detectable (Tables XXXIV-XXXV). The highest ^{137}Cs concentration in farmed fish was 2.3 Bq kg^{-1} fresh wt. It was stated earlier that the low concentrations are due to the low cesium contents of the feed used by the farms. For the first time in the history, traces of local discharge nuclides were found in one sample of young salmon taken from the Olkiluoto fish farm in May 1994. However, the concentrations of ^{60}Co and ^{54}Mn were very low, 0.13 and 0.05 Bq kg^{-1} fresh wt. respectively [8].

5.4.4 Sinking matter

Suspended particulate matter can be considered as a non-living indicator of radionuclides in the aquatic environment as many radionuclides tend to adsorb onto sinking particles. The affinity of cesium to clay particles is well known, but many other nuclides seem to have a similar tendency. Since many problems are involved in sampling recently settled particles from the surface of the sediment, proper sediment samples are taken in the monitoring programmes only once every 4 years, and the less frequent sampling is substituted by the continuous year-round collection of sinking matter.

In sinking matter, the activity concentrations of ^{137}Cs and ^{134}Cs were clearly higher than in indicator organisms. In 1996, the mean concentration of

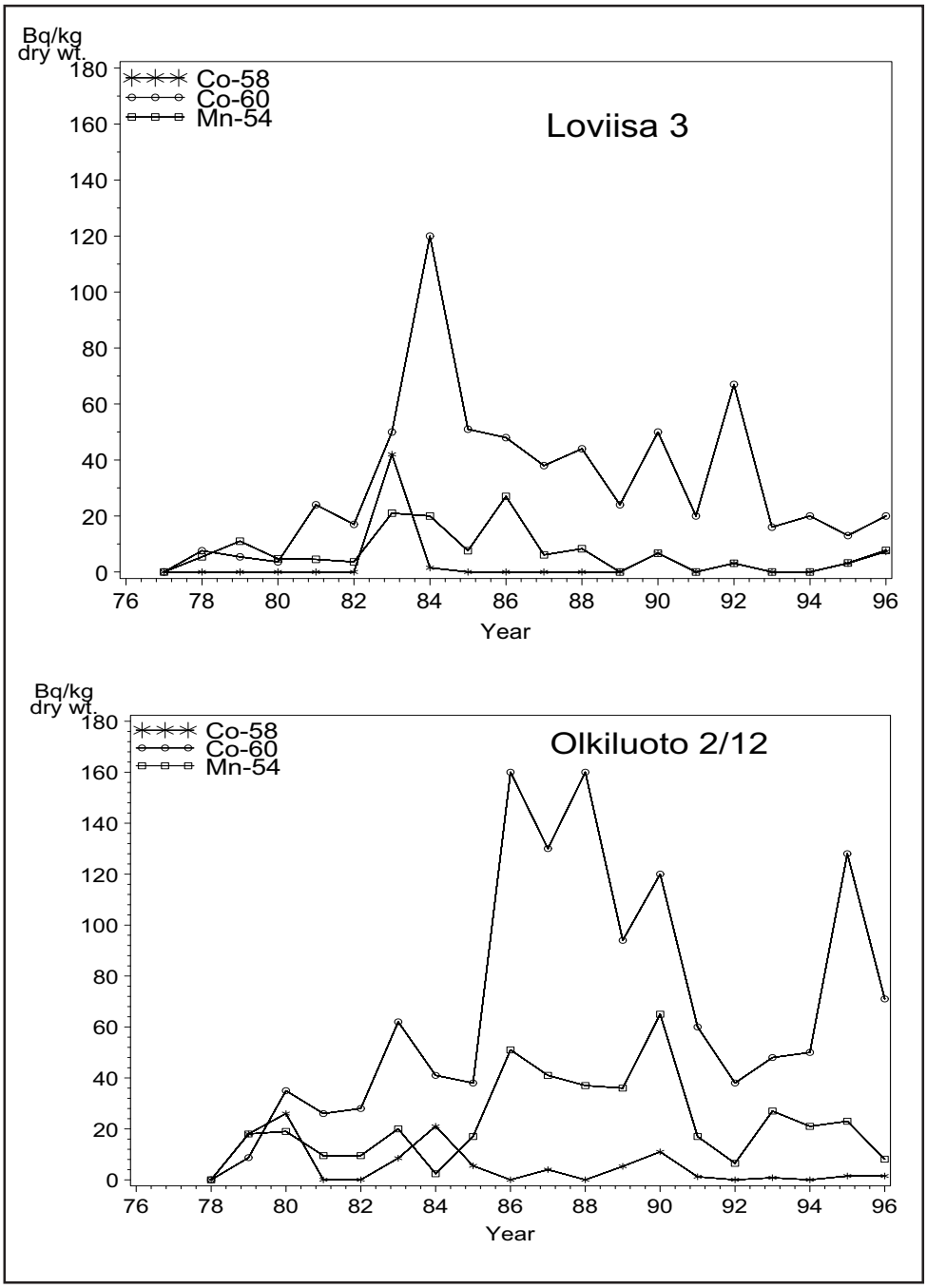

Figure 16. Mean concentrations of ^{54}Mn, ^{58}Co and ^{60}Co in sinking matter at Stations Loviisa 3 and Olkiluoto 2/12 during the open-water period in 1977-1996.

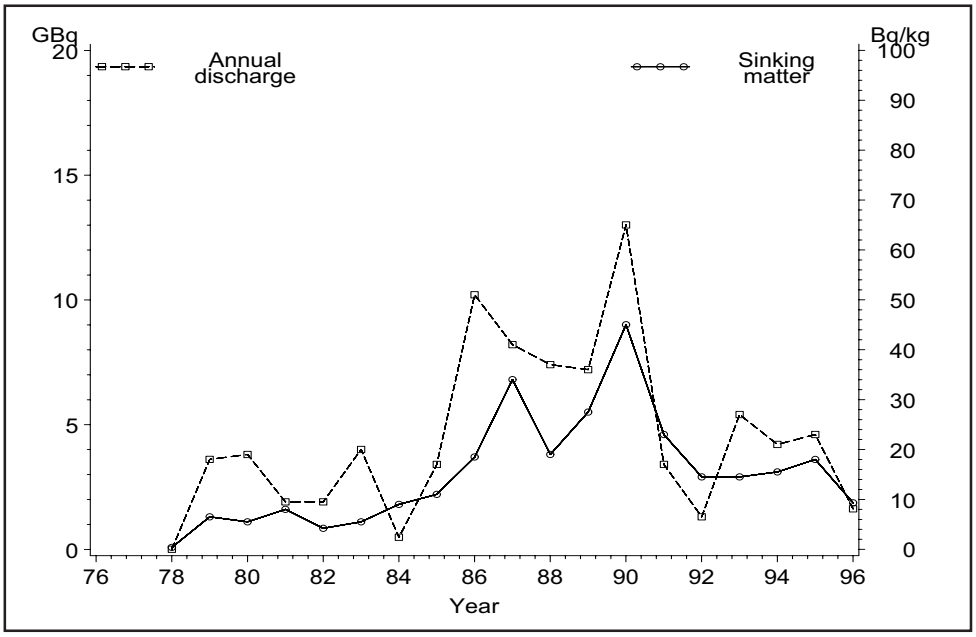

Figure 17. Annual aquatic discharges of ^{54}Mn from Olkiluoto NPP and annual mean concentrations of ^{54}Mn in sinking matter at sampling station Olkiluoto 2/12 in 1978-1996.

^{137}Cs was 790 (580-970) Bq kg^{-1} dry wt. at Hästholmsfjärden (Station 3) in Loviisa, 820 (670-910) Bq kg^{-1} dry wt. at the Reference Station Loviisa R1 and 740 (570-840) Bq kg^{-1} dry wt. at the Station Olkiluoto 12 (Tables XXXVI-XXXVII). The slightly higher values in the Loviisa area are explained by the higher particle content in water [6].

In both areas, the ^{60}Co, ^{54}Mn, ^{58}Co, ^{110m}Ag and ^{125}Sb found in sinking matter originate from local discharges. The maximum concentration of these nuclides was 245 Bq kg^{-1} dry wt. of ^{60}Co in a sample collected at Station Olkiluoto 12 during early summer in 1995. At the Reference Station Loviisa R1, located about 14 km to the west of the Loviisa NPP, no traces of local discharges were detected. However, local discharge nuclides were regularly detected at Station Olkiluoto 15, located 10 km to the north of the Olkiluoto NPP. Long-term fluctuations of ^{54}Mn, ^{58}Co and ^{60}Co in sinking matter collected during the open-water periods at Stations Loviisa 3 and Olkiluoto 2 (12 since 1993) are illustrated in Fig. 16. Fig. 17 shows that there is a good agreement between the ^{54}Mn discharges and its concentrations in sinking matter.

5.4.5 Bottom sediments

The gamma-emitting radionuclides found in sinking matter were generally also detected in corresponding sediment samples taken during the 1995 sediment survey in Olkiluoto (Tables XXXIX-XL). The only exception was ^{58}Co, the half-life of which is only 70 days. Strontium and plutonium were analysed only from ordinary sediment samples.

The peak values of cesium caused by the Chernobyl fallout occurred at many stations in the 5-10 cm sediment layer. The highest activity concentration of ^{137}Cs (1900 Bq kg^{-1} dry wt.) was detected in this layer at Station Olkiluoto 2. However, at most stations the cesium peak was still in the uppermost 0-5 cm layer. ^{60}Co was found at all other stations except at station S7. The highest ^{60}Co concentrations (73-75 Bq kg^{-1} dry wt.) were in the surface layer at Stations Olkiluoto 1 and 9. In the near distance from the power plant, the deepest observations of ^{60}Co were generally in the 10-15 cm layer. At a greater distance, ^{60}Co was usually found only in the uppermost layer.

Figure 18 illustrates the vertical distribution of ^{137}Cs in 1 cm slices at Station 2 in 1987 and 1991 and at Station 12 in 1995. In the cores taken by the Gemini Twin Corer from Station 12 in 1995, the peak concentration occurred at a depth of 7-8 cm. Accordingly, the sedimentation rate at this station has been estimated to about 5-8 mm y^{-1} (0.08-0.22 g cm^{-2} y^{-1})[17]. Thus, the occurrence of locally discharged ^{60}Co in the 12-13 cm layer (Table XL) is in agreement with the upper limit of the sedimentation rate, given that the power plant was started in 1978. The trace amount of ^{125}Sb found in a deeper layer (Table XXXIX) is probably due to the diffusibility of ^{125}Sb, bioturbation, or to smearing deeper sediment layers by surface particles during sampling [9].

The highest total amount of ^{137}Cs was 46 600 Bq m^{-2} at Station 9 and the lowest 2600 Bq m^{-2} at Station 3. In general, the total amounts have continued to increase after the preceding 1991 sediment survey, but at some stations, the values were now smaller.

Activity concentrations of ^{90}Sr, ^{238}Pu and ^{239,240}Pu in the sediment samples taken from the Olkiluoto area were 5-18 Bq kg^{-1}, 0.07-0.32 Bq kg^{-1} and 1.7-5.7 Bq kg^{-1} dry wt., respectively. These values do not diverge from those typical for the Bothnian Sea [STUK, unpublished data].

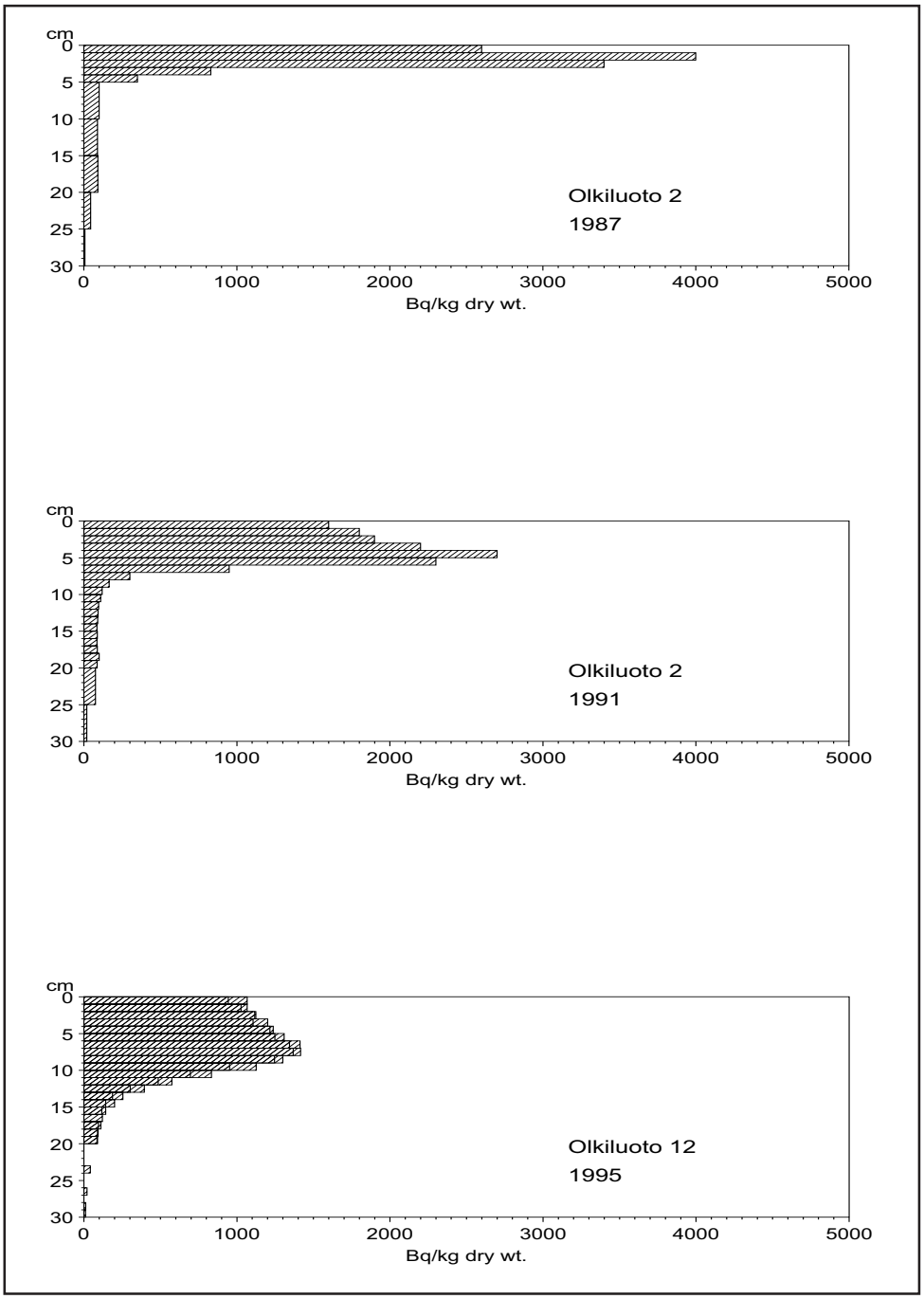

Figure 18. Vertical distribution of ^{137}Cs concentrations at Stations Olkiluoto 2 and 12 in 1987-1995.

5.5 Measurements of environmental gamma radiation

The results of the measurements made at the dosimeter stations in 1995 and 1996 are given in Tables XLI and XLII. The values range from 0.14 to 0.23 mSv h^{-1} in the Loviisa area and from 0.09 to 0.14 mSv h^{-1} in the Olkiluoto area. Table XLIII shows the fallout nuclides observed in the spectrometric measurements of the gamma radiation in the open field locations. No fission products were observed during the direct spectroscopic measurements of atmospheric releases.

5.6 Dose estimates based on reported release data

The radiation doses to the public from releases by the Finnish nuclear power plants were estimated using the VALTO computer model developed at STUK. The calculations are based on the discharge and meteorological data reported to STUK by the power companies. The effective dose commitments in 1995 and 1996 are summarised in the following table:

		From airborne releases	**From aquatic releases**
Individual dose (μSv)			
Loviisa	1995	0.026	0.013
	1996	0.022	0.013
Olkiluoto	1995	0.009	1.1
	1996	0.068	0.80
Collective dose (manSv)			
Loviisa	1995	1.5×10^{-3}	6.9×10^{-6}
	1996	4.5×10^{-4}	6.7×10^{-6}
Olkiluoto	1995	9.0×10^{-5}	1.3×10^{-3}
	1996	8.6×10^{-4}	8.8×10^{-4}

The collective doses were calculated for the population within 80 km of the power plant. The dose estimates do not include ^{14}C releases, which are reported as calculated from energy output figures.

Individual doses to the hypothetical critical group since the beginning of power production of the NPPs are presented in Fig. 19.

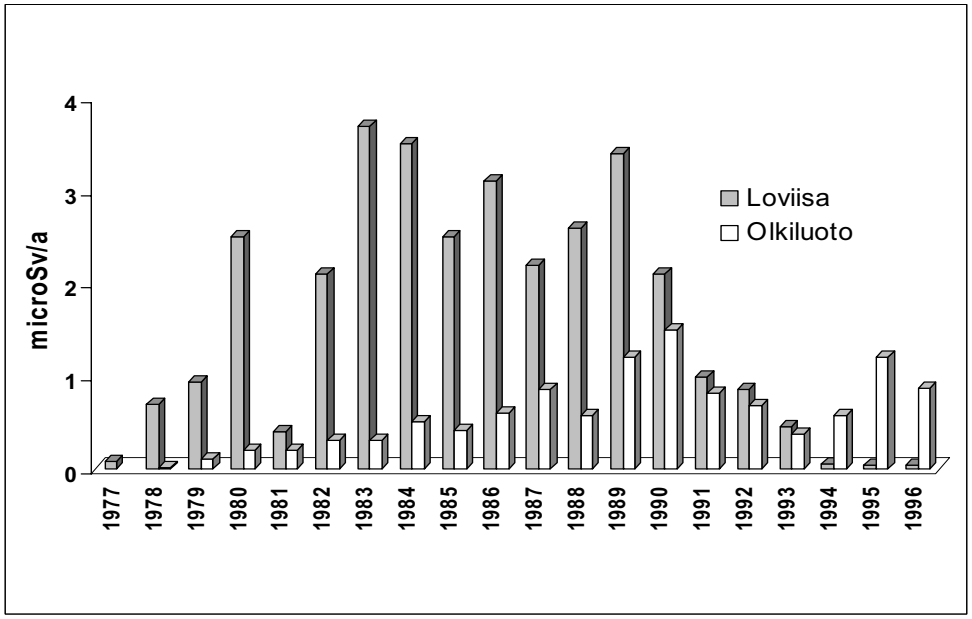

Figure 19. Average doses to critical groups in the vicinities of Finnish NPPs since beginning of power production.

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Table Ia. The concentration of gamma-emitting nuclides in ground-level air at the Loviisa 21 sampling station in 1995 (μBq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period			^{7}Be	^{51}Cr	^{54}Mn	^{58}Co	^{60}Co	^{137}Cs
03.01.1995	-	17.01.1995	1280 5	0	0	0	0	3.7 16
17.01.1995	-	31.01.1995	2940 4	0	0	0	0	3.4 17
31.01.1995	-	07.02.1995	2060 6	0	0	0	0	7.1 18
07.02.1995	-	14.02.1995	1460 5	0	0	0	0	0
14.02.1995	-	28.02.1995	1760 4	0	0	0	0	0
28.02.1995	-	14.03.1995	3000 3	0	0	0	0	1.9 16
14.03.1995	-	28.03.1995	2820 4	0	0	0	0	7.0 13
28.03.1995	-	11.04.1995	1950 3	0	0	0	0	2.8 6
11.04.1995	-	25.04.1995	2830 3	0	0	0	0	2.9 13
25.04.1995	-	09.05.1995	3300 3	0	0	2.1 16	0	3.2 10
09.05.1995	-	23.05.1995	4400 3	0	0	0	0	5.4 7
23.05.1995	-	06.06.1995	5500 3	0	0	0	0	8.5 8
06.06.1995	-	20.06.1995	4500 5	0	0	0	0	4.2 14
20.06.1995	-	04.07.1995	2530 5	0	0	0	0	5.7 12
04.07.1995	-	18.07.1995	2110 3	0	0	0	0	4.0 10
18.07.1995	-	01.08.1995	2930 3	0	0	0	0	4.4 5
01.08.1995	-	08.08.1995	3500 4	0	0	0	0	7.4 20
08.08.1995	-	15.08.1995	2510 4	0	4.6 24	20.9 9	0	0
15.08.1995	-	22.08.1995	2310 4	0	0	0	0	0
22.08.1995	-	29.08.1995	3800 5	46 16	2.5 30	5.1 18	0	4.3 22
29.08.1995	-	05.09.1995	2380 6	0	0	0	0	4.4 21
05.09.1995	-	12.09.1995	2480 6	0	0	0	0	5.2 19
12.09.1995	-	26.09.1995	4100 3	0	0	0	0	6.1 7
26.09.1995	-	10.10.1995	2690 3	0	0	0	0	7.0 7
10.10.1995	-	24.10.1995	2230 3	0	0	0	0	3.4 11
24.10.1995	-	31.10.1995	2820 5	0	0	0	0	0
31.10.1995	-	07.11.1995	2320 3	0	0	3.8 17	1.6 22	3.5 15

Table Ia. Continues.

Sampling period	^{7}Be	^{51}Cr	^{54}Mn	^{58}Co	^{60}Co	^{137}Cs
14.11.1995 - 21.11.1995	1970 3	0	0	0	0	5.0 14
21.11.1995 - 05.12.1995	1750 3	0	0	0	0	4.2 7
05.12.1995 - 12.12.1995	2920 3	0	0	0	0	3.2 9
12.12.1995 - 19.12.1995	1490 3	0	0	0	0	5.9 9
19.12.1995 - 02.01.1996	1700 3	0	0	0	0	5.7 5

0 = below the detection limit

Table Ib. The concentration of gamma-emitting nuclides in ground-level air at the Loviisa 21 sampling station in 1996 (μBq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period			^{7}Be	^{54}Mn	^{58}Co	^{60}Co	^{110m}Ag	^{124}Sb	^{137}Cs
02.01.1996	-	16.01.1996	4000 4	0	0	0	0	0	3.6 14
16.01.1996	-	30.01.1996	2270 3	0	0	0	0	0	5.4 10
30.01.1996	-	13.02.1996	1810 3	0	0	0	0	0	8.4 6
13.02.1996	-	27.02.1996	2090 3	0	0	0	0	0	5.8 10
27.02.1996	-	12.03.1996	2050 3	0	0	0	0	0	4.8 5
12.03.1996	-	26.03.1996	3900 3	0	0	0	0	0	2.6 11
26.03.1996	-	09.04.1996	3700 3	0	0	0	0	0	2.5 7
09.04.1996	-	23.04.1996	3900 3	0	0	0	0	0	3.4 12
23.04.1996	-	07.05.1996	2840 3	0	0	0	0	0	2.4 7
07.05.1996	-	21.05.1996	3600 3	0	0	0	0	0	3.4 9
21.05.1996	-	04.06.1996	3500 3	0	0	0	0	0	3.9 13
04.06.1996	-	18.06.1996	3100 3	0	0	0	0	0	4.9 8
18.06.1996	-	02.07.1996	2510 3	0	0	0	0	0	3.1 14
02.07.1996	-	16.07.1996	2300 3	0	0	0	0	0	2.7 17
16.07.1996	-	23.07.1996	3600 3	0	0	0	0	0	4.0 13
23.07.1996	-	30.07.1996	4400 3	0	0	0	0	0	3.9 14
30.07.1996	-	06.08.1996	2300 3	0	0	3.5 25	5.4 13	0	2.5 31
06.08.1996	-	13.08.1996	4500 3	0	4.9 17	9.0 8	0	8.9 9	4.6 19
13.08.1996	-	20.08.1996	6000 3	0	0	0	0	0	2.9 18
20.08.1996	-	27.08.1996	5100 5	0	0	2.3 24	0	0	4.8 19
27.08.1996	-	03.09.1996	5300 3	0	0	0	1.6 16	1.1 22	8.2 8
03.09.1996	-	10.09.1996	1440 3	0	0	0	0	0	3.1 25
10.09.1996	-	17.09.1996	3100 3	0	0	0	0	0	6.8 10
17.09.1996	-	24.09.1996	3100 3	0	0	0	0	0	3.7 9
24.09.1996	-	01.10.1996	3900 5	1.5 25	4.8 13	1.9 19	0	0	1.7 27
01.10.1996	-	08.10.1996	2670 5	0	0	0	0	0	0
08.10.1996	-	22.10.1996	2400 3	0	0	0	0	0	2.6 7
22.10.1996	-	05.11.1996	1680 3	0	0	0	0	0	1.9 9

Table Ib. Continues.

Sampling period			^{7}Be	^{54}Mn	^{58}Co	^{60}Co	^{110m}Ag	^{124}Sb	^{137}Cs
05.11.1996	-	19.11.1996	1760 3	0	0	0	0	0	1.6 17
19.11.1996	-	03.12.1996	1870 3	0	0	0	0	0	1.4 9
03.12.1996	-	17.12.1996	1540 3	0	0	0	0	0	1.7 9
17.12.1996	-	31.12.1996	1640 3	0	0	0	0	0	4.8 7
0 = below the detection limit									

Table IIa. The concentration of gamma-emitting nuclides in ground-level air at the Loviisa 22 sampling station in 1995 (μBq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period			^{7}Be	^{137}Cs
27.12.1994	-	10.01.1995	1620 5	2.7 21
10.01.1995	-	24.01.1995	2860 5	2.7 21
24.01.1995	-	07.02.1995	1440 4	3.2 18
07.02.1995	-	21.02.1995	1510 3	1.2 21
21.02.1995	-	07.03.1995	1630 5	0
07.03.1995	-	21.03.1995	3600 3	5.4 8
21.03.1995	-	04.04.1995	1800 5	2.9 16
04.04.1995	-	18.04.1995	1920 3	2.3 12
18.04.1995	-	02.05.1995	2650 3	2.1 15
02.05.1995	-	16.05.1995	2400 3	2.5 14
16.05.1995	-	30.05.1995	3700 3	6.6 7
30.05.1995	-	13.06.1995	5300 5	8.3 9
13.06.1995	-	27.06.1995	2900 3	3.7 8
27.06.1995	-	11.07.1995	1740 3	2.6 7
11.07.1995	-	25.07.1995	2130 4	4.2 18
25.07.1995	-	08.08.1995	3100 3	5.3 8
08.08.1995	-	22.08.1995	2240 5	2.4 20
22.08.1995	-	05.09.1995	2740 3	2.7 12
05.09.1995	-	19.09.1995	2340 5	5.4 13
19.09.1995	-	03.10.1995	2620 5	2.6 11
03.10.1995	-	17.10.1995	2220 5	0
17.10.1995	-	31.10.1995	2340 3	1.5 22
31.10.1995	-	14.11.1995	2130 5	3.6 15
14.11.1995	-	28.11.1995	1390 4	2.8 6
28.11.1995	-	12.12.1995	1950 4	1.8 24
12.12.1995	-	27.12.1995	1440 3	7.0 6

0 = below the detection limit

Table IIb. The concentration of gamma-emitting nuclides in ground-level air at the Loviisa 22 sampling station in 1996 (μBq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period			^{7}Be	^{54}Mn	^{58}Co	^{60}Co	^{110m}Ag	^{137}Cs
04.01.1996	-	09.01.1996	4100 3	0	0	0	0	6.0 13
09.01.1996	-	23.01.1996	2530 3	0	0	0	0	3.5 8
23.01.1996	-	06.02.1996	1600 3	0	0	0	0	4.5 5
06.02.1996	-	20.02.1996	1620 3	0	0	0	0	9.2 12
20.02.1996	-	05.03.1996	2180 3	0	0	0	0	4.4 10
05.03.1996	-	19.03.1996	2310 3	0	0	0	0	4.1 5
19.03.1996	-	02.04.1996	3300 3	0	0	0	0	3.7 17
02.04.1996	-	16.04.1996	3600 3	0	0	0	0	3.5 10
16.04.1996	-	30.04.1996	2860 3	0	0	0	0	1.3 15
30.04.1996	-	14.05.1996	3300 3	0	0	0	0	3.0 9
14.05.1996	-	28.05.1996	3300 3	0	0	0	0	4.3 8
28.05.1996	-	11.06.1996	2800 3	0	0	0	0	3.2 12
11.06.1996	-	25.06.1996	1900 3	0	0	0	0	2.2 13
25.06.1996	-	09.07.1996	2530 3	0	0	0	0	2.0 14
09.07.1996	-	23.07.1996	2520 3	0	0	0	0	2.2 14
23.07.1996	-	06.08.1996	2880 3	0	0	0	0	2.5 11
06.08.1996	-	20.08.1996	4600 3	0	0	0	0	3.5 10
20.08.1996	-	03.09.1996	4300 5	0	0	1.2 18	3.8 19	3.9 10
03.09.1996	-	17.09.1996	2120 3	0	0	0	0	2.8 9
17.09.1996	-	01.10.1996	3000 3	0.8 24	1.1 20	7.0 22	0	2.2 10
01.10.1996	-	15.10.1996	2020 3	0	0	0	0	1.7 21
15.10.1996	-	29.10.1996	2420 3	1.8 16	2.8 6	1.0 17	0	3.6 11
29.10.1996	-	12.11.1996	1070 3	0	0	0	0	1.0 36

Table IIb. Continues.

Sampling period			^{7}Be	^{54}Mn	^{58}Co	^{60}Co	^{110m}Ag	^{137}Cs
12.11.1996	-	26.11.1996	2080 3	0	0	0	0	1.6 19
26.11.1996	-	10.12.1996	1270 3	0	0	0	0	1.4 10
10.12.1996	-	23.12.1996	1390 5	0	0	0	0	4.0 11
23.12.1996	-	07.01.1997	1700 3	0	0	0	0	3.9 10

0 = below the detection limit

Table IIIa. The concentration of gamma-emitting nuclides in ground-level air at the Loviisa 24 sampling station in 1995 (μBq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period			^{7}Be	^{131}I	^{137}Cs
27.12.1994	-	10.01.1995	1820 4	0	3.3 20
10.01.1995	-	24.01.1995	1340 5	0	2.0 23
24.01.1995	-	07.02.1995	1640 3	0	3.3 15
07.02.1995	-	21.02.1995	1540 5	0	2.2 31
21.02.1995	-	07.03.1995	2120 3	0	1.2 20
07.03.1995	-	21.03.1995	3600 4	0	5.0 15
21.03.1995	-	04.04.1995	2160 3	0	3.0 11
04.04.1995	-	18.04.1995	2350 4	0	0
18.04.1995	-	02.05.1995	3300 3	0	2.2 15
02.05.1995	-	16.05.1995	2870 3	0	1.9 9
16.05.1995	-	30.05.1995	4600 3	0	5.0 9
30.05.1995	-	13.06.1995	5600 5	0	9.6 10
13.06.1995	-	27.06.1995	3300 5	0	4.1 17
27.06.1995	-	11.07.1995	1780 3	0	3.3 12
11.07.1995	-	25.07.1995	2520 3	0	7.9 8
25.07.1995	-	08.08.1995	3200 3	0	4.4 8
08.08.1995	-	22.08.1995	2860 3	0	3.4 10
22.08.1995	-	05.09.1995	2750 4	0	4.1 17
05.09.1995	-	19.09.1995	2860 3	0	4.7 16
19.09.1995	-	03.10.1995	2720 4	0	5.0 10
03.10.1995	-	17.10.1995	2450 4	0	0
17.10.1995	-	31.10.1995	2360 4	16 20	2.5 13
31.10.1995	-	14.11.1995	2350 4	0	0
14.11.1995	-	28.11.1995	1600 4	0	2.3 9
28.11.1995	-	12.12.1995	2220 3	0	2.8 8
12.12.1995	-	27.12.1995	1430 5	0	5.2 13

0 = below the detection limit

Table IIIb. The concentration of gamma-emitting nuclides in ground-level air at the Loviisa 24 sampling station in 1996 (Bq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period	^{7}Be	^{54}Mn	^{58}Co	^{60}Co	^{110m}Ag	^{124}Sb	^{137}Cs
27.12.1995 - 09.01.1996	2800 3	0	0	0	0	0	2.8 16
09.01.1996 - 23.01.1996	2580 5	0	0	0	0	0	3.1 13
26.01.1996 - 06.02.1996	1860 3	0	0	0	0	0	6.4 7
06.02.1996 - 20.02.1996	1780 3	0	0	0	0	0	7.6 12
20.02.1996 - 05.03.1996	2270 3	0	0	0	0	0	3.3 11
05.03.1996 - 19.03.1996	1600 3	0	0	0	0	0	3.4 9
19.03.1996 - 02.04.1996	3600 3	0	0	0	0	0	0
02.04.1996 - 16.04.1996	3400 5	0	0	0	0	0	3.2 17
16.04.1996 - 30.04.1996	3100 3	0	0	0	0	0	1.5 23
30.04.1996 - 14.05.1996	3400 3	0	0	0	0	0	2.4 7
14.05.1996 - 28.05.1996	3400 3	0	0	0	0	0	3.0 13
28.05.1996 - 11.06.1996	3100 4	0	0	0	0	0	3.5 12
11.06.1996 - 25.06.1996	2050 3	0	0	0	0	0	3.3 15
25.06.1996 - 09.07.1996	2500 3	0	0	0	0	0	1.9 14
09.07.1996 - 23.07.1996	2690 3	0	0	0	0	0	3.3 11
23.07.1996 - 06.08.1996	2880 3	0	0	0	1.8 22	1.8 23	1.6 30
06.08.1996 - 20.08.1996	4900 3	0	0	0	0	0	3.5 14
20.08.1996 - 03.09.1996	3700 3	0	0	0	0	0	5.7 8
03.09.1996 - 17.09.1996	2160 3	0	0	0	0	0	4.0 12
17.09.1996 - 01.10.1996	2780 4	2.7 27	4.2 26	2.1 17	0	0	3.1 25
01.10.1996 - 15.10.1996	2110 3	2.6 26	0	2.7 22	0	0	0
15.10.1996 - 29.10.1996	2370 3	0	0	0	0	0	3.2 12
29.10.1996 - 12.11.1996	1200 3	0	0	0	0	0	1.3 21

Table IIIb. Continues.

Sampling period	^{7}Be	^{54}Mn	^{58}Co	60Co	^{110m}Ag	^{124}Sb	^{137}Cs
12.11.1996 - 26.11.1996	2110 3	0	0	0	0	0	0
26.11.1996 - 10.12.1996	1310 3	0	0	0	0	0	0
10.12.1996 - 23.12.1996	1460 5	0	0	0	0	0	4.2 11
23.12.1996 - 07.01.1997	1670 3	0	0	0	0	0	3.4 11

0 = below the detection limit

Table IVa. The concentration of gamma-emitting nuclides in ground-level air at the Loviisa 27 sampling station in 1995 (μBq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period			^{7}Be	^{54}Mn	^{58}Co	^{60}Co	^{137}Cs
03.01.1995	-	17.01.1995	1970 4	0	0	0	5.1 25
17.01.1995	-	31.01.1995	2530 4	0	0	0	3.7 19
31.01.1995	-	14.02.1995	1580 3	0	0	0	5.3 9
14.02.1995	-	28.02.1995	1900 3	0	0	0	1.3 24
28.02.1995	-	14.03.1995	2350 4	0	0	0	3.0 26
14.03.1995	-	28.03.1995	2700 3	0	0	0	6.0 8
28.03.1995	-	11.04.1995	1620 3	0	0	0	4.0 10
11.04.1995	-	25.04.1995	2380 4	0	0	0	3.2 23
25.04.1995	-	09.05.1995	2600 3	2.8 15	5.7 15	2.2 11	2.9 10
09.05.1995	-	23.05.1995	3400 3	0	0	0	3.9 20
23.05.1995	-	06.06.1995	5300 3	0	0	0	12.2 6
06.06.1995	-	20.06.1995	3800 3	0	0	0	5.5 16
20.06.1995	-	04.07.1995	2160 3	0	0	0	4.3 5
04.07.1995	-	18.07.1995	1730 3	0	0	0	3.6 12
18.07.1995	-	01.08.1995	2700 3	0	0	0	2.8 8
01.08.1995	-	15.08.1995	2570 3	0	0	0	3.2 21
15.08.1995	-	29.08.1995	2860 3	0	0	0	4.5 15
29.08.1995	-	12.09.1995	1950 3	0	1.3 30	0	7.3 8
12.09.1995	-	26.09.1995	3100 5	0	0	0	5.4 13
26.09.1995	-	10.10.1995	1930 3	0	0	0	3.4 14
10.10.1995	-	24.10.1995	1880 3	0	0	0	11.9 14
24.10.1995	-	07.11.1995	2150 5	0	0	0	4.4 16
07.11.1995	-	21.11.1995	2120 4	0	0	0	5.1 7
21.11.1995	-	05.12.1995	1550 3	0	0	0	5.2 9
05.12.1995	-	19.12.1995	1670 3	0	0	0	3.8 9
19.12.1995	-	02.01.1996	1320 3	0	0	0	7.5 7

0 = below the detection limit

Table IVb. The concentration of gamma-emitting nuclides in ground-level air at the Loviisa 27 sampling station in 1996 (μBq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period			^{7}Be	^{110m}Ag	^{137}Cs
02.01.1996	-	16.01.1996	3300 3	0	2.9 9
16.01.1996	-	30.01.1996	1840 5	0	4.8 9
30.01.1996	-	13.02.1996	1410 3	0	7.0 8
13.02.1996	-	27.02.1996	1840 3	0	5.9 11
27.02.1996	-	12.03.1996	1750 5	0	3.4 11
12.03.1996	-	26.03.1996	4800 5	0	3.3 16
26.03.1996	-	09.04.1996	3200 3	0	2.3 14
09.04.1996	-	23.04.1996	3500 3	0	3.8 22
23.04.1996	-	07.05.1996	2420 3	0	2.4 20
07.05.1996	-	21.05.1996	2990 3	0	4.4 12
21.05.1996	-	04.06.1996	2890 3	0	4.6 10
04.06.1996	-	18.06.1996	2570 3	0	5.1 11
18.06.1996	-	02.07.1996	2030 3	0	2.5 20
02.07.1996	-	16.07.1996	2150 3	0	2.9 13
16.07.1996	-	30.07.1996	3300 3	0	4.6 9
30.07.1996	-	13.08.1996	3100 3	0	3.2 10
13.08.1996	-	27.08.1996	4500 3	0	4.2 13
27.08.1996	-	10.09.1996	2840 4	0	6.4 16
10.09.1996	-	24.09.1996	2510 3	0	3.5 9
24.09.1996	-	08.10.1996	2550 3	0	2.8 16
08.10.1996	-	22.10.1996	2060 3	0	2.8 8
22.10.1996	-	05.11.1996	1600 3	0	2.0 15
05.11.1996	-	11.11.1996	1400 3	0	0
22.11.1996	-	03.12.1996	1310 4	4.1 14	2.9 13
03.12.1996	-	17.12.1996	1310 3	0	2.4 9
17.12.1996	-	31.12.1996	1270 3	0	5.7 8

0 = below the detection limit

Table V. The concentrations of gamma-emitting radionuclides in the supplementary samples of ground-level air at the Loviisa 33 sampling station in 1995-1996. Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period	^{7}Be	^{110m}Ag	^{137}Cs
27.07.1995 - 31.07.1995	3200 3	0	0
31.07.1995 - 07.08.1995	3400 3	0	3.1 8
07.08.1995 - 14.08.1995	2450 3	2.6 18	3.7 10
14.08.1995 - 21.08.1995	2360 3	0	2.62 6
21.08.1995 - 28.08.1995	3200 3	0	3.1 15
28.08.1995 - 04.09.1995	2330 3	0	3.1 7
04.09.1995 - 11.09.1995	1960 5	0	2.48 9
18.07.1996 - 22.07.1996	2630 3	0	2.05 27
22.07.1996 - 29.07.1996	4000 5	0	2.46 9
29.07.1996 - 05.08.1996	1940 3	0	1.64 7
05.08.1996 - 12.08.1996	3900 3	0	2.90 12
12.08.1996 - 19.08.1996	5000 5	0	1.67 15
19.08.1996 - 26.08.1996	4200 5	0	2.07 13
19.09.1996 - 23.09.1996	1730 3	0	3.1 12
23.09.1996 - 30.09.1996	3600 3	0	1.88 6
30.09.1996 - 07.10.1996	2500 5	0	1.62 12
07.10.1996 - 14.10.1996	1890 3	0	2.10 10

0 = below the detection limit

Table VIa. The concentration of gamma-emitting nuclides in ground-level air at the Olkiluoto 22 sampling station in 1995 (μBq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period			^{7}Be	^{134}Cs	^{137}Cs
04.01.1995	-	19.01.1995	2840 5	0	9.7 15
19.01.1995	-	01.02.1995	2150 5	0	21.4 6
01.02.1995	-	16.02.1995	1720 3	0	7.4 5
16.02.1995	-	01.03.1995	1550 5	0	2.2 22
01.03.1995	-	15.03.1995	2480 4	0	4.7 15
15.03.1995	-	30.03.1995	2240 3	1.1 12	23.1 3
30.03.1995	-	12.04.1995	2250 3	0	4.7 4
12.04.1995	-	26.04.1995	2650 3	0	2.8 11
26.04.1995	-	10.05.1995	2570 3	0	4.4 14
10.05.1995	-	17.05.1995	3200 3	0	3.1 15
17.05.1995	-	24.05.1995	3400 3	0	4.3 13
24.05.1995	-	31.05.1995	4300 5	0	7.2 14
31.05.1995	-	07.06.1995	4400 5	0	11.8 6
07.06.1995	-	21.06.1995	1860 3	0	4.9 6
21.06.1995	-	05.07.1995	2240 5	0	3.9 12
05.07.1995	-	19.07.1995	1830 3	0	3.9 7
19.07.1995	-	02.08.1995	2550 3	0	3.4 9
02.08.1995	-	16.08.1995	2610 3	0	2.9 10
16.08.1995	-	30.08.1995	2250 5	0	2.8 16
30.08.1995	-	13.09.1995	1990 5	0	5.3 11
13.09.1995	-	27.09.1995	3400 3	0	3.6 7
27.09.1995	-	11.10.1995	2360 3	0	2.6 16
11.10.1995	-	25.10.1995	1940 4	0	0
25.10.1995	-	08.11.1995	2090 3	0	4.1 10
08.11.1995	-	22.11.1995	2020 3	0	3.6 7
22.11.1995	-	07.12.1995	1860 3	0	6.2 10
07.12.1995	-	20.12.1995	1760 3	0	9.1 6
20.12.1995	-	03.01.1996	2090 3	0	17.1 4

0 = below the detection limit

Table VIb. The concentration of gamma-emitting nuclides in ground-level air at the Olkiluoto 22 sampling station in 1996 (μBq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period	^{7}Be	^{54}Mn	^{60}Co	^{137}Cs
03.01.1996 - 18.01.1996	2840 4	0	0	5.4 12
18.01.1996 - 01.02.1996	2330 3	0	0	4.6 5
01.02.1996 - 15.02.1996	1730 3	0	0	6.9 5
15.02.1996 - 29.02.1996	2060 3	0	0	7.3 11
29.02.1996 - 14.03.1996	1390 3	0	0	4.3 9
14.03.1996 - 28.03.1996	3500 3	0	0	4.7 5
28.03.1996 - 11.04.1996	3700 3	0	0	4.6 7
11.04.1996 - 25.04.1996	3500 3	0	0	5.3 14
25.04.1996 - 02.05.1996	1770 3	0	0	4.3 7
02.05.1996 - 08.05.1996	2290 4	0	0	2.9 11
08.05.1996 - 15.05.1996	4500 3	0	0	4.9 11
15.05.1996 - 22.05.1996	2790 3	0	0	3.3 17
22.05.1996 - 30.05.1996	2680 3	1.3 23	2.3 13	3.4 14
22.05.1996 - 06.06.1996	3700 3	0	0	5.0 13
06.06.1996 - 19.06.1996	2530 3	0	0	3.8 9
19.06.1996 - 04.07.1996	1880 3	0	0	3.0 13
04.07.1996 - 17.07.1996	1590 3	0	0	2.4 17
17.07.1996 - 31.07.1996	3600 3	0	0	2.8 9
31.07.1996 - 14.08.1996	3100 5	0	0	3.3 13
14.08.1996 - 29.08.1996	4800 3	0	0	2.7 13
29.08.1996 - 11.09.1996	2170 3	0	0	2.1 24
11.09.1996 - 25.09.1996	2350 3	0	0	3.6 18
25.09.1996 - 09.10.1996	2220 3	0	0	2.3 16
09.10.1996 - 23.10.1996	1880 3	0	0	3.9 8
23.10.1996 - 06.11.1996	1740 3	0	0	2.0 21
06.11.1996 - 20.11.1996	1090 3	0	0	1.4 24
20.11.1996 - 05.12.1996	1260 3	0	0	3.2 19
05.12.1996 - 18.12.1996	1450 4	0	0	6.7 5
18.12.1996 - 03.01.1997	1530 3	0	0	6.4 6

0 = below the detection limit

Table VIIa. The concentration of gamma-emitting nuclides in ground-level air at the Olkiluoto 26 sampling station in 1995 (μBq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period			^{7}Be	^{137}Cs
28.12.1994	-	12.01.1995	1790 5	4.2 16
12.01.1995	-	26.01.1995	2760 5	11.0 8
26.01.1995	-	09.02.1995	1840 3	6.1 6
09.02.1995	-	23.02.1995	1410 3	4.5 9
23.02.1995	-	07.03.1995	1910 4	4.2 16
07.03.1995	-	23.03.1995	2830 3	5.8 12
23.03.1995	-	05.04.1995	1870 4	3.8 15
05.04.1995	-	19.04.1995	2300 3	2.2 11
19.04.1995	-	03.05.1995	3500 3	3.6 9
03.05.1995	-	17.05.1995	2240 3	3.5 7
17.05.1995	-	31.05.1995	3200 3	2.5 13
31.05.1995	-	15.06.1995	3400 3	9.8 6
15.06.1995	-	27.06.1995	2480 5	4.0 14
27.06.1995	-	12.07.1995	1270 3	2.0 11
12.07.1995	-	26.07.1995	1930 3	3.5 13
26.07.1995	-	09.08.1995	2450 3	2.6 21
09.08.1995	-	24.08.1995	2260 3	4.1 11
24.08.1995	-	06.09.1995	1870 5	4.7 12
06.09.1995	-	20.09.1995	2460 3	5.4 9
20.09.1995	-	05.10.1995	2590 5	4.4 13
05.10.1995	-	18.10.1995	2360 4	3.5 21
18.10.1995	-	01.11.1995	2130 5	3.0 12
01.11.1995	-	15.11.1995	1900 3	3.4 12
15.11.1995	-	30.11.1995	1690 5	4.1 11
30.11.1995	-	13.12.1995	2260 5	5.5 9
13.12.1995	-	28.12.1995	1390 3	6.2 4

Table VIIb. The concentration of gamma-emitting nuclides in ground-level air at the Olkiluoto 26 sampling station in 1996 (μBq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period			^{7}Be	^{137}Cs
28.12.1995	-	11.01.1996	3700 5	3.9 13
11.01.1996	-	25.01.1996	1530 5	2.7 16
25.01.1996	-	08.02.1996	2310 3	9.2 8
08.02.1996	-	22.02.1996	1670 3	7.2 5
22.02.1996	-	07.03.1996	1850 4	6.9 14
07.03.1996	-	21.03.1996	2650 3	4.9 8
21.03.1996	-	03.04.1996	2870 4	4.1 8
03.04.1996	-	22.04.1996	4100 3	3.8 10
22.04.1996	-	02.05.1996	1800 3	5.2 18
02.05.1996	-	15.05.1996	3200 3	3.8 7
15.05.1996	-	30.05.1996	2950 3	3.5 10
30.05.1996	-	12.06.1996	3400 3	6.7 6
12.06.1996	-	26.06.1996	1720 3	6.3 6
26.06.1996	-	10.07.1996	2040 3	3.2 11
10.07.1996	-	24.07.1996	2530 3	3.2 13
24.07.1996	-	07.08.1996	2350 3	3.1 13
07.08.1996	-	21.08.1996	4600 3	3.3 10
21.08.1996	-	04.09.1996	4100 5	3.5 13
04.09.1996	-	18.09.1996	1570 3	2.9 11
18.09.1996	-	02.10.1996	3000 3	4.3 15
02.10.1996	-	16.10.1996	1890 3	3.1 8
16.10.1996	-	31.10.1996	2070 3	3.7 5
31.10.1996	-	14.11.1996	1180 3	2.2 17
14.11.1996	-	28.11.1996	1180 3	3.0 6
28.11.1996	-	12.12.1996	1360 3	2.9 10
12.12.1996	-	27.12.1996	1340 3	8.5 5

Table VIIIa. The concentration of gamma-emitting nuclides in ground-level air at the Olkiluoto 31 sampling station in 1995 (μBq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period			^{7}Be		^{137}Cs	
04.01.1995	-	19.01.1995	2060	3	2.0	19
19.01.1995	-	01.02.1995	2330	3	8.4	6
01.02.1995	-	16.02.1995	1910	3	7.2	11
16.02.1995	-	01.03.1995	1800	3	3.1	10
01.03.1995	-	15.03.1995	2800	3	3.6	9
15.03.1995	-	30.03.1995	2120	4	6.6	6
30.03.1995	-	12.04.1995	1910	3	2.2	11
12.04.1995	-	26.04.1995	2610	4	2.2	23
26.04.1995	-	10.05.1995	2890	3	3.0	9
10.05.1995	-	24.05.1995	3500	3	3.5	10
24.05.1995	-	07.06.1995	4300	3	7.4	11
07.06.1995	-	21.06.1995	2480	5	8.8	9
21.06.1995	-	05.07.1995	2240	3	9.3	7
05.07.1995	-	19.07.1995	1840	5	5.3	7
19.07.1995	-	02.08.1995	2410	3	2.5	13
02.08.1995	-	16.08.1995	2310	5	2.3	18
16.08.1995	-	30.08.1995	2240	3	1.8	14
30.08.1995	-	13.09.1995	2000	4	4.8	8
13.09.1995	-	27.09.1995	3100	5	5.0	7
27.09.1995	-	11.10.1995	2500	4	3.7	8
11.10.1995	-	25.10.1995	2140	3	2.9	10
25.10.1995	-	08.11.1995	2100	4	2.5	26
08.11.1995	-	22.11.1995	2020	3	3.7	8
22.11.1995	-	07.12.1995	1890	5	5.2	9
07.12.1995	-	20.12.1995	1680	3	4.7	9
20.12.1995	-	03.01.1996	2030	5	5.0	10

Table VIIIb. The concentration of gamma-emitting nuclides in ground-level air at the Olkiluoto 31 sampling station in 1996 (μBq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period			^{7}Be	^{137}Cs
03.01.1996	-	18.01.1996	2840 3	3.1 9
18.01.1996	-	01.02.1996	2230 3	5.3 6
01.02.1996	-	15.02.1996	1880 3	4.6 10
15.02.1996	-	29.02.1996	2240 3	9.4 7
29.02.1996	-	14.03.1996	1540 3	4.5 6
14.03.1996	-	28.03.1996	3800 3	7.3 6
28.03.1996	-	11.04.1996	3900 3	5.6 9
11.04.1996	-	25.04.1996	3500 3	4.1 8
02.05.1996	-	08.05.1996	1590 3	4.6 7
08.05.1996	-	22.05.1996	3600 3	4.2 8
22.05.1996	-	06.06.1996	3100 3	3.2 10
06.06.1996	-	19.06.1996	2580 3	3.6 10
19.06.1996	-	04.07.1996	1840 3	2.4 15
04.07.1996	-	17.07.1996	1550 3	3.8 13
17.07.1996	-	31.07.1996	3300 3	2.6 10
31.07.1996	-	14.08.1996	3100 3	2.7 13
14.08.1996	-	29.08.1996	4800 5	3.3 8
29.08.1996	-	11.09.1996	2310 5	1.7 31
11.09.1996	-	25.09.1996	2260 5	3.7 15
25.09.1996	-	09.10.1996	2590 3	2.7 10
09.10.1996	-	23.10.1996	1930 3	3.7 7
23.10.1996	-	06.11.1996	1750 3	2.2 15
06.11.1996	-	20.11.1996	1180 3	2.4 12
20.11.1996	-	05.12.1996	1220 3	2.3 10
05.12.1996	-	18.12.1996	1480 3	3.4 7
18.12.1996	-	03.01.1997	1590 3	6.6 7

Table IXa. The concentration of gamma-emitting nuclides in ground-level air at the Olkiluoto 37 sampling station in 1995 (μBq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period			^{7}Be	^{137}Cs
28.12.1994	-	12.01.1995	1680 3	1.6 23
12.01.1995	-	26.01.1995	2570 3	4.5 11
26.01.1995	-	09.02.1995	1650 5	5.0 13
09.02.1995	-	23.02.1995	1220 4	0
23.02.1995	-	07.03.1995	1810 3	1.4 18
07.03.1995	-	23.03.1995	2840 3	4.8 8
23.03.1995	-	05.04.1995	1940 3	2.2 10
05.04.1995	-	19.04.1995	2070 4	3.0 9
19.04.1995	-	03.05.1995	3100 3	4.0 14
03.05.1995	-	17.05.1995	2490 3	4.3 12
17.05.1995	-	31.05.1995	3400 3	3.0 14
31.05.1995	-	15.06.1995	3300 5	6.5 10
15.06.1995	-	27.06.1995	2370 3	2.3 21
27.06.1995	-	12.07.1995	1560 3	2.0 20
12.07.1995	-	26.07.1995	1770 4	2.4 24
26.07.1995	-	09.08.1995	2590 3	2.6 12
09.08.1995	-	24.08.1995	2480 5	3.1 14
24.08.1995	-	06.09.1995	1840 3	3.3 15
06.09.1995	-	20.09.1995	2530 3	4.3 8
20.09.1995	-	05.10.1995	2690 3	3.1 9
05.10.1995	-	18.10.1995	2270 4	1.5 17
18.10.1995	-	02.11.1995	2260 3	2.1 10
02.11.1995	-	15.11.1995	2270 3	3.7 9
15.11.1995	-	30.11.1995	1440 3	3.9 6
30.11.1995	-	13.12.1995	2220 3	5.1 11
13.12.1995	-	28.12.1995	1240 3	5.8 5

0 = below the detection limit

Table IXb. The concentration of gamma-emitting nuclides in ground-level air at the Olkiluoto 37 sampling station in 1996 (μBq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling period	^{7}Be	^{137}Cs
28.12.1995 - 11.01.1996	3500 4	4.8 15
11.01.1996 - 25.01.1996	1490 3	4.5 11
25.01.1996 - 08.02.1996	2080 3	5.6 7
08.02.1996 - 22.02.1996	1550 3	5.2 8
22.02.1996 - 07.03.1996	1900 4	5.8 13
07.03.1996 - 21.03.1996	2730 3	4.8 7
21.03.1996 - 03.04.1996	2930 4	2.8 8
03.04.1996 - 22.04.1996	4300 3	4.5 9
22.04.1996 - 02.05.1996	1900 3	3.0 12
02.05.1996 - 15.05.1996	3700 3	3.6 10
15.05.1996 - 30.05.1996	2900 3	3.7 8
30.05.1996 - 12.06.1996	3300 3	3.9 12
12.06.1996 - 26.06.1996	1790 3	3.0 11
26.06.1996 - 10.07.1996	1910 3	1.9 18
10.07.1996 - 24.07.1996	2590 3	2.5 10
24.07.1996 - 07.08.1996	2430 3	1.7 22
07.08.1996 - 21.08.1996	4400 3	2.2 18
21.08.1996 - 04.09.1996	3900 3	2.4 18
04.09.1996 - 18.09.1996	1580 3	4.5 10
18.09.1996 - 02.10.1996	3100 3	2.7 9
02.10.1996 - 16.10.1996	1930 3	1.8 6
16.10.1996 - 31.10.1996	2010 3	4.2 16
31.10.1996 - 14.11.1996	1220 3	2.1 12
14.11.1996 - 28.11.1996	1040 3	2.4 10
28.11.1996 - 12.12.1996	1420 3	1.7 14
12.12.1996 - 27.12.1996	1390 3	6.6 6

Table X. The concentrations of gamma-emitting radionuclides in the supplementary samples of ground-level air at the Olkiluoto 33 sampling station in 1995-1996. Relative uncertainties (1σ) include both statistical and calibration uncertainty

Sampling period			^{7}Be	^{137}Cs
09.05.1995	-	15.05.1995	3500 3	4.2 5
15.05.1995	-	22.05.1995	3100 3	2.11 7
22.05.1995	-	29.05.1995	4300 3	4.2 5
29.05.1995	-	05.06.1995	3600 3	8.7 3
06.05.1996	-	13.05.1996	3800 3	4.0 5
13.05.1996	-	20.05.1996	2940 3	2.95 5
20.05.1996	-	27.05.1996	3500 3	3.2 5
27.05.1996	-	03.06.1996	2910 3	4.3 5
03.06.1996	-	10.06.1996	2630 3	4.0 7

Table XI. Quarterly ^{90}Sr concentrations in ground level-air at Loviisa and Olkiluoto in 1995-1996 (μBq m^{-3}).

Loviisa 21, 22, 24, 27 (combined sample)			
1995			
Jan	-	Mar	< 0.3
Apr	-	Jun	< 0.3
Jul	-	Sep	< 0.3
Oct	-	Dec	< 0.3
1996			
Jan	-	Mar	< 0.3
Apr	-	Jun	< 0.3
Jul	-	Sep	< 0.3
Oct	-	Dec	< 0.3

Olkiluoto 22, 26, 31, 37 (combined sample)			
1995			
Jan	-	Mar	< 0.3
Apr	-	Jun	< 0.3
Jul	-	Sep	< 0.3
Oct	-	Dec	< 0.3
1996			
Jan	-	Mar	< 0.3
Apr	-	Jun	< 0.3
Jul	-	Sep	< 0.3
Oct	-	Dec	< 0.3

< = below the detection limit

Table XII. Monthly deposits of gamma-emitting nuclides at the Loviisa 20 sampling station (Bq m^{-2}) in 1995-1996. Area of the collector is 1 m^2. Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Month	^{7}Be	^{54}Mn	^{58}Co	^{60}Co	^{110m}Ag	^{134}Cs	^{137}Cs
1995							
Jan	78 4	0	0	0.060 10	0.019 19	0.034 13	1.19 4
Feb	77 3	0.038 24	0.290 8	0.132 8	0	0.058 21	1.00 4
Mar	51 3	0	0	0	0	0	0.35 6
Apr	31 3	0	0	0	0	0.012 16	0.25 3
May	129 5	0	0	0.024 14	0.023 28	0.037 10	0.98 4
Jun	71 3	0	0	0.028 8	0.015 19	0	0.82 3
Jul	49 5	0	0	0	0	0.036 9	1.12 4
Aug	92 3	0.015 18	0.043 9	0.021 10	0.018 19	0.016 15	0.50 4
Sep	120 3	0	0.035 18	0.015 22	0.018 27	0.022 17	0.34 4
Oct	108 3	0.018 20	0.038 15	0.031 10	0.026 21	0	0.33 4
Nov	67 3	0	0	0	0	0	0.22 4
Dec	29 3	0	0	0	0	0.009 18	0.18 4
Annual total							7.3
1996							
Jan	36 3	0	0	0	0	0.018 11	0.55 4
Feb	18.5 5	0	0	0	0	0	0.32 5
Mar	26.5 3	0.013 20	0	0.012 16	0	0.009 21	0.38 3
Apr	74 3	0	0	0.010 16	0	0.013 18	0.34 4
May	126 5	0	0	0	0	0.026 16	1.11 4
Jun	93 3	0	0	0.022 8	0.020 12	0.019 11	0.70 4
Jul	155 3	0.071 18	0.014 31	0.171 3	0.177 3	0.033 8	1.08 3
Aug	10.5 3	0	0	0.009 20	0.012 17	0.010 15	0.37 3
Sep	60 3	0.038 13	0.064 11	0.130 5	0.118 5	0	0.36 4
Oct [a]	103 5	0.232 5	1.58 4	0.46 2	0.172 3	0.031 15	0.49 4
Nov	235 3	0.010 19	0.0117 20	0.019 11	0.099 4	0.038 11	1.10 3
Dec	43 3	0.007 25	0	0.012 12	0.043 7	0.020 12	0.94 4
Annual total							7.7

0 = below the detection limit

[a] = in addition: ^{51}Cr: 4.5 (5), ^{57}Co: 0.012 (19), ^{59}Fe: 0.11 (12), ^{95}Nb: 0.065 (13), ^{124}Sb: 0.065 (15)

Table XIII. Monthly deposits of gamma-emitting nuclides at the Olkiluoto 21 sampling station (Bq m^{-2}) in 1995-1996. Area of the collector is 1 m^2. Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Month	^{7}Be	^{54}Mn	^{60}Co	^{134}Cs	^{137}Cs
1995					
Jan	47 3	0	0	0.073 4	1.79 3
Feb	51 3	0	0.170 7	0	0.39 6
Mar	44 4	0	0	0	0.43 6
Apr	63 3	0	0	0	0.31 5
May	154 5	0.032 13	0.117 5	0.049 12	1.05 5
Jun	199 3	0.014 32	0.018 17	0.057 13	1.71 4
Jul	64 5	0	0	0.015 16	0.41 5
Aug	93 3	0	0	0.018 16	0.50 3
Sep	114 5	0	0	0.018 15	0.50 5
Oct	129 3	0	0	0.054 17	1.21 4
Nov	55 3	0	0	0.006 26	0.19 3
Dec	32 3	0	0	0.006 21	0.25 4
Annual total					8.8
1996					
Jan	21.7 3	0	0	0	0.18 4
Feb	54 5	0	0	0.031 9	1.08 4
Mar	24.0 3	0	0.010 14	0.007 23	0.38 3
Apr	118 3	0	0.019 14	0	0.52 4
May	91 3	0	0.038 6	0.011 19	0.41 4
Jun	68 5	0	0	0.053 7	1.77 4
Jul	100 3	0	0	0	0.50 5
Aug	27.4 5	0	0	0	0.36 5
Sep	54 3	0	0	0	0.42 4
Oct	84 3	0	0.010 14	0.008 26	0.47 4
Nov	106 3	0	0.020 12	0.028 8	1.32 3
Dec	78 3	0	0.030 8	0.012 17	0.39 3
Annual total					7.8

0 = below the detection limit

Table XIV. Quarterly deposits of ^{90}Sr at the Loviisa 20 and Olkiluoto 21 sampling stations (Bq m^{-2}) in 1995-1996. Area of the collector is 1 m^2. The uncertainties include statistical calibration and analytical uncertainty.

	Loviisa 20		**Olkiluoto 21**	
1995				
Jan - Mar	0.045	20	0.057	20
Apr - Jun	0.056	20	0.057	20
Jul - Sep	0.073	20	0.063	20
Oct - Dec	0		0	
Annual total	0.174		0.177	
1996				
Jan - Mar	0		0	
Apr - Jun	0.050	20	0.059	20
Jul - Sep	0.072	20	0.086	20
Oct - Dec	0.067	20	0.077	20
Annual total	0.189		0.222	

Table XV. Quarterly deposits of ^{90}Sr and gamma-emitting nuclides at the Loviisa 22 and Olkiluoto 26 sampling stations (Bq m^{-2}) in 1995-1996. Area of the collector is 0.05 m^2. The uncertainties include statistical and calibration uncertainty.

	^{7}Be	^{60}Co	^{90}Sr	^{134}Cs	^{137}Cs
Loviisa 22					
1995					
Jan – Mar	450 3	0	0.42 20	0.19 22	3.8 4
Apr – Jun	340 3	0	0	0	3.6 4
Jul – Sep	460 3	0	0	0	3.8 4
Oct – Dec	256 3	0	0	0	2.38 4
Annual total					13.6
1996					
Jan – Mar	103 5	1.40 6	0	0	2.21 6
Apr – Jun	450 5	0	0	0	4.1 5
Jul – Sep	340 3	0	0	0	2.55 6
Oct – Dec	530 3	0	0	0	2.19 6
Annual total					11.1
Olkiluoto 26					
1995					
Dec – Mar	198 3	0.56 14	0	0.45 21	9.5 4
Mar – Jul	480 3	0.216 14	0	0	2.13 5
Jul – Sep	370 3	0.294 11	0	0	4.5 4
Oct – Dec	273 5	0	0	0	0.89 12
Annual total					17.0
1996					
Jan – Mar	12 11	0.29 23	0	0	0.25 **30**
Apr – Jul	400 3	0.55 9	0	0	4.8 3
Jul – Oct	240 3	0	0	0	2.92 6
Oct – Dec	440 3	0	0.52 20	0	5.3 4
Annual total					13.0

0 = below the detection limit

* =analytical error included

Table XVI. The amounts of ^{90}Sr and gamma-emitting nuclides in soil samples taken from the vicinity of the Loviisa nuclear power station in 1996 (Bq kg^{-1} dry weight).

Sampling depth cm	^{40}K		^{90}Sr		^{125}Sb		^{134}Cs		^{137}Cs	
Loviisa 42										
0-2	460	8	28.5	10	0		44	3	1840	3
2-4	760	8	15.8	10	0		20.2	3	890	3
4-6	830	4	5.0	10	0.83	16	4.7	4	238	3
6-10	890	3	-		0.89	16	1.00	4	53	2
10-20	950	3	-		0		0		6.3	2
Total Bq m^{-2}									4509	
Loviisa 43										
0-2	570	8	24.7	10	5.4	27	64	2	2710	3
2-4	770	8	9.4	10	0		29.0	3	1180	3
4-6	900	4	4.6	10	0		12.0	3	520	4
6-10	840	4	-		0		1.95	4	87	3
10-30	930	4	-		0		0.11	27	8.2	3
Total Bq m^{-2}									6048	
Loviisa 44										
0-2	242	8	23.3	10	12.3	8	78	2	3300	3
2-4	620	4	10.2	10	0		52	4	2130	4
4-6	830	4	10.3	10	1.18	15	10.7	2	440	3
6-10	960	4	-		0		3.5	4	174	4
10-30	990	4	-		0		0.29	23	23.5	3
Total Bq m^{-2}									3032	

= below the detection limit
- = not analysed

Table XVII. ^{90}Sr and gamma-emitting nuclides in hair moss at Loviisa and Olkiluoto in 1995-1996 (Bq kg^{-1} dry weight). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

	^{7}Be	^{40}K	^{90}Sr*	^{134}Cs	^{137}Cs
Loviisa					
1995					
31.5.	700 4	276 4	-	75 3	2340 4
29.9.	580 4	320 3	3.2 10	62 3	2110 3
1996					
27.5.	289 4	196 4	-	38 3	1550 3
4.10.	360 5	278 4	3.3 10	28.1 3	1350 3
Olkiluoto					
1995					
7.6.	470 4	226 4	-	19.7 3	610 3
28.9.	310 4	298 4	6.6 10	22.7 3	760 3
1996					
10.6.	278 3	253 3	-	14.6 3	640 3
30.9.	256 5	214 4	4.4 10	11.6 3	550 3

* = analytical error included
\- = not analysed

Table XVIII. Gamma-emitting nuclides in grazing grass in a zone extending 10 km from the Loviisa and Olkiluoto power plants in 1995-1996 (Bq kg^{-1} dry weight). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

	^{7}Be	^{40}K	^{134}Cs	^{137}Cs
Loviisa				
1995				
5.7.	81 4	700 4	0	3.2 6
31.8.	224 4	350 4	0	2.55 9
1996				
3.7.	40 5	670 4	0	4.1 5
22.8.	100 5	680 3	0	1.81 10
Olkiluoto				
1995				
15.6.	71 7	840 4	0	3.5 10
24.8.	38 5	720 4	0.18 20	6.1 4
1996				
17.6.	23 6	810 4	0	5.1 4
21.8.	19 8	570 3	0	1.20 9

0 = below the detection limit

Table XIX. Gamma-emitting radionuclides in the water of the ditch around dumping ground of Olkiluoto in 1995-1996 (Bq m^{-3}). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Date	^{40}K	^{137}Cs
1995		
9.5.	230 5	7.6 6
15.11.	97 5	6.6 5
1996		
23.5.	205 4	6.6 6
8.10.	1480 4	37 5

0 = below the detection limit

Table XX. ^{90}Sr, ^{134}Cs and ^{137}Cs in monthly milk samples (Bq l^{-1}) from the Loviisa area in 1995-1996. Relative uncertainties (1σ) include both statistical and calibration uncertainty.

	Within 10 km radius of the nuclear power plant		**Sampling routes within a 40 km radius of the nuclear power plant**		
	^{134}Cs	**^{137}Cs**	**^{90}Sr***	**^{134}Cs**	**^{137}Cs**
1995					
Jan	0	0.41 4	0.064 20	0	0.30 5
Feb	0.018 15	0.40 3	0.050 20	0.017 13	0.39 3
Mar	0.015 15	0.27 3	0.059 20	0.009 12	0.24 3
Apr	0.012 22	0.31 3	0.042 20	0.013 17	0.24 3
May	0	0.17 4	0.044 20	0	0.25 4
Jun	0	0.22 4	0.049 20	0	0.39 5
Jul	0.021 15	0.62 3	0.071 20	0.022 5	0.70 3
Aug	0.017 28	0.61 5	0.055 20	0.017 18	0.58 4
Sep	0	0.19 7	0.051 20	0	0.22 5
Oct	0	0.22 6	0.063 20	0	0.29 3
Nov	0	0.27 5	0.060 20	0	0.30 5
Dec	0	0.38 6	0.052 20	0.0096 15	0.29 3
Mean	0.017	0.34	0.055	0.016	0.34
1996					
Jan	0	0.25 3	0.057 20	0	0.32 3
Feb	0.008 16	0.26 3	0.051 20	0.012 20	0.26 4
Mar	0.009 14	0.31 3	0.043 20	0	0.27 5
Apr	0	0.30 3	0.048 20	0.008 27	0.26 4
May	0	0.26 3	0.060 20	0	0.27 5
Jun	0	0.36 4	0.058 20	0.009 28	0.31 3
Jul	0	0.24 6	0.057 15	0	0.32 4
Aug	0	0.21 6	0.059 15	0	0.34 3
Sep	0	0.38 5	0.060 15	0.010 27	0.35 3
Oct	0	0.16 4	0.091 10	0	0.55 3
Nov	0	0.33 3	0.078 10	0	0.25 4
Dec	0	0.44 4	0.070 10	0	0.57 5
Mean	0.009	0.28	0.060	0.010	0.32

0 = below the detection limit
* = analytical error included

Table XXI. ^{90}Sr, ^{134}Cs and ^{137}Cs in monthly milk samples (Bq l^{-1}) from the Olkiluoto area in 1995-1996. Relative uncertainties (1σ) include both statistical and calibration uncertainty.

	Within 10 km radius of the nuclear power plant		**Sampling routes within a 40 km radius of the nuclear power plant**		
	^{134}Cs	**^{137}Cs**	**^{90}Sr***	**^{134}Cs**	**^{137}Cs**
1995					
Jan	0.013 27	0.39 4	0.070 20	0.062 8	1.71 4
Feb	0	0.44 4	0.076 20	0.052 9	1.70 4
Mar	0.033 17	0.76 4	0.073 20	0.049 4	1.50 3
Apr	0.024 9	0.66 3	0.053 20	0.033 18	1.33 4
May	0.011 22	0.31 3	0.058 20	0.063 7	1.54 4
Jun	0.023 18	0.73 4	0.062 20	0.043 10	1.24 4
Jul	0.038 8	1.31 5	0.085 20	0.051 8	1.53 4
Aug	0.025 12	1.14 4	0.074 20	0.046 7	1.49 4
Sep	0	0.45 4	0.078 20	0.050 9	1.58 3
Oct	0.016 11	0.56 4	0.083 20	0.036 7	1.57 3
Nov	0.034 13	1.22 3	0.074 20	0.038 13	1.63 3
Dec	0.035 7	1.22 3	0.056 20	0.025 15	0.99 4
Mean	0.025	0.766	0.070	0.046	1.48
1996					
Jan	0.018 13	0.69 13	0.059 20	0.032 7	1.35 3
Feb	0.048 5	1.74 3	0.049 20	0.015 12	0.46 4
Mar	0.017 12	0.79 4	0.062 20	0.030 7	1.50 3
Apr	0.012 23	0.39 3	0.060 20	0.044 6	1.51 3
May	0.015 22	0.41 3	0.056 20	0.033 8	1.24 3
Jun	0.020 11	0.84 4	0.071 20	0.026 13	1.07 3
Jul	0.024 10	0.98 3	0.079 15	0.023 11	1.15 3
Aug	0.021 11	1.05 3	0.053 15	0.030 10	1.31 3
Sep	0.019 15	0.79 3	0.071 15	0.027 8	1.50 3
Oct	0.012 20	0.44 3	0.078 10	0.027 7	1.41 3
Nov	0	0.78 3	0.077 10	0.018 14	0.93 3
Dec	0.017 11	0.94 4	0.069 10	0.025 15	1.14 4
Mean	0.021	0.81	0.065	0.028	1.22

0 = below the detection limit
* = analytical error included

Table XXIIa. ^{90}Sr and gamma-emitting radionuclides (Bq m^{-3}) in drinking water sampled in the waterworks serving the Loviisa and Olkiluoto power plants and nearest towns in 1995. Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Date	^{40}K	^{90}Sr*	^{134}Cs	^{137}Cs
Town of Loviisa[a]				
1.3.	92 11	0.30 20	0	0
31.5.	86 6	-	0	0.68 26
7.9.	179 5	1.40 20	0	0
30.11.	86 3	-	0	0.49 7
Loviisa power plant[a]				
1.3.	79 7	11.7 10	3.4 6	84 4
31.5.	50 8	-	2.0 9	57 3
7.9.	46 19	10.7 10	3.1 9	99 3
30.11.	73 6	-	2.8 5	84 5
Town of Rauma[b]				
12.1.	121 6	14.6 10	0	7.1 5
12.4.	135 8	12.3 10	0	6.4 9
12.7.	166 6	8.9	0	10.3 5
11.10.	152 5	11.8 10	0	8.2 5
Olkiluoto power plant[b]				
12.1.	98 10	14.4 10	0	11.6 7
18.4.	123 7	14.6 10	0	13.6 5
12.7.	87 9	11.4 10	0	12.2 6
12.10.	136 5	12.1 10	0	14.5 4

0 = below the detection limit
* = analytical error included
- = not analysed
[a] tap water
[b] raw water

Table XXIIb. ^{90}Sr and gamma-emitting radionuclides (Bq m^{-3}) in drinking water sampled in the waterworks serving the Loviisa and Olkiluoto power plants and nearest towns in 1996. Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Date	^{40}K		^{90}Sr*		^{134}Cs		^{137}Cs	
Town of Loviisa[a]								
29.2.	164	4	4.3	15	0		0.32	25
31.5.	181	5	-		0		0.63	21
30.8.	183	5	0		0		0	
29.11.	172	5	-		0		0.89	27
Loviisa power plant[a]								
29.2.	76	9	13.2	10	2.84	6	101	4
31.5.	64	7	-		1.55	14	66	4
30.8.	64	15	4.6	10	2.80	14	91	4
29.11.	69	7	-		1.42	12	66	3
Town of Rauma[b]								
10.1.	116	6	13.5	10	0		13.3	5
11.4.	187	5	9.1	10	0		9.3	5
10.7.	82	9	4.6	10	0		7.5	8
9.10.	98	5	9.8	10	0		7.0	5
Olkiluoto power plant[b]								
10.1.	145	6	14.9	10	0		16.8	4
11.4.	112	5	22.6	10	0		14.7	4
10.7.	96	11	5.1	10	0		11.8	7
10.10.	96	6	11.7	10	0		9.1	4

0 = below the detection limit
* = analytical error included
- = not analysed
[a] tap water
[b] raw water

Table XXIII. ^{90}Sr and gamma-emitting radionuclides in cereals in the vicinity of Loviisa and Olkiluoto in 1995-1996 (Bq kg^{-1} dry weight). Relative uncertainties include both statistical and calibration uncertainty.

	Dry matter %	^{40}K		^{90}Sr*		^{137}Cs	
Loviisa							
1995							
Rye	90.1	170	3	0.15	20	0.34	6
Wheat	90.3	129	4	0.28	20	0.66	5
1996							
Rye	89.5	177	3	0.17	15	0.34	5
Wheat	91.9	128	4	0.22	15	0.26	5
Olkiluoto							
1995							
Rye		201	3	0.40	20	0.74	5
Wheat		126	3	0.30	20	0.15	7
1996							
Rye	87.3	168	3	0.21	15	0.59	4
Wheat	86.9	137	3	0.23	15	0.16	7

* = analytical error included

Table XXIV. Gamma-emitting radionuclides in lettuce, apple and black currant samples in 1995-1996 (Bq kg^{-1} dry weight). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

	Date	Dry matter %	^{7}Be		^{40}K		^{137}Cs	
Lettuce								
Loviisa	5.7.1995	4.6	95	4	2710	3	4.0	5
	31.8.1995	6.3	185	3	2110	3	3.1	6
	3.7.1996	5.6	86	4	2790	4	4.9	5
	16.8.1996	6.7	20.3	7	2230	4	2.74	5
Olkiluoto	1.8.1995	6.0	76	3	2580	3	2.89	5
	6.9.1995	9.9	231	3	1650	3	16.5	3
	23.7.1996	6.2	59	3	2170	3	3.2	4
	4.9.1996	5.7	72	3	2180	3	7.0	3
Apple								
Loviisa	28.9.1995	13.8	4.0	15	269	3	0.84	9
	18.9.1996	14.8	0.33	14	44	4	0.081	8
Black currant								
Olkiluoto	1.8.1995	18.0	0		500	4	1.12	9
	20.8.1996	18.1	10.7	6	590	8	1.15	6

0 = below the detection limit

Table XXV. Gamma-emitting radionuclides in beef in the Loviisa and Olkiluoto areas in 1995-1996 (Bq kg^{-1} fresh weight). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

	^{40}K	^{134}Cs	^{137}Cs
Loviisa			
1995			
Spring	68 4	0.061 8	1.71 3
Autumn	79 4	0.038 18	1.01 3
1996			
Spring	98 3	0.020 18	0.93 3
Autumn	70 4	0.033 16	1.07 3
Olkiluoto			
1995			
Spring	71 3	0.037 11	1.13 4
Autumn	85 3	0	0.85 4
1996			
Spring	89 3	0.074 9	2.77 3
Autumn	76 3	0.049 24	2.06 3
0 = below the detection limit			

Table XXVI. The amounts of gamma-emitting radionuclides in mushrooms and wild berries taken from the vicinity of the Loviisa nuclear power plant in 1996 (Bq kg^{-1} fresh weight). For sampling sites see Fig. 6. Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Specie	**Sampling area**	**^{40}K**	**^{134}Cs**	**^{137}Cs**
Orange-cap boletus	54	68 4	4.6 4	201 4
Leccinum testaceoscabrum				
Milk cap	55	132 4	0.099 18	5.3 5
Lactarius trivialis				
Russula	52	286 4	12.6 4	560 3
Russula vinosa				
Sheep Polyporus	52	137 8	1.02 4	47 3
Albatrellus ovinus				
False morel	51	93 8	0.64 3	26.8 3
Gyromitra esculenta				
Lingonberry	53	35 9	1.36 4	59 3
Vaccinium vitis-idaea				
Blueberry	52	30 8	1.27 5	55 3
Vaccinium myrtillus	54	26 4	2.10 2	91 4
Raspberry	52	68 8	1.31 4	57 3
Rubus idaeus				
Rowanberry	56	113 8	1.47 4	63 3
Sorbus aucuparia				

Table XXVIIa. ^{3}H, ^{90}Sr and gamma-emitting radionuclides (Bq m^{-3}) in sea water samples at Loviisa in 1995. Relative uncertaintainties (1σ) include both statistical and calibration uncertainty.

Sampling station	Date	Salinity ‰	^{3}H	^{40}K	^{90}Sr	^{134}Cs	^{137}Cs
02	30.3.1995	4.56	4300 14	2060 4	15.2 10	0	73 5
	5.5.1995	3.66	4400 20	1410 4	13.7 10	2.21 14	59 4
	26.7.1995	4.77	4300 15	1770 4	15.5 10	2.08 27	67 5
	11.10.1995	4.83	0[a]	1850 4	15.8 10	3.2 11	67 4
1	5.5.1995	3.15	8300 10	1120 4	-	1.26 19	47 4
	26.7.1995	4.51	4500 15	1790 4	-	1.82 19	80 4
	11.10.1995	4.58	4500 15	1760 4	-	0	81 4
2	5.5.1995	3.55	10400 10	1360 4	-	1.78 13	57 4
	26.7.1995	4.69	5700 12	1870 3	-	2.62 15	69 3
	11.10.1995	4.55	4400 15	1570 2	-	1.67 20	63 3
4	5.5.1995	3.55	7600 10	1390 4	-	0	58 5
	26.7.1995	4.81	0[a]	1800 2	-	2.68 16	67 3
	11.10.1995	4.84	0[a]	1820 4	-	1.86 21	67 4
R1	5.5.1995	2.91	0[a]	1110 4	11.7 10	0	48 5
	25.7.1995	4.92	0[a]	1700 2	14.3 10	1.58 12	59 3
	12.10.1995	4.73	0[a]	1700 4	14.2 10	1.68 10	63 3

0 = below the detection limit
0[a] = below the detection limit 4000 Bq m^{-3}
- = not analysed

Table XXVIIb. ^{3}H, ^{90}Sr and gamma-emitting radionuclides (Bq m^{-3}) in sea water samples at Loviisa in 1996. Relative uncertaintainties (1σ) include both statistical and calibration uncertainty.

Sampling station	Date	Salinity ‰	^{3}H	^{40}K	^{90}Sr	^{134}Cs	^{137}Cs
02	29.3.1996	3.59	4200 15	1630 3	14.8 10	0	66 4
	14.5.1996	3.45	19500 5	1330 4	10.2 10	1.38 16	53 4
	29.7.1996	4.41	4200 15	1650 4	14.5 10	2.41 19	59 5
	16.10.1996	4.98	4800 10	1760 3	13.9 10	0	59 3
1	14.5.1996	2.84	8700 8	1050 4	-	1.81 16	47 4
	30.7.1996	4.28	9700 10	1480 4	-	0	65 4
	16.10.1996	4.23	7000 10	1430 3	-	0	57 3
2	14.5.1996	3.10	21800 4	1340 4	-	0	56 4
	30.7.1996	4.37	7400 10	1840 4	-	0	71 5
	16.10.1996	4.51	6600 10	1650 4	-	0	60 4
4	14.5.1996	3.25	35500 3	1080 2	-	0	48 3
	30.7.1996	4.41	0^{a}	1720 4	-	0	61 5
	16.10.1996	5.05	0^{a}	1920 4	-	1.15 19	65 4
R1	14.5.1996	2.20	4300 14	810 2	11.2 10	1.36 17	36 3
	29.7.1996	4.18	0^{a}	1730 4	14.3 10	0	57 5
	16.10.1996	4.91	0^{a}	1900 4	13.5 10	1.01 28	65 4

0 = below the detection limit
0^{a} = below the detection limit 4000 Bq m^{-3}
- = not analysed

Table XXVIIIa. ^{3}H, ^{90}Sr and gamma-emitting radionuclides (Bq m^{-3}) in sea water samples at Olkiluoto in 1995. Relative uncertaintainties (1σ) include both statistical and calibration uncertainty.

Sampling station	Date	Salinity ‰	^{3}H	^{40}K	^{60}Co	^{90}Sr	^{134}Cs	^{137}Cs
13	17.3.1995	5.58	0[a]	2130 4		14.5 10	3.5 9	109 4
	25.5.1995[a]	5.22	4700 20	2050 4	5.5 9	14.1 10	5.7 7	113 4
	9.8.1995	5.7	0[a]	2220 4		14.3 10	5.1 10	124 4
	30.10.1995	5.23	0[a]	2320 4		14.9 10	3.7 12	117 4
10	25.5.1995[b]	5.42	7200 10	1990 4	5.6 7	-	5.6 9	105 4
	9.8.1995	5.63	0[a]	1660 2		-	4.0 17	111 2
	30.10.1995	5.59	0[a]	2000 4		-	2.9 11	112 3
2	25.5.1995	5.43	4500 20	1970 4	1.48 18	-	5.0 7	108 4
	9.8.1995	5.65	0[a]	2220 3	1.18 24	-	4.4 7	125 3
	30.10.1995	5.52	0[a]	2090 4		-	3.1 23	109 4
3	25.5.1995	5.23	4200 20	1890 4	2.28 9	-	4.1 6	106 3
	9.8.1995	5.64	0[a]	1680 3		-	3.5 8	111 2
	30.10.1995	5.38	0[a]	2020 2		-	3.3 12	111 3
15	25.5.1995	4.56	0[a]	1840 4		13.5 10	3.1 16	98 4
	9.8.1995	5.59	0[a]	2030 2		14.8 10	3.7 10	119 3
	5.11.1995	5.40	0[a]	1870 3		14.8 10	3.8 15	108 3

0 = below the detection limit
0[a] = below the detection limit 4000 Bq m^{-3}
- = not analysed
[a] in addition: ^{58}Co: 2.57 (20)
[b] in addition: ^{54}Mn: 2.80 (13), ^{58}Co: 1.79 (20)

Table XXVIIIb. ^{3}H, ^{90}Sr and gamma-emitting radionuclides (Bq m^{-3}) in sea water samples at Olkiluoto in 1996. Relative uncertaintainties (1σ) include both statistical and calibration uncertainty.

Sampling station	Date	Salinity ‰	^{3}H	^{40}K	^{90}Sr	^{134}Cs	^{137}Cs
13	19.3.1996[a]	5.65	35000 4	1960 3	16.2 10	2.71 15	107 3
	28.5.1996[b]	5.24	6700 10	2010 3	7.4 10	5.8 10	113 3
	13.8.1996	5.37	0[a]	1800 3	16.1 10	2.41 13	103 2
	14.10.1996	5.6	0[a]	1920 3	15.8 10	2.80 17	96 3
10	28.5.1996	5.3	5800 11	2120 3	-	3.4 13	119 3
	13.8.1996	5.36	0[a]	1980 4	-	2.73 17	108 4
	14.10.1996	5.66	0[a]	1990 3	-	2.31 17	97 3
2	28.5.1996	5.33	4700 15	1990 4	-	3.0 11	112 4
	13.8.1996	5.37	0[a]	1950 4	-	3.4 16	109 4
	14.10.1996	5.67	0[a]	2240 4	-	2.60 13	109 4
3	28.5.1996	5.29	4500 14	2130 4	-	0	117 4
	13.8.1996	5.21	0[a]	1760 3	-	1.97 20	97 2
	14.10.1996	5.71	0[a]	2110 4	-	2.20 8	103 3
15	28.5.1996	5.01	0[a]	1650 2	7.7 10	2.93 12	93 2
	13.8.1996	5.28	0[a]	2200 4	16.6 10	0	126 4
	14.10.1996	5.7	0[a]	2070 4	15.4 10	1.97 18	104 4

0 = below the detection limit
0[a] = below the detection limit 4000 Bq m^{-3}
- = not analysed
[a] in addition: ^{60}Co: 16.2 (4)
[b] in addition: ^{54}Mn: 4.0 (18), ^{60}Co: 11.0 (7)

Table XXIXa. ^{90}Sr, $^{239,240}Pu$ and gamma-emitting radionuclides (Bq kg^{-1} dry weight) in littoral algae in the sampling areas A-E at Loviisa in 1995. Relative uncertainties (1σ) include both statistical and calibration uncertainty.

	Date	^{40}K	^{54}Mn	^{58}Co	^{60}Co	^{90}Sr	^{110m}Ag	^{124}Sb	^{134}Cs	^{137}Cs	^{238}Pu	$^{239,240}Pu$
Fucus vesiculosus												
Loviisa A	16.05.	940 4	0.90 9	0.167 20	7.8 3	-	1.18 7	0	3.4 3	93 3	-	-
	22.08.	980 4	0.98 21	0.77 22	5.6 4	12.5 10	2.49 14	1.17 19	2.76 9	85 4	0	0.18 19
Loviisa B	16.05.	830 3	0.82 18	0	7.9 3	-	0.95 20	0	4.7 6	144 5	-	-
	22.08.	730 2	0	0	2.55 3	-	1.00 9	0	1.71 3	56 3	-	-
Loviisa C	16.05.	780 3	0	0	0.98 16	-	0	0	3.4 10	91 5	-	-
	22.08.	800 4	0	0	0.62 16	-	0.38 24	0	1.91 7	63 4	-	-
Loviisa D	26.05.	790 4	0	0	0	-	0	0	1.95 9	59 4	-	-
	24.08.	850 3	0	0	0.27 14	-	0	0	1.64 4	54 2	-	-
Loviisa E	26.05.	920 8	0	0	0	-	0	0	2.15 6	68 3	-	-
	24.08.	820 3	0	0	0	10.0 10	0	0	1.87 3	56 2	0	0.12 22
Cladophora glomerata												
Loviisa A	05.07.	1140 4	0	0	0.90 7	-	0.32 13	0	1.33 5	40 3	-	-

0 = below the detection limit
- = not analysed

Table XXIXb. ^{90}Sr, $^{239,240}Pu$ and gamma-emitting radionuclides (Bq kg^{-1} dry weight) in littoral algae in the sampling areas A-E at Loviisa in 1996. Relative uncertainties (1σ) include both statistical and calibration uncertainty.

	Date	^{40}K	^{54}Mn	^{58}Co	^{60}Co	^{90}Sr	^{110m}Ag	^{124}Sb	^{134}Cs	^{137}Cs	^{238}Pu	$^{239,240}Pu$
Fucus vesiculosus												
Loviisa A	14.05.	890 4	1.88 6	0.31 16	3.4 3	-	0.84 5	0	3.0 3	111 3	-	-
	20.08.[a]	690 4	2.16 6	4.2 4	2.56 4	10.8 10	6.3 3	15.0 5	1.03 6	59 3	0	0.11 15
Loviisa B	14.05.	810 4	1.40 9	0	3.2 4	-	0.90 13	0	3.3 4	130 4	-	-
	20.08.[b]	890 4	1.65 8	1.75 7	3.3 4	-	2.37 7	0	1.87 4	83 4	-	-
Loviisa C	14.05.	770 4	0	0	0.67 10	-	0	0	1.72 7	62 4	-	-
	19.08.	730 3	0	0	0.267 13	-	0	0	1.30 3	57 2	-	-
Loviisa D	13.05.	620 4	0	0	0	-	0	0	1.00 7	40 3	-	-
	19.08.	820 2	0	0	0	-	0	0	1.15 4	56 3	-	-
Loviisa E	13.05.	650 3	0	0	0	-	0	0	0.86 4	40 3	-	-
	19.08.	740 4	0	0	0	11.4 10	0	0	1.14 11	48 4	0.037 35	0.16 20
Cladophora glomerata												
Loviisa A	04.07.	540 4	0.77 12	0	0.80 10	-	0	0	0.73 13	24.7 4	0	0

0 = below the detection limit
- = not analysed
[a] in addition: ^{95}Zr: 1.0 (10), ^{95}Nb: 2.72 (6)
[b] in addition: ^{95}Zr: 1.6 (17)

Table XXXa. ^{90}Sr, $^{239,240}Pu$ and gamma-emitting radionuclides (Bq kg^{-1} dry weight) in littoral algae in the sampling areas A-E at Olkiluoto in 1995. Relative uncertainties (1σ) include both statistical and calibration uncertainty.

	Date	^{40}K		^{54}Mn		^{58}Co		^{60}Co		^{90}Sr		^{124}Sb		^{134}Cs		^{137}Cs		^{238}Pu	$^{239,240}Pu$	
Fucus vesiculosus																				
Olkiluoto A	23.05.[a]	680	4	27.3	4	10.7	4	59	3	-		0.34	25	6.6	3	99	3	-	-	
	07.09.	680	4	22.3	6	4.2	8	40	3	10.9	10	0		3.4	8	77	4	0	0.06	28
Olkiluoto B	23.05.[b]	580	4	7.9	4	2.36	6	19.7	3	-		0		3.5	4	70	3	-	-	
	07.09.	570	3	10.3	3	1.47	6	11.8	3	-		0		2.53	3	68	2	-	-	
Olkiluoto C	24.05.	700	4	0.35	18	0		1.55	4	-		0		1.83	5	56	4	-	-	
	05.09.	670	3	1.10	10	0.42	19	5.6	3	12.1	10	0		1.77	5	58	3	0	0.04	40
Olkiluoto D	23.05.	680	3	0		0		1.82	9	-		0		2.44	11	59	5	-	-	
	06.09.	770	4	2.41	6	0.38	17	3.6	3	-		0		1.93	4	60	4	-	-	
Olkiluoto E	10.05.	680	4	0		0		2.42	6	-		0		2.08	8	50	4	-	-	
	06.09.	680	3	0.64	8	0		2.31	3	-		0		1.58	3	52	2	-	-	
Cladophora glomerata																				
Olkiluoto A	20.07.[c]	1430	4	46	4	2.55	8	20.5	2	-		0		1.72	7	37	4	-	-	

0 = below the detection limit
- = not analysed
[a] in addition: ^{51}Cr: 15.8 (15), ^{65}Zn: 0.71 (28), ^{95}Zr: 0.80 (25), ^{125}Sb: 1.39 (20)
[b] in addition: ^{51}Cr: 5.4 (25), ^{125}Sb: 1.15 (22)
[c] in addition: ^{51}Cr: 8.8 (12)

Table XXXb. ^{90}Sr, $^{239,240}Pu$ and gamma-emitting radionuclides (Bq kg^{-1} dry weight) in littoral algae in the sampling areas A-E at Olkiluoto in 1996. Relative uncertainties (1σ) include both statistical and calibration uncertainty.

	Date	^{40}K	^{54}Mn	^{58}Co	^{60}Co	^{90}Sr	^{124}Sb	^{134}Cs	^{137}Cs	^{238}Pu	$^{239,240}Pu$
Fucus vesiculosus											
Olkiluoto A	21.05.[a]	830 4	27.3 3	24.7 3	86 3	-	0.76 12	5.8 2	110 3	-	-
	28.08.	720 4	11.3 4	3.4 7	29.8 3	13.3 10	0	1.92 7	69 4	0	0.054 25
Olkiluoto B	21.05.	660 4	15.4 4	3.5 7	35 3	-	0	4.2 4	118 4	-	-
	28.08.	540 4	6.3 4	1.38 5	14.6 3	-	0	1.40 5	54 3	-	-
Olkiluoto C	21.05.	570 4	0.59 12	0	1.55 4	-	0	1.17 5	51 3	-	-
	28.08.	490 4	0.60 14	0	1.72 4	14.4 10	0	1.16 6	46 3	0	0.043 35
Olkiluoto D	22.05.	770 4	1.03 9	0.36 18	3.7 3	-	0	1.75 4	68 4	-	-
	29.08.	680 4	0.68 12	0	2.29 4	-	0	1.36 5	60 3	-	-
Olkiluoto E	22.05.	620 4	1.04 6	1.32 5	4.4 3	-	0	1.60 3	55 3	-	-
	29.08.	510 3	0.87 9	0.48 18	2.46 3	-	0	1.04 5	42 2	-	-
Cladophora glomerata											
Olkiluoto A	27.06.	860 4	9.0 4	1.73 8	28.1 3	-	0	2.68 4	57 4	-	-

0 = below the detection limit
- = not analysed
[a] in addition: ^{51}Cr: 8.1 (10), ^{57}Co: 0.14 (19), ^{131}I: 8.0 (7)

Table XXXI. The concentration of ^{90}Sr and gamma-emitting nuclides (Bq kg^{-1} dry weight) in a benthic crustacean at Loviisa and two benthic bivalves at Olkiluoto in 1995 and 1996. Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Date	^{40}K	^{54}Mn	^{58}Co	^{60}Co	^{90}Sr	^{110m}Ag	^{134}Cs	^{137}Cs
Saduria entomon								
Loviisa B								
16.5.1995	253 6	0	0	3.1 11	15.2 10	4.9 9	0	36 4
9.5.1996	241 4	2.23 10	0	3.7 6	16.8 5	2.77 7	0.78 20	42 4
Macoma baltica								
Olkiluoto A								
18.7.1995	64 11	0	1.4 25	4.1 9	16.2 10	0	0	17.8 5
27.6.1996	73 4	0.36 23	0	2.74 4	20.0 5	0	0.54 15	21.8 4
Mytilus edulis								
Olkiluoto A								
19.7.1995	85 5	10.8 4	0.54 25	19.4 4	-	0	0	5.4 6
27.6.1996	44 9	6.4 6	1.23 19	19.9 3	-	0	0	4.7 8

0 = below the detection limit
- = not analysed

Table XXXIIa. Gamma-emitting radionuclides and ^{90}Sr in edible parts of fish caught in the vicinity of the Loviisa power plant in 1995 (Bq kg^{-1} fresh weight). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Species	Date	^{40}K	^{90}Sr	^{134}Cs	^{137}Cs
Baltic herring, *Clupea harengus membras*[a]					
Area I	02.05. - 10.05.	120 4	-	0.32 6	11.1 5
	06.09. - 20.09.	120 4	0.053 20	0.38 7	11.3 4
Area II	02.05. - 10.05.	114 3	-	0.37 5	11.2 4
	06.09. - 20.09.	117 4	-	0.29 7	10.5 5
Pike, *Esox lucius*[b]					
Area I	02.05. - 10.05.	103 3	-	0.72 4	19 4
	06.09. - 20.09.	124 3	-	0.65 3	21 3
Pike-perch, *Stizostedion lucioperca*[b]					
Area II					
	02.05. - 10.05.	100 4	-	1.15 2	37 3
	06.09. - 20.09.	129 3	-	0.95 2	33 3
Perch, *Perca fluviatilis*[a]					
Area I	02.05. - 10.05.	105 3	-	1.19 2	37 3
	06.09. - 20.09.	107 4	0.76 20	0.92 5	31 3
Area II	02.05. - 10.05.	92 4	-	1.33 3	39 5
	06.09. - 20.09.	107 3	-	0.91 4	32 3
Roach, *Rutilus rutilus*[a]					
Area I	02.05. - 10.05.	96 3	-	0.30 7	9.3 3
	06.09. - 20.09.	98 3	-	0.17 10	6.1 3
Area II	02.05. - 10.05.	92 4	-	0.17 13	8.3 4
	06.09. - 20.09.	99 4	-	0.12 19	7.1 4

[a] = flesh and bones analysed in one
[b] = only flesh analysed
- = not analysed

Table XXXIIb. Gamma-emitting radionuclides and ^{90}Sr in edible parts of fish caught in the vicinity of the Loviisa power plant in 1996 (Bq kg^{-1} fresh weight). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Species	Date			^{40}K		^{90}Sr		^{134}Cs		^{137}Cs	
Baltic herring, *Clupea harengus membras*[a]											
Area I	10.05.	-	10.05.	105	4	-		0.25	6	10.3	3
	01.09.	-	30.09.	118	3	0.061	20	0.20	5	10.1	3
Area II	09.05.	-	10.05.	114	3	-		0.25	6	10.7	3
	01.09.	-	30.09.	125	3	-		0.21	6	9.9	3
Pike, *Esox lucius*[b]											
Area I	10.05.	-	10.05.	114	4	-		0.49	3	20	3
	01.09.	-	30.09.	130	3	-		0.51	3	24	3
Area II	09.05.	-	10.05.	123	3	-		0.81	3	34	3
	01.09.	-	30.09.	130	3	-		0.43	3	20	3
Perch, *Perca fluviatilis*[a]											
Area I	10.05.	-	10.05.	101	3	-		0.88	3	39	3
	01.09.	-	30.09.	106	4	0.39	10	0.59	5	28	3
Area II	09.05.	-	10.05.	107	3	-		0.87	3	40	3
	01.09.	-	30.09.	109	4	-		0.66	6	34	4
Roach, *Rutilus rutilus*[a]											
Area I	10.05.	-	10.05.	91	4	-		0.19	6	7.6	5
	01.09.	-	30.09.	107	3	-		0.16	8	6.3	3
Area II	09.05.	-	10.05.	87	4	-		0.24	6	8.4	3
	01.09.	-	30.09.	109	4	-		0.16	3	7.6	3

[a] = flesh and bones analysed in one
[b] = only flesh analysed
- = not analysed

Table XXXIIIa. Gamma-emitting radionuclides and ^{90}Sr in edible parts of fish caught in the vicinity of the Olkiluoto power plant in 1995 (Bq kg^{-1} fresh weight). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Species	Date			^{40}K		^{90}Sr		^{134}Cs		^{137}Cs	
Baltic herring, *Clupea harengus membras*[a]											
Area I	10.05.	-	27.05.	121	4	-		0.55	6	17.4	5
	12.09.	-	09.10.	118	3	0.037	20	0.53	5	18.8	3
Area II	10.05.	-	26.05.	93	3	-		0.44	4	13.9	3
	13.09.	-	09.10.	115	3	-		0.63	3	20.9	3
Pike, *Esox lucius*[b]											
Area I	10.05.	-	27.05.	119	4	-		1.36	3	41	4
	12.09.	-	09.10.	116	3	-		1.12	2	37	3
Area II	10.05.	-	26.05.	173	4	-		2.90	2	90	3
	12.09.	-	09.10.	111	4	-		0.89	3	27	4
Perch, *Perca fluviatilis*[a]											
Area I	10.05.	-	27.05.	98	4	-		2.48	3	74	5
	13.09.	-	09.10.	91	4	0.79	20	1.53	4	51	3
Area II	10.05.	-	26.05.	95	3	-		1.96	4	60	4
	13.09.	-	09.10.	96	4	-		1.41	4	49	3
Roach, *Rutilus rutilus*[a]											
Area I	10.05.	-	27.05.	101	3	-		0.47	5	13.0	4
	12.09.	-	09.10.	97	4	-		0.43	4	12.6	3
Area II	10.05.	-	26.05.	96	4	-		0.49	6	14.1	4
	13.09.	-	09.10.	100	4	-		0.36	8	12.0	4

[a] = flesh and bones analysed in one
[b] = only flesh analysed
- = not analysed

Table XXXIIIb. Gamma-emitting radionuclides and ^{90}Sr in edible parts of fish caught in the vicinity of the Olkiluoto power plant in 1995 (Bq kg^{-1} fresh weight). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Species	Date	^{40}K	^{90}Sr	^{134}Cs	^{137}Cs
Baltic herring, *Clupea harengus membras*[a]					
Area I	27.04. - 05.05.	116 3	-	0.45 3	18.1 3
	03.10. - 04.10.	118 3	0.032 20	0.45 3	19.8 3
Area II	03.05. - 24.05.	100 4	-	0.42 3	17.4 3
	13.09. - 30.09.	117 3	-	0.48 3	21.4 3
Pike, *Esox lucius*[b]					
Area I	27.04. - 05.05.	102 3	-	0.76 3	28.0 3
	17.09. - 19.09.	120 4	-	0.60 4	24.4 4
Area II	03.05. - 24.05.	99 4	-	1.16 3	47 3
	21.09. - 22.09.	117 3	-	0.44 3	19.1 3
Perch, *Perca fluviatilis*[a]					
Area I	27.04. - 05.05.	88 4	-	1.48 3	60 3
	12.09. - 04.10.	96 3	0.77 10	1.43 3	66 3
Area II	03.05. - 24.05.	89 4	-	1.47 3	60 3
	13.09. - 30.09.	102 4	-	1.45 3	61 3
Roach, *Rutilus rutilus*[a]					
Area I	27.04. - 05.05.	91 3	-	0.31 8	11.8 3
	03.10. - 04.10.	102 4	-	0.24 10	11.0 4
Area II	03.05. - 24.05.	101 3	-	0.33 8	13.1 3
	04.10. - 15.10.	101 3	-	0.24 6	11.9 3

[a] = flesh and bones analysed in one
[b] = only flesh analysed
- = not analysed

Table XXXIV. Gamma-emitting radionuclides in young salmon from the Loviisa Fish Farm in 1995-1996 (Bq kg^{-1} fresh weight). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Species	Date	^{40}K	^{137}Cs
-	30.1.1995	116 4	1.30 6
Salmo gairdneri	7.2.1995	109 4	1.30 7
-	9.3.1995	106 4	2.00 4
Salmo gairdneri	30.3.1995	109 4	1.90 5
Salmo gairdneri	5.5.1995	113 4	1.88 4
Salmo gairdneri	1.6.1995	125 4	2.20 6
-	30.1.1996	103 4	1.29 7
-	28.2.1996	99 4	1.11 5
Salmo salar	3.4.1996	110 3	1.72 4
Salmo gairdneri	3.4.1996	115 4	0.73 10
Salmo gairdneri	16.4.1996	111 4	1.05 5
Salmo gairdneri	13.5.1996	112 3	1.18 5
Salmo gairdneri	17.6.1996	104 4	0.99 5
-	2.12.1996	103 4	1.09 8
Salmo gairdneri	11.12.1996	97 4	0.69 6

- = not reported

Table XXXV. Gamma-emitting radionuclides in young salmon from the Olkiluoto Fish Farm in 1995-1996 (Bq kg^{-1} fresh weight). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Species	Date	^{40}K	^{137}Cs
Salmo salar	2.1.1995	181 4	1.60 6
Salmo salar	30.1.1995	116 4	1.30 6
Salmo trutta trutta	28.2.1995	113 4	1.20 5
-	15.3.1995	127 4	1.16 6
Salmo salar	3.4.1995	129 4	1.20 8
Salmo salar	2.5.1995	115 4	1.07 5
Salmo gairdneri	5.6.1995	105 4	1.22 7
Salmo gairdneri	3.11.1995	96 3	2.32 3
Salmo salar	7.12.1995	117 4	1.31 6
Salmo gairdneri	2.1.1996	98 4	0.88 5
Salmo salar	29.1.1996	102 4	0.79 6
Salmo trutta trutta	28.2.1996	112 3	0.93 6
Coregonus lavaretus	1.4.1996	110 4	1.60 4
Coregonus lavaretus	4.4.1996	111 2	1.58 4
Salmo salar	4.4.1996	117 4	1.02 7
Salmo gairdneri	29.4.1996	96 4	0.76 6
Salmo gairdneri	3.6.1996	101 3	0.70 7
Salmo salar	2.12.1996	103 4	1.09 8

- = not reported

Table XXXVI. Gamma-emitting radionuclides in sinking matter (Bq kg^{-1} dry weight) in the vicinity of Loviisa nuclear power plant in 1995-1996. Relative uncertainties (1 σ) include both statistical and calibration uncertainty.

	Sampling depth m	Dry weight g	^{40}K	^{54}Mn	^{58}Co	^{60}Co	^{110m}Ag	^{125}Sb	^{134}Cs	^{137}Cs
Loviisa 1	6									
1.11.1994 - 5.5.1995			740 3	0	0	8.5 3	2.79 15	4.6 20	39 2	1120 2
5.5.1995 - 4.7.1995		12.6	680 5	0	0	8.3 12	0	0	30 5	910 4
4.7.1995 - 31.8.1995		17.3	780 4	0	0	9.9 6	0	0	33 3	1100 3
31.8.1995 - 8.11.1995			760 3	0	0	9.0 5	0	0	34 3	1080 4
8.11.1995 - 29.5.1996		17.7	760 3	2.73 17	0	6.5 5	0	0	26.5 3	990 3
7.5.1996 - 4.7.1996		10.8	680 3	0	0	4.3 6	0	0	21.0 3	880 3
4.7.1996 - 5.9.1996		37.0	810 3	0	3.1 15	8.7 4	5.6 10	15.2 5	23.7 3	1070 3
5.9.1996 - 18.11.1996		52.4	850 4	4.6 14	0	9.8 5	4.1 23	0	21.6 4	1090 3
Loviisa 3	16									
1.11.1994 - 5.5.1995		34.6	750 5	0	0	17.2 5	3.6 28	0	37 5	1060 4
5.5.1995 - 4.7.1995		18.5	640 4	0	0	10.9 6	5.4 10	0	28.2 3	820 2
4.7.1995 - 29.8.1995		11.3	730 4	0	0	10.4 6	7.7 18	0	28.9 5	930 3
29.8.1995 - 8.11.1995			750 4	12.6 7	12.2 9	15.4 4	3.4 26	0	28.6 6	940 4
8.11.1995 - 7.5.1996		10.9	760 4	8.1 10	9.2 19	23.9 3	5.4 19	0	25.3 4	970 3
7.5.1996 - 4.7.1996		12.4	630 4	0	0	7.4 8	0	0	15.6 7	580 4
4.7.1996 - 5.9.1996		13.7	740 6	9.7 14	0	20.3 7	0	0	17.2 7	770 4
5.9.1996 - 18.11.1996		19.5	760 4	12.9 7	20.0 7	29.8 3	10.4 11	6.5 16	16.9 4	850 3

Table XXXVI. Continues.

			Sampling depth m	Dry weight g	^{40}K		^{54}Mn		^{58}Co		^{60}Co		^{110m}Ag		^{125}Sb		^{134}Cs		^{137}Cs	
Loviisa 4A			26																	
1.11.1994	-	5.5.1995		22.5	870	3	0		0		2.16	16	0		4.3	25	38	3	1060	3
5.5.1995	-	4.7.1995		5.2	460	8	0		0		0		0		0		18.7	12	560	4
4.7.1995	-	29.8.1995		4.8	560	11	0		0		0		0		0		22.5	14	670	4
29.8.1995	-	7.11.1995			660	5	4.5	27	6.7	26	6.4	13	0		0		29.0	5	1000	4
7.11.1995	-	7.5.1996		9.2	680	4	0		0		3.1	18	0		0		28.3	5	1080	3
7.5.1996	-	4.7.1996		9.7	380	5	0		0		0		0		0		8.8	7	350	3
4.7.1996	-	5.9.1996		10.4	660	4	0		0		1.95	16	0		0		14.3	5	960	3
5.9.1996	-	18.11.1996		31.7	720	3	1.24	24	0		3.6	7	0		3.9	19	19.0	4	910	3
Loviisa R1			11																	
31.10.1994	-	16.5.1995		22.9	840	4	0		0		0		0		0		36	5	1020	4
16.5.1995	-	4.7.1995		32.5	830	5	0		0		0		0		0		29.3	4	850	5
4.7.1995	-	30.8.1995		31.2	940	3	0		0		0		0		0		27.1	2	900	3
30.8.1995	-	7.11.1995			870	4	0		0		0		0		0		29.7	3	990	3
7.11.1995	-	30.5.1996		15.9	840	3	0		0		0		0		0		19.9	4	810	2
8.5.1996	-	4.7.1996		22.0	830	2	0		0		0		0		0		15.8	3	670	2
4.7.1996	-	5.9.1996		45.0	900	4	0		0		0		0		0		20.7	3	910	3
5.9.1996	-	18.11.1996		34.7	940	4	0		0		0		0		0		20.3	5	890	4

0 = below the detection limit

Table XXXVII. Gamma-emitting radionuclides in sinking matter (Bq kg^{-1} dry weight) in the vicinity of Olkiluoto nuclear power plant in 1995-1996. Relative uncertainties (1 σ) include both statistical and calibration uncertainty.

			Sampling depth m	Dry weight g	^{40}K		^{54}Mn		^{58}Co		^{60}Co		^{125}Sb		^{134}Cs		^{137}Cs	
Olkiluoto 12			14															
10.11.1994	-	12.5.1995		-	-		-		-		-		-		-		-	
12.5.1995	-	29.6.1995		11.2	670	5	47	5	15.6	10	245	3	0		33	4	780	5
29.6.1995	-	6.9.1995		24.9	750	3	13.6	6	0		98	2	5.7	25	31	4	920	3
6.9.1995	-	15.11.1995			720	3	9.8	5	0		42	3	0		24.5	2	780	2
15.11.1995	-	2.5.1996		21.5	700	4	11.1	7	0		72	2	6.9	21	24.9	3	840	3
2.5.1996	-	26.6.1996		21	570	3	10.5	5	6.0	12	127	3	0		17.8	3	570	2
26.6.1996	-	27.8.1996		17.6	730	3	7.1	11	0		55	2	0		21.5	3	790	2
27.8.1996	-	26.11.1996		66.5	670	4	3.5	20	0		30	4	0		16.8	6	760	2
Olkiluoto 3			12															
10.11.1994	-	10.5.1995		123.2	670	5	27.8	6	0		69	3	0		27.6	5	770	3
10.5.1995	-	29.6.1995		13.2	640	5	32	5	12.0	12	69	3	0		24.1	4	550	4
29.6.1995	-	6.9.1995		-	-		-		-		-		-		-		-	
6.9.1995	-	15.11.1995			750	4	22.6	5	3.2	21	73	2	0		24.4	3	730	3
15.11.1995	-	3.5.1996		27.2	690	4	10.2	8	0		70	3	0		23.5	4	710	4
3.5.1996	-	26.6.1996		27.2	570	5	9.9	9	2.82	27	73	3	0		16.2	5	550	5
26.6.1996	-	27.8.1996		22.2	710	4	10.2	6	2.87	22	98	3	0		17.7	4	660	3
27.8.1996	-	26.11.1996		122.2	720	4	6.9	10	0		33	3	0		16.1	4	660	4
Olkiluoto 4			7															
10.11.1994	-	11.5.1995		-	-		-		-		-		-		-		-	
11.5.1995	-	29.6.1995		15.6	600	5	35	6	10.1	14	63	4	0		23.9	7	640	5
29.6.1995	-	6.9.1995		37.1	730	6	11.2	13	0		53	4	0		23.2	5	740	4
6.9.1995	-	15.11.1995			720	2	10.9	7	0		36	2	5.4	26	22.0	4	780	2
15.11.1995	-	2.5.1996		12.4	680	3	13.2	5	0		53	2	0		19.4	3	700	2
2.5.1996	-	26.6.1996		24.2	660	3	5.8	7	2.02	22	31	2	0		17.9	3	640	3
26.6.1996	-	27.8.1996		19.7	730	6	6.3	19	0		31	5	0		14.7	10	690	4
27.8.1996	-	26.11.1996		50.2	720	3	7.3	9	0		38	3	0		18.4	4	750	4

Table XXXVII. Continues.

	Sampling depth m	Dry weight g	^{40}K	^{54}Mn	^{58}Co	^{60}Co	^{125}Sb	^{134}Cs	^{137}Cs
Olkiluoto 15	10								
10.11.1994 - 11.5.1995		-	-	-	-	-	-	-	-
11.5.1995 - 28.6.1995		14.5	660 4	3.4 22	0	8.3 9	0	21.3 4	630 2
28.6.1995 - 5.9.1995		44.5	790 3	3.1 11	0	12.4 3	3.2 23	27.2 2	860 3
5.9.1995 - 15.11.1995			760 5	4.3 21	0	17.5 6	0	23.9 4	770 4
15.11.1995 - 2.5.1996		18.2	790 3	1.90 21	0	11.0 4	0	21.1 3	830 3
2.5.1996 - 26.6.1996		22.6	690 4	2.00 27	0	11.6 5	0	17.4 4	660 4
26.6.1996 - 27.8.1996		21.9	740 4	0	0	9.1 6	0	16.4 5	770 3
27.8.1996 - 26.11.1996		71	720 4	2.14 13	0	13.7 4	5.1 22	16.6 4	740 3

- = the trap disappeared
0 = below the detection limit

Table XXXVIII. The concentrations of ^{238}Pu and $^{239,240}Pu$ (Bq kg^{-1} dry weight) in combined sinking matter samples in the vicinities of Loviisa and Olkiluoto nuclear power plants in 1995-1996.

			^{238}Pu		$^{239,240}Pu$	
Loviisa 3						
1.11.1994	-	8.11.1995	0.040	34	1.35	6
7.5.1996	-	18.11.1996	0.041	24	1.12	4
Loviisa R1						
31.10.1994	-	7.11.1995	0.027	31	0.84	5
8.5.1996	-	18.11.1996	0.020	50	0.86	6
Olkiluoto 12						
12.5.1995	-	5.11.1995	0.041	36	1.62	6
2.5.1996	-	26.11.1996	0.110	20	1.73	4
Olkiluoto 15						
11.5.1995	-	5.11.1995	0.082	20	1.84	6
2.5.1996	-	26.11.1996	0.068	19	1.67	5

Table XXXIX. Vertical distribution of ^{90}Sr, ^{238}Pu, $^{239,240}Pu$ and gamma-emitting radionuclides (Bq kg^{-1} dry weight) and total amounts of ^{137}Cs (Bq m^{-2}) in bottom sediments at Olkiluoto in 1995. Relative uncertainties (1σ) include both statistical and calibration uncertainty.

Sampling station (depth) slice (cm)	**Dry matter %**	**^{40}K**	**^{54}Mn**	**^{60}Co**	**^{90}Sr**	**^{125}Sb**	**^{134}Cs**	**^{137}Cs**	**^{238}Pu**	**$^{239,240}Pu$**
Olkiluoto 1 (6.9 m)										
0-5	18	780 4	9.9 8	75 3	5.6 10	4.7 24	26.5 3	850 3	0.093 18	2.10 4
5-10	31	760 3	0	13.9 3	5.3 10	0	13.0 5	440 4	0.092 35	2.35 7
10-15	31	600 3	0	1.15 17	-	0	2.09 11	96 3	-	-
15-20	29	610 3	0	0	-	0	0	25.2 4	-	-
20-25	27	810 4	0	0	-	0	0	7.5 7	-	-
25-30	27	880 3	0	0	-	0	0	3.1 7	-	-
total amount								19800		
Olkiluoto 2 (13.8 m)										
0-5	17	780 4	9.0 7	58 3	-	8.9 21	39 3	1230 3	-	-
5-10	20	750 5	0	26.2 4	-	21.5 18	65 5	1900 4	-	-
10-15	18	700 4	0	9.1 8	-	0	5.3 12	214 4	-	-
15-20	22	710 5	0	0	-	0	0	117 5	-	-
20-25	23	730 4	0	3.3 15	-	0	0	97 4	-	-
25-30	26	770 5	0	0	-	0	0	60 5	-	-
total amount								40900		
Olkiluoto 3 (13 m)										
0-3	63	690 3	0.90 24	2.22 10	-	0	2.10 12	76 3	-	-
total amount								2600		

Table XXXIX. Continues.

Sampling station (depth) slice (cm)	Dry matter %	^{40}K	^{54}Mn	^{60}Co	^{90}Sr	^{125}Sb	^{134}Cs	^{137}Cs	^{238}Pu	^{239,240}Pu
Olkiluoto 4 (9.1 m)										
0-5	20	660 4	3.7 17	36 3	9.2 10	0	30.0 6	860 4	0.10 23	1.68 7
5-10	27	740 4	0	11.8 5	6.2 10	5.1 26	25.9 3	810 3	0	1.87 6
10-15	27	740 4	0	1.51 19	-	0	3.8 11	142 3	-	-
15-20	29	770 5	0	0	-	0	0	35 6	-	-
20-25	29	810 4	0	0	-	0	0	8.3 11	-	-
25-28	30	940 3	0	0	-	0	0	6.0 11	-	-
total amount								26400		
Olkiluoto 9 (9.7 m)										
0-5	19	700 6	15.5 11	73 4	5.3 10	0	31 5	970 4	0.22 16	2.24 6
5-10	24	560 3	2.87 22	47 3	18 10	4.4 27	37 27	1160 3	0.32 11	2.82 5
10-15	24	850 4	0	26 6	-	0	24 22	1030 3	-	-
15-20	25	720 5	0	7.3 11	-	0	0	177 4	-	-
20-25	31	770 4	0	0	-	0	0	69 5	-	-
25-30	30	820 5	0	0	-	0	0	23 7	-	-
total amount								46600		
Olkiluoto 12 (15.5 m)										
0-5	14	710 5	4.8 16	31 4	9.0 10	0	34 3	1040 3	0.15 32	5.7 8
5-10	22	750 5	0	15.4 7	16 10	20.7 21	42 4	1250 4	0.078 21	2.30 4
10-15	22	730 4	0	11.6 5	-	9.4 17	18.5 4	590 3	-	-
15-20	23	750 3	0	0	-	0	1.65 22	126 3	-	-
20-25	21	780 3	0	0	-	2.64 23	0	88 4	-	-
25-30	27	750 3	0	0	-	0	0	32 5	-	-
total amount								35500		

Table XXXIX. Continues.

Sampling station (depth) slice (cm)	Dry matter %	^{40}K	^{54}Mn	^{60}Co	^{90}Sr	^{125}Sb	^{134}Cs	^{137}Cs	^{238}Pu	^{239,240}Pu
Olkiluoto 15 (10.1 m)										
0-5	22	790 3	0	5.9 7	-	5.5 21	34 3	1030 3	-	-
5-10	31	780 4	0	0	-	0	13.1 6	440 4	-	-
10-15	32	610 3	0	0	-	0	0	63 3	-	-
15-18	35	810 5	0	0	-	0	0	38 5	-	-
total amount								24100		
Olkiluoto S5 (8 m)										
0-5	13	780 3	0	4.9 6	0	6.0 20	26.3 3	830 3	0.067 28	2.48 5
5-10	27	790 5	0	0	4.8 10	0	25.0 6	850 4	0.11 28	2.56 6
10-15	30	760 4	0	0	-	5.4 23	7.6 7	297 3	-	-
15-20	36	760 3	0	0	-	0	0	42 4	-	-
20-25	33	840 4	0	0	-	0	0	10.4 6	-	-
25-30	34	860 3	0	0	-	0	0	3.8 8	-	-
total amount								27500		
Olkiluoto S6 (6.5 m)										
0-5	16	820 3	1.46 25	5.9 5	-	0	18.9 3	630 3	-	-
5-10	21	780 4	0	4.1 7	-	0	19.6 3	590 3	-	-
10-15	24	840 4	0	0	-	0	8.1 10	258 5	-	-
15-20	25	830 4	0	0	-	0	0	58 5	-	-
20-25	27	860 4	0	0	-	0	0	8.8 11	-	-
25-30	29	880 2	0	0	-	0	0	3.4 12	-	-
total amount								17500		

Table XXXIX. Continues.

Sampling station (depth) slice (cm)	Dry matter %	^{40}K	^{54}Mn	^{60}Co	^{90}Sr	^{125}Sb	^{134}Cs	^{137}Cs	^{238}Pu	^{239,240}Pu
Olkiluoto S7 (14.8 m)										
0-4	62	650 4	0	0	-	0	3.7 10	99 5	-	-
total amount								4700		
Olkiluoto S8 (10.9 m)										
0-5	17	790 4	0	2.59 15	-	0	32 3	960 4	-	-
5-10	24	780 5	0	0	-	0	11 5	430 3	-	-
10-15	27	800 4	0	0	-	0	0	53 3	-	-
15-20	29	880 3	0	0	-	0	0	9.2 7	-	-
20-25	30	850 4	0	0	-	0	0	3.9 16	-	-
25-30	32	870 4	0	0	-	0	0	2.86 14	-	-
total amount								17400		

0 = below the detection limit
- = not analysed

Table XL. Vertical distribution of gamma-emitting radionuclides in 1 cm slices of bottom sediments taken by the Gemini Twin Corer at the station Olkiluoto 12 in 1995 (Bq kg^{-1} dry wt.). Relative uncertainties (1σ) include both statistical and calibration uncertainty.

cm	Dry matter %	^{40}K	^{54}Mn	^{60}Co	^{134}Cs	^{137}Cs	^{226}Ra
0-1	10	710 6	5.9 22	35 5	33 7	940 4	29 8
1-2	16	810 5	6.9 22	25 7	35 8	1030 4	39 6
2-3	18	720 5	3 31	26 5	37 6	1120 5	36 5
3-4	19	590 8	0	32 8	37 9	1110 5	27 10
4-5	20	850 7	0	20 10	32 10	1210 4	31 10
5-6	21	740 4	0	24 6	40 3	1250 3	33 5
6-7	21	720 5	0	20 8	45 6	1340 4	34 6
7-8	22	650 12	0	19 16	40 9	1370 4	30 23
8-9	23	750 6	0	19 8	38 4	1300 4	36 8
9-10	24	700 6	0	10 13	37 6	1130 4	32 8
10-11	24	740 6	0	9.3 14	26 6	830 5	37 7
11-12	24	800 8	0	8.8 18	16 11	580 4	32 14
12-13	24	730 3	0	5.1 12	11 7	390 4	34 4
13-14	24	730 6	0	0	8.2 22	255 5	39 7
14-15	24	730 6	0	0	5.3 26	200 5	29 8
15-16	24	730 5	0	0	3.8 25	143 5	36 5
16-17	24	680 7	0	0	0	121 6	31 8
17-18	24	770 6	0	0	0	111 4	33 6
18-19	25	740 4	0	0	0	93 5	34 5
19-20	25	700 7	0	0	0	89 6	37 7
23-24	27	750 5	0	0	0	42 6	34 5
26-27	29	780 5	0	0	0	20 10	33 7
28-29	30	800 4	0	0	0	12 6	31 4
29-30	30	780 5	0	0	0	11 10	31 5
30-31	31	770 4	0	0	0	9 11	28 5

0 = below the detection limit

Table XLI. High pressure ionization chamber measurements of environmental dose rates in the vicinity of Loviisa nuclear power plant in 1995-1996.

Station		Dose rate μSv h^{-1}	
		1995	1996
20	Laitosalue	0.18	0.18
21	Säämasto	0.18	0.18
22	Keitala	0.16	0.16
23	Saaristotie	0.20	0.20
24	Böle	0.16	0.15
25	Hudö	0.14	0.14
26	Fantsnäs	0.14	0.14
27	Määrlahti	0.18	0.18
28	Tesjoki	0.17	0.17
29	Tallholmen	0.22	0.23

Table XLII. High pressure ionization chamber measurements of environmental dose rates in the vicinity of Olkiluoto nuclear power plant in 1995-1996.

Station		Dose rate μSv h^{-1}	
		1995	1996
20	Laituri	0.11	0.13
21	Säämasto	0.11	0.11
22	Korvensuo	0.12	0.13
23	Pujonnokka	0.12	0.13
24	Kuivalahti	0.14	0.14
25	Linnamaa	0.10	0.11
26	Hankkila	0.09	0.10
27	Taipalmaa	0.09	0.12
28	Reksaari	0.12	0.14
29	Rauma	0.13	0.14
34	Otpää	0.11	0.12

Table XLIII. Direct spectroscopic measurements of source activity on open fields near the nuclear power plants in 1995-1996 (kBq m^{-2}).

	^{134}Cs	^{137}Cs
Loviisa		
1995	0.75	26
1996	0.3	14
Olkiluoto		
1995	0.35	10
1996	0	2.8
0 = below the detection limit		