COMMISSION OF THE EUROPEAN COMMUNITIES

# radiological protection — no 20

# Results of environmental radioactivity measurements in the Member States of the European Community for

air — deposition — water — milk 1979

1981 EUR 7032 DA/DE/EN/FR/IT/NL

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**Directorate-General 'Employment and Social Affairs'**
Directorate 'Health and Safety'
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# F O R O R D

Dette dokument er den nittende rapport om radioaktivitet i omgivelserne offentliggjort af EF-Kommissionens Direktorat for Sundhed og Sikkerhed. Dokumentet er udarbejdet på basis af data indsamlet af de stationer, der forestår kontrollen med radioaktivitet i omgivelserne i de enkelte medlemsstater. Oplysningerne er uddrag af de data, der er indsendt til Kommissionen i medfør af artikel 36 i Rom-traktaten om oprettelse af Det europæiske Atomenergifællesskab.

Resultaterne i nærværende rapport dækker den radioaktive forurening af luft, nedfald, overfladevand og mælk for 1979 i Det europæiske Fællesskabs ni medlemslande: Belgien, Forbundsrepublikken Tyskland, Danmark, Frankrig, Italien, Irland, Luxembourg, Nederlandene og Det forenede Kongerige.

Disse resultater er opdelt i fire hovedafsnit:

- menneskedannet radioaktivitet i luften målt ved jordoverfladen,
- menneskedannet radioaktivitet i nedfald,
- radioaktiv forurening af vand,
- radioaktiv forurening af mælk.

Rapporten omfatter ligeledes listen over prøvestationer og laboratorier samt en liste over de publikationer, som medlemsstaterne har udgivet om dette emne.

I denne rapport er der især lagt vægt på resultaterne af målinger af visse specifikke radionuklider. Data om den totale betaaktivitet bibeholdes imidlertid for kontinuitetens skyld og for at muliggøre sammenligninger med forudgående rapporter.

## I. INDLEDNING

Tabel 1 giver et generelt billede af nettet til kontrol med radioaktiviteten i omgivelserne i Fællesskabet i 1979, og de data, der er fremkommet ved disse målinger, indgår i denne rapport.

Listen over de prøvestationer og laboratorier, der foretager målingerne, er vedlagt denne rapport.

Analysen af oplysningerne vedrørende den menneskedannede radioaktivitet i luften målt ved jordoverfladen og i nedfaldet viser for 1979 et generelt fald i den totale betaaktivitet i forhold til 1978 og de forudgående år.

På grund af medlemsstaternes forskelligartede kontrolsystemer (prøvetagninger og målinger) har det ikke været muligt at kontrollere radioaktiviteten i vand på samme systematiske måde som radioaktiviteten i luft. Man konstaterer imidlertid, at resultaterne fra 1979 næsten er de samme som for 1978.

Den radioaktive forurening af forskellige levnedsmidler kontrolleres i EF-medlemsstaterne ved hjælp af udtagning af prøver af grundkosten. Rapporten indeholder kun resultaterne af målinger af $^{90}Sr$ og $^{137}Cs$ i mælk. Den forurening, der skyldes indtagelse af mælk er i almindelighed den største; der føres derfor størst kontrol med dette levnedsmiddel, som sædvanligvis betragtes som en udmærket indikator for variationer i den radioaktive forurening, mennesket udsættes for.

Supplerende oplysninger findes i de vedlagte nationale rapporter.

Den målte $^{90}Sr$ og $^{137}Cs$ aktivitet har været meget svag og har i det store og hele været identisk med den aktivitet, der blev målt i 1978; man har heller ikke registreret større variationer i løbet af året.

I udregningerne for hele Fællesskabet beregnes de månedlige gennemsnitsværdier på grundlag af de samlede disponible data for en given måned. Til beregning af den årlige gennemsnitsværdi har man anvendt den aritmetiske middel af månedsgennemsnitsværdierne for Fællesskabet.

## II. MENNESKEDANNET RADIOAKTIVITET I LUFTEN MÅLT VED JORDOVERFLADEN

Målingen af den totale betaaktivitet og aktiviteten af specifikke radionuklider, som findes partikulært i atmosfæren, foretages ved en filtrering af luften indsamlet ved jordoverfladen ved hjælp af et papirfilter. Filtreringshastigheden er ca. 1000 $m^3$ luft pr. 24 timer.

Hvad angår værdierne for den globale betaaktivitet, er de anførte data resultatet af målinger foretaget efter 5 dages henfald.

I forhold til det foregående år er radioaktiviteten i luften faldet. Der er ikke foretaget prøvesprængning i luften i 1979. Den seneste kinesiske atombombe (20 kilotons) blev bragt til sprængning den 14.12.78 i Lop Nor. Der har været den samme udvikling med hensyn til fissionsprodukter med mellemlang og lang levetid som tidligere; der er især konstateret en stigning som følge af udvekslingen om foråret mellem stratosfæren og troposfæren (ny tilførsel af radioaktivitet fra stratosfæren), denne stigning er efterfulgt af et langsomt henfald.

Den geografiske fordeling af de prøvestationer, der foretager målinger af specifikke radionuklider og af den totale betaaktivitet i Fællesskabet, er angivet på kort 1 og 2.

Tabel 2.1-2.18 gengiver for 1979 og for hver station de månedlige svingninger i og årsgennemsnittet for betaaktiviteten af specifikke radionuklider og i den totale betaaktivitet, for således at give et samlet overblik over, hvor store de lokale svingninger og de månedlige sæsonmæssige variationer, der kan overskride mere end én størrelsesorden, har været.

Årsgennemsnittene for årene 1967-1979 for en række udvalgte stationer inden for Fællesskabet er, når det gælder $^{90}Sr$, angivet i tabel 3, og når det gælder $^{137}Cs$, i tabel 4.

De nuværende atmosfæriske koncentrationer af $^{90}Sr$ og $^{137}Cs$ udgør mindre end 1% af de årlige grænseværdier for de koncentrationer, der er fastsat i Euratoms grundlæggende normer for enkeltpersoner i befolkningen.

En samlet oversigt over de månedlige og årlige gennemsnitsværdier for den totale betaaktivitet for 1979 i de enkelte EF-lande og i Fællesskabet er vist i tabel 5.

I 1979 var gennemsnitsværdien for Fællesskabet for den totale betaaktivitet af partikler i luften 0,03 $pCi/m^3$.

En sammenligning mellem de månedlige og årlige værdier for den totale betaaktivitet i luften i alle medlemsstaterne og i Fællesskabet som helhed mellem 1962 og 1979 findes i tabel 6 og 7.

For diagrammernes vedkommende viser nr. 1 de månedlige svingninger for $^{90}Sr$ målt ved Ispra (Italien) og Le Vésinet (Frankrig) siden 1965.

Diagram 2a viser de månedlige svingninger for $^{137}Cs$ målt ved Chilton (Det forenede Kongerige) siden 1953, og diagram 2b viser de samme svingninger målt ved Ispra (Italien) og Le Vésinet (Frankrig) siden 1961.

Diagram 3 a), b), c) og d) viser udviklingen i den totale betaaktivitet siden 1963 i Fællesskabet og ved de 11 repræsentative stationer udvalgt af medlemsstaterne: Bruxelles, Paris, Schleswig, Berlin, Chilton, Montpellier, Luxembourg, De Bilt, Ispra, Pian Rosa og Dublin.

Resultaterne af målingerne af $^{238}Pu$ og $^{239}Pu$ ved Ispra og ved Milford Haven er angivet i tabel 8. Diagram 4 a) og 4 b) viser udviklingen siden 1961. Det bemærkes, at Milford Haven stationen fra 1979 er trådt i stedet for Chiltonstationen, da denne ikke længere foretager målinger af $^{238}Pu$ og $^{239}Pu$ i luften.

Tabel 9 viser resultaterne af målingerne af $^{239}Pu$ + $^{240}Pu$, der blev foretaget ved Shrivenham og Glasgow i 1979.

## III. MENNESKEDANNET RADIOAKTIVITET I NEDFALD

Kontrollen med radioaktivitet afsat på jorden foretages konstant ved hjælp af prøvetagninger af regnvand og af tørt nedfald. Prøvetagningerne foretages daglig, ugentlig og månedlig, alt efter hvilken station det drejer sig om.

Den geografiske fordeling i Fællesskabet af de prøvestationer, hvor der foretages målinger af henholdsvis specifikke radionuklider og den totale betaaktivitet er angivet på kort 3 og 4.

Tabel 10.1-10.18 gengiver for 1979 for de enkelte stationer de gennemsnitlige månedlige svingninger for radionuklider, for den totale betaaktivitet og for nedbørsmængden.

Disse tabeller er i lighed med tabellerne for menneskedannet radioaktivitet i luften målt ved jorden medtaget for at give et samlet overblik over, hvor store de lokale svingninger og de månedlige og sæsonmæssige forskelle er.

Med henblik på at lette sammenligningen af værdierne målt ved de forskellige geografiske placeringer viser tabel 11 og 12 det årlige nedfald af $^{90}Sr$ og $^{137}Cs$ for årene 1967-1979.

De månedlige gennemsnitsværdier og den samlede betaaktivitet i nedfald i Fællesskabets ni medlemsstater for 1979 er vist i tabel 13.

Den totale betaaktivitet i nedfald pr. år og pr. land for årene 1962-1979 er angivet i tabel 14.

I 1979 har man igen registreret en svag nedgang i den totale betaaktivitet i forhold til de foregående år (19,8 mCi/km$^2$ i 1978 mod 6,9 mCi/km$^2$ i 1979).

Diagram 5 viser det kumulative nedfald af $^{137}Cs$ siden 1954 ved Milford Haven (Det forenede Kongerige), henfald iberegnet. Det nye nedfald efter 1967 udlignede ikke nedgangen, men man konstaterer en langsom og kontinuerlig formindskelse af det totale kumulative nedfald.

Diagram 6 giver en oversigt over nedfald af $^{239}Pu$ i regnvand ved Orsay (Frankrig) for perioden 1973-1979.

Diagram 7 a), 7 b) og 7 c) gengiver udviklingen i den totale betaaktivitet i det årlige nedfald målt ved jordoverfladen ved ni repræsentative stationer fordelt over hele Fællesskabet: Mol, Le Vésinet, Ispra, Schleswig, München, Berlin, Chilton, Dublin og Bilthoven.

Nedbørsmængden er også angivet.

## IV. RADIOAKTIVITET I VAND

### IV. 1. Foreliggende nationale rapporter

I forbindelse med kontrollen med radioaktiviteten i vand er det vanskeligt i de almindelige programmer for overvågning af omgivelserne at skelne klart mellem den del, der vedrører den naturlige baggrundsradioaktivitet, og programmer for målinger og udslip ved ganske bestemte steder. I Fællesskabet er antallet af stationer, der foretager baggrundsmålinger i omgivelserne, lige så stort som antallet af de stationer, der foretager målinger af luft og af nedfald.

Beskrivelser af de samlede kontrolmålinger af radioaktiviteten i vand er at finde i en række nationale publikationer.

BELGIEN

Rapporterne fra l'Institut d'Hygiène et d'Epidémiologie (sundhedsministeriet) giver en beskrivelse af nettet af de kontrolstationer, der foretager målinger af de forskellige kategorier af vand og af den samlede alfa- og betaaktivitet, af $^{226}Ra$, af $\beta$ $^{40}K$ og af HTO i overfladevand, havvand og drikkevand.

Der er blevet offentliggjort tre dokumenter:

- "Résultats des mesures de radioactivité dans l'air, dans les précipitations et dans les eaux de 1958 à 1968".
- "Résultats des mesures de radioactivité dans l'air, dans les Précipitations et dans les eaux de 1969 à 1974".
- "Résultats des mesures de radioactivité dans l'air, dans les Précipitations et dans les eaux de 1975 à 1978".

DANMARK

Forsøgsanlægget Risø offentliggør årlige rapporter om radioaktiviteten i Danmark, "Environmental Radioactivity in Denmark in ... ", der viser resultaterne af de målinger, der er foretaget i hele landet af koncentrationen af $^{90}Sr$ i grundvand, vandløb, søer og havvand og af $^{137}Cs$ i havvand.

FORBUNDSREPUBLIKKEN TYSKLAND

En detaljeret beskrivelse af kontrolnettet for de forskellige kategorier af vand og resultaterne af målingerne af aktiviteten af de specifikke nuklider, af alfa- og betaaktiviteten i overfladevand, havvand, drikkevand og spildevand gengives i de årlige rapporter med titlen: "Umweltradioaktivität und Strahlenbelastung" udgivet af forbundsindenrigsministeriet.

FRANKRIG

Detaljerede resultater af målinger af radioaktiviteten (total betaaktivitet, $^{3}H$, $^{90}Sr$, $^{137}Cs$ ...) i overfladevand, grundvand, drikkevand, havvand samt spildevand fra husholdninger og fra kernekraftværker gengives i "Rapports d'activité", der siden 1961 offentliggøres månedlig af SCPRI. Disse oplysninger gengives desuden i SCPRIs årsrapporter.

ITALIEN

Resultaterne af målinger af koncentrationer af $^{90}Sr$ og $^{137}Cs$ i ferskvand, vand til overrisling og havvand gengives i de årlige rapporter med titlen "Data on Environmental Radioactivity collected in Italy", som offenttliggøres af Comitato Nazionale per l'Energia Nucleare (Den nationale Atomenergikommission).

NEDERLANDENE

De årlige rapporter fra Coördinatie-Commissie voor de metingen van Radioactiviteit en Xenobiotische Stoffen med titlen "Algemene Radioactivieve Besmetting van de Biosfeer. In Nederland verrichte metingen" indeholder resultaterne af målingerne af de forskellige typer vand.

Disse rapporter indeholder ligeledes resultaterne af de målinger af rest-betaaktiviteten, der er foretaget af de nukleare anlæg af vandet i den vestlige Schelde, Waal samt i en række mindre vandløb nær Dodewaard.

DET FORENEDE KONGERIGE

Ministry of Agriculture, Fisheries and Food har siden 1978 udgivet en ny række rapporter med titlen "Annual Survey of Radioactive Discharges in Great Britain", som indeholder en beskrivelse af den virkning, som væskebåret radioaktivt affald fra større nuklearanlæg har på omgivelserne. Disse undersøgelser indgår i én publikation, der omfatter de vigtigste oplysninger fra en række rapporter offentliggjort af Ministry of Agriculture, Fisheries and Food og foruden disse findes der rapporter udgivet af de nukleare anlæg.

IV. 2. Beskrivelse af overvågningsprogrammerne

I det følgende gives en kort oversigt over de enkelte medlemsstaters overvågningsprogrammer for vand, der ikke er forbundet med udslip fra særlige kilder.

BELGIEN

I Belgien har der siden 1958 eksisteret et overvågningssystem for forskellige kategorier af vand.

Detaljerede oplysninger fremgår af de dokumenter, som er nævnt i ovenstående afsnit IV.1.

Der er oprettet 5 målestationer ved Maas mellem Givet og Lanaken. Yderligere oplysninger om dette system findes i den årlige rapport "Surveillance radiologique des sites d'implantation des centrales nucléaires" (groupe mixte CEN - Santé publique).

DANMARK

a) Grundvand

Siden 1961 har man udtaget årlige prøver af grundvand fra ni udvalgte stationer fordelt på hele landet. Formålet med denne undersøgelse har først og fremmest været at kontrollere $^{90}$Sr-niveauet i grundvandet i Danmark og at sammenligne de registrerede niveauer med data for de filtrerende lag ved de ni prøvestationer.

b) Vandløb og søer

Siden 1970 er der hvert andet år blevet udtaget prøver af overfladevand fra otte søer og otte vandløb fordelt over hele landet. Formålet med disse prøvetagninger er blandt andet at kontrollere udslip af $^{90}$Sr i havet og at konstatere, hvorvidt der eksisterer forskelle af betydning mellem $^{90}$Sr-niveauet i de forskellige vandområder.

c) Drikkevand

Man har siden 1965 indsamlet prøver af vandværksvand i hele landet. Formålet med dette arbejde er at sammenligne $^{90}$Sr-niveauet i drikkevand med de niveauer, man har konstateret i grund- og overfladevand. Størstedelen af det danske drikkevand stammer fra grundvand. I de seneste år har man imidlertid i stadig højere grad anvendt overfladevand til drikkevand.

Overvågningsprogrammerne for ferskvand skal ses i forbindelse med de danske programmer for kontrol med jordbundens indhold af $^{90}$Sr og $^{137}$Cs. Formålet med disse programmer er at kontrollere det kumulerede nedfald i jorden og at sammenligne resultaterne med de teoretiske niveauer beregnet på grundlag af data om nedbør og afløb.

FORBUNDSREPUBLIKKEN TYSKLAND

Overvågningsprogrammet i Forbundsrepublikken Tyskland er opdelt i følgende områder:

a) Overfladevandet

(Hovedcenter: Bundesanstalt für Gewässerkunde, Koblenz).

Overvågningen af radioaktiviteten i overfladevand (G$\beta$, R$\beta$, H3- og andre nuklider) gennemføres for øjeblikket af 19 delstatsmålestationer. Måleprogrammet omfatter i alt mere end 200 prøveudtagningssteder for overfladevand, ca. 20 for svævestøv og ca. 30 for slamprøver.

b) Havvand

(Hovedcenter: Deutsches Hydrographisches Institut, Hamburg)

Deutsches Hydrographisches Institut har siden 1965 haft den ved lov fastsatte opgave at overvåge radioaktiviteten i havet. Målenettet omfatter for øjeblikket 11 stationer i Nordsøen og Østersøen. Disse stationer har måleanlæg, der kontinuerligt registrerer gammastråler. Desuden bliver der regelmæssigt taget prøver til bestemmelse af koncentrationen $^{90}Sr$, $^{137}Cs$ og andre nuklider. Siden 1976 er der tillige foretaget målinger af koncentrationen af transuraner i havet.

c) Drikkevand og spildevand

(Hovedcenter: Institut für Wasser-, Boden- und Lufthygiene des Bundesgesundheitsamtes, Berlin)

Inden for dette område findes der 18 officielle målestationer, som på ca. 160 prøveudtagningssteder analyserer drikkevandet og på 75 steder spildevandet fra rensningsanlæg, atomkraftværker, kerneforskningscentre, nuklearmedicinske klinikker og fra andre steder, hvor der anvendes radioaktive stoffer.

Der findes en udførlig beskrivelse af de enkelte målestationer, deres opgaver, måleprogrammer og analysemetoder i "Statusbericht über die Überwachung der Umweltradioaktivität in der Bundesrepublik Deutschland".

FRANKRIG

SCPRI foretager ved 143 prøvestationer kontrol med overflade- og grundvand; 17 af disse prøvestationer, som er beliggende ved de større nuklearanlæg, enten umiddelbart efter virksomheden i strømmens retning eller i nærheden af udløbet af de store floder, foretager kontinuerlige og automatiske prøveudtagninger.

SCPRI kontrollerer desuden regelmæssigt 39 prøvestationer, hvor der tages prøver af drikkevand; disse stationer er beliggende i nærheden af nukleare anlæg eller tilknyttet vandforsyningen i de store byer. Der foretages desuden en gennemgribende undersøgelse af radioaktivitetsniveauet i forbindelse med nye drikkevandsanlæg og inden for rammerne af de obligatoriske undersøgelser af befolkningens sundhed.

Til kontrol af havvand råder SCPRI langs den franske kyst over 20 målestationer, som foretager prøveudtagninger mindst hver måned.

SCPRI foretager grundige analyser af månedlige prøver af spildevand fra 14 kernekraftanlæg og 6 tilknyttede virksomheder. De kontrollerer desuden spildevand fra store byområder.

ITALIEN

Kontrollen med overfladevandet, der foretages af de nationale prøvestationer, består i målinger af $^{90}Sr$ og $^{137}Cs$ i prøver udtaget ved 14 stationer (13 floder og 1 sø).

Når det drejer sig om vand til overrisling, udføres målingerne af $^{90}Sr$ og $^{137}Cs$ på prøver udtaget ved to stationer.

Når det drejer sig om havvand, foretages målingerne af $^{90}Sr$ og $^{137}Cs$ på prøver udtaget ved fire stationer.

NEDERLANDENE

Overvågningen af radioaktiviteten i vand koncentreres, når det drejer sig om de store floder (prøveudtagning foretages ved grænserne) og Ijselmeer, om den totale alfaaktivitet, rest-betaaktiviteten og $^{3}H$, og desuden om $^{90}Sr$ og $^{226}Ra$, når det drejer sig om Rhinen, Maas og den vestlige Schelde. Desuden måles $^{3}H$-aktiviteten i visse vandløb, hvor der foretages opsamling med henblik på produktion af drikkevand.

DET FORENEDE KONGERIGE

a) I Det forenede Kongerige besluttede man i 1967, at programmet for måling af nedfald i drikkevand ikke længere var berettiget på grund af den meget ringe bestråling, som befolkningen ved at drikke vandet blev udsat for. Man har i stedet bibeholdt et forskningsprogram til undersøgelse af særlige spørgsmål som f.eks. bevægelsen af $^{90}Sr$ i bassiner til forsyning af reservoirer, og man har taget stikprøver og foretaget analyser af vand henhørende under 5 stationer, der dækker overfladevand, vandløb og kilder med henblik på at måle niveauet af $^{90}Sr$ og $^{137}Cs$. Disse 5 stationer indgår i tabel 15.1 under "drikkevand", og man har her foretaget målinger med henblik på at bestemme niveauet for særlige radionuklider og ikke den totale betaaktivitet. Som forventet viste resultaterne af de målinger, der var blevet foretaget af opsamlet kildevand, et forholdsvis højt niveau, men selv det højeste niveau udgør en formindskelse i forhold til maksimumværdierne for samme målinger i 60'erne.

b) Desuden eksisterer der siden 1975 et program til en mere omfattende prøveudtagning og analyse af vand, der gennemføres hvert år i forbindelse med blot én af de store floder. Resultaterne viser meget lave radioaktivitetsniveauer.

c) Visse steder foretages der stikprøveundersøgelser af drikkevand, overfladevand og vandløb. Disse prøver analyseres med henblik på at måle den totale alfaradioaktivitet, den totale betaaktivitet og tritium-niveauet. Resultaterne af disse stikprøveundersøgelser findes i tabel 15.1. I de tilfælde, hvor prøveudtagningen sker i nærheden af et sted, hvor der foretages radioaktivt udslip, analyserer man ligeledes de særlige og repræsentative radionuklider, som dette radioaktive spild indeholder.

Det vand, der indgår i tabel 15.1 under "overfladevand", og som udviser en høj værdi (over 10), anvendes ikke direkte til drikkevand.

* * *

Tabel 15.1 viser for 1979 et uddrag af målinger af rest-betaaktiviteten foretaget i visse medlemsstater i drikkevand, overfladevand, der er egnet til drikkevand, overfladevand i al almindelighed og havvand.

For Danmarks vedkommende findes i tabel 15.2 målinger af $^{90}Sr$, $^{137}Cs$ og $^{134}Cs$.

Mangelen på tilstrækkelige data gør det vanskeligt at drage nøjagtige konklusioner vedrørende radioaktiviteten i vand; der synes imidlertid ikke at være sket væsentlige ændringer siden 1972.

## V. RADIOAKTIVITET I MÆLK

### V.1 Indledning og disponible rapporter

I en række år har medlemslandene fortrinsvis koncentreret deres overvågningsprogrammer om mælk som en god biologisk indikator for tilstedeværelsen af menneskedannede radioaktive stoffer, hvoraf de vigtigste i øjeblikket er $^{90}Sr$ og $^{137}Cs$, der stammer fra atmosfæriske atomsprængninger.

Den aktivitet, der blev målt i 1979, er meget svag. Niveauet svarer næsten til det, der blev målt i 1978, og der har ikke været tale om større variationer i årets løb.

Erfaringen viser, at forholdet mellem $^{90}Sr$/g Ca i kosten og $^{90}Sr$/gCa i mælk er forholdsvis konstant for det samme land (se tabel 16).

I de fleste af Fællesskabets medlemsstater findes næsten 80% af kostens samlede kalkindhold i mælk og mælkeprodukter. Desuden kan de målte værdier for $^{137}Cs$ i mælk benyttes til at bedømme koncentrationen af dette nuklid i kosten som helhed.

Hvad angår andre levnedsmidler følger her en liste over de seneste nationale rapporter:

Belgien - Contamination radioactive des denrées alimentaires en Belgique en 1978 et 1979 - Rapport I.H.E. - J. Gillard-Baruh

| | |
|---|---|
| Danmark | - Environmental Radioactivity in Denmark in 1979. A. Aarkrog, L. Bøtter-Jensen, H. Dahlgaard, Heinz Hansen, J. Lippert, S.P. Nielsen og K. Nilsson: Risø Report nr. 421. |
| Forbundsrepublikken Tyskland | - Umweltradioaktivität und Strahlenbelastung. Jahresbericht 1977 - Der Bundesminister des Innern. |
| Frankrig | - Rapports d'activité mensuels et annuels du SCPRI-INSERM - Ministère de la Santé pour 1979. |
| Italien | - Data on Environmental Radioactivity collected in Italy 1977 (CNEN). |
| Nederlandene | - Årsrapporter fra Coördinatie-Commissie voor de metingen van Radioactiviteit en Xenobiotische Stoffen med titlen: "Algemene Radioactieve Besmetting van de Biosfeer. In Nederland verrichte metingen". |
| Det forenede Kongerige | - Milk report 1979 - NRPB - R115 B.M.R. Green, A. Knight, R.S. Bruce, W. Downs, E.B. Ellis og E.R. Mercer. |

* * *

I Nederlandene måler Rijks-Kwaliteits instituut voor Landen en Tuinbauwprodukten i Wageningen hver måned niveauet af $^{90}Sr$ og $^{137}Cs$ og eventuelt $^{89}Sr$ og $^{131}I$ i mælkeprodukter, og den analyserer i dette øjemed en blanding af standardiseret "mælk til industriel anvendelse", der kommer fra den nordlige, vestlige og sydlige del af landet, samt standardiseret konsummælk fra prøver, der er indsamlet tilfældigt hos en række virksomheder, der fortrinsvis er beliggende i den vestlige del af landet.

I Det forenede Kongerige er ansvaret for overvågningsprogrammet for mælk flyttet fra Agricultural Research Council, Letcambe Laboratory til National Radiological Protection Board.

## V.2. $^{90}Sr$-forurening

Tabel 17 giver for 1979 kvartals- og årsværdierne for pCi$^{90}Sr$/g Ca-forholdet ved de forskellige prøvestationer i Fællesskabet.

Tabel 18 giver en oversigt over kvartalsværdierne for pCi $^{90}$Sr/gCa-forholdet for 1979 for hver enkelt medlemsstat og for Fællesskabet som helhed. Tabel 19 giver en oversigt over de gennemsnitlige kvartalsværdier siden 1972 for Fællesskabet.

Den årlige gennemsnitsværdi for 1979 er 3.4 pCi/g Ca mod 3.9 pCi/g Ca i 1979.

$^{90}$Sr-forurening af mælk udgør i dag kun 10-20% af det niveau, der blev målt i 1963-1965, de år, hvor forureningen var størst (se tabel 20).

Disse niveauer svarer til blot en lille procentdel af den maksimalt tilladelige koncentrationsværdi (1).

V.3. $^{137}$Cs-forurening

Tabel 21 giver for 1979 kvartals- og årsværdierne for forholdet pCi $^{137}$Cs/liter mælk målt ved alle prøvestationerne inden for Fællesskabet.

Tabel 22 viser et sammendrag af kvartals- og årsværdierne for 1979 for hver enkelt medlemsstat og for Fællesskabet som helhed. Tabel 23 viser kvartals- og årsgennemsnittene for Fællesskabet siden 1972.

Fællesskabets årsgennemsnit for 1979 ligger på 5.2 pCi $^{137}$Cs/liter mod 7.6 pCi $^{137}$Cs/liter i 1978.

$^{137}$Cs-foruureningen af mælk udgør i dag mindre end 10% af det niveau, der blev målt i 1963-1965 (se tabel 24).

Disse værdier svarer til mindre end 1% af de fastsatte årlige grænser for koncentrationen af radiocaesium i drikkevand (1).

(1) De årlige grænseværdier for koncentrationen af radionuklider i drikkevand er fastsat i de grundlæggende EURATOM-normer; i særlige tilfælde er mælk det eneste fødemiddel, der indeholder dette radionuklid.

KONKLUSIONER

De generelle konklusioner er de samme som i den foregående rapport.

i) De små svingninger, man har konstateret i en række år, skyldes prøvesprængningerne i Asien; de målte værdier har imidlertid ikke på noget tidspunkt nået et niveau, der berettiger særlige undersøgelser.

ii) Indsamlingen af de målte værdier og sammenligningen af resultaterne fra de forskellige målestationer udgør et udmærket varslingssystem; som følge heraf bør den indsats, der hidtil er gjort, fortsættes.

iii) Selv om der ikke er grund til at betvivle, at de målinger, der foretages af mælk, er særdeles repræsentative, foretrækker man dog stadig med henblik på data om fødevarekæden at fortsætte de periodiske målinger ved hjælp af prøver af andre fødevarer (kød, fisk, korn osv.), af græs som en forløber for mælk og også af de relevante biologiske indikatorer (prøver af menneskevæv, skaldyr osv.).

* * *

MESSWERTE

DER UMWELTRADIOAKTIVITAET IN DEN LAENDERN DER

EUROPAEISCHEN GEMEINSCHAFT

FUER

Luft - Ablagerung - Wasser - Milch 1979

## VORWORT

Mit dem vorliegenden Dokument veröffentlicht die Direktion "Gesundheit und Sicherheit" der Kommission der Europäischen Gemeinschaften ihren neunzehnten Bericht über die Umweltradioaktivität. Sie stützt sich dabei auf Daten aus den Stationen, die mit der Ueberwachung der Umweltradioaktivität in den Mitgliedstaaten beauftragt sind. Die angeführten Ergebnisse stellen eine Auswahl aus den Daten dar, die der Kommission gemäss Artikel 36 des Vertrags von Rom zur Gründung der Europäischen Atomgemeinschaft übermittelt worden sind.

Die Ergebnisse dieses Berichts betreffen die radioaktive Kontamination von Luft, Ablagerung, Oberflächengewässern und Milch in den neun Mitgliedstaaten der Europäischen Gemeinschaft - Belgien, Bundesrepublik Deutschland, Dänemark, Frankreich, Irland, Italien, Luxemburg, Niederlande und Vereinigtes Königreich - für das Jahr 1979.

Sie sind in vier Hauptabschnitte unterteilt:
- künstliche Radioaktivität in der bodennahen Luft;
- künstliche Radioaktivität der Ablagerungen am Boden (Fallout);
- radioaktive Kontamination der Gewässer;
- radioaktive Kontamination der Milch.

Ausserdem enthält der Bericht ein Verzeichnis der Probenahmestellen und Labors sowie eine Uebersicht über die Veröffentlichungen der Mitgliedstaaten auf diesem Gebiet.

Der Schwerpunkt des Berichts liegt auf den Messergebnissen für bestimmte spezifische Radionuklide, jedoch werden die Angaben zur Gesamt-Beta-Aktivität aus Gründen der Kontinuität und zu Vergleichszwecken mit den bisherigen Berichten ebenfalls beibehalten.

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## I. EINLEITUNG

Tabelle 1 gibt einen allgemeinen Ueberblick über das im Jahr 1979 bestehende Netz zur Ueberwachung der Umweltradioaktivität in der Gemeinschaft; die einschlägigen Angaben werden in diesem Bericht vorgelegt.

Das Verzeichnis der Probenahmestellen und Messstationen ist im Anhang wiedergegeben.

Die Analyse der Angaben über die künstliche Radioaktivität in der bodennahen Luft und im Fallout ergibt für 1979 eine allgemeine Verringerung der Gesamt-Beta-Aktivität gegenüber 1978 und den Vorjahren.

Die Radioaktivität des Wassers konnte wegen der verschiedenen Ueberwachungssysteme (Probenahmen und Messungen) der Mitgliedstaaten nicht so systematisch wie die der Luft untersucht werden. Die Ergebnisse von 1979 entsprechen aber in etwa denen von 1978.

Die Ueberwachung der radioaktiven Kontamination einzelner Nahrungsmittel wird in den Mitgliedsländern durch Probenahmen aus den Grundnahrungsmitteln gewährleistet. Der Bericht enthält lediglich die Ergebnisse der Messungen des $Sr^{90}$- und $Cs^{137}$-Gehalts der Milch. Da der auf Milch-Ingestion zurückzuführende Radioaktivitätsanteil im allgemeinen überwiegt, wird dieses Nahrungsmittel, das weiterhin als ausgezeichneter Indikator für die Schwankungen des Beitrags zur radioaktiven Kontamination des Menschen gilt, einer strengen Ueberwachung unterzogen.

Für weitere Informationen sei auf das Verzeichnis der einzelstaatlichen Berichte im Anhang verwiesen.

Die nachgewiesenen Aktivitäten von $Sr^{90}$ und $Cs^{137}$ sind sehr schwach und liegen unter den im Jahre 1978 gemessenen Werten. Sie weisen keine grossen Schwankungen im Jahresverlauf auf.

Die monatlichen Mittelwerte für die Gemeinschaft als Ganzes werden aus sämtlichen für einen bestimmten Monat verfügbaren Daten errechnet. Das Jahresmittel für die Gemeinschaft ergibt sich als arithmetisches Mittel aus den Monatswerten für die Gemeinschaft.

## II. KUENSTLICHE RADIOAKTIVITAET IN DER BODENNAHEN LUFT

Die Gesamt-Beta-Aktivität und die Aktivität der spezifischen in Luftpartikeln enthaltenen Radionuklide wird durch bodennahes Sammeln dieser Partikel auf Filterpapier mit einem Durchsatz von ca. 1000 $m^3$ Luft pro 24 Stunden bestimmt.

Die für die Gesamt-Beta-Radioaktivität angeführten Werte resultieren aus Messungen nach fünftägiger Abklingzeit.

Der Radioaktivitätspegel der Luft ging im Vergleich zum Vorjahr zurück. 1979 wurden keine oberirdischen Kernwaffenversuche durchgeführt. Die letzte chinesische Atombombe (20 Kilotonnen) explodierte am 14.12.78 im Raume Lop Nor. Bei den mittel- und langlebigen Spaltprodukten war die Entwicklung unverändert. Vor allem wurde ein Anstieg nach dem Austausch zwischen Stratosphäre und Troposphäre im Frühjahr festgestellt (neue Aktivitätszufuhr aus der Stratosphären-Schicht). Nach diesem Anstieg bahnte sich eine leicht rückläufige Entwicklung an.

Abb. 1 und 2 zeigen die geographische Verteilung der Probenahmestellen innerhalb der Gemeinschaft, die in diesem Bericht bei der Bestimmung der spezifischen Radionuklide und der Gesamt-Beta-Aktivität herangezogen wurden.

In den Tabellen 2.1 bis 2.18 werden für 1979 die nach Entnahmestellen aufgeschlüsselten monatlichen Schwankungen und das Jahresmittel der Aktivität der spezifischen Radionuklide und der Gesamt-Beta-Aktivität ausgewiesen. Dadurch soll ein Ueberblick über das Ausmass der örtlichen Schwankungen sowie der monatlichen und der jahreszeitlichen Abweichungen, die mehr als eine Grössenordnung überschreiten, gegeben werden.

Tabelle 3 enthält die für den Zeitraum 1967-1979 an einigen ausgewählten Messstationen der Gemeinschaft ermittelten Jahresdurchschnittswerte für $Sr^{90}$; Tabelle 4 gibt die entsprechenden Werte für $Cs^{137}$.

Die derzeitigen $Sr^{90}$- und $Cs^{137}$-Konzentrationen in der Atmosphäre machen weniger als 1% der nach den Euratom-Grundnormen für Einzelpersonen der Bevölkerung geltenden jährlichen Konzentrationsgrenzwerte aus.

Tabelle 5 gibt für 1979 eine Gesamtübersicht über die Monats- und Jahresdurchschnittswerte der Gesamt-Beta-Aktivität in den einzelnen Mitgliedstaaten und für die Gemeinschaft.

In der Gemeinschaft lag im Jahr 1979 der Mittelwert der Gesamt-Beta-Aktivität für atmosphärische Schwebstoffe bei 0,03 $pCi/m^3$.

In den Tabellen 6 und 7 werden die während des Zeitraums 1962-1979 in allen Mitgliedstaaten der Gemeinschaft festgestellten Monats- und Jahreswerte der Gesamt-Beta-Aktivität in der Luft verglichen.

Graphik 1 zeigt für $Sr^{90}$ die in Ispra (Italien) und Le Vésinet (Frankreich) seit 1965 ermittelten Schwankungen.

Graphik 2a) stellt die monatlichen Schwankungen der $Cs^{137}$-Konzentrationen in Chilton (Vereinigtes Königreich) seit 1953 dar; Graphik 2b) die entsprechenden Werte für Ispra (Italien) und Le Vésinet (Frankreich) seit 1961.

Die Graphiken 3a), b), c) und d) geben die Entwicklung der Gesamt-Beta-Aktivität in der Gemeinschaft an folgenden 11 von den Mitgliedstaaten ausgewählten Messstationen seit 1963 wieder: Brüssel, Paris, Schleswig, Berlin, Chilton, Montpellier, Luxemburg, De Bilt, Ispra, Pian Rosà und Dublin.

Die Ergebnisse der Messungen von $Pu^{238}$ und $Pu^{239}$ in Ispra und Milford Haven sind in Tabelle 8 angegeben. Die Graphiken 4a) und 4b) stellen die Entwicklung seit 1961 dar. Von 1979 an wurde die Messstation Milford Haven durch die Station Chilton ersetzt, die die Messungen des $Pu^{238}$- und des $Pu^{239}$-Gehalts der Luft nicht mehr durchführt.

Tabelle 9 gibt die Messergebnisse für $Pu^{239}$ und $Pu^{240}$ in Shrivenham und Glasgow aus dem Jahre 1979 wieder.

## III. KUENSTLICHE RADIOAKTIVITAET DER ABLAGERUNGEN

Die am Boden abgelagerte Radioaktivität wird ständig durch Probenahmen aus den Niederschlägen und den trockenen Ablagerungen überwacht. Je nach Station werden die Proben täglich, wöchentlich oder monatlich entnommen.

Die geographische Verteilung der Entnahmestellen für die spezifischen Radionuklide und für die Gesamt-Beta-Aktivität wird in Abb. 3 und 4 dargestellt.

Die im Jahre 1979 festgestellten und nach Stationen aufgeschlüsselten mittleren monatlichen Schwankungen der spezifischen Radionuklide, der Gesamt-Beta-Aktivität und der Niederschlagsmenge werden in den Tabellen 10.1 bis 10.18 ausgewiesen.

Diese Tabellen wurden wie auch bei der künstlichen Radioaktivität in bodennaher Luft mit aufgenommen, um einen Gesamtüberblick über das Ausmass der örtlichen Schwankungen und der monatlichen und jahreszeitlichen Abweichungen zu vermitteln.

Um den Vergleich zwischen den Werten der einzelnen geographischen Stationen zu erleichtern, enthalten die Tabellen 11 und 12 die zwischen 1967 und 1979 jährlich abgelagerten Mengen von $Sr^{90}$ und $Cs^{137}$.

Die monatlichen Mittelwerte und die im Jahre 1979 insgesamt in den neun Mitgliedstaaten der Gemeinschaft abgelagerte Gesamt-Beta-Aktivität sind in Tabelle 13 enthalten.

Tabelle 14 zeigt nach Ländern aufgeschlüsselt die jährlich von 1962 bis 1979 am Boden abgelagerte Gesamt-Beta-Aktivität.

Im Jahre 1979 ist die Gesamt-Beta-Aktivität gegenüber den Vorjahren noch weiter zurückgegangen (19,8 mCi/$km^2$ 1978 gegenüber 6,9 mCi/$km^2$ 1979).

Graphik 5 zeigt die seit 1954 in Milford Haven (VK) kumulierten Ablagerungen von $Cs^{137}$ unter Berücksichtigung der Abklingfaktoren. Da nach 1967 grössere Mengen $Cs^{137}$ zerfallen sind als neu abgelagert wurden, ist eine langsame aber stetige Abnahme der insgesamt kumulierten Ablagerungen festzustellen.

Graphik 6 gibt einen Ueberblick über das zwischen 1973 und 1979 in Orsay (Frankreich) im Regenwasser abgelagerte $Pu^{239}$.

Die Graphiken 7a), 7b) und 7c) zeigen die Entwicklung der jährlich am Boden abgelagerten Gesamt-Beta-Aktivität für neun über das Gebiet der Gemeinschaft verteilte charkteristische Stationen: Mol, Le Vésinet, Ispra, Schleswig, München, Berlin, Chilton, Dublin und Bilthoven.

Ausserdem weisen sie die Niederschlagsmengen aus.

## IV. RADIOAKTIVITAET DES WASSERS

### IV. 1. Verfügbare einzelstaatliche Berichte

Was die Ueberwachung der Radioaktivität des Wassers betrifft, so ist bei den allgemeinen Umweltüberwachungsprogrammen schwer zu unterscheiden, welcher Aktivitätsanteil auf natürliche Strahlung und welcher auf die einzelnen Ableitungsstellen zurückzuführen ist. In der Gemeinschaft gibt es ebensoviele Probenahmestellen für allgemeine Umweltmessungen wie für Luft- und Falloutmessungen.

Eine Beschreibung aller Massnahmen zur Ueberwachung der Radioaktivität des Wassers findet sich in verschiedenen einzelstaatlichen Veröffentlichungen.

#### BELGIEN

Die Berichte des Instituts für Hygiene und Epidemiologie (Gesundheitsministerium) enthalten eine Beschreibung der Ueberwachungssysteme für verschiedene Wasserarten und die Auswirkungen der Gesamt-Alpha- und -Beta-Aktivität sowie der $Ra^{226}$-, $\beta K^{40}$- und der HTO-Aktivität in Oberflächengewässern, Meerwasser und Trinkwasser.

Folgende drei Dokumente wurden veröffentlicht:

- "Résultats des mesures de radioactivité dans l'air, dans les précipitations et dans les eaux de 1958 à 1968";
- "Résultats des mesures de radioactivité dans l'air, dans les précipitations et dans les eaux de 1969 à 1974";
- "Résultats des mesures de radioactivité dans l'air, dans les précipitations et dans les eaux de 1975 à 1978".

DAENEMARK

Das Forschungszentrum Risø (Forsøgsarlagget) veröffentlicht Jahresberichte über die Umweltradioaktivität in Dänemark und teilt die Ergebnisse der im ganzen Land durchgeführten Messungen der $Sr^{90}$-Konzentration im Grund-, Fluss-, See- und Meerwasser sowie der $Cs^{137}$-Konzentration im Meerwasser mit.

BUNDESREPUBLIK DEUTSCHLAND

Eine detaillierte Beschreibung der Ueberwachungsnetze der einzelnen Wassersysteme sowie die Ergebnisse der Messungen spezifischer Radionuklide und der Alpha- und Beta-Aktivität in Oberflächengewässern, im Meer- und Trinkwasser sowie in Abwässern ist in den Jahresberichten des Bundesministeriums des Innern "Umweltradioaktivität und Strahlenbelastung" enthalten.

FRANKREICH

Die detaillierten Ergebnisse der Radioaktivitätsmessungen (Gesamt-Beta-, $H^3$-, $Sr^{90}$-, $Cs^{137}$-Aktivität u.a.m.) in Oberflächengewässern, im Grund-, Trink- und Meerwasser sowie in städtischen Abwässern und die Ableitungen aus Kernkraftwerken sind in den vom SCPRI seit 1961 monatlich veröffentlichten Tätigkeitsberichten sowie in seinen jährlichen Tätigkeitsberichten wiedergegeben.

ITALIEN

Die Ergebnisse von Messungen der $Sr^{90}$- und $Cs^{137}$-Konzentrationen im Süsswasser, in zur künstlichen Bewässerung dienendem Wasser sowie im Meerwasser sind in den jährlichen Veröffentlichungen des "Comitato Nazionale per l'Energia Nucleare" (CNEN) "Data on Environmental Radioactivity collected in Italy" (Angaben über die Umweltradioaktivität in Italien) enthalten.

NIEDERLANDE

Die Ergebnisse der Messungen zur Ueberwachung der verschiedenen Wasserarten werden in den Jahresberichten der "COORDINATIE-COMMISSIE VOOR DE

METINGEN VAN RADIOACTIVITEIT EN XENOBIOTISCHE STOFFEN"(C.C.R.X.), "Allgemeine Messungen der radioaktiven Kontamination der Umwelt in den Niederlanden" vorgelegt.

Diese Berichte enthalten ebenfalls die Ergebnisse der Messungen der Beta-Restaktivität, die die Kernkraftwerksbetreiber in den Gewässern der Westerschelde, des Waal und einiger kleiner Flüsse in der Nähe von Dodewaard durchgeführt haben.

VEREINIGTES KOENIGREICH

Die Auswirkungen der Ableitungen flüssiger radioaktiver Stoffe aus den grössten Kernkraftwerken auf die Umwelt sind in der neuen seit 1978 herausgegebenen Berichtserie "Annual Survey of Radioactive Discharges in Great Britain" (jährliche Untersuchung der radioaktiven Ableitungen in Grossbritannien) enthalten. In diesen Untersuchungen werden die wichtigsten Informationen der vom "Ministry of Agriculture, Fisheries and Food" (Ministerium für Landwirtschaft, Fischerei und Ernährung) herausgegebenen Berichtserie in einer einzigen Veröffentlichung zusammengefasst und durch Berichte der Anlagenbetreiber ergänzt.

IV. 2. Beschreibung der Ueberwachungsprogramme

In den folgenden Abschnitten wird für jeden Mitgliedstaat ein kurzer Ueberblick über die nicht an bestimmte Strahlungsquellen gebundenen Programme zur Ueberwachung der Gewässer gegeben.

BELGIEN

In Belgien besteht seit 1958 ein Ueberwachungsnetz, das grundlegende Informationen über verschiedene Wasserarten liefert.

Nähere Einzelheiten sind in den unter Ziffer IV.1 genannten Berichten enthalten.

An der Maas zwischen Givet und Lanaken befinden sich fünf Probenahmestellen. Weitere Informationen hierüber enthält der Jahresbericht "Surveillance radiologique des sites d'implantation des centrales nucléaires" (groupe mixte CEN - Santé Publique) (Radiologische Ueberwachung der Kernkraftwerksstandorte - Gemischte Gruppe belgisches Atomzentrum - öffentliches Gesundheitswesen).

DAENEMARK

a) Grundwasser

Seit 1961 werden an neun speziell ausgewählten und über das ganze Land verteilten Orten Messungen an jährlich entnommenen Grundwasserproben durchgeführt. Hauptziel dieser Untersuchungen ist es, die Entwicklung der $Sr^{90}$-Pegel im dänischen Grundwasser zu überwachen und die gemessenen Pegel mit den Filterschichten an diesen neun Standorten zu vergleichen.

b) Fluss- und Sewasser

Seit 1970 werden jedes zweite Jahr aus acht Seen und Flüssen an verschiedenen Orten des Landes Oberflächenwasserproben entnommen. Hierdurch will man u.a. feststellen, wieviel $Sr^{90}$ ins Meer abgeleitet wird, und ob signifikante Unterschiede zwischen den $Sr^{90}$-Pegeln in den verschiedenen Wassersystemen bestehen.

c) Trinkwasser

Seit 1965 werden im ganzen Land Leitungswasserproben gesammelt, um den $Sr^{90}$-Gehalt des Trinkwassers mit dem des Grund- und Oberflächenwassers zu vergleichen. In Dänemark wird das Trinkwasser grösstenteils aus dem Grundwasser gewonnen. In den letzten Jahren entstammen jedoch immer grössere Mengen aus dem Oberflächenwasser.

Die Programme zur Ueberwachung des Süsswassers müssen im Zusammenhang mit den dänischen Programmen zur Untersuchung des Bodens zwecks Feststellung des $Sr^{90}$- und $Cs^{137}$-Gehalts gesehen werden. Diese Untersuchungen verfolgen das Ziel, den im Boden angesammelten Fallout zu bestimmen und die auf diese Weise erhaltenen Werte mit den aus den Niederschlagsdaten und den abfliessenden Mengen errechneten theoretischen Werten zu vergleichen.

BUNDESREPUBLIK DEUTSCHLAND

Das Ueberwachungsprogramm der Bundesrepublik Deutschland umfasst folgende drei klar abgegrenzte Bereiche:

a) Oberflächenwasser
(unter der Zuständigkeit der Bundesanstalt für Gewässerkunde, Koblenz)

Die Radioaktivität des Oberflächenwassers (Gesamt-Beta, Rest-Beta, H3 und andere Nuklide) wird zur Zeit von 19 Messstellen der Länder überwacht. Das Messprogramm umfasst insgesamt mehr als 200 Probenahmestellen für Oberflächenwasser, etwa 20 für Schwebstoffe und etwa 30 für Schlammproben.

b) Meerwasser

(unter der Zuständigkeit des Deutschen Hydrographischen Instituts, Hamburg)

Das Deutsche Hydrographische Institut ist seit 1965 amtlich mit der Ueberwachung der Radioaktivität beauftragt. Das Ueberwachungsnetz umfasst zur Zeit elf über die Nord- und Ostsee verteilte Messstellen, die mit kontinuierlich registrierenden Anlagen zur Messung von Gammastrahlen ausgestattet sind. Zusätzlich werden regelmässig Proben entnommen um die Anwesenheit von $Sr^{90}$, $Cs^{137}$ und anderen Nukliden festzustellen. Seit 1976 wird ausserdem der Gehalt des Meerwassers an Transuranen gemessen.

c) Trink- und Abwasser

(unter der Zuständigkeit des Instituts für Wasser-, Boden- und Lufthygiene des Bundesgesundheitsamtes, Berlin)

Dieser Teil des Ueberwachungsnetzes besteht aus 18 amtlichen Messstellen, die an etwa 160 Probenahmestellen Trinkwasserproben und an 75 Entnahmepunkten die flüssigen Ableitungen aus Kläranlagen, Kernkraftwerken, Kernforschungszentren, nuklearmedizinischen Anlagen und anderen mit radioaktiven Stoffen umgehenden Anlagen analysieren.

Eine ausführliche Beschreibung der einzelnen Probenahmestellen, ihrer Aufgaben, ihres Messprogramms und ihrer Analysenmethoden wird in dem "Statusbericht über die Ueberwachung der Umweltradioaktivität in der Bundesrepublik Deutschland" gegeben.

FRANKREICH

Der SCPRI überwacht das Oberflächen- und Grundwasser an 143 Stellen. An 17 dieser Stellen, die entweder unterhalb der grössten Nuklearanlagen oder im Mündungsbereich der grossen Flüsse liegen, werden in automatischen Wassersammelbehältern kontinuierlich Proben entnommen.

Ausserdem überwacht der SCPRI regelmässig 39 Entnahmestellen für Trinkwasser, die sich in der Nähe von Nuklearanlagen befinden oder zum Verteilernetz der grossen Städte gehören. Für jedes Wasserversorgungsvorhaben führt er im Rahmen der "obligatorischen Gesundheitserziehung" eine vollständige Untersuchung der Radioaktivität durch.

Zur Ueberwachung des Meerwassers stehen dem SCPRI 20 über das gesamte französische Küstengebiet verteilte Entnahmestellen zur Verfügung, an denen mindestens einmal monatlich Proben entnommen werden.

Der SCPRI führt detaillierte Analysen der monatlich aus Abwässern von 14 Nuklearzentren und 6 angeschlossenen Industrien gewonnen Proben durch. Er kontrolliert überdies die Abwässer grosser Stadtgebiete.

ITALIEN

Die Ueberwachung des Oberflächenwassers der italienischen Binnengewässer geschieht in Form von Messungen des $Sr^{90}$- und des $Cs^{137}$-Gehalts der an 14 verschiedenen Punkten (13 Flüsse und 1 See) entnommenen Proben.

Was das zur künstlichen Bewässerung verwendete Wasser betrifft, so wird der $Sr^{90}$- und $Cs^{137}$-Gehalt bei an 2 Stellen entnommenen Proben gemessen.

Der $Sr^{90}$- und $Cs^{137}$-Gehalt des Meerwassers wird an Proben aus 4 Entnahmestellen kontrolliert.

NIEDERLANDE

Die radiologische Gewässerüberwachung umfasst Messungen der Gesamt-Alpha- und Rest-Beta-Aktivität sowie der $H^3$-Werte des Wassers der grossen Flüsse (wobei die Proben an den Landesgrenzen entnommen werden) und des Ijsselmeeres sowie Messungen des $Sr^{90}$- und $Ra^{226}$-Gehalts von Rhein, Maas und Westerschelde. Ausserdem wird der $H^3$-Gehalt bestimmter für die Trinkwasserversorgung genutzter Gewässer gemessen.

VEREINIGTES KOENIGREICH

a) Als 1967 im Vereinigten Königreich beschlossen wurde, wegen der nur geringen durch Ingestion von Trinkwasser verursachten Strahlenbelastung der Bevölkerung auf das Programm zur Messung der radioaktiven Niederschläge im Trinkwasser zu verzichten, wurde ein Forschungsprogramm zur Untersuchung spezieller Fragen wie z.B. die Bewegung des $Sr^{90}$ auf dem Wege von den Versorgungsbecken zu den Versorgungsbehältern beibehalten. Aus fünf zur Untersuchung von Oberflächen-, Fluss- und Quellwasser errichteten Messstationen wurden zwecks Bestimmung des $Sr^{90}$- und $Cs^{137}$-Gehalts Wasserproben entnommen und analysiert. An diesen fünf Probenahmestellen, die in Tabelle 15.1 unter der Rubrik "Trinkwasser" angeführt sind, wurden Messungen durchgeführt, um die spezifischen Radionuklide im Trinkwasser festzustellen, wobei die Gesamt-Beta-Radioaktivität unberücksichtigt blieb. Erwartungsgemäss waren die bei den gefassten Quellen ermittelten Werte weiterhin relativ hoch, wobei allerdings berücksichtigt werden muss, dass selbst der höchste Pegel wesentlich unter den in der Mitte der sechziger Jahre festgestellten Höchstwerten lag.

b) Ausserdem besteht seit 1975 ein detailliertes Probenahme- und Analysenprogramm für Gewässer, demzufolge jedes Jahr nur ein grosser Fluss untersucht wird. Die Ergebnisse weisen sehr niedrige Radioaktivitätspegel aus.

c) Bei einigen Trinkwasserquellen, Oberflächengewässern und Flüssen werden stichprobenartig die Gesamt-Alpha- und die Gesamt-Beta-Radioaktivität sowie der Tritiumgehalt gemessen. Die Ergebnisse dieser Stichprobenkontrollen sind in Tabelle 15.1 enthalten. Befindet sich die Probenahmestelle in der Nähe eines Ableitungspunktes für flüssige radioaktive Stoffe, so werden ausserdem die im Wasser enthaltenen spezifischen und repräsentativen Nuklide analysiert. Die in Tabelle 15.1 unter der Rubrik "Oberflächengewässer" angeführten Quellen, bei denen hohe (über 10 hinausgehende) Werte festgestellt wurden, dienen nicht als direkte Trinkwasserquelle.

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Tabelle 15.1 enthält ausserdem Ergebnisse der im Jahre 1979 in einigen Mitgliedstaaten durchgeführten Messungen zur Bestimmung der Rest-Beta-Aktivität im Trinkwasser, in den zum menschlichen Verbrauch geeigneten und in den übrigen Oberflächengewässern sowie im Meerwasser.

Die in Dänemark durchgeführten Messungen des $Sr^{90}$-, $Cs^{137}$- und $Cs^{134}$-Gehalts sind Tabelle 15.2 zu entnehmen.

Obwohl es in Ermangelung vollständiger Angaben schwierig ist, sich ein genaues Bild über die Radioaktivität der Gewässer zu machen, kann man sagen, dass seit 1972 keine wesentlichen Aenderungen eingetreten sind.

## V. RADIOAKTIVITAET DER MILCH

### V. 1. Einleitung und verfügbare einzelstaatliche Berichte

Vor einigen Jahren sind die Mitgliedstaaten dazu übergegangen, ihre Ueberwachungsprogramme vorwiegend auf Milch zu konzentrieren, die als guter biologischer Indikator für künstliche Radionuklide gilt. Die wichtigsten unter ihnen sind zur Zeit das $Sr^{90}$ und $Cs^{137}$ aus oberirdischen Kernwaffenversuchen.

Die im Jahre 1979 festgestellten Aktivitäten sind sehr niedrig; sie entsprechen in etwa den 1978 gemessenen Werten und weisen im Jahresverlauf keine grossen Schwankungen auf.

Die Erfahrung hat gezeigt, dass der $Sr^{90}$/g Ca-Anteil in der Nahrungskette gegenüber dem $Sr^{90}$/g Ca in der Milch in den einzelnen Ländern relativ konstant blieb (siehe Tabelle 16).

In den meisten Mitgliedstaaten der Gemeinschaft sind nahezu 80% des in der Nahrung vorhandenen Calcium in der Milch und in den Milchprodukten anzutreffen. Zudem lassen Messungen des $Cs^{137}$-Gehalts der Milch Rückschlüsse auf die Entwicklung der durch dieses Nuklid hervorgerufenen radioaktiven Kontamination der Nahrungsmittel zu.

Die nachstehend angeführten neuesten Berichte der Mitgliedsländer enthalten Angaben über andere Nahrungsmittel:

| | |
|---|---|
| Belgien | - Contamination radioactive des denrées alimentaires en Belgique en 1978 et 1979 - Rapport I.H.E. - J. Gillard-Baruh |
| Dänemark | - Environmental Radioactivity in Denmark in 1979. Aarkrog A., Bøtter-Jensen L., Dahlgaard H., Hansen Heinz, Lippert J., Nielsen S.P. and Nilsson K.: Risø Report No 421 |
| Bundesrepublik Deutschland | - Umweltradioaktivität und Strahlenbelastung. Jahresbericht 1977 - Der Bundesminister des Innern |
| Frankreich | - Rapports d'activité mensuels et annuels du SCPRI - INSERM - Ministère de la Santé pour 1979 |
| Italien | - Data on Environmental Radioactivity collected in Italy in 1977 (CNEN) |
| Niederlande | - Jahresberichte der "Coördinatie-Commissie voor de metingen van Radioactiviteit en Xenobiotische Stoffen" unter dem Titel: "Algemene Radioactieve Besmetting van de Biosfeer. In Nederland verrichte metingen" |
| Vereinigtes Königreich | - Milk report 1979 - NRPB - R115 Green B.M.R., Knight A., Bruce R.S., Downs W., Ellis E.B. and Mercer E.R. |

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In den Niederlanden wird der $Sr^{90}$-, der $Cs^{137}$- und erforderlichenfalls auch der $Sr^{89}$- und $I^{131}$-Gehalt der Milch jeden Monat vom "Rijks-Kwaliteitsinstituut voor Landen en Tuinbouwprodukten" in Wageningen gemessen, das zu diesem Zweck sowohl gewerblich verwendete Standardmilch aus dem Norden, Westen und Süden des Landes als auch Standardtrinkmilch analysiert, die stichprobenartig aus bestimmten vorwiegend im Westen des Landes gelegenen Betrieben ausgewählt wird.

Im Vereinigten Königreich ging die Zuständigkeit für das Programm zur Ueberwachung der Milch vom "Agricultural Research Council, Letcombe Laboratory", auf den "National Radiological Protection Board" über.

V. 2. Kontamination durch $Sr^{90}$

Tabelle 17 enthält für 1979 die Vierteljahres- und Jahreswerte des an verschiedenen Entnahmestellen der Gemeinschaft gemessenen Verhältnisses pCi $Sr^{90}$/g Ca.

Tabelle 18 enthält die Vierteljahres- und Jahreswerte des Verhältnisses pCi $Sr^{90}$/g Ca für das Jahr 1979 nach Ländern und für die Gemeinschaft als Ganzes. In Tabelle 19 sind die mittleren Vierteljahres- und Jahreswerte für die Gemeinschaft seit 1972 zusammengefasst.

Das Jahresmittel 1979 beträgt 3,4 pCi/g Ca gegenüber 3,9 pCi/g Ca im Jahre 1978.

Die Kontamination der Milch durch $Sr^{90}$ erreicht zur Zeit lediglich 10-20% der höchsten Werte, die in den Jahren 1963 bis 1965 gemessen wurden (siehe Tabelle 20).

Diese Pegel stellen nur einen geringen Prozentsatz der Jahresgrenzwerte dar, die Einzelpersonen der Bevölkerung durch Ingestion aufnehmen dürfen (1).

V. 3. Kontamination durch $Cs^{137}$

Tabelle 21 enthält für 1979 die an verschiedenen Entnahmestellen der Gemeinschaft gemessenen Vierteljahres- und Jahreswerte des Verhältnisses pCi $Cs^{137}$/Liter Milch.

Tabelle 22 fasst die 1979 gemessenen Vierteljahres- und Jahreswerte nach Ländern und für die Gemeinschaft zusammen. Tabelle 23 enthält die vierteljährlichen und jährlichen Mittelwerte für die Gemeinschaft seit 1972.

Das Jahresmittel für die Gemeinschaft beträgt 1979 5,2 pCi $Cs^{137}$/Liter gegenüber 7,6 pCi $Cs^{137}$/Liter im Jahre 1978.

Die Kontamination der Milch durch $Cs^{137}$ liegt zur Zeit bei weniger als 10% der in den Jahren 1963 bis 1965 gemessenen Pegel (siehe Tabelle 24).

Diese Werte entsprechen weniger als 1% der für die Inkorporation von Radiocäsium mit dem Trinkwasser festgelegten Jahresgrenzwerte (1).

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(1) Die Jahresgrenzwerte für die Inkorporation von Radionukliden mit dem Trinkwasser sind in den Euratom-Grundnormen festgesetzt. Milch ist ein Sonderfall und das einzige Nahrungsmittel, das dieses Radionuklid enthält.

SCHLUSSFOLGERUNGEN

Die allgemeinen Schlussfolgerungen sind die gleichen wie die des vorausgegangenen Berichts.

i) Die seit mehreren Jahren festgestellten geringfügigen Schwankungen sind weiterhin auf die Kernwaffenversuche in Asien zurückzuführen. Die Messwerte haben jedoch niemals Grössenordnungen erreicht, die besondere Untersuchungsmassnahmen gerechtfertigt hätten.

ii) Mit der Zusammenstellung der Messwerte und dem Vergleich der von den einzelnen Messstationen ermittelten Ergebnisse steht ein ausgezeichnetes Warnsystem zur Verfügung; die bisherigen Bemühungen sollten also fortgesetzt werden.

iii) Wenn auch im Zusammenhang mit den Angaben über die Nahrungskette keine Veranlassung besteht, den besonders repräsentativen Charakter der bei den Messungen von Milchproben erzielten Ergebnisse in Frage zu stellen, wird es nach wie vor als wünschenswert erachtet, bei anderen Nahrungsmitteln (Fleisch, Fisch, Getreide, usw.), bei den Vorläufern von Milch (Gras) sowie bei geeigneten biologischen Indikatoren (menschliche Gewebeproben, Muscheln, usw.) periodisch stichprobenartige Messungen durchzuführen.

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# RESULTS OF ENVIRONMENTAL RADIOACTIVITY MEASUREMENTS IN THE MEMBER STATES OF THE EUROPEAN COMMUNITY FOR

Air - Deposition - Water - Milk 1979

## PREFACE

The present document is the 19th report on ambient radioactivity published by the Health and Safety Directorate of the Commission of the European Communities. It was drawn up using the data collected by the stations responsible for environmental radioactivity monitoring in the Member States. The results are extracts from the data sent to the Commission under Article 36 of the Treaty of Rome establishing the European Atomic Energy Community.

The results presented in this report deal with radioactive contamination of the air, deposition, surface water and milk during 1979 in the nine Member States of the European Community, viz. Belgium, Denmark, the Federal Republic of Germany, France, Italy, Ireland, Luxembourg, the Netherlands and the United Kingdom.

The results are presented under four main headings:
- artificial radioactivity in the air at ground level;
- artificial radioactivity in deposition;
- radioactive contamination of water;
- radioactive contamination in milk.

The report also contains the list of sampling stations and laboratories, together with a list of publications by Member States in this field.

This report places special emphasis on the measurement results for specific radionuclides, but it also contains data on total beta activity so as to ensure continuity vis-à-vis previous reports and provide comparative values.

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INTRODUCTION

Table 1 provides an overall view of the environmental radioactivity monitoring network in the Community in 1979, for which data are presented in this report.

A list of the sampling stations and of the laboratories carrying out the measurements is appended.

A study of the data on artificial radioactivity in the air at ground level and in deposition shows that 1979 saw a general decline in total beta activity as compared with 1978 and preceding years.

Radioactivity in water could not be treated as systematically as that in air because of the different monitoring systems (sampling and measurement) existing in the Member States. However, the 1979 results were similar to those of 1978.

Monitoring of contamination of the different foodstuffs is carried out in the Member States of the Community by sampling the basic constituents of the diet. The report contains measurement results only for $^{90}Sr$ and $^{137}Cs$ in milk. The contribution due to milk intake is generally predominant; accordingly, it is still considered to be an excellent indicator of changes in contamination in man.

Additional information may be found in the national reports contained in the annex.

The detected activities of $^{90}Sr$ and $^{137}Cs$ are very low, lower than those measured in 1978; neither were there any significant fluctuations during the year.

Finally, with regard to the calculations made for the Community as a whole, the relevant monthly means are calculated from the total data available for a given month. The annual mean for the Community is calculated as the arithmetic mean of the monthly values for the Community.

II. ARTIFICAL RADIOACTIVITY IN THE AIR AT GROUND LEVEL

The assessment of total beta activity and the activity of specific radionuclides present in particulates suspended in the air is carried out by filtering the air, at ground level, using a filter paper. The filtering rate is approximately 1 000 $m^3$ per 24 hours.

With regard to the values for total beta activity, the data shown represent the results of measurements carried out after five days decay.

There was a decrease in airborne radioactivity as compared with the previous year. No nuclear test was carried out in 1979. The last chinese atomic bomb (20 kilotonnes) was detonated on 14 December 1978 at Lop Nor. The pattern for long-lived and medium-lived fission products was unchanged: there was an increase following the spring transfers between the stratosphere and the troposhere (new influx of radioactivity from the stratospheric reservoir); this increase was followed by a slow decrease.

The geographical distribution of the sampling stations for specific radionuclides and for total beta activity in the Community is shown in maps 1 and 2.

Tables 2.1 to 2.18 present, for each station, monthly fluctuations and the annual mean for the activity of specific radionuclides and of total beta activity in 1979, in order to give an overall view of the importance of local fluctuations and of monthly and seasonal variations which may exceed one order of magnitude.

Tables 3 and 4 show the annual means for $^{90}Sr$ and $^{137}Cs$ respectively from 1967 to 1979 for a selected number of stations in the Community.

The current atmospheric concentrations of $^{90}Sr$ and $^{137}Cs$ are less than 1% of the annual limits for members of the public laid down in the Euratom Basic Safety Standards.

Table 5 shows an overview of the annual and mean monthly values for total beta activity in 1979 in the different Member States and the Community.

In 1979 the mean value for the Community of total beta activity of atmospheric suspended particulates was 0.03 $pCi/m^3$.

Tables 6 and 7 compare the monthly and annual values of total beta activity in the air for all the Member States and the Community, from 1962 to 1979.

Graph 1 shows monthly fluctuations of $^{90}Sr$ since 1965 at Ispra (Italy) and Le Vésinet (France).

Graph 2a) shows monthly fluctuations of $^{137}Cs$ at Chilton (United Kingdom) since 1953 and graph 2b) shows the same fluctuations at Ispra (Italy) and Le Vésinet (France) from 1961.

Graphs 3a), b), c) and d) show trends in total beta activity since 1963 in the Community and in the 11 pilot stations chosen by the Member

States, viz: Brussels, Paris, Schleswig, Berlin, Chilton, Montpellier, Luxembourg, De Bilt, Ispra, Pian Rosà and Dublin.

Table 8 contains the result of $^{238}Pu$ and $^{239}Pu$ measurements carried out at Ispra and Milford Haven. Graphs 4a) and 4b) show the trends since 1961. It should be noted that in 1979 the Milford Haven station took over from that of Chilton; the latter no longer carries out measurements of $^{238}Pu$ and $^{239}Pu$ in the air.

Table 9 contains the results of $^{239}Pu$ + $^{240}Pu$ measurements at Shrivenham and Glasgow in 1979.

## III. ARTIFICIAL RADIOACTIVITY IN DEPOSITION

The assessment of radioactivity deposited on the ground is carried out continuously by sampling precipitation and dry deposition. Depending on the station, measurements are carried out daily, weekly or monthly.

The geographical distribution of the sampling stations for specific radionuclides and for total beta activity is shown in maps 3 and 4.

Mean monthly fluctuations of specific radionuclides, total beta activity and the volume of precipitation are shown in Tables 10.1 to 10.18 for 1979 and for each station.

As in the case of artificial radioactivity in air at ground level, these tables have been included in order to give an overall view of the significance of local fluctuations and of monthly and seasonal variations.

For easier comparison of the values recorded at different geographical stations, Tables 11 and 12 show the quantities of annual deposition of $^{90}Sr$ and $^{137}Cs$ from 1967 to 1979.

Table 13 shows the monthly means and total beta activity deposited in the nine Member States of the Community in 1979.

Table 14 shows total beta activity deposited on the ground per year and per country from 1962 to 1979.

1979 saw a further decrease in the level of total beta activity vis-à-vis the previous years (19.8 mCi/km$^2$ in 1978 as opposed by 6.9 mCi/km$^2$ in 1979).

Graph 5 provides information on the cumulative deposition of $^{137}Cs$ since 1954 for Milford Haven (UK), taking decay factors into account. Since 1967 fresh deposition of $^{137}Cs$ has not compensated for this decay

and a steady, slow decrease in total accumulated deposition can be observed.

Graph 6 provides an overall view of $^{239}Pu$ deposition in rainwater at Orsay (France) for the period 1973-1979.

Graphs 7a), 7b) and 7c) give an indication of trends in total beta activity deposited annually on the ground in nine characteristic stations distributed throughout the Community, viz: Mol, Le Vésinet, Ispra, Schleswig, Munich, Berlin, Chilton, Dublin and Bilthoven.

The amount of precipitation is also shown.

## IV. RADIOACTIVITY IN WATER

### IV. 1. National reports available

In monitoring radioactivity in water it is difficult, in general environmental monitoring programmes, to make a clear distinction between radioactivity due to natural background radiation and that due to radioactive waste disposal at selected points. There are as many sampling stations for background measurements in the Community as there are stations for measuring radioactivity in air and in deposition.

A certain number of national publications contain overall descriptions of the measures for monitoring radioactivity in water.

#### BELGIUM

A description of monitoring networks for different types of water and the results of total alpha and beta activity, of $^{226}Ra$, of $\beta$ $^{40}K$ and of HTO in surface waters, sea water and drinking water is given in the reports of the Institut d'Hygiène et d'Epidémiologie (Ministry of Public Health).

Three documents have been published:

- "Résultats des mesures de radioactivité dans l'air, dans les précipitations et dans les eaux de 1958 à 1968" (Results of radioactivity measurements for air, precipitation and water, 1958-1968);
- "Résultats des mesures de radioactivité dans l'air, dans les précipitations et dans les eaux de 1969 à 1974" (Results of radioactivity measurements for air, precipitation and water, 1969-1974);
- "Résultats des mesures de radioactivité dans l'air, dans les précipitations et dans les eaux de 1975 à 1978" (Results of radioactivity measurements for air, precipitation and water, 1975-1978).

DENMARK

Measurements of $^{90}Sr$ in groundwater, stream and lake water, and sea water, and $^{137}Cs$ in sea water made throughout the country, are contained in annual reports entitled "Environmental radioactivity in Denmark in ...." and published by the Research Establishment at Risø (Forsøgsarlagget).

FEDERAL REPUBLIC OF GERMANY

A detailed description of monitoring networks for different aquatic systems and the results of alpha and beta activity in surface waters, sea water and drinking water are contained in the annual reports of the Federal Ministry of the Interior, entitled "Umweltradioaktivität und Strahlenbelastung" (Environmental Radioactivity and Radiation Exposure).

FRANCE

Detailed results of radioactivity (total beta activity, $^{3}H$, $^{90}Sr$, $^{137}Cs$, etc.) in surface and groundwater, drinking water and sea water, municipal water supply and effluent from nuclear power stations are reported in the "Rapports d'activité" published monthly by the SCPRI since 1961.

ITALY

The results of $^{90}Sr$ and $^{137}Cs$ measurements in fresh water, irrigation water and sea water are reported in the annual publications of the Comitato Nazionale per l'Energia Nucleare (CNEN), entitled "Data on Environmental Radioactivity collected in Italy".

NETHERLANDS

The results of measurements to monitor different types of water are contained in the annual reports of the Coördinatie-Commissie voor de Metingen van Radioaktiviteit en Xenobiotische Stoffen, entitled "General Radioactivity Contamination of the Biosphere : Measurements in the Netherlands".

These reports also include the results of residual beta activity measurements carried out by the operators of nuclear centres in the waters of the Western Scheldt, the Waal and a number of small rivers in the Dodewaard region.

UNITED KINGDOM

A description of the environmental effects of liquid radioactive effluent and other discharges from major nuclear establishments is given

in a new series of reports started in 1978 and entitled "Annual Survey of Radioactive Discharges in Great Britain". These surveys collect in a single publication the main data contained in the series of reports issued by the Ministry of Agriculture, Fisheries and Food and are supplemented by reports issued by operators.

IV. 2. Description of monitoring programmes

A summary of water monitoring programmes not relating to specific sources is given in the following paragraphs for each Member State.

BELGIUM

A monitoring network has been in operation in Belgium since 1958, giving the basic situation for different types of water.

Details are given in the documents referred to above under IV. 1.

Five sampling stations have been set up on the Meuse between Givet and Lanaken. Additional details on this network can be found in the annual report "Surveillance radiologique des sites d'implantation des centrales nucléaires" - groupe mixte CEN/Santé publique (Radiological Monitoring of Nuclear Power Station Sites - CEN/Public Health Joint Working Party).

DENMARK

a) groundwater

Since 1961 measurements have been made of annual samples of groundwater taken from nine selected locations throughout the country. The main purpose of this study is to follow the $^{90}Sr$ levels in Danish groundwater and to compare the observed levels with the characteristics of the filtering strata at the nine locations.

b) stream and lake water

Since 1970 surface water samples have been collected every other year from eight Danish lakes and eight streams throughout the country. One of the objectives of this programme is to estimate $^{90}Sr$ discharge into the sea and to see if there are any systematic differences between the $^{90}Sr$ levels in aquiferous systems.

c) drinking water

"Tap water" samples have been collected thoughout the country since 1965. The purpose of this programme is to compare the $^{90}Sr$ level in drinking

water with the levels found in groundwater and surface waters. Most Danish drinking water is recovered from the groundwater. In recent years, however, increasing amounts have been taken from surface waters.

The monitoring programmes for freshwater should be seen side by side with the Danish programmes to establish the contents of $^{90}Sr$ and $^{137}Cs$ in the soil. The aim of these programmes is to estimate accumulated deposition in the soil and to compare this estimate with the theoretical levels calculated from precipitation and runoff data.

FEDERAL REPUBLIC OF GERMANY

The following areas are covered by the monitoring programme in the Federal Republic of Germany.

a) surface water
(monitored by: Bundesanstalt für Gewässerkunde, Koblenz)

Monitoring of radioactivity in surface water (G beta; R beta; $^{3}H$ and other nuclides) is currently carried out at 19 regional measuring stations. The measuring programme involves a total of more than 200 sampling points for surface water, approximately 20 for aerosols and approximately 30 for sludge samples.

b) seawater
(monitored by: Deutsches Hydrographisches Institut, Hamburg)

In 1965 the Deutsches Hydrographisches Institut was made responsible by the Government for monitoring radioactivity in the sea. The area covered currently includes 11 measuring stations in the North Sea and the Baltic. These stations operate continuous measuring equipment for gamma radiation. In addition, regular samples are taken to determine $^{90}Sr$, $^{137}Cs$ and any other single nuclides present. Since 1976 measurements to determine the amount of transuranic elements contained in sea water have also been taken.

c) drinking water and waste water
(monitored by: Institut für Wasser-, Boden- und Lufthygiene des Bundesgesundheitsamtes, Berlin)

The area covered includes 18 official measuring stations which analyse drinking water and waste water from 160 and 75 sampling points respectively. The waste water comes from sewage treatment plants, nuclear power stations, nuclear research establishments, hospitals with nuclear medicine departments and other installations in which radioactive substances are used.

A detailed description of the various measuring stations, their tasks, measuring programmes and methods of analysis is contained in the "Statusbericht über die Ueberwachung der Umweltradioaktivität in der Bundesrepublik Deutschland" (State-of-the-art Report on Environmental Radioactivity Monitoring in the Federal Republic of Germany).

FRANCE

Monitoring of surface water and groundwater is carried out by the SCPRI at 143 points; in 17 of these sampling stations, located either downstream of major nuclear power stations or near the mouths of large rivers, sampling is carried out continuously using automatic collectors.

Furthermore the SCPRI regularly monitors 39 drinking water sampling stations located near nuclear power stations or belonging to the main supply networks of large cities. In addition, it carries out a complete radioactivity study for each new drinking water supply project, under the compulsory public health regulations.

For seawater the SCPRI has 20 sampling stations spread out along the French coast which take samples at least once each month.

The SCPRI carries out detailed analyses of monthly samples of liquid effluent from 14 nuclear establishments and 6 associated industries. It also monitors the waste water of large conurbations.

ITALY

Monitoring of surface waters in the national network consists of measurements of $^{90}Sr$ and $^{137}Cs$ from samples taken at 14 stations (13 rivers and one lake).

In the case of irrigation water, measurements of $^{90}Sr$ and $^{137}Cs$ are carried out using samples taken at 2 stations.

For seawater, measurements of $^{90}Sr$ and $^{137}Cs$ are carried out using samples taken at 4 stations.

NETHERLANDS

For the water of large rivers and the Ijselmeer, radiological monitoring relates to total alpha activity, residual beta activity and $^{3}H$ (sampling is carried out at the borders). In the Rhine, the Meuse and the Western Scheldt $^{90}Sr$ and $^{226}Ra$ are also measured. Moreover, $^{3}H$ is measured in certain waters collected with a view to producing drinking water.

UNITED KINGDOM

a) When it was decided in the United Kingdom in 1967 that the programme to determine precipitation and fallout in drinking water was no longer justified because of the small contribution to public radiation exposure due to ingestion of water, a research programme was retained to study specific questions such as the movement of $^{90}Sr$ from catchment areas to reservoirs. The waters from five stations covering surface, river and well waters are sampled and analysed for $^{90}Sr$ and $^{137}Cs$. These five sampling points are included in Table 15.1 under "drinking waters" and are measured for specific nuclides and not for total beta activity. Results from the impounded sources are relatively high as might be expected but even the highest show a considerable decrease from the peak values obtained in the mid-sixties.

b) In addition since 1975 there has been a programme of thorough sampling and analysis of the water of one major river per year. The results show very low levels of radioactivity.

c) Spot checks are made on some drinking waters, surface waters and rivers. These are analysed for total alpha, total beta and tritium. The results of these spot checks are included as appropriate in Table 15.1. When the sampling point is in the vicinity of a liquid radioactive effluent discharge the samples are analysed in addition for specific and representative nuclides. The sources showing high readings (greater than 10) in Table 15.1 under "surface waters" are not used directly as sources of drinking water.

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Table 15.1 shows a summary of the residual beta activity measurements carried out in certain Member States in 1979 for drinking water, surface waters suitable for drinking water supply, surface waters in general and sea water.

Table 15.2 contains measurements of $^{80}Sr$, $^{137}Cs$ and $^{134}Cs$ in Denmark.

The lack of sufficient data makes it difficult to draw precise conclusions on radioactivity in water; however, no important changes have been observed since 1972.

## V. RADIOACTIVITY IN MILK

### V. 1. Introduction; national reports available

In recent years monitoring programmes in Member States have tended to

concentrate on milk as a good biological indicator of artificial radio-elements, the main elements at present being $^{90}Sr$ and $^{137}Cs$ from atmospheric nuclear tests.

The activities measures in 1979 are very low; they are similar to the 1978 results and there were no significant fluctuations during the year.

Experience has shown that the ratio of $^{90}Sr$/g Ca in the total diet to $^{90}Sr$/g Ca in milk is relatively constant for any given country (see Table 16).

In most Member States of the Community almost 80% of all the calcium present in the diet comes from milk and dairy products. Moreover, measurements of $^{137}Cs$ in milk indicate the trends in dietary contamination caused by this nuclide.

As regards other foodstuffs, a list of the latest national reports available is given below:

| | |
|---|---|
| Belgium | - Contamination radioactive des denrées alimentaires en Belgique en 1978 et 1979 - Rapport I.H.E. - J. Gillard-Baruh |
| Denmark | - Environmental Radioactivity in Denmark in 1979. Aarkrog A., Bøtter-Jensen L., Dahlgaard H., Hansen Heinz, Lippert J., Nielsen S.P. and Nilsson K.: Risø Report No 421 |
| Federal Republic of Germany | - Umweltradioaktivität und Strahlenbelastung. Jahresbericht 1977 - Der Bundesminister des Innern |
| France | - Rapports d'activité mensuels et annuels du SCPRI - INSERM - Ministère de la Santé pour 1979 |
| Italy | - Data on Environmental Radioactivity collected in Italy in 1977 (CNEN) |
| Netherlands | - Annual reports of the Coördinatiecommissie voor de metingen van Radioactiviteit en Xenobiotische Stoffen entitled: " Algemene Radioactieve Besmetting van de Biosfeer. In Nederland verrichte metingen". |
| United Kingdom | - Milk report 1979 - NRPB - R115 Green B.M.R., Knight A., Bruce R.S., Downs W., Ellis E.B. and Mercer E.R. |

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* *

In the Netherlands, the presence of $^{90}Sr$, $^{137}Cs$ and certain cases of $^{89}Sr$ or $^{131}I$ is determined monthly by the Rijks-Kwaliteits instituut voor Landen en Tuinbauwprodukten in Wageningen which to this end analyses a mixture of standarized "milk for industrial use" from the north, west

and south of the country and standardized drinking milk from samples gathered at random in a certain number of undertakings, usually situated in the west of the country.

In the United Kingdom responsibility for the milk monitoring scheme has been transferred from the Agricultural Research Council, Letcombe Laboratory, to the National Radiological Protection Board.

V. 2. Contamination by $^{90}Sr$

Table 17 shows the quarterly and annual values of the pCi $^{90}Sr$/g Ca ratio found at all the sampling points of the Community in 1979.

Table 18 summarizes by Member State and for the Community the quarterly and annual values of the pCi $^{90}Sr$/g Ca ratio for 1979. Table 19 summarizes the mean quarterly and annual values for the Community from 1972 on.

The annual mean for 1979 is 3.4 pCi/g Ca as opposed to 3.9 pCi/g Ca in 1978.

The contamination of milk by $^{90}Sr$ is now only 10-20% of the levels reached in 1963-1965, the years in which contamination was greatest (see Table 20).

The values are only a small percentage of the annual limits of intake by ingestion for members of the public (1).

V. 3. Contamination by $^{137}Cs$

Table 21 shows the quarterly and annual values of the ratio of pCi $^{137}Cs$ per litre of milk at the different sampling stations in the Community for 1979.

Table 22 summarizes by Member State and for the Community the quarterly and annual values for 1979. Table 23 shows the quarterly and annual means for the Community from 1972 on.

The annual mean for the Community for 1979 is 5.2 pCi $^{137}Cs$/litre as opposed to 7.6 pCi $^{137}Cs$/litre in 1978.

The contamination of milk by $^{137}Cs$ is now less than 10% of the levels reached in 1963-1965 (see Table 24).

These values are less than 1% of the annual limits laid down for the intake of radiocaesium from drinking water (1).

(1) The limits of annual intake of radionuclides in drinking water are laid down in the Euratom basic safety standards; in this case milk is the only element in the diet containing this radionuclide.

CONCLUSIONS

The general conclusions are similar to those of the preceding report.

i) The slight fluctuations which have been observed for several years can be attributed to the nuclear tests in Asia; however, the values measured have never reached a level which would justify special investigations.

ii) Compilation of the measurements and the comparison of the results obtained in different sampling stations constitute an excellent early warning system; accordingly, the work that has been carried out up to now should be continued.

iii) With respect to data relating to the food chain - and although there is no reason to doubt the particularly representative nature of milk samples - it is still considered desirable to carry out periodic spot checks on other foodstuffs (meat, fish, cereals, etc.), on earlier stages in the milk cycle (grass) and also appropriate biological indicators (human samples, shellfish, etc.).

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# RESULTATS
# DES MESURES DES NIVEAUX DE RADIOACTIVITE
# DANS L'ENVIRONNEMENT
# DES ETATS MEMBRES DE LA COMMUNAUTE EUROPEENNE
# POUR

Air - Retombées - Eau - Lait 1979

# PREFACE

Le présent document est le dix-neuvième rapport sur la radioactivité ambiante publié par la Direction Santé et Sécurité de la Commission des Communautés européennes. Il a été élaboré à partir des données recueillies dans les stations chargées de la surveillance de la radioactivité de l'environnement des Etats membres. Les résultats sont extraits des données envoyées à la Commission en application de l'art. 36 du Traité de Rome instituant la Communauté Européenne de l'Energie Atomique.

Les résultats présentés dans le rapport concernent la radiocontamination de l'air, des retombées, des eaux de surface et du lait pendant l'année 1979 dans les neuf Pays membres de la Communauté Européenne, c'est-à-dire Belgique, République fédérale d'Allemagne, Danemark, France, Italie, Irlande, Luxembourg, Pays-Bas et Royaume-Uni.

Les résultats sont groupés en quatre rubriques principales, à savoir:
- radioactivité artificielle dans l'air au niveau du sol,
- radioactivité artificielle des retombées,
- contamination radioactive des eaux,
- radiocontamination du lait.

On y trouve également la liste des stations de prélèvement et des laboratoires, ainsi qu'une liste des publications effectuées par les Etats membres dans ce domaine.

Le rapport attache une attention particulière aux résultats des mesures de certains radionucléides particuliers, mais il contient aussi des données sur la radioactivité bêta globale afin d'assurer la continuité avec les précédents rapports et de pouvoir disposer de valeurs comparatives.

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## I. INTRODUCTION

Le tableau 1 donne un aperçu général du réseau de surveillance des niveaux de la radioactivité de l'environnement dans la Communauté en 1979 dont les données sont présentées dans ce rapport.

La liste des stations de prélèvement et des laboratoires effectuant les mesures est publiée en annexe.

L'analyse des données concernant la radioactivité artificielle dans l'air au niveau du sol et dans les retombées permet d'observer pour 1979 une diminution générale de l'activité bêta globale par rapport à 1978 et les années précédentes.

La radioactivité de l'eau n'a pu être examinée d'une façon aussi systématique que celle de l'air en raison de la diversité des systèmes de surveillance (prélèvement et mesures) des Etats membres. Toutefois on constate que les résultats de 1979 sont proches de ceux de 1978.

La surveillance de la radiocontamination des différentes denrées alimentaires est assurée dans les Etats membres de la Communauté par un échantillonage des aliments de base du régime. Le rapport ne contient que les résultats des mesures du $^{90}Sr$ et du $^{137}Cs$ dans le lait. La contribution due à l'ingestion de lait est généralement prépondérante; pour cette raison la surveillance la plus étroite est exercée à cet aliment, qui est toujours considéré comme un excellent indicateur des fluctuations de l'apport en contamination radioactive de l'homme.

Pour toute information complémentaire, on fera référence, en annexe, à la liste des rapports nationaux.

Les activités détectées de $^{90}Sr$ et de $^{137}Cs$ sont très faibles et inférieures à celles qui ont été mesurées en 1978 et n'ont pas présenté de fluctuations importantes au cours de l'année.

Enfin, en ce qui concerne les calculs effectués pour la Communauté dans son ensemble, les moyennes mensuelles qui en découlent, sont calculées à partir de la totalité des données disponibles pour un mois déterminé. Pour calculer la moyenne annuelle communautaire, on a utilisé la moyenne arithmétique des valeurs mensuelles communautaires.

## II. RADIOACTIVITE ARTIFICIELLE DANS L'AIR AU NIVEAU DU SOL

L'évaluation de la radioactivité bêta globale et de l'activité des radionucléides spécifiques présents dans les particules atmosphériques se fait par la collecte, au niveau du sol, de ces particules sur un papier filtre avec un débit d'environ 1000 $m^3$ d'air par 24 heures.

Pour ce qui est des valeurs de la radioactivité bêta globale, les données indiquées représentent les résultats des mesures effectuées après cinq jours de décroissance.

Par rapport à l'année précédente, le taux de la radioactivité dans l'air a diminué. Aucun essai nucléaire aérien n'a été effectué en 1979. La dernière bombe atomique chinoise (20 kilotonnes) a explosé le 14.12.78 au Lop Nor. Les produits de fission à vie moyenne et longue ont évolué comme précédemment; on a observé notamment un accroissement consécutif aux échanges printaniers entre la stratosphère et la troposphère (nouvel apport d'activités provenant du réservoir stratosphérique); cet accroissement a été suivi d'une lente décroissance.

La répartition géographique des stations de prélèvement des radionucléides spécifiques et de l'activité bêta globale dans la Communauté est présentée dans les cartes 1 et 2.

Sur les tableaux 2.1 à 2.18 sont reportées, pour 1979 et par stations, les variations mensuelles et la moyenne annuelle de l'activité des radionucléides spécifiques et de la radioactivité bêta globale, afin de donner une vue globale de l'importance des fluctuations locales, des variations mensuelles et saisonnières qui peuvent dépasser plus d'un ordre de grandeur.

Les moyennes annuelles, de 1967 à 1979, sont données, pour un certain nombre de stations sélectionnées de la Communauté dans le tableau 3 pour ce qui est du $^{90}Sr$ et dans le tableau 4 pour le $^{137}Cs$.

Les concentrations atmosphériques actuelles en $^{90}Sr$ et $^{137}Cs$ représentent moins de 1% des valeurs limites annuelles des concentrations fixées par les normes de base de l'Euratom pour les individus de la population.

Une vue d'ensemble des valeurs mensuelles moyennes et annuelles de la radioactivité bêta globale en 1979 dans les différents Etats membres et pour la Communauté est donnée dans le tableau 5.

En 1979, la valeur moyenne pour la Communauté de l'activité bêta globale des particules en suspension dans l'air a été de 0.03 pCi/$m^3$.

Une comparaison des valeurs mensuelles et annuelles de la radioactivité bêta globale dans l'air dans tous les Etats membres et la Communauté, à partir de 1962 jusqu'à 1979, est donnée dans les tableaux 6 et 7.

Pour ce qui est des graphiques, le graphique 1 montre les fluctuations mensuelles du $^{90}Sr$ depuis 1965 à Ispra (Italie) et au Vésinet (France).

Le graphique 2a) présente les fluctuations mensuelles du $^{137}Cs$ à Chilton (Royaume-Uni) depuis 1953 et le graphique 2b) les mêmes fluctuations à Ispra (Italie) depuis 1961 et au Vésinet (France) à partir de 1965.

Les graphiques 3a), b), c) et d) donnent l'évolution de la radioactivité bêta globale depuis 1963 dans la Communauté et dans les 11 stations pilotes retenues par les Etats membres, à savoir: Bruxelles, Paris, Schleswig, Berlin, Chilton, Montpellier, Luxembourg, De Bilt, Ispra, Pian Rosà et Dublin.

Les résultats des mesures du $^{238}Pu$ et $^{239}Pu$ effectuées à Ispra et à Milford Haven sont indiqués dans le tableau 8. Les graphiques 4a) et 4b) représentent l'évolution depuis 1961. A noter que, à partir de 1979, la station de Milford Haven a remplacé celle de Chilton, cette dernière n'effectuant plus les mesures du $^{238}Pu$ et $^{239}Pu$ dans l'air.

Le tableau 9 donne les résultats des mesures du $^{239}Pu+^{240}Pu$ à Shrivenham et Glasgow en 1979.

## III. RADIOACTIVITE ARTIFICIELLE DES RETOMBEES

La radioactivité déposée au sol est contrôlée constamment par des prélèvements des précipitations et des retombées sèches. Suivant les stations, les prélèvements sont journaliers, hebdomadaires ou mensuels.

La répartition géographique des stations de prélèvement pour les radionucléides spécifiques et pour l'activité bêta globale est représentée dans les cartes 3 et 4.

Les fluctuations mensuelles moyennes des radionucléides spécifiques, de la radioactivité bêta globale et du volume des précipitations pour 1979 et par stations, sont données dans les tableaux 10.1 à 10.18.

Ces tableaux, comme dans le cas de la radioactivité artificielle dans l'air au niveau du sol, ont été insérés afin de donner une vue d'ensemble de l'importance des fluctuations locales et des variations mensuelles et saisonnières.

Afin de faciliter la comparaison des valeurs entre différentes stations géographiques, les tableaux 11 et 12 donnent les quantités des retombées annuelles de $^{90}Sr$ et $^{137}Cs$ depuis 1967 jusqu'à 1979.

Les moyennes mensuelles et le total de l'activité bêta globale déposée en 1979, dans les neuf Etats membres de la Communauté, figurent dans le tableau 13.

La radioactivité bêta globale déposée au sol par année et par pays depuis 1962 jusqu'à 1979 est indiquée dans le tableau 14.

En 1979 le niveau de l'activité bêta globale a diminué encore par rapport aux années précédentes (19,8 mCi/km$^2$ en 1978 contre 6,9 mCi/km$^2$ en 1979).

Le graphique 5 présente la somme des retombées du $^{137}Cs$ depuis 1954 à Milford Haven (RU), compte tenu des facteurs de décroissance. Les nouvelles retombées du $^{137}Cs$, après 1967, n'ont pas compensé cette décroissance mais l'on peut constater une diminution lente et continue des retombées totales accumulées.

Le graphique 6 fournit une vue d'ensemble des retombées de $^{239}Pu$ dans les eaux de pluie à Orsay (France), pendant la période s'étendant de 1973 à 1979.

Les graphiques 7a), 7b) et 7c) donnent une idée de l'évolution de la radioactivité bêta globale déposée annuellement au sol dans neuf stations caractéristiques réparties sur le territoire de la Communauté, à savoir: Mol, Le Vésinet, Ispra, Schleswig, Munich, Berlin, Chilton, Dublin et Bilthoven.

Il y est également fait état de la hauteur des précipitations.

## IV. RADIOACTIVITE DE L'EAU

### IV. 1 Rapports nationaux disponibles

En ce qui concerne le contrôle de la radioactivité de l'eau, il est difficile de distinguer clairement parmi les programmes généraux de surveillance de l'environnement, la part qui revient au rayonnement naturel et celle des différents rejets effectués en des points déterminés. Dans la Communauté, le nombre des stations de prélèvement pour les mesures générales dans l'environnement est aussi important que celui des stations de prélèvement pour les mesures dans l'air et dans les retombées.

Des descriptions de l'ensemble des mesures de surveillance de la radioactivité dans l'eau sont faites dans un certain nombre de publications nationales.

#### BELGIQUE

Les rapports de l'Institut d'Hygiène et d'Epidémiologie (Ministère de la Santé Publique) fournissent une description des réseaux de surveillance des différentes catégories d'eau, et les résultats de l'activité alpha et bêta globale, du Ra-226, du $\beta$ K 40 et du HTO dans les eaux de surface, l'eau de mer et l'eau potable.

Trois documents ont été publiés:

- "Résultats des mesures de radioactivité dans l'air, dans les précipitations et dans les eaux de 1958 à 1968";
- "Résultats des mesures de radioactivité dans l'air, dans les précipitations et dans les eaux de 1969 à 1974";
- "Résultats des mesures de radioactivité dans l'air, dans les précipitations et dans les eaux de 1975 à 1978".

#### DANEMARK

L'établissement de recherche de Risø (Forsøgsarlagget) publie des rapports annuels sur la "radioactivité de l'environnement au Danemark...", (Environmental Radioactivity in Denmark in...) et donne les résultats des mesures, dans tout le pays, de la concentration du $^{90}Sr$ dans les eaux souterraines, les rivières, les lacs et l'eau de mer, et du $^{137}Cs$ dans l'eau de mer.

REPUBLIQUE FEDERALE D'ALLEMAGNE

Une description détaillée des réseaux de surveillance des différents réseaux aquifères, et les résultats des mesures de radionucléides spécifiques, de l'activité alpha et bêta dans les eaux de surface, l'eau de mer, l'eau potable et les eaux usées, figurent dans les rapports annuels du Ministère fédéral de l'Intérieur intitulé "Radioactivité de l'environnement et doses d'irradiation" (Umweltradioaktivität und Strahlenbelastung).

FRANCE

Les résultats détaillés de mesures de radioactivité (activité bêta totale $^{3}H$, $^{90}Sr$, $^{137}Cs$...) dans les eaux de surface, les eaux souterraines, les eaux potables, les eaux de mer, les eaux usées urbaines et les effluents des centres nucléaires sont repris dans les rapports d'activité publiés chaque mois par le SCPRI depuis 1961 et dans ses rapports d'activité annuels.

ITALIE

Les résultats des mesures de concentration du $^{90}Sr$ et du $^{137}Cs$ dans les eaux douces, d'irrigation et de mer sont repris dans les publications annuelles du Comitato Nazionale per l'Energia Nucleare (CNEN), intitulées "informations recueillies en Italie sur la radioactivité de l'environnement" (Data on Environmental Radioactivity collected in Italy).

PAYS-BAS

Les résultats des mesures de contrôle des différents types d'eau sont présentés dans les rapports annuels de la COORDINATIE-COMMISSIE VOOR DE METINGEN VAN RADIOACTIVITEIT EN XENOBIOTISCHE STOFFEN (C.C. R.X.), intitulés "Mesures générales de la contamination radioactive du milieu aux Pays-Bas".

Ces rapports reproduisent également les résultats des mesures de l'activité bêta résiduelle effectuées par les exploitants de centrales nucléaires dans les eaux de l'Escaut-Occidental, du Waal ainsi que d'un certain nombre de petites rivières au voisinage de Dodewaard.

ROYAUME-UNI

Une description des conséquences sur l'environnement du rejet d'effluents liquides radioactifs par les installations nucléaires les plus importantes est fournie par une nouvelle série de rapports intitulés "Annual Survey of Radioactive Discharges in Great Britain" ("enquête annuelle sur les rejets radioactifs en Grande-Bretagne") dont la publication a commencé en 1978. Ces enquêtes rassemblent en une publication unique les principales informations tirées de la série de rapports publiés par le Ministry of Agriculture, Fisheries and Food (ministère de l'agriculture, des pêches et des produits alimentaires), et sont complétées par les rapports publiés par les exploitants.

IV. 2 Description des programmes de surveillance

Les paragraphes suivants donnent pour chaque Etat membre une vue sommaire des programmes de surveillance des eaux non liés à des sources spécifiques.

BELGIQUE

Un réseau de surveillance existe en Belgique depuis 1958, donnant la situation de base de différentes catégories d'eau.

Les détails figurent dans les documents dont il a été question ci-dessus au paragraphe IV. 1.

5 stations de prélèvement ont été mises en place sur la Meuse entre Givet et Lanaken. Des détails supplémentaires sur ce réseau peuvent être trouvés dans le rapport annuel "Surveillance radiologique des sites d'implantation des centrales nucléaires" (groupe mixte CEN-Santé Publique).

DANEMARK

a) Eaux souterraines

Depuis 1961, on a procédé à des mesures sur des échantillons annuels d'eaux souterraines à neuf endroits sélectionnés, répartis sur tout le pays. Cette étude a principalement pour but de suivre l'évolution des taux de $^{90}Sr$ dans les eaux souterraines danoises et de comparer les taux constatés avec les caractéristiques des couches filtrantes dans ces neuf sites.

b) Eaux de rivières et de lacs

Depuis 1970, on a prélevé, tous les deux ans, des échantillons d'eau de surface dans huit lacs et huit rivières, répartis sur tout le Danemark. L'un des buts de ces opérations est d'évaluer les rejets de $^{90}Sr$ dans la mer et d'observer s'il y a des différences significatives entre les niveaux de $^{90}Sr$ dans les différents réseaux aquifères.

c) Eau potable

Depuis 1965, on recueille des échantillons "d'eau de robinet" dans tout le pays. Ce travail a pour but de comparer le niveau de $^{90}Sr$ dans l'eau potable avec les niveaux constatés dans les eaux souterraines et superficielles. L'eau potable danoise est, en grande partie, obtenue à partir des eaux souterraines. Depuis quelques années, toutefois, des volumes de plus en plus importants ont été retirés des eaux superficielles.

Les programmes de surveillance des eaux douces doivent être étudiés en corrélation avec les programmes danois d'étude du contenu du sol en $^{90}Sr$ et $^{137}Cs$. Ces études ont pour but d'évaluer les retombées accumulées dans le sol et de comparer cette évaluation avec les niveaux théoriques calculés à partir des renseignements sur les précipitations et les écoulements.

REPUBLIQUE FEDERALE D'ALLEMAGNE

Le programme de surveillance de la République fédérale d'Allemagne comprend trois domaines distincts:

a) Eaux de surface
(service responsable: Bundesanstalt für Gewässerkunde, Coblence)

La surveillance de la radioactivité des eaux de surface ($\beta$ global, $\beta$ résiduel, H3 et autres nucléides) est assurée actuellement par 19 stations de mesures régionales. Le programme de mesure comprend en tout plus de 200 postes de prélèvement pour les eaux de surface, 20 environ pour les particules en suspension et 30 environ pour les prélèvements d'échantillons de boue.

b) Eau de mer
(service responsable: Deutsches Hydrographisches Institut, Hambourg)

L'institut allemand d'hydrographie est chargé officiellement, depuis 1965, de surveiller la radioactivité de l'eau de mer. Le réseau de

surveillance comprend à l'heure actuelle 11 stations réparties sur la mer du Nord et la mer Baltique. Ces stations possèdent des installations de mesure des rayonnements gamma à enregistrement continu. De plus, des échantillons sont prélevés régulièrement pour décéler la présence de $^{90}Sr$, $^{137}Cs$ et d'autres nucléides. Depuis 1976, on procède, en outre, à des mesures de la teneur de l'eau de mer en transuraniens.

c) Eau potable et eaux résiduaires
(service responsable: Institut für Wasser-, Boden- und Lufthygiene des Bundesgesundheitsamtes, Berlin)

Ce domaine du réseau de surveillance comprend 18 stations de mesures officielles qui analysent l'eau potable, pour environ 160 postes d'échantillonnage et pour 75 points de prélèvement, les effluents liquides des stations d'épuration, des centrales électro-nucléaires, des centres de recherche nucléaires, des installations de médecine nucléaire et autres installations dans lesquelles des substances radioactives sont utilisées.

Une description détaillée des divers postes d'échantillonage de leurs tâches, de leur programme de mesure et de leurs méthodes d'analyse figure dans le "Statutsbericht über die Ueberwachung der Umweltradioaktivität in der Bundesrepublik Deutschland" (Rapport sur la surveillance de la radioactivité de l'environnement en République fédérale d'Allemagne).

FRANCE

Le SCPRI effectue des contrôles des eaux superficielles et des eaux souterraines au niveau de 143 points; pour 17 d'entre eux situés soit en aval des principaux centres nucléaires, soit près de l'embouchure des grands fleuves, l'échantillonnage est réalisé de manière continue à partir d'hydrocollecteurs automatiques.

Le SCPRI surveille par ailleurs régulièrement 39 points de prélèvement d'eaux potables situés près de centres nucléaires ou appartenant aux réseaux de distribution des grandes villes. De plus, il effectue une étude complète de la radioactivité pour tout projet d'adduction dans le cadre de l' "instruction sanitaire obligatoire".

En ce qui concerne les eaux de mer, le SCPRI dispose de 20 stations de prélèvement réparties sur tout le littoral français, au niveau desquelles sont effectués des prélèvements au moins mensuels.

Le SCPRI effectue des analyses détaillées sur des échantillons mensuels d'effluents liquides de 14 centres nucléaires et 6 industries annexes. Il contrôle, en outre, les eaux usées de grands centres urbains.

ITALIE

Le contrôle des eaux superficielles du réseau national consiste en des mesures de $^{90}Sr$ et $^{137}Cs$ sur des échantillons prélévés en 14 points (13 fleuves et 1 lac).

Pour les eaux d'irrigation, les mesures de $^{90}Sr$ et $^{137}Cs$ sont effectuées sur des échantillons prélevés en 2 points.

Pour les eaux de mer les mesures de $^{90}Sr$ et $^{137}Cs$ sont effectuées sur des échantillons prélevés en 4 points.

PAYS-BAS

La surveillance radiologique des eaux porte sur l'activité alpha totale, l'activité bêta résiduelle et le $^{3}H$ en ce qui concerne les eaux des grands fleuves (dont les échantillons sont prélevés aux frontières) et l'Ijselmeer, et, en outre, sur le $^{90}Sr$ et le $^{226}Ra$ pour ce qui est du Rhin, de la Meuse et de l'Escaut occidental. D'autre part, le $^{3}H$ est mesuré dans certaines eaux faisant l'objet de captage en vue de la production d'eau potable.

ROYAUME-UNI

a) Lorsqu'il a été décidé en 1967 au Royaume-Uni que le programme de mesure des retombées radioactives dans l'eau potable n'était plus justifiée en raison de la faible exposition au rayonnement à laquelle était soumis le public en ingérant de l'eau, on a conservé un programme de recherche destiné à étudier des questions spécifiques telles que le mouvement du $^{90}Sr$ des bassins d'alimentation aux réservoirs; les eaux de 5 stations couvrant les eaux de surface, de rivière et de source ont fait l'objet d'échantillonnages et d'analyses en vue de déterminer leur niveau en $^{90}Sr$ et $^{137}Cs$. Ces 5 points de prélèvement sont inclus dans le tableau 15.1 sous la rubrique "eaux potables" et ont fait l'objet de mesures destinées à déterminer les radionucléides spécifiques qu'ils contiennent et non pas la radioactivité bêta globale. Les résultats fournis par les sources captées restent relativement élevés comme on pouvait s'y attendre mais même le niveau le plus élevé présente une diminution considérable par rapport aux valeurs maximales obtenues dans le milieu des années 60.

b) En outre, depuis 1975, il existe un programme d'échantillonnage et d'analyse approfondi des eaux qui est mis en oeuvre chaque année à l'égard d'un seul grand fleuve. Les résultats indiquent des niveaux très faibles de radioactivité.

c) Des vérifications par sondages sont pratiquées sur certaines eaux potables, eaux de surface et rivières. Celles-ci sont analysées en vue de mesurer la radioactivité alpha globale, la radioactivité bêta globale et le niveau en tritium. Les résultats de ces contrôles par sondage sont indiqués de façon appropriée dans le tableau 15.1. Lorsque le lieu de prélèvement se trouve à proximité du rejet d'effluents liquides radioactifs, on analyse également les nucléides spécifiques et représentatifs qu'ils contiennent. Ne sont pas utilisées comme source directe d'eau potable celles qui figurent dans le tableau 15.1, sous la rubrique "eaux de surface" et dont les valeurs sont élevées (dépassant 10).

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Le tableau 15.1 donne pour 1979 un extrait des mesures de l'activité bêta résiduelle, effectuées dans certains Etats membres, pour l'eau potable, les eaux de surface convenant à la consommation humaine, les eaux de surface en général et l'eau de mer.

Pour ce qui est du Danemark, on trouve dans le tableau 15.2 les mesures du $^{90}Sr$, du $^{137}Cs$ et du $^{134}Cs$.

S'il est difficile de tirer des conclusions précises sur la radioactivité des eaux, faute de données complètes, on ne note toutefois aucun changement important depuis 1972.

## V. RADIOACTIVITE DU LAIT

### V.1. Introduction et rapports nationaux disponibles

Depuis un certain nombre d'années les Etats membres ont eu tendance à orienter leurs programmes de surveillance sur le lait, considéré comme un bon indicateur biologique pour les radioéléments artificiels, dont les principaux sont actuellement le $^{90}Sr$ et le $^{137}Cs$ provenant des tirs atmosphériques nucléaires.

Les activités mesurées en 1979 sont très faibles; elles sont proches de celles mesurées en 1978 et n'ont pas présenté de fluctuations importantes au cours de l'année.

L'expérience a montré que la proportion de $^{90}Sr/g$ Ca dans la chaîne alimentaire par rapport au $^{90}Sr/g$ Ca dans le lait est relativement constante dans un même pays (voir tableau 16).

Dans la plus grande partie des Etats membres de la Communauté, près de 80% de tout le calcium présent dans la ration alimentaire se trouve dans le lait et les produits laitiers. En outre, les mesures de $^{137}Cs$ présent dans le lait donnent une idée de l'évolution de la radiocontamination du régime alimentaire par ce nucléide.

En ce qui concerne des autres denrées alimentaires, une liste des derniers rapports nationaux existants est donnée ci-après:

| | |
|---|---|
| Belgique | - Contamination radioactive des denrées alimentaires en Belgique en 1978 et 1979 - Rapport I.H.E. - J. Gillard-Baruh |
| Danemark | - Environmental Radioactivity in Denmark in 1979. Aarkrog A., Bøtter-Jensen L., Dahlgaard H., Hansen Heinz, Lippert J., Nielsen S.P. and Nilsson K.: Risø Report No 421 |
| République fédérale d'Allemagne | - Umweltradioaktivität und Strahlenbelastung. Jahresbericht 1977 - Der Bundesminister des Innern |
| France | - Rapports d'activité mensuels et annuels du SCPRI - INSERM - Ministère de la Santé pour 1979 |
| Italie | - Data on Environmental Radioactivity collected in Italy in 1977 (CNEN). |
| Pays-Bas | - Rapports annuels de la Coördinatie-Commissie voor de metingen van Radioactiviteit en Xenobiotische Stoffen intitulés: "Algemene Radioactieve Besmetting van de Biosfeer. In Nederland verrichte metingen". |
| Royaume-Uni | - Milk report 1979 - NRPB - R115 Green B.M.R., Knight A., Bruce R.S., Downs W., Ellis E.B. and Mercer E.R. |

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Aux Pays-Bas, la présence de $^{90}Sr$, de $^{137}Cs$ et éventuellement de $^{89}Sr$ et $^{131}I$ est déterminée mensuellement par le Rijks-Kwaliteitsinstituut voor Landen en Tuinbauwprodukten à Wageningen, qui analyse dans ce but un mélange de "lait à usage industriel" normalisé provenant du nord, de l'ouest et du sud du pays et de lait de consommation normalisé provenant d'échantillons recueillis au hasard dans un certain nombre d'entreprises situées, en général, à l'ouest du pays.

Au Royaume-Uni la responsabilité du programme de surveillance du lait a été transférée de l'Agricultural Research Council, Letcombe Laboratory au National Radiological Protection Board.

## V.2. Contamination par le $^{90}Sr$

Le tableau 17 donne, pour 1979, les valeurs trimestrielles et annuelles du rapport pCi $^{90}Sr$/g Ca mesurées dans différents points de prélèvements de la Communauté.

Le tableau 18 donne un résumé, par Etat membre et pour la Communauté, des valeurs trimestrielles et annuelles du rapport pCi $^{90}Sr$/g Ca pour l'année 1979. Un résumé des moyennes trimestrielles et annuelles pour la Communauté, à partir de 1972, est donné dans le tableau 19.

La moyenne annuelle pour 1979 est de pCi/g Ca 3.4 contre 3.9 pCi/g Ca en 1978.

La contamination du lait par le $^{90}Sr$ n'atteint aujourd'hui que 10-20% des taux mesurés en 1963-1965, années où la contamination était la plus élevée (voir tableau 20).

Ces taux ne correspondent qu'à un faible pourcentage des valeurs annuelles limites fixées pour les incorporations par ingestion pour les individus de la population (1).

## V.3. Contamination par le $^{137}Cs$

Le tableau 21 fournit, pour 1979, les valeurs trimestrielles et annuelles du rapport pCi $^{137}Cs$/litre de lait mesuré dans différents points de prélèvement de la Communauté.

Le tableau 22 donne un résumé par Etat membre et pour la Communauté des valeurs trimestrielles et annuelles pour l'année 1979. Le tableau 23 donne les moyennes trimestrielles et annuelles pour la Communauté à partir de 1972.

La moyenne annuelle communautaire pour 1979 se situe à 5.2 pCi $^{137}$Cs/litre contre 7.6 pCi $^{137}$Cs/litre en 1978.

La contamination du lait par le $^{137}$Cs s'élève aujourd'hui à moins de 10% des taux mesurés en 1963-1965 (voir tableau 24).

Ces valeurs correspondent à moins de 1% des limites annuelles fixées pour les incorporations de radiocésium dans l'eau de boisson(1).

CONCLUSIONS

Les conclusions générales sont comparables à celles qui avaient été formulées dans le précédent rapport.

i) Les faibles fluctuations observées depuis plusieurs années doivent toujours être attribuées aux tests nucléaires asiatiques; toutefois les valeurs mesurées n'ont jamais atteint un ordre de grandeur justifiant des investigations particulières.

ii) Le rassemblement des mesures ainsi que l'établissement de comparaisons entre les résultats des différentes stations de mesure constituent un excellent système d'alarme; en conséquence les efforts entrepris jusqu'à ce jour méritent être continués.

iii) En ce qui concerne les données relatives à la chaîne alimentaire et bien qu'il n'y ait pas lieu de remettre en cause le caractère particulièrement représentatif des mesures effectuées dans le lait, il continue à être considéré comme souhaitable de procéder périodiquement et par sondages à des mesures sur d'autres denrées (viande, poissons, céréales, etc.) sur les précurseurs du lait (herbe) et aussi sur les indicateurs biologiques appropriées (échantillons humains, coquillages, etc.).

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(1) Les valeurs annuelles limites pour les incorporations de radionucléides dans l'eau de boisson sont définies par les Normes de Base de l'Euratom; dans le cas particulier le lait est la seule denrée alimentaire contenant ce radionucléide.

# RISULTATI DELLE MISURE
# DELLA RADIOATTIVITA' AMBIENTALE NEGLI STATI MEMBRI
# DELLA COMUNITA' EUROPEA PER

Aria - Ricadute - Acque - Latte 1979

# P R E F A Z I O N E

Il presente documento è la 19^ relazione annuale sulla radioattività ambientale pubblicata dalla Direzione Sicurezza e Sanità della Commissione delle Comunità Europee. E' stata elaborata sulla scorta dei dati raccolti negli Stati membri dalle stazioni incaricate della sorveglianza generale della radioattività ambientale. I risultati sono stati desunti dai dati trasmessi alla Commissione in esecuzione dell'articolo 36 del Trattato di Roma che istituisce la Comunità europea dell'Energia Atomica.

I risultati esposti nella presente relazione si riferiscono alla contaminazione radioattiva dell'aria, delle ricadute, delle acque di superficie e del latte per il 1979 nei nove paesi membri della Comunità europea, ossia: Belgio, Repubblica federale di Germania, Danimarca, Francia, Italia, Irlanda, Lussemburgo, Paesi Bassi e Regno Unito.

I valori sono stati raggruppati in quattro sezioni principali:
- radioattività artificiale dell'aria a livello del suolo;
- radioattività artificiale delle ricadute;
- contaminazione radioattiva delle acque;
- contaminazione radioattiva del latte.

La relazione contiene inoltre l'elenco delle stazioni di prelievo e dei laboratori, nonché un elenco delle pubblicazioni effettuate dagli Stati membri in tale settore.

Nella relazione, un particolare rilievo à stato dato alle misurazioni riguardanti radionuclidi specifici; tuttavia, vengono presentati anche dati sulla radioattività beta globale per garantire la continuità con le precedenti relazioni e permettere raffronti.

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## 1. INTRODUZIONE

La tabella 1 fornisce un quadro globale della rete delle stazioni di controllo dei livelli della radioattività ambientale per il 1979, i cui dati figurano nella presente relazione.

In allegato è riportato l'elenco delle stazioni di prelievo e dei laboratori che effettuano le misurazioni.

L'analisi dei dati relativi alla radioattività artificiale nell'aria a livello del suolo e nelle ricadute consente di registrare, per il 1979, una diminuzione generale dell'attitività beta globale rispetto al 1978 e agli anni precedenti.

I dati concernenti la radioattività dell'acqua non sono stati trattati sistematicamente come quelli riguardanti l'aria, a causa dei diversi sistemi di controllo (campionamento e misurazione) esistenti negli Stati membri. Tuttavia si è constatato che i risultati del 1979 sono pressoché analoghi a quelli del 1978.

Il controllo della contaminazione radioattiva degli alimenti è garantito, negli Stati membri della Comunità, da un campionamento degli alimenti di base. La relazione contiene soltanto i risultati delle misurazione dello $^{90}Sr$ e del $^{137}Cs$ nel latte. Il contributo dovuto al consumo di latte è generalmente preponderante; per tale motivo il controllo più rigoroso viene esercitato su questo alimento, considerato sempre un indicatore eccellente delle fluttuazioni dell'apporto in contaminazione radioattiva dell'uomo.

Per informazioni complementari si rimanda all'elenco delle relazioni nazionali che figura in allegato.

Le attività registrate per lo $^{90}Sr$ e il $^{137}Cs$ sono molto deboli e inferiori a quelle misurate nel 1978 e non hanno presentato fluttuazioni di rilievo nel corso dell'anno.

Infine, per quanto concerne i calcoli effettuati per la Comunità nel suo insieme, le relative medie mensili sono calcolate sulla base della totalità dei dati disponibili per un determinato mese. Per calcolare la media annua comunitaria è stata utilizzata la media aritmetica dei valori mensili comunitari.

## II. RADIOATTIVITA' ARTIFICIALE NELL'ARIA A LIVELLO DEL SUOLO

La determinazione della radioattivià beta globale e dell'attività dei radionuclidi specifici presenti nelle particelle in sospensione nell'aria viene effettuata, normalmente, filtrando, a livello del suolo, tali particelle su un filtro di carta a un regime di circa 1000 $m^3$ di aria ogni 24 ore.

Per quanto riguarda i valori della radioattività beta globale, i dati indicati rappresentano i risultati delle misurazioni effettutate dopo 5 giorni di decadimento.

Rispetto all'anno precedente, il tasso di radioattività presente nell'aria è diminuito. Nel 1979 non vi sono stati esperimenti nucleari nell'aria. L'ultima bomba atomica cinese (20 kiloton) è esplosa il 14/12/78 nel Lop Nor. I prodotti di fissione con vita media e lunga hanno avuto la stessa evoluzione; è stato osservato, in particolare, un aumento nella stagione primaverile dovuto agli scambi fra stratosfera e troposfera (nuovo apporto d'attività proveniente dalla riserva stratosferica); questo aumento è stato seguito da una lenta diminuzione.

Nelle carte geografiche 1 e 2 è indicata la ripartizione geografica delle stazioni di prelievo nella Comunità, rispettivamente per i radionuclidi specifici e per l'attività beta globale.

Nelle tabelle da 2.1 a 2.18 vengono indicate, per il 1979 e per ciascuna stazione, le variazioni mensili e la media annuale dell'attività dei radionuclidi specifici e della radioattività beta globale, al fine di fornire un quadro completo dell'importanza delle fluttuazioni locali e delle variazioni mensili e stagionali che possono superare più di un ordine di grandezza.

Le medie annue, dal 1967 al 1979, sono riportate, per un certo numero di stazioni selezionate della Comunità, in tabella 3 per lo $^{90}Sr$ e in tabella 4 per il $^{137}Cs$.

Le attuali concentrazioni atmosferiche dello $^{90}Sr$ e del $^{137}Cs$ rappresentano meno dell' 1% delle concentrazioni massime ammissibili per il singolo individuo della populazione, secondo le Norme Fondamentali dell'EURATOM.

La tabella 5 dà un quadro generale delle medie mensili e annuali della radioattività beta globale nei vari paesi della Comunità e in tutta la Comunità per il 1979.

Nel 1979 il valore medio per la Comunità dell'attività beta globale delle particelle in sospensione nell'aria è stato di 0.03 pCi/$m^3$.

Nelle tabelle 6 e 7, vengono raffrontati i valori medi mensili e annui della radioattività beta globale dell'aria in tutti gli Stati membri e nella Comunità dal 1962 al 1979.

Per quanto riguarda i grafici, il grafico n. 1 dà le fluttuazioni mensili dello $^{90}Sr$ a partire dal 1965 a Ispra (Italia), e a Le Vésinet (Francia).

Il grafico 2a) presenta le fluttuazioni mensili del $^{137}Cs$ a Chilton (Regno Unito), a partire dal 1953, mentre il grafico 2b) fornisce le stesse fluttuazioni per Ispra (Italia) e per Le Vésinet (Francia) a partire dal 1961.

I grafici 3a), b), c), e d) presentano l'andamento dell'attività beta globale a decorrere dal 1963 nella Comunità e nelle 11 stazioni caratteristiche degli Stati membri: Bruxelles, Parigi, Schleswig, Berlino, Chilton, Montpellier, Lussemburgo, De Bilt, Ispra, Pian Rosà e Dublino.

I risultati delle misurazioni del $^{238}Pu$ e del $^{239}Pu$ effettuate a Ispra e a Mildford Haven figurano nella tabella 8. I grafici 4a) e 4b) mostrano gli andamenti a decorrere dal 1961. Va notato che, a partire dal 1979, la stazione di Mildford Haven ha sostituito quella di Chilton, dato che quest'ultima non effettua più le misurazioni del $^{238}Pu$ e del $^{239}Pu$ nell'aria.

In tabella 9 figurano i risultati delle misurazioni del $^{239}Pu$ + $^{240}Pu$ a Shrivenham e a Glasgow nel 1979.

## III. RADIOATTIVITA' ARTIFICIALE DELLE RICADUTE

La radioattività depositata al suolo viene controllata in modo continuo mediante prelievo di campioni delle precipitazioni e delle ricadute secche. Le misure si riferiscono, secondo le stazioni, a prelievi giornalieri, settimanali o mensili.

Nelle carte geografiche 3 e 4 è indicata la ripartizione geografica nella Comunià delle stazioni di prelievo, rispettivamente per i radionuclidi specifici e per l'attività beta globale.

Le tabelle da 10.1 a 10.18 riportano, per il 1979 e per ciascuna stazione, le variazioni medie mensili dei radionuclidi specifici, della radioattività beta globale e dell'altezza delle precipitazioni.

Le tabelle, come nel caso della radioattività artificiale nell'aria a livello del suolo, sono state incluse per dare un quadro globale dell'entità delle fluttuazioni locali e delle variazioni mensili e stagionali.

Per facilitare il raffronto dei valori tra diverse stazioni geografiche, le tabelle 11 e 12 forniscono le quantità delle ricadute annue dello $^{90}Sr$ e del $^{137}Cs$ dal 1967 al 1979.

Nella tabella 13 figurano le medie mensili e il totale dell'attività beta globale delle ricadute per il 1979 nei nove paesi della Comunità.

Nella tabella 14 è indicata la radioattività beta globale depositata al suolo, per anno e per paese, dal 1962 fino al 1979.

Nel corso del 1979 si osserva un'ulteriore diminuzione dell'attività beta globale rispetto agli anni precedenti (19,8 $mCi/km^2$ nel 1978 rispetto a 6,9 $mCi/km^2$ nel 1979).

Il grafico 5 presenta le ricadute cumulative del $^{137}Cs$ a decorrere dal 1954 per la stazione di Mildford Haven (RU), tenendo conto dei fattori di decadimento. Dopo il 1967, le ricadute fresche di $^{137}Cs$ non hanno compensanto il decadimento e si puo' registrare una constante lenta diminuzione del totale delle ricadute accumulate.

Il grafico 6 fornisce un quadro generale delle ricadute del $^{239}Pu$ nell'acqua piovana della stazione di Orsay (Francia) per il periodo 1973-1979.

I grafici 7a), b), c), mostrano l'andamento dell'attività beta globale annua depositata per nove stazioni caratteristiche ripartite sul territorio della Comunità: Mol, Le Vésinet, Ispra, Schleswig, Monaco, Berlino, Chilton, Dublino e Bilthoven.

Viene inoltre indicata l'altezza delle precipitazioni.

## IV. RADIOATTIVITA' DELLE ACQUE

### IV. 1. Disponibilità delle relazioni nazionali

Per quanto riguarda il controllo della radioattività dell'acqua, è difficile distinguere, tra i programmi generali di controllo ambientale, la parte relativa alle radiazioni naturali e quella dei diversi scarichi effettuati in determinati punti. Nella Comunità, il numero delle stazioni di campionamento per le misurazioni generali nell'ambiente è altrettanto elevato di quello delle stazioni di campionamento per le misurazioni nell'aria e nelle ricadute.

Per una descrizione dell'insieme delle misure di controllo della radioattività delle acque si rimanda a varie pubblicazioni nazionali.

#### BELGIO

Una descrizione delle varie reti di controllo per i diversi tipi di acqua e i risultati dell'attività alfa e beta globale del $^{226}Ra$, del $\beta$ K40 e del HTO nelle acque di superficie, nell'acqua marina e nell'acqua potabile vengono forniti nelle relazioni dell'Istituto di Igiene e di Epidemiologia (Ministero della Sanità).

Tre sono i documenti pubblicati:

- "Résultats des mesures de radioactivité dans l'air, dans les précipitations et dans les eaux de 1958 à 1968";
- "Résultats des mesures de radioactivité dans l'air, dans les précipitations et dans les eaux de 1969 à 1974";
- "Résultats des mesures de radioactivité dans l'air, dans les précipitations et dans les eaux de 1975 à 1978".

#### DANIMARCA

I dati relativi alle misurazioni riguardanti lo $^{90}Sr$ nelle acque sotterranee, nelle acque dei fiumi, di lago e di mare e del $^{137}Cs$ nell'acqua marina, effettuate nel paese, sono riportati nelle relazioni annuali (Environmental Radioactivity in Denmark in ...) pubblicate dal Research Establishment Risø (Forsøgsarlagget).

#### REPUBBLICA FEDERALE DI GERMANIA

Una descrizione particolareggiata delle reti di controllo delle varie reti acquifere nonché i risultati delle misurazioni di radionuclidi specifici,

dell'attività alfa e beta nelle acque di superficie, nell'acqua marina, nella acque potabili e nelle acque usate, figurano nelle relazioni annuali del Ministero federale degli Interni intitolate "Radioattività dell'ambiente e dose di radiazione (Umweltradioaktivität und Strahlenbelastung)".

FRANCIA

I dati particolareggiati riguardanti la radioattività (attività beta globale, $^{3}H$, $^{90}Sr$, $^{137}Cs$...) nelle acque di superficie e sotterranee, potabili e marine, scarichi urbani e scarichi di centrali nucleari, vengono riportati nei "Rapports d'activité" pubblicati mensilmente dallo SCPRI dal 1961 e nelle sue relazioni annuali di attività.

ITALIA

I risultati relativi alle misurazioni delle concentrazioni dello $^{90}Sr$ e del $^{137}Cs$ nelle acque continentali, d'irrigazione e marine, vengono riportati nella pubblicazione annuale del Comitato Nazionale per l'Energia Nucleare (CNEN), intitolata "Data on Environmental Radioactivity collected in Italy".

PAESI BASSI

I risultati delle misurazioni effettuate dalle reti di controllo dei vari tipi di acqua sono presentati nelle relazioni annuali della Coördinatie-Commissie voor de metingen van Radioactiviteit en Xenobiotische Stoffen, (C.C. R.X.), intitolate "Misurazioni generali della contaminazione radioattiva della biosfera nei Paesi Bassi".

Nelle relazioni figurano anche i risultati delle misurazioni dell'attività beta residua effettuate dagli addetti alle centrali nucleari nelle acque della Schelda occidentale, del Waal, nonchè in un certo numero di piccoli corsi d'acqua nei pressi di Dodewaard.

REGNO UNITO

Descrizioni particolareggiate degli effetti prodotti sull'ambiente dagli scarichi residui radioattivi dei principali centri nucleari vengono pubblicate in una nuova serie di relazioni tecniche intitolate "Annual Survey of Radioactive Discharges in Great Britain" (Indagine annuale sugli scarichi radioattivi in Gran Bretagna), iniziata nel 1978. Tali indagini riuniscono in un'unica pubblicazione le principali informazioni

desunte dalla serie di relazioni pubblicate dal Ministry of Agriculture, Fisheries and Food.

IV. 2. Descrizione dei programmi di controllo

Qui di seguito, per ogni Stato membro, diamo una descrizione sommaria dei programmi di sorveglianza delle acque, non inerenti a fonti specifiche.

BELGIO

Dal 1958 funziona in Belgio una rete di controllo che verifica la situazione di base per i vari tipi di acqua.

Per dati più particolareggiati, si fa riferimento ai documenti che figurano al paragrafo IV. 1.

Sulla Mosa, tra Givet e Lanaken, sono entrati in esercizio 5 punti di prelievo; per la descrizione particolareggiata si rimanda alla relazione annuale "Surveillance radiologique des sites d'implantation des centrales nucléaires" (gruppo misto CEN-Sanità).

DANIMARCA

a) Acque sotterranee

A decorrere dal 1961, si effettuano misurazioni su campioni di acqua sotterranea prelevati annualmente in nove stazioni caratteristiche situate in tutto il paese. Scopo principale dello studio è di seguire i livelli di $^{90}Sr$ nelle acque sotterranee in Danimarca e di raffrontare i livelli riscontrati con le caratteristiche degli strati di filtraggio nelle nove stazioni.

b) Acque fluviali e lacustri

A decorrere dal 1970, sono stati prelevati ogni due anni campioni di acqua di superficie in 8 laghi e in 8 fiumi distribuiti in tutto il paese. Lo scopo è tra l'altro quello di valutare lo scarico di $^{90}Sr$ verso il mare e di vedere se esistano differenze significative tra i livelli di $^{90}Sr$ nelle varie reti acquifere.

c) Acqua potabile

Dal 1965 si raccolgono campioni di acqua di rubinetto in tutto il paese. Lo scopo del programma è di raffrontare il livello di $^{90}Sr$

nell'acqua potabile con i livelli riscontrati nelle acque di superficie e di sottosuolo. L'acqua potabile danese è, in generale, ricavata dall'acqua sotterranea. Da alcuni anni tuttavia si ricava l'acqua potabile in quantità sempre maggiori dalle acque di superficie.

I programmi di sorveglianza delle acque dolci devono essere studiati in correlazione con i programmi danesi concernenti lo studio del tenore di $^{90}Sr$ e $^{137}Cs$ nel terreno.

Lo scopo di tali programmi è di valutare le ricadute cumulative sul terreno e di raffrontare tali stime con i livelli teorici calcolati in funzione dei dati relativi alle precipitazioni e allo smaltimento.

REPUBBLICA FEDERALE DI GERMANIA

Il programma di controllo della Repubblica federale di Germania si articola nei tre seguenti settori:

a) Acque di superficie
(Direzione: Bundesanstalt für Gewässerkunde, Coblenza)

Attualmente, il controllo della radioattività presente nelle acque di superficie (attività beta globale, beta residua, $^{3}H$ e altri nuclidi) viene effettuata in 19 stazioni regionali. Il programma di rilevamento prevede complessivamente oltre 200 stazioni di prelievo di campioni per le acque superficiali, circa 20 stazioni per le sostanze in sospensione e circa 30 per i campioni di fanghi.

b) Acque marine
(Direzione: Deutsches Hydrographisches Institut, Amburgo)

Fino dal 1965, l'Istituto di Idrografia ha per legge il compito di controllare la radioattività presente nelle acque marine. La rete di misurazione comprende attualmente 11 stazioni nel mare del Nord e nel mare Baltico. In tali stazioni sono in funzione impianti per la misurazione di radiazioni gamma a registrazione continua. Si procede inoltre regolarmente al prelievo di campioni per la determinazione di $^{90}Sr$, $^{137}Cs$ e altri nuclidi. Dal 1976 si procede inoltre alla misurazione del tenore di elementi transuranici presenti nelle acque marine.

c) Acque potabili e acque di rifiuto

(Direzione: Institut für Wasser-, Boden- und Lufthygiene des Bundesgesundheitsamtes, Berlino)

Al controllo di tale settore collaborano 18 stazioni di misurazione ufficiali, preposte all'analisi di acque potabili per circa 160 stazioni di prelievo campioni e per altre 75 stazioni di prelievo delle acque di rifiuto provenienti da impianti di depurazione, centrali elettronucleari, centri di ricerca nucleare, cliniche spezializzate in medicina nucleare ed altri centri in cui vengono utilizzate sostanze radioattive.

Per ulteriori particolari sulle singole stazioni di misurazione, con relativi compiti, programmi di misurazione e metodi d'analisi, si rinvia all'opuscolo "Rapporto sul controllo della radioattività ambientale nella Repubblica federale di Germania" (Statusbericht über die Ueberwachung der Umweltradioaktivität in der Bundesrepublik Deutschland).

FRANCIA

Il controllo delle acque sotterranee e di superficie viene effettuato in 143 punti ad opera dello SCPRI; per 17 di questi punti di campionamento situati sia a valle dei principali centri nucleari, sia vicino alla foce di fiumi principali, il campionamento viene effettuato in continuo con collettori automatici.

Lo SCPRI controlla inoltre regolarmente 39 punti di campionamento di acqua potabile situati vicino ai centri nucleari, oppure appartenenti alla rete di distribuzione delle grandi città. Per ogni nuovo progetto di fornitura di acqua potabile e nell'ambito delle indagini obbligatorie per la salute pubblica, lo SCPRI effettua inoltre uno studio completo sulla radioattività.

Per quanto concerne l'acqua marina, lo SCPRI dispone di 20 stazioni di prelievo dislocate su tutto il litorale francese, con campionamento perlomeno mensile.

Lo SCPRI effettua analisi particolareggiate su campioni mensili di scarichi liquidi di 14 centrali nucleari e di 6 industrie ausilarie. Esso controlla inoltre le acque usate di grandi centri urbani.

ITALIA

Il controllo, nell'ambito delle reti nazionali, delle acque di superficie viene eseguito con misure di $^{90}Sr$ e $^{137}Cs$ su campioni prelevati in 14 punti (13 fiumi e 1 lago).

Per le acque di irrigazione vengono eseguite misure di $^{90}Sr$ e $^{137}Cs$ su campioni prelevati in due punti.

Per le acque di mare vengono eseguite misure di $^{90}Sr$ e $^{137}Cs$ su campioni prelevati in quattro punti.

PAESI BASSI

Il controllo radiologico delle acque riguarda l'attività alfa totale, beta residua e il $^{3}H$ per i grandi fiumi (il campionamento avviene alle frontiere) e per l'Ijselmeer, nonché lo $^{90}Sr$ e il $^{226}Ra$ per il Reno, la Mosa e la Schelda occidentale. D'altra parte, il $^{3}H$ è misurato in alcune acque che formano oggetto di captazione per la produzione di acqua potabile.

REGNO UNITO

a) Quando, nel 1967, fu deciso nel Regno Unito che il programma di misurazione delle ricadute radioattive nell'acqua potabile non era più giustificato stante la debole esposizione all'irraggiamento alla quale era sottoposta la popolazione con l'ingestione di acqua, fu mantenuto un programma di ricerche destinato a studiare aspetti specifici, quali il movimento dello $^{90}Sr$ dai bacini di alimentazione ai serbatoi; le acque di 5 stazioni di prelievo delle acque di superficie, di fiume e di sorgente hanno formato oggetto di campionamento e di analisi per determinare il loro tenore di $^{90}Sr$ e di $^{137}Cs$. Questi 5 punti di prelievo sono inclusi nella tabella 15.1. sotto la voce "acque potabili" e hanno formato oggetto di misurazioni destinate a determinare i radionuclidi specifici che essi contengono e non la loro radioattività beta globale. I risultati forniti dalle acque sorgive restano relativamente elevati, come del resto ci si poteva aspettare, ma anche il livello più elevato registra una diminuzione considerevole rispetto ai valori massimi ottenuti verso la metà degli anni 60.

b) Inoltre, dal 1975, esiste un programma approfondito di campionamento e di analisi delle acque, che viene realizzato ogni anno per un solo grande fiume. I resultati indicano livelli molto deboli di radioattività.

c) Per certe acque potabili, per le acque superficiali e le acque di fiume, vengono praticate verifiche per sondaggio. Dette acque vengono

analizzate ai fini della misurazione della radioattività alfa globale, della radioattività beta globale e del tenore di tritio. I risultati dei controlli per sondaggio vengono indicati in modo appropriato in tabella 15.1. Quando il luogo di prelievo si trova in prossimità di uno scarico di residui liquidi radioattivi, vengono altresì analizzati i nuclidi specifici e rappresentativi in essi contenuti. Non sono utilizzate come fonte diretta di acque potabile quelle che figurano nella tabella 15.1., sotto la voce "acque superficiali" e i cui valori sono elevati (ossia superano il valore 10).

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La tabella 15.1. fornisce per il 1979 un compendio delle misurazioni dell'attività beta residua effettuate in taluni Stati membri per l'acqua potabile, per le acque di superficie utilizzabili per i rifornimenti di acqua potabile, per le acque di superficie in genere e per l'acqua di mare.

Per quanto riguarda la Danimarca, nella tabella 15.2. figurano le misurazioni del $^{90}Sr$, del $^{137}Cs$ e del $^{134}Cs$.

La carenza di dati completi rende difficile formulare conclusioni; tuttavia, dal 1972, non risultano variazioni significative.

## V. RADIOATTIVITA' DEL LATTE

### V. 1. Introduzione e disponibilità delle relazioni nazionali

Da un certo numero di anni i programmi di controllo degli Stati membri si sono orientati sul latte, in quanto esso costituisce un buon indicatore biologico per le ricadute dei radioelementi artificiali, i più importanti dei quali sono lo $^{90}Sr$ e il $^{137}Cs$ provenienti dalle esplosioni nucleari nell'atmosfera.

Le attività misurate nel 1979 sono molto deboli; esse sono pressoché analoghe a quelle misurate nel 1978 e non hanno presentato fluttuazioni di rilievo nel corso dell'anno.

L'esperienza ha dimostrato che il rapporto di $^{90}Sr/g$ Ca nella catena alimentare rispetto a $^{90}Sr/g$ Ca nel latte è relativamente costante in uno stesso paese (vedasi tabella 16).

Nella maggior parte degli Stati membri, pressoché l' 80% di tutto il calcio presente negli alimenti si trova nel latte e nei suoi derivati;

inoltre le misurazioni sul latte danno l'indicazione dell'andamento della contaminazione alimentare da $^{137}Cs$.

Per quanto riguarda gli altri alimenti, diamo in appresso una bibliografia che contiene le ultime relazioni nazionali:

| | |
|---|---|
| Belgio | - Contamination radioactive des denrées alimentaires en Belgique en 1978 et 1979 Rapport I.H.E. - J. Gillard-Baruh |
| Danimarca | - Environmental Radioactivity in Denmark in 1979, Aarkrog A., Bøtter-Jensen L., Dahlgaard H., Hansen Heinz, Lippert J., Nielsen S.P. and Nilsson K.: Risø Report No 421 |
| Repubblica federale di Germania | - Umweltradioaktivität und Strahlenbelastung. Jahresbericht 1977 - Der Bundesminister des Innern |
| Francia | - Rapports d'activité mensuels et annuels du SCPRI INSERM - Ministère de la Santé pour 1979 |
| Italia | - Data on Environmental Radioactivity collected in Italy in 1977 (CNEN) |
| Paesi-Bassi | - Rapports annuels de la Coördinatie-Commissie voor de metingen van Radioactiviteit en Xenobiotische Stoffen intitulés: "Algemene Radioactieve Besmetting van de Biosfeer.In Nederland verrichte metingen" |
| Regno Unito | - Milk report 1979 - NRPB - R115 Green B.M.R., Knight A., Bruce R.S., Downs W., Ellis E.B. and Mercer E.R. |

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Nei Paesi Bassi, la presenza di $^{90}Sr$ e di $^{137}Cs$, e eventualmente di $^{89}Sr$ e $^{131}I$, è accertata mensilmente dal Rijks-Kwaliteits instituut voor Landen en Tuinbauwprodukten di Wageningen, che analizza a tale proposito un miscuglio di "latte ad uso industriale", normalizzato, proveniente dal Nord, dall'Ovest e dal Sud del paese e di latte di consumo normalizzato proveniente da campioni raccolti a caso in un certo numero di imprese situate generalmente nella zona occidentale del paese.

Nel Regno Unito la responsabilità del programma di sorveglianza del latte è passata dall'Agricultural Research Council, Letcombe Laboratory, al National Radiological Protection Board.

## V. 2. Contaminazione da $^{90}Sr$

La tabella 17 fornisce, per il 1979, un elenco completo dei valori

trimestrali e annuali del rapporto pCi $^{90}$Sr/g Ca riscontrati in vari punti di prelievo della Comunità.

La tabella 18 riassume per paese e per la Comunità, i valori trimestrali e annuali del rapporto pCi $^{90}$Sr/g Ca per il 1979. La tabella 19 riassume le medie trimestrali e annuali per la Comunità a decorrere dal 1972.

La media annuale per il 1979 è di 3.4 pCi/g Ca contro 3.9 pCi/g Ca per il 1978.

La contaminazione da $^{90}$Sr del latte rappresenta ora soltanto il 10%-20% dei livelli raggiunti nel 1963-1965, anni in cui si è registrata la contaminazione più elevata (vedasi tabella 20).

Tali livelli corrispondono solo ad una trascurabile percentuale dei valori limite annuali fissati per la populazione per le incorporazioni mediante ingestione (1).

V. 3. Contaminazione da $^{137}$Cs

La tabella 21 fornisce, per il 1979 i valori trimestrali e annuali del rapporto pCi $^{137}$Cs/litro di latte, rilevato in vari punti di prelievo della Comunità.

La tabella 22 riassume, per paese e per la Comunità, i valori trimestrale e annuali per lo stesso periodo. La tabella 23 fornisce le medie trimestrali e annuali per la Comunità a decorrere dal 1972.

La media annuale comunitaria per il 1979 si eleva a 5.2 pCi/$^{137}$Cs/litro contro 7.6 pCi/$^{137}$Cs/litro per il 1978.

La contaminazione del latte da $^{137}$Cs rappresenta oggi meno del 10% dei livelli raggiunti nel 1963-1965 (vedasi tabella 24).

Tali valori rappresentano meno dell' 1% dei limiti annuali fissati per le incorporazioni di radiocesio nell'acqua potabile (1).

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(1) I valori limite annuali per le incorporazioni di radionuclidi nell'acqua potabile sono definiti dalle Norme Fondamentali dell'EURATOM; nella fattispecie, il latte è il solo alimento contenente tale radionuclide.

CONCLUSIONI

Le conclusioni generali sono paragonabili a quelle della precedente relazione:

i) Le deboli fluttuazioni osservate da parechi anni devono sempre essere attribuite agli esperimenti nucleari asiatici; tuttavia i valori misurati non hanno mai raggiunto un ordine di grandezza che giustifichi indagini specifiche.

ii) E' communque un fatto acquisito che la raccolta di valori misurati, cosi' come il raffronto tra i risultati delle varie stazioni, costituiscono un sistema eccellente di allarme; di consequenza sarà opportuno continuare sulla via seguita fino ad ora.

iii) Per quanto riguarda i dati relativi alla catena alimentare, e benché non ci sia motivo di rimettere in causa il carattere particolarmente rappresentativo delle misure effettuate sul latte, resta auspicabile procedere periodicamente per sondaggio a misurazioni su altri alimenti (carne, pesce, cereali, ecc.), sugli elementi che concorrono alla produzione del latte (erba), nonché sugli indicatori biologici appropriati (campioni umani, molluschi, ecc.).

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# RESULTATEN
# VAN DE METINGEN VAN DE OMGEVINGSRADIOACTIVITEIT
# IN DE LANDEN VAN DE EUROPESE GEMEENSCHAP
# VOOR

Lucht - Depositie - Water - Melk 1979

# V O O R W O O R D

Dit document is het negentiende rapport betreffende de omgevingsradioactiviteit dat door het Directoraat Gezondheid en Veiligheid van de Commissie van de Europese Gemeenschappen wordt gepubliceerd. Het is opgesteld aan de hand van de gegevens die in de met de bewaking van de omgevingsradioactiviteit belaste stations in de Lid-Staten werden verzameld. De in dit rapport opgenomen resultaten werden ontleend aan de gegevens die aan de Commissie werden medegedeeld krachtens artikel 36 van het Verdrag van Rome tot oprichting van de Europese Gemeenschap voor Atoomenergie.

De resultaten in dit rapport hebben betrekking op de radioactieve besmetting van de lucht, de depositie, het oppervlaktewater en de melk in 1979 in de negen Lid-Staten van de Europese Gemeenschap, dat wil zeggen België, de Bondsrepubliek Duitsland, Denemarken, Frankrijk, Italië, Ierland, Luxemburg, Nederland en het Verenigd Koninkrijk.

Deze resultaten zijn ondergebracht in vier hoofdrubrieken:
- kunstmatige radioactiviteit van de lucht ter hoogte van de bodem,
- kunstmatige radioactiviteit van de depositie,
- radioactieve besmetting van het water,
- radioactieve besmetting van de melk.

Voorts bevat het rapport een lijst van de bemonsteringsstations en de laboratoria, alsmede een lijst van de publikaties die op dit gebied door de Lid-Staten zijn uitgegeven.

Hoewel in dit rapport vooral aandacht wordt besteed aan de meetresultaten voor specifieke radionucliden, zijn er eveneens gegevens in opgenomen over de totale bêta-activiteit, zulks om de continuïteit met de vorige rapporten en de vergelijkbaarheid van de gegevens te waarborgen.

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## I. INLEIDING

Tabel 1 geeft een algemeen overzicht van het meetnet waarmee de omgevingsradioactiviteit binnen de Gemeenschap in 1979 werd gecontroleerd en waarmee de in dit rapport opgenomen gegevens werden verkregen.

De lijst van de bemonsteringsstations en de laboratoria waar de metingen werden verricht, is opgenomen als bijlage.

Uit de analyse van de gegevens over de kunstmatige radioactiviteit van de lucht ter hoogte van de bodem en de depositie blijkt dat de totale bêta-activiteit in 1979 overal is gedaald ten opzichte van 1978 en de voorgaande jaren.

De radioactiviteit van het water kon niet even systematisch worden behandeld als die van de lucht, omdat in de Lid-Staten verschillende controlesystemen (bemonstering en meting) worden toegepast. Toch kan worden vastgesteld dat de resultaten voor 1979 dicht bij die van 1978 liggen.

De controle van de radioactieve besmetting van de verschillende voedingsmiddelen geschiedt in de Lid-Staten van de Gemeenschap via de bemonstering van de hoofdbestanddelen van het voedselpakket. Het rapport geeft slechts de resultaten van de metingen van de hoeveelheid $^{90}Sr$ en $^{137}Cs$ in melk. Over het algemeen is de radioactieve besmetting ten gevolge van de ingestie van melk het grootst; daarom wordt de scherpste controle uitgeoefend op dit voedingsmiddel, dat nog steeds wordt beschouwd als een uitstekende indicator voor de schommelingen in de radioactieve besmetting van de mens.

Voor aanvullende gegevens wordt verwezen naar de nationale rapporten in de bijlage.

De waargenomen hoeveelheid $^{90}Sr$ en $^{137}Cs$ is zeer gering en lager dan die welke in 1978 werd gemeten, en heeft in de loop van het jaar geen belangrijke schommelingen te zien gegeven.

Tenslotte zij erop gewezen dat de maandgemiddelden voor het gehele grondgebied van de Gemeenschap werden berekend aan de hand van alle voor een bepaalde maand beschikbare gegevens. Het jaargemiddelde voor de Gemeenschap werd verkregen door berekening van het rekenkundige gemiddelde van de maandwaarden voor de Gemeenschap.

## II. KUNSTMATIGE RADIOACTIVITEIT VAN DE LUCHT TER HOOGTE VAN DE BODEM

De totale bêta-activiteit en de activiteit van de specifieke radionucliden in het luchtstof worden bepaald door dergelijke stofdeeltjes ter hoogte van de bodem op te vangen op filterpapier waar per etmaal ongeveer 1000 $m^3$ lucht doorheen stroomt.

De voor de totale bêta-activiteit opgegeven waarden zijn het resultaat van metingen na een verval van vijf dagen.

In vergelijking met het voorgaande jaar is de radioactiviteit van de lucht gedaald. In 1979 zijn geen bovengrondse kernproeven gehouden. De laatste Chinese atoombom (20 kiloton) explodeerde op 14 december 1978 in het Lop Nor-gebied. De splijtingsprodukten met een middellange en een lange levenstijd vertoonden dezelfde ontwikkeling als vroeger; er werd vooral een toename geconstateerd ten gevolge van de uitwisselingen tussen stratosfeer en troposfeer in het voorjaar (nieuwe activiteit afkomstig van de stratosfeer); hierop volgde een trage afname.

Kaart 1 en 2 geven de geografische spreiding binnen de Gemeenschap van de bemonsteringsstations voor de controle op de specifieke radionucliden en op de totale bêta-activiteit.

De tabellen 2.1 t/m 2.18 geven voor 1979 de in ieder station waargenomen maandschommelingen en het jaargemiddelde van de activiteit van de specifieke radionucliden en van de totale bêta-activiteit, ten einde een algemeen overzicht te verschaffen van de grootte van de plaatselijk, maandelijks en per seizoen waargenomen schommelingen, die meer dan één orde van grootte kunnen bedragen.

De jaargemiddelden van 1967 tot en met 1979 zijn voor een aantal geselecteerde stations binnen de Gemeenschap opgenomen in tabel 3 voor $^{90}Sr$ en in tabel 4 voor $^{137}Cs$.

De huidige concentraties van $^{90}Sr$ en $^{137}Cs$ in de lucht bedragen minder dan 1% van de jaarlijkse grenswaarden voor dergelijke concentraties, die zijn vastgesteld in de basisnormen van Euratom voor individuele leden van de bevolking.

Tabel 5 geeft een algemeen overzicht van de maand- en jaargemiddelden voor de totale bêta-activiteit in 1979 in de verschillende Lid-Staten en voor de Gemeenschap als geheel.

In 1979 bedroeg het gemiddelde van de totale bêta-activiteit van het luchtstof in de Gemeenschap 0.03 pCi/$m^3$.

In tabel 6 en 7 worden de maand- en jaarwaarden voor de totale bêta-activiteit van de lucht in alle Lid-Staten en in de Gemeenschap van 1962 tot en met 1979 vergeleken.

Grafiek 1 geeft de maandschommelingen van het $^{90}$Sr-gehalte in Ispra (Italië) en Le Vésinet (Frankrijk) sinds 1965.

Grafiek 2a) geeft de maandschommelingen voor $^{137}$Cs in Chilton (Verenigd Koninkrijk) sinds 1953 en grafiek 2b) dezelfde schommelingen in Ispra (Italië) en Le Vésinet (Frankrijk) sinds 1961.

In de grafieken 3a), b), c) en d) is het verloop sinds 1963 weergegeven van de totale bêta-activiteit in de Gemeenschap en in de 11 door de Lid-Staten aangewezen proefstations, namelijk Brussel, Parijs, Sleeswijk, Berlijn, Chilton, Montpellier, Luxemburg, De Bilt, Ispra, Pian Rosà en Dublin.

De resultaten van de in Ispra en Milford Haven verrichte $^{238}$Pu- en $^{239}$Pu-metingen zijn opgenomen in tabel 8. Grafiek 4a) en 4b) geven het verloop sinds 1961 weer. Met ingang van 1979 is het station van Milford Haven in de plaats gekomen voor dat van Chilton, dat geen metingen meer verricht van de $^{238}$Pu- en $^{239}$Pu-concentraties in de lucht.

Tabel 9 geeft de resultaten van de $^{239}$Pu- en $^{240}$Pu-metingen in 1979 in Shrivenham en Glasgow.

## III. KUNSTMATIGE RADIOACTIVITEIT VAN DE DEPOSITIE

De depositie van radioactieve stoffen op de bodem wordt continu gecontroleerd door bemonstering van de neerslag en van de depositie in droge vorm. Naar gelang het station vindt de bemonstering dagelijks, wekelijks of maandelijks plaats.

De kaartjes 3 en 4 geven een beeld van de geografische spreiding binnen de Gemeenschap van de bemonsteringsstations voor de controle op de specifieke radionucliden en op de totale bêta-activiteit.

De tabellen 10.1 t/m 10.18 geven voor 1979 en voor elk station de gemiddelde maandelijkse schommelingen van de specifieke radionucliden, de totale bêta-activiteit en de hoeveelheid neerslag.

Net zoals voor de kunstmatige radioactiviteit van de lucht ter hoogte van de bodem, zijn deze tabellen in het rapport opgenomen om een algemeen overzicht te verschaffen van de grootte van de plaatselijk, maandelijks en per seizoen waargenomen schommelingen.

Ten einde de resultaten die in stations met uiteenlopende geografische ligging zijn verkregen, beter met elkaar te kunnen vergelijken, geven tabel 11 en 12 de omvang van de jaarlijkse depositie van $^{90}Sr$ en $^{137}Cs$ van 1967 tot en met 1979.

In tabel 13 zijn voor 1979 de maandgemiddelden alsmede de totale depositie van de totale bêta-activiteit in de negen Lid-Staten van de Gemeenschap opgenomen.

In tabel 14 wordt voor elke Lid-Staat een overzicht gegeven van de jaarlijkse depositie van de totale bêta-activiteit van 1962 tot en met 1979.

In 1979 is het niveau van de totale bêta-activiteit ten opzichte van de voorgaande jaren opnieuw gedaald (19,8 mCi/km$^2$ in 1978 tegen 6,9 mCi/km$^2$ in 1979).

Grafiek 5 toont de cumulatieve depositie van $^{137}Cs$ sinds 1954 te Milford Haven (VK), waarbij rekening is gehouden met de vervalfactoren. Na 1967 werd dit verval niet door de nieuwe depositie van $^{137}Cs$ gecompenseerd, maar er kan een trage en gestadige vermindering van de totale cumulatieve depositie worden geconstateerd.

Grafiek 6 geeft een overzicht van de depositie van $^{239}Pu$ met de neerslag in de periode van 1973 tot 1979 te Orsay (Frankrijk).

De grafieken 7a), 7b) en 7c) geven het verloop weer van de jaarlijkse depositie op de bodem van de totale bêta-activiteit in negen, over de gehele Gemeenschap verspreide karakteristieke bemonsteringsstations, namelijk Mol, Le Vésinet, Ispra, Sleeswijk, München, Berlijn, Chilton, Dublin en Bilthoven.

In deze grafieken is tevens de hoeveelheid neerslag vermeld.

# IV. RADIOACTIVITEIT VAN HET WATER

## IV.1. Nationale rapporten

Wat de controle op de radioactiviteit van het water betreft, kan uit de gegevens van algemene programma's voor milieubewaking moeilijk worden afgeleid wat het aandeel is van de natuurlijke straling enerzijds en de straling van op bepaalde punten geloosde radioactieve afvalstoffen anderzijds. In de Gemeenschap is het aantal bemonsteringsstations voor algemene milieumetingen even groot als het aantal bemonsteringsstations voor de controle van de lucht en de depositie.

In een aantal nationale publikaties wordt een beschrijving gegeven van alle maatregelen die werden getroffen voor de controle van het water op radioactieve besmetting.

### België

De rapporten van het Instituut voor Hygiëne en Epidemiologie (Ministerie van Volksgezondheid) bevatten een beschrijving van de controlenetten voor de verschillende soorten water, alsook de gegevens over de totale alfa- en bêta-activiteit, $^{226}Ra$, bêta $^{40}K$ en HTO in oppervlaktewater, zeewater en drinkwater.

Drie documenten werden uitgegeven:

- "Uitslagen van de metingen van de radioactiviteit in de lucht, in de neerslagen en in de waters tijdens de periode van 1958 tot 1968";
- "Uitslagen van de metingen van de radioactiviteit in de lucht, in de neerslagen en in de waters tijdens de periode van 1969 tot 1974";
- "Uitslagen van de metingen van de radioactiviteit in de lucht, in de neerslagen en in de waters tijdens de periode van 1975 tot 1978".

### Denemarken

De resultaten van de over het gehele grondgebied verrichte metingen van de concentratie van $^{90}Sr$ in het grond-, rivier-, meer- en zeewater en van het gehalte aan $^{137}Cs$ van het zeewater zijn opgenomen in de jaarlijkse

rapporten van het researchinstituut te Risø (Forsøgsarlagget): "Environmental Radioactivity in Denmark in ....".

Bondsrepubliek Duitsland

De jaarlijkse door het ministerie van Binnenlandse Zaken uitgegeven rapporten over de radioactiviteit van het milieu en de stralingsbelasting ("Umweltradioaktivität und Strahlenbelastung") bevatten een gedetailleerde beschrijving van de netten voor de controle van de verschillende hydrografische netten en een overzicht van de resultaten van de metingen van de activiteit van specifieke radionucliden, van de alfa- en bêta-activiteit in oppervlakte-, zee-, drink- en afvalwater.

Frankrijk

De gedetailleerde gegevens over de radioactiviteitsmetingen (totale bêta-activiteit $^{3}H$, $^{90}Sr$, $^{137}Cs$ ...) in oppervlaktewater, grondwater, drinkwater, zeewater, stedelijk afvalwater en afvalwater van de kerninstallaties, zijn opgenomen in de sinds 1961 maandelijks door de SCPRI uitgegeven "rapports d'activité" en in de jaarlijkse verslagen over de werkzaamheden van deze dienst.

Italië

De resultaten van de metingen van $^{90}Sr$ en $^{137}Cs$ in zoet water, irrigatiewater en zeewater zijn opgenomen in de jaarlijkse publikaties van het Comitato Nazionale per l'Energia Nucleare (CNEN): "Data on Environmental Radioactivity collected in Italy".

Nederland

De resultaten van de metingen voor de controle van de verschillende soorten water zijn opgenomen in de jaarlijkse rapporten van de Coördinatie-Commissie voor de metingen van Radioactiviteit en Xenobiotische Stoffen (C.C.R.X.), getiteld: "Algemene radioactieve besmetting van de biosfeer. In Nederland verrichte metingen".

In deze rapporten zijn ook de resultaten opgenomen van de metingen van de bêta-restactiviteit door de exploitanten van kernenergiecentrales in het water van de Westerschelde, de Waal en een aantal kleine riviertjes in de buurt van Dodewaard.

Verenigd Koninkrijk

De gevolgen voor het milieu van de lozing van vloeibare radioactieve afvalstoffen door de grootste nucleaire installaties worden beschreven in een nieuwe reeks rapporten: "Annual Survey of Radioactive Discharges in Great Britain", waarvan het eerste in 1978 is verschenen. De belangrijkste gegevens uit de reeks door het Ministry of Agriculture, Fisheries and Food gepubliceerde rapporten zijn in deze uitgave gebundeld. Deze wordt gecompleteerd door de rapporten van de exploitanten van kerninstallaties.

## IV.2. Beschrijving van de meetprogramma's

Hieronder volgt voor elke Lid-Staat een overzicht van de algemene meetprogramma's voor de bewaking van de radioactiviteit van het water.

België

Sinds 1958 bestaat in België een controlenet waarmee gegevens worden verzameld die een algemeen beeld geven van de radioactieve besmetting van de verschillende soorten water.

Voor nadere gegevens over dit controlenet zij verwezen naar de drie onder IV.1. genoemde documenten.

Aan de Maas tussen Givet en Lanaken werden vijf bemonsteringsstations opgericht. Het jaarlijkse rapport "Radiologisch toezicht op de vestigingsplaatsen van kerncentrales" (van de gemengde groep SCK-Volksgezondheid) verschaft aanvullende gegevens over dit controlenet.

Denemarken

a) Grondwater

Sinds 1961 worden metingen verricht op grondwatermonsters die jaarlijks op negen over het gehele grondgebied van Denemarken verspreide punten worden genomen. Dit onderzoek heeft in de eerste plaats ten doel het verloop van het $^{90}Sr$-gehalte van het Deense grondwater te controleren en de daarbij verkregen meetresultaten te vergelijken met de kenmerken van de grondlagen op de negen bemonsteringspunten.

b) Rivier- en meerwater

Sinds 1970 worden om het andere jaar monsters genomen van het oppervlaktewater in acht rivieren en meren, die over het gehele grondgebied van Denemarken verspreid liggen. Deze metingen hebben onder andere ten doel de lozing van $^{90}Sr$ in zee te bepalen en na te gaan of er significante verschillen bestaan tussen de $^{90}Sr$-concentraties in de verschillende hydrografische netten.

c) Drinkwater

Sinds 1965 worden over het gehele land monsters van het leidingwater genomen, ten einde het gehalte aan $^{90}Sr$ van het drinkwater te vergelijken met dat van het grond- en oppervlaktewater. In Denemarken wordt het drinkwater meestal uit grondwater verkregen. De laatste jaren wordt evenwel steeds meer drinkwater uit oppervlaktewater gewonnen.

De controleprogramma's voor zoet water moeten worden gezien in samenhang met de Deense programma's voor de controle van de hoeveelheid $^{90}Sr$ en $^{137}Cs$ in de bodem. Deze programma's hebben ten doel het niveau van de in de bodem geaccumuleerde radioactieve neerslag te meten en te vergelijken met de theoretische niveaus die op basis van gegevens over de neerslag en de afvloeiing werden berekend.

Bondsrepubliek Duitsland

Het controleprogramma van de Bondsrepubliek Duitsland wordt onderscheiden in het toezicht op:

a) Oppervlaktewateren
(leiding: Bundesanstalt für Gewässerkunde, Koblenz)

De controle op de radioactiviteit van oppervlaktewateren ($\beta_G$, $\beta_R$, alsook de activiteit van $^3H$ en andere specifieke nucliden) wordt momenteel uitgevoerd door 19 onder de bevoegdheid van de verschillende deelstaten ressorterende meetdiensten. In het kader van het meetprogramma wordt het oppervlaktewater hierbij bemonsterd op meer dan 200 plaatsen, het gesuspendeerde stof op circa 20 plaatsen en het slib op circa 30 plaatsen.

b) Zeewater
(leiding: Deutsches Hydrographisches Institut, Hamburg)

Het Deutsche Hydrographische Institut is sedert 1965 wettelijk belast met de controle op de radioactiviteit van het zeewater. Het meetnet bestaat momenteel uit 11 bemonsteringsstations aan de Noordzee en de Oostzee. In deze stations worden de nodige gegevens verzameld met behulp van continu registrerende apparatuur voor de meting van gammastraling. Daarnaast worden regelmatig monsters genomen voor het bepalen van de concentratie van $^{90}Sr$, $^{137}Cs$ en andere specifieke radionucliden. Sinds 1976 wordt ook het gehalte van het zeewater aan transuranen gemeten.

c) Drinkwater en afvalwater
(leiding: Institut für Wasser-, Boden- und Lufthygiene des Bundesgesundheitsamtes, Berlijn)

Deze controle wordt verricht door 18 officiële meetdiensten die het drinkwater op circa 160 en het afvalwater, afkomstig van zuiveringsinstallaties, kerncentrales, centra voor kernonderzoek, radiotherapeutische klinieken en andere installaties waar radioactieve stoffen worden gebruikt, op 75 bemonsteringspunten analyseren.

In het "Statusbericht über die Ueberwachung der Umweltradioaktivität in der Bundesrepublik Deutschland" worden gedetailleerde gegevens verstrekt over de diverse meetdiensten, hun taken, meetprogramma's en analysemethoden.

Frankrijk

De SCPRI controleert de radioactieve besmetting van het oppervlaktewater en het grondwater op 143 bemonsteringspunten. Op 17 van deze punten, die hetzij stroomafwaarts ten opzichte van de belangrijkste kerninstallaties, hetzij bij de monding van de grote rivieren liggen, worden door middel van automatische bemonsteringsapparaten continu monsters genomen.

Voorts controleert de SCPRI regelmatig 39 bemonsteringspunten voor drinkwater in de nabijheid van kerncentrales of op het waterleidingnet van grote steden. Bovendien wordt door de SCPRI bij elk nieuw drinkwatervoorzieningsproject een grondig en in het kader van de gezondheidsbescherming verplicht radioactiviteitsonderzoek verricht.

Het zeewater wordt door de SCPRI op radioactieve besmetting gecontroleerd in 20 over de gehele lengte van de Franse kust verspreide bemonsteringsstations, waar ten minste iedere maand monsters worden genomen.

De SCPRI onderwerpt de maandelijkse monsters van vloeibare afvalstoffen van 14 kerncentrales en 6 daarmee samenhangende industrieën aan uitgebreide analyses en controleert bovendien het afvalwater van grote stedelijke agglomeraties.

Italië

De controle van het oppervlaktewater geschiedt door meting van de hoeveelheid $^{90}Sr$ en $^{137}Cs$ in op 14 punten (13 rivieren en 1 meer) genomen monsters.

Voor de controle van het irrigatiewater wordt de hoeveelheid $^{90}Sr$ en $^{137}Cs$ gemeten in op 2 punten genomen monsters.

Voor de controle van het zeewater wordt de hoeveelheid $^{90}Sr$ en $^{137}Cs$ gemeten in op 4 bemonsteringsplaatsen genomen monsters.

Nederland

Het water van de grote rivieren (bemonsterd aan de grenzen) en het Ijsselmeer wordt onderzocht op alfa-totaal, bêta-rest en $^{3}H$, het water van de Rijn, de Maas en de Westerschelde ook nog op $^{90}Sr$ en $^{226}Ra$. Verder wordt $^{3}H$ gemeten in een aantal wateren waaraan drinkwater wordt onttrokken.

Verenigd Koninkrijk

a) Toen in 1967 in het Verenigd Koninkrijk werd besloten dat het meetprogramma voor radioactieve neerslag in drinkwater overbodig was geworden wegens de geringe straling waaraan het publiek bij de ingestie van water was blootgesteld, werd niettemin een onderzoekprogramma gehandhaafd voor de bestudering van specifieke vraagstukken zoals de beweging van $^{90}Sr$ van de toevoerbekkens naar de reservoirs; in 5 meetstations is oppervlakte-, rivier- of bronwater bemonsterd en geanalyseerd ter bepaling van het gehalte aan $^{90}Sr$ en $^{137}Cs$. Deze 5 bemonsteringspunten zijn opgenomen in tabel 15.1 onder de rubriek "drinkwater" en er werden metingen verricht ter bepaling van de daarin aanwezige specifieke radionucliden, maar niet van de totale bêta-activiteit. Zoals te verwachten was, blijven de resultaten van de meting van het opgevangen bronwater betrekkelijk hoog, maar zelfs het hoogste niveau betekent een aanzienlijke daling ten opzichte van de maximumwaarden in het midden van de jaren '60.

b) Daarnaast wordt sinds 1975 elk jaar het water van een grote rivier bemonsterd en grondig geanalyseerd. Uit de resultaten blijkt een zeer laag radioactiviteitsniveau.

c) Van bepaalde soorten drink-, oppervlakte- en rivierwater worden steekmonsters genomen. Deze worden geanalyseerd op totale alfa-activiteit, totale bêta-activiteit en tritiumgehalte. De resultaten van deze metingen zijn op de overeengekomen wijze in tabel 15.1 opgenomen. Wanneer de plaats van bemonstering niet ver van een lozingspunt voor radioactieve vloeibare afvalstoffen gelegen is, worden tevens de daarin aanwezige, representatieve specifieke radionucliden geanalyseerd.

De in tabel 15.1 onder de rubriek "oppervlaktewater" opgenomen bronnen, die hoge waarden te zien geven (groter dan 10), worden niet als directe drinkwaterbron gebruikt.

*

* *

Tabel 15.1 geeft voor 1979 een uittreksel van de in bepaalde Lid-Staten verrichte metingen van de bêta-restactiviteit in het drinkwater, het oppervlaktewater dat als drinkwater kan worden gebruikt, het oppervlaktewater in het algemeen en het zeewater.

Wat Denemarken betreft, zijn de resultaten van de metingen van de hoeveelheid $^{90}Sr$, $^{137}Cs$ en $^{134}Cs$ te vinden in tabel 15.2.

Hoewel het moeilijk is nauwkeurige conclusies over de radioactieve besmetting van het water te trekken, aangezien de beschikbare gegevens onvolledig zijn, kan toch worden geconstateerd dat zich sinds 1972 geen belangrijke wijzigingen meer hebben voorgedaan.

## V. RADIOACTIVITEIT VAN DE MELK

### V.1. Inleiding en beschikbare nationale rapporten

Sinds enkele jaren zijn de controleprogramma's in de Lid-Staten steeds meer geconcentreerd op de melk, die wordt beschouwd als een goede biologische indicator voor kunstmatige radionucliden, waarvan de uit bovengrondse kernproeven afkomstige $^{90}Sr$- en $^{137}Cs$-isotopen momenteel de belangrijkste zijn.

De in 1979 gemeten radioactiviteit is zeer gering; zij ligt in de buurt van die welke in 1978 werd gemeten en heeft in de loop van het jaar geen belangrijke schommelingen vertoond.

De ervaring heeft aangetoond dat in een zelfde land de verhouding van de hoeveelheid $^{90}Sr/g$ Ca in de voedselketen tot de hoeveelheid $^{90}Sr/g$ Ca in de melk betrekkelijk constant is (zie tabel 16).

In de meeste Lid-Staten van de Gemeenschap bedraagt de hoeveelheid calcium in de melk en in melkprodukten bijna 80% van de totale hoeveelheid calcium die via het voedsel wordt ingenomen. Voorts kunnen uit de metingen van de hoeveelheid $^{137}Cs$ in melk gegevens worden afgeleid over het verloop van de radioactieve besmetting van het voedselpakket door dit nuclide.

Voor de overige voedingsmiddelen volgt hier een lijst van de meest recente nationale rapporten :

| | |
|---|---|
| België | : - Contamination radioactive des denrées alimentaires en Belgique en 1978 et 1979 - Rapport I.H.E. - J. Gillard-Baruh |
| Denemarken | : - Environmental Radioactivity in Denmark in 1979. Aarkrog A., Bøtter-Jensen L., Dahlgaard H., Hansen Heinz, Lippert J., Nielsen S.P. and Nilsson K.: Risø Report No. 421 |
| Bondsrepubliek Duitsland | : - Umweltradioaktivität und Strahlenbelastung. Jahresbericht 1977 - Der Bundesminister des Innern |
| Frankrijk | : - Rapports d'activité mensuels et annuels du SCPRI - INSERM - Ministère de la Santé pour 1979 |
| Italië | : - Data on Environmental Radioactivity collected in Italy in 1977 (CNEN) |
| Nederland | : - Jaarlijkse rapporten van de Coördinatie-Commissie voor de metingen van Radioactiviteit en Xenobiotische Stoffen, getiteld: "Algemene Radioactieve Besmetting van de Biosfeer. In Nederland verrichte metingen" |
| Verenigd Koninkrijk | : - Milk Report 1979 - NRPB - R115 Green B.M.R., Knight A., Bruce R.S., Downs W., Ellis E.B. and Mercer E.R. |

* * *

Nederland kent maandelijkse bepalingen van $^{90}Sr$ en $^{137}Cs$ en eventueel van $^{89}Sr$ en $^{131}I$ door het Rijks-Kwaliteitsinstituut voor Land- en Tuinbouwprodukten in Wageningen in een mengsel van gestandaardiseerde "industriemelk" uit Noord-, Oost- en Zuid-Nederland en gestandaardiseerde consumptiemelk uit West-Nederland (mengsel steekmonsters genomen in een aantal standaardisatiebedrijven, die echter ten dele ook niet uit het Westen afkomstige melk verwerken).

In het Verenigd Koninkrijk berust de verantwoordelijkheid voor het programma inzake de controle van melk in het vervolg niet langer bij de Agricultural Research Council, Letcombe Laboratory, maar bij de National Radiological Protection Board.

V.2. Besmetting door $^{90}Sr$

Tabel 17 geeft voor 1979 de op verschillende bemonsteringspunten in de Gemeenschap verkregen kwartaal- en jaarwaarden voor de verhouding pCi $^{90}Sr$/g Ca.

Tabel 18 geeft voor 1979 een samenvatting van de kwartaal- en jaarwaarden van de verhouding pCi $^{90}Sr$/g Ca voor elke Lid-Staat afzonderlijk en voor de Gemeenschap als geheel. Een samenvatting van de kwartaal- en jaargemiddelden voor de Gemeenschap sinds 1972 is opgenomen in tabel 19.

Het jaargemiddelde voor 1979 bedraagt 3,4 pCi/g Ca tegen 3,9 pCi/g Ca in 1978.

De besmetting van melk door $^{90}Sr$ bedraagt thans slechts 10 à 20% van de in de periode van 1963 tot 1965 geconstateerde waarden, die toen hun hoogste niveau bereikten (zie tabel 20).

Deze besmettingsniveaus komen overeen met slechts een gering percentage van de voor de opneming via het voedsel voor individuele leden van de bevolking vastgestelde MAC-waarden (1).

V.3. Besmetting door $^{137}Cs$

Tabel 21 geeft voor 1979 de kwartaal- en jaarwaarden van de verhouding pCi $^{137}Cs$/liter melk op verschillende bemonsteringspunten in de Gemeenschap.

Tabel 22 geeft voor 1979 een samenvatting van de kwartaal- en jaarwaarden voor elke Lid-Staat afzonderlijk en voor de Gemeenschap als geheel. Tabel 23 geeft de kwartaal- en jaargemiddelden voor de Gemeenschap sinds 1972.

---

(1) De maximaal toelaatbare jaarwaarden voor het nuclidengehalte van het drinkwater zijn vastgesteld in de Basisnormen van Euratom; in dit specifieke geval is melk het enige voedingsmiddel dat dit radionuclide bevat.

Voor 1979 ligt het jaargemiddelde voor de Gemeenschap op 5,2 pCi $^{137}$Cs/liter tegen 7,6 pCi $^{137}$Cs/liter in 1978.

De graad van besmetting van melk door $^{137}$Cs bedraagt thans minder dan 10% van de waarden die in de periode 1963-1965 werden gemeten (zie tabel 24).

Deze waarden komen overeen met minder dan 1% van de voor het gehalte aan radioactief caesium van het drinkwater vastgestelde MAC-waarden (1).

## CONCLUSIES

De algemene conclusies zijn vergelijkbaar met die welke in het vorige rapport zijn geformuleerd.

i) De al enkele jaren waargenomen geringe schommelingen moeten nog steeds worden toegeschreven aan de in Azië gehouden kernproeven; de gemeten waarden hebben echter nooit een omvang bereikt die specifieke onderzoekingen rechtvaardigt.

ii) De verzameling van de gemeten waarden alsmede de vergelijking van de resultaten van de verschillende meetstations vormen een uitstekend alarmsysteem; de tot nu toe verrichte inspanningen moeten dan ook worden voortgezet.

iii) Wat de gegevens betreffende de voedselketen aangaat, kan worden opgemerkt dat, hoewel geenszins hoeft te worden getwijfeld aan het bijzonder representatieve karakter van de op melk verrichte metingen, het nog steeds wenselijk wordt geacht periodiek en steekproefgewijs metingen te verrichten op andere voedingsmiddelen (vlees, vis, granen, enz.), op wat in de voedselketen aan melk voorafgaat (gras) en tevens op geschikte biologische indicatoren (humane monsters, schelpdieren, enz.).

---

(1) De maximaal toelaatbare jaarwaarden voor het nuclidengehalte van het drinkwater zijn vastgesteld in de Basisnormen van Euratom; in dit specifieke geval is melk het enige voedingsmiddel dat dit radionuclide bevat.

## Signaturforklaring

| | |
|---|---|
| 12345 | måned i året |
| a | år |
| $\beta$ G | total $\beta$-stråling |
| $\beta$ R | rest $\beta$-stråling |
| ind. | person |
| L | prøvetagningssted |
| l | liter |
| mm,l/m$^2$ | millimeter, regnmaengde i liter pr. kvadratmeter |
| M | middelvaerdi for Faellesskabet |
| mCi | millicurie ($10^{-3}$ Curie) |
| N | prøveantal |
| N.M. | vaerdierne ligger under malegraendrn |
| T | samlet arlig maengde |
| pCi | picocurie ($10^{-12}$ Curie) |
| tr | spor |
| - | vaerdi mangler |
| $\bar{x}$ | middlevaerdi |
| $\bar{x}_m$ | månedsmiddelvaerdi |
| $\bar{x}_a$ | årsmiddelvaerdi |
| $< x$ | mindre end x |
| $\Sigma$ | sum |
| NA | ikke disponibel |
| LD | målegraense |

## Zeichenerklärung

| | |
|---|---|
| 12345 | am Kopf der Spalte: Monat |
| a | Jahr |
| $\beta$ G | Gesamt $\beta$-Aktivität |
| $\beta$ R | Rest $\beta$-Aktivität |
| ind. | Person |
| L | Entnahmestelle |
| l | Liter |
| mm,l/m$^2$ | Millimeter; Regenmenge in Litern je Quadratmeter |
| M | Mittelwert für die Gemeinschaft |
| mCi | Millicurie ($10^{-3}$ Curie) |
| N | Probenanzahl |
| N.M. | Werte unterhalb der Nachweisgrenze |
| T | jährliche Gesamtmenge |
| pCi | Picocurie ($10^{-12}$ Curie) |
| tr | Spuren |
| - | Werte fehlen |
| $\bar{x}$ | Mittelwert |
| $\bar{x}_m$ | Monatsmittel |
| $\bar{x}_a$ | Jahresmittel |
| $< x$ | Kleiner als x |
| $\Sigma$ | Summe |
| NA | Nicht ermittelbar |
| LD | Nachweisgrenze |

## List of Symbols

| | |
|---|---|
| 12345 | at the head of column: month of the year |
| a | year |
| $\beta$ G | total $\beta$ activity |
| $\beta$ R | residual $\beta$ activity |
| ind. | person |
| L | sampling site |
| l | litre |
| mm, $l/m^2$ | Millimetres; rainfall in litres per square metre |
| M | Community mean |
| mCi | millicurie ($10^{-3}$ curie) |
| N | number of samples |
| N.M. | values lie below the detection limit |
| T | annual total |
| pCi | picocurie ($10^{-12}$ curie) |
| tr | traces |
| - | no values available |
| $\bar{x}$ | mean |
| $\bar{x}_m$ | monthly mean |
| $\bar{x}_a$ | annual mean |
| $< x$ | less than x |
| $\Sigma$ | overall total |
| NA | not available |
| LD | limit detection |

## Liste des Symbols

| | |
|---|---|
| 12345 | mois de l'année |
| a | an |
| $\beta$G | activité $\beta$ globale |
| $\beta$R | activité $\beta$ résiduelle |
| ind. | individu |
| L | lieu du prélèvement |
| l | litre |
| mm, $l/m^2$ | millimètres; hauteur de pluie en litre par mètre carré |
| M | moyenne pour la Communauté |
| mCi | millicurie ($10^{-3}$ curie) |
| N | nombre d'échantillons |
| N.M. | valeurs inférieures à la limite de détection |
| T | total annuel |
| pCi | picocurie ($10^{-12}$ curie) |
| tr | traces |
| - | valeur manquante |
| $\bar{x}$ | valeur moyenne |
| $\bar{x}_m$ | valeur moyenne mensuelle |
| $\bar{x}_a$ | valeur moyenne annuelle |
| $< x$ | plus petit que x |
| $\Sigma$ | somme |
| NA | non disponible |
| LD | limite détection |

## Elenco dei Simboli

| | |
|---|---|
| 12345 | in testa alle colonne: tali cifre indicano i mesi dell'anno |
| a | anno |
| $\beta$G | attività $\beta$ globale |
| $\beta$R | attività $\beta$ residua |
| ind. | individuo |
| L | luogo di prelievo |
| l | litro |
| mm,l/m$^2$ | millimetri; altezza delle precipitazioni espressa in litri per metro quadrato |
| M | media per la Comunità |
| mCi | millicurie ($10^{-3}$ curie) |
| N | numero di campioni |
| N.M. | valori inferiori al limite di rivelabilità |
| T | totale annuale |
| pCi | picocurie ($10^{-12}$ curie) |
| tr | tracce |
| - | dato mancante |
| $\bar{x}$ | valore medio |
| $\bar{x}_m$ | valore medio mensile |
| $\bar{x}_a$ | valore medio annuale |
| $< x$ | inferiore a x |
| $\Sigma$ | somma |
| NA | non disponibile |
| LD | limite di rivelabilità |

## Lijst van Afkortingen

| | |
|---|---|
| 12345 | bovenaan de kolom: maand van het jaar |
| a | jaar |
| $\beta$G | totale $\beta$-activiteit |
| $\beta$R | $\beta$-restactiviteit |
| ind. | persoon |
| L | monsternemingaplaats |
| l | liter |
| mm,l/m$^2$ | millimeter; regenval in liter per vierkante meter |
| M | gemiddelde voor de Gemeenschap |
| mCi | millicurie ($10^{-3}$ curie) |
| N | aantal monsters |
| N.M. | waarden beneden het meetbare minimum |
| T | totaal per jaar |
| pCi | picocurie ($10^{-12}$ curie) |
| tr | sporen |
| - | waarden ontbreken |
| $\bar{x}$ | gemiddelde waarde |
| $\bar{x}_m$ | maandgemiddelde |
| $\bar{x}_a$ | jaargemiddelde |
| $< x$ | kleiner dan x |
| $\Sigma$ | som |
| NA | niet beschikbaar |
| LD | detectiegrens |

AMBIANT RADIOACTIVITY MONITORING SITUATION IN THE COMMUNITY

1979

Table 1

| | AIR (number of sites) | | FALLOUT (number of sites) | | WATER (drinking, ground, surface, etc.) | MILK |
|---|---|---|---|---|---|---|
| | specific radio-nuclides | total beta | specific radio-nuclides | total beta | number of samples or sampling points | number of samples or sampling points |
| BELGIQUE/BELGIË | 7 | 9 | 7 | 7 | 68 sampling points: 51 twice yearly; 17 fourth yearly | 12 samples yearly |
| DENMARK | 1 | 1 | 11 | 1 | 9 sampling points | 7 sampling points |
| DEUTSCHLAND | 3 | 11 | 4 | 17 | c.a.8900 samples<br>c.a.520 sampling points | 404 samples<br>40 sampling points |
| FRANCE (SCPRI) | 22 | 30 | 13 | 28 | 4478 samples | 737 samples |
| FRANCE (CEA) | 14 | 24 | 7 | 6 | - samples | 156 samples |
| IRELAND | - | 2 | 1 | 7 | 96 samples<br>2 sampling points | |
| ITALIA | 2 | 18 | 3 | 2 | 8 sampling points | 11 sampling points |
| LUXEMBOURG | - | - | - | - | - | - |
| NEDERLAND | - | 5 | 1 | 1 | about 300 samples<br>8 sampling points | 48 samples |
| UNITED KINGDOM | 7 | 7 | 6 | 6 | 27 sampling points | 73 sampling points |
| COMMUNITY | 56 | 107 | 53 | 75 | | |

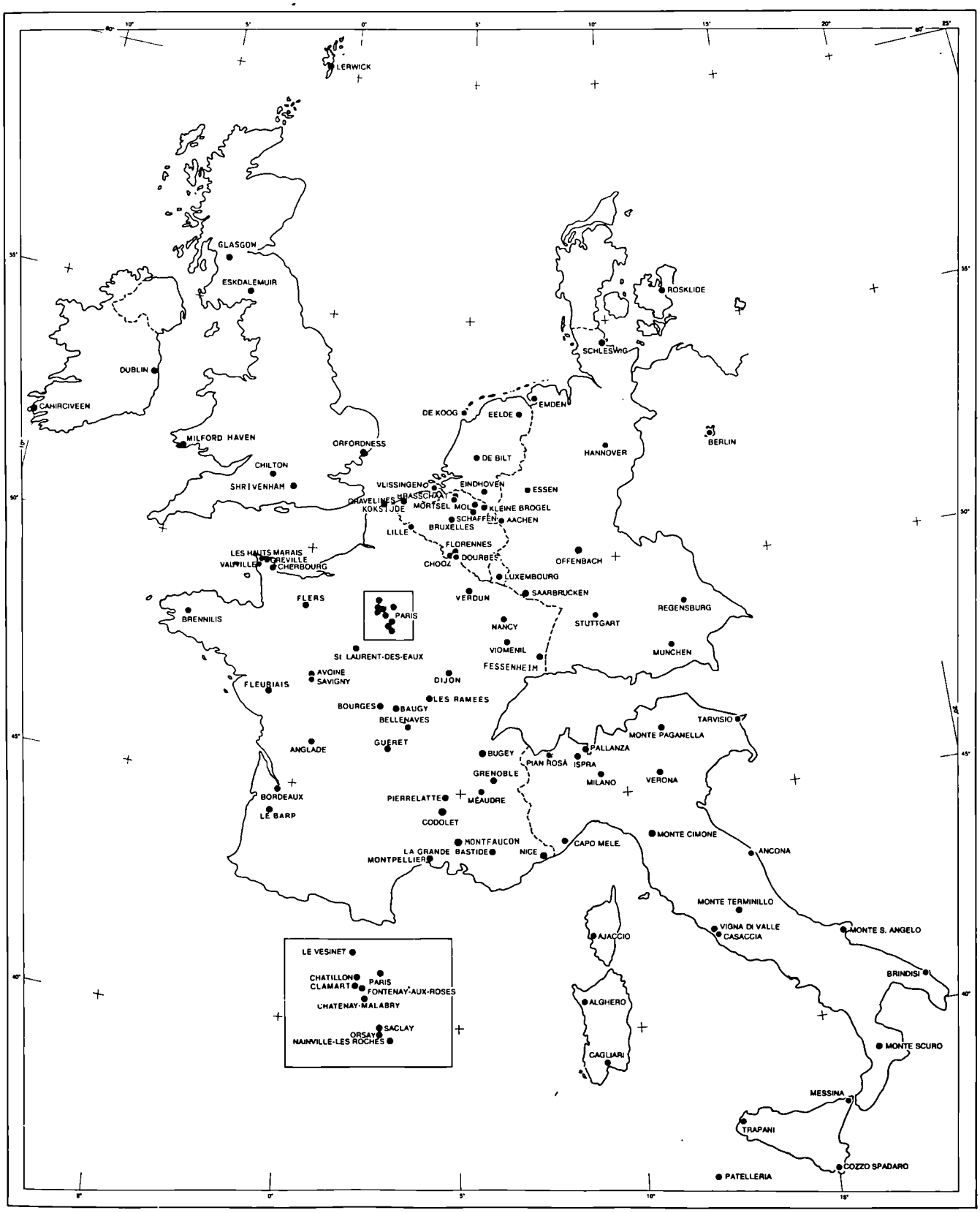
# ARTIFICIAL RADIOACTIVITY IN THE AIR AT GROUND LEVEL

## AMBIANT ATMOSPHERIC RADIOACTIVITY

### Sampling points and measuring stations for specific radionuclides


Map 1

AMBIANT ATMOSPHERIC RADIOACTIVITY
Sampling points and measuring stations for total beta




Map 2

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.1

BELGIQUE/BELGIË

$10^{-3}$ pCi/m$^3$

| | Brasschaat | | Florennes | | Kleine Brogel | | Koksijde | | Schaffen | |
|---|---|---|---|---|---|---|---|---|---|---|
| | total beta pCi/m$^3$ | $^{90}$Sr | total beta pCi/m$^3$ | $^{90}$Sr | total beta pCi/m$^3$ | $^{90}$Sr | total beta pCi/m$^3$ | $^{90}$Sr | total beta pCi/m$^3$ | $^{90}$Sr |
| January | 0.02 | 0.30 | 0.02 | 0.20 | 0.02 | 0.17 | 0.02 | 0.08 | 0.02 | 0.17 |
| February | 0.02 | 0.44 | - | 0.28 | 0.02 | 0.40 | 0.02 | 0.32 | 0.02 | 0.47 |
| March | 0.02 | 0.58 | 0.01 | 0.53 | 0.02 | 0.57 | 0.02 | 0.50 | 0.01 | 0.41 |
| April | 0.02 | 0.51 | 0.02 | 0.52 | 0.02 | 0.52 | 0.02 | 0.55 | 0.02 | 0.47 |
| May | 0.02 | 0.47 | 0.02 | 0.31 | 0.02 | 0.53 | 0.02 | 0.86 | 0.02 | 0.37 |
| June | 0.02 | 0.48 | 0.02 | 0.78 | 0.02 | 0.70 | 0.01 | 0.61 | 0.02 | 0.57 |
| July | 0.02 | 0.32 | 0.02 | 0.54 | 0.02 | 0.46 | 0.02 | 0.44 | 0.02 | 0.50 |
| August | 0.01 | 0.27 | 0.01 | 0.42 | 0.02 | 0.27 | 0.01 | 0.26 | 0.01 | 0.35 |
| September | 0.02 | 0.38 | 0.02 | 0.50 | 0.01 | 0.39 | 0.02 | 0.31 | 0.02 | 0.33 |
| October | 0.02 | 0.36 | 0.02 | 0.47 | 0.02 | 0.45 | 0.02 | 0.34 | 0.02 | 0.30 |
| November | 0.01 | 9.7 | 0.01 | 7.3 | 0.01 | 11.6 | 0.01 | 8.3 | 0.01 | 8.7 |
| December | 0.01 | 0.27 | 0.02 | 0.19 | 0.02 | 0.24 | 0.02 | 0.25 | 0.02 | 0.25 |
| M | 0.018 | 1.17 | 0.016 | 1.00 | 0.018 | 1.36 | 0.017 | 1.07 | 0.018 | 1.07 |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.2

INSTITUT D'HYGIENE ET D'EPIDEMIOLOGIE - BRUXELLES - BELGIQUE

$10^{-3}$ pCi/m$^3$

| | total beta pCi/m$^3$ | $^{7}Be$ | $^{90}Sr$ | $^{95}ZrNb$ | $^{106}Bu$ | $^{137}Cs$ | $^{144}Ce$ |
|---|---|---|---|---|---|---|---|
| January | 0.02 | 41.7 | 0.11 | < 0.24 | < 1.06 | < 0.13 | < 0.66 |
| February | 0.02 | 46.5 | 0.18 | < 0.28 | < 1.22 | < 0.15 | 2.69 |
| March | 0.01 | 45.6 | 0.21 | < 0.14 | < 0.59 | 0.55 | 1.45 |
| April | 0.02 | 48.7 | 0.21 | < 0.27 | < 1.22 | 0.47 | < 0.76 |
| May | 0.02 | 99.7 | 0.32 | < 0.78 | < 2.85 | 1.19 | < 1.99 |
| June | 0.02 | 51.5 | 0.24 | < 0.25 | < 1.09 | 0.40 | < 0.68 |
| July | 0.02 | 54.7 | 0.21 | < 0.25 | < 1.26 | 0.61 | < 0.78 |
| August | 0.01 | 40.4 | 0.14 | < 0.27 | < 1.15 | 0.09 | < 0.74 |
| September | 0.02 | 62.9 | 0.12 | < 0.22 | < 0.62 | 0.30 | < 0.50 |
| October | 0.02 | 56.5 | 0.29 | < 0.21 | < 0.89 | 0.28 | < 0.58 |
| November | 0.01 | 51.1 | 7.3 | < 0.29 | < 1.26 | < 0.13 | < 0.74 |
| December | 0.02 | 48.1 | - | < 0.28 | < 1.21 | < 0.13 | < 0.73 |
| M | 0.02 | 53.9 | 0.85 | < 0.29 | < 1.20 | < 0.37 | < 1.03 |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.3

MOL - BELGIQUE

$10^{-3}$ pCi/m$^3$

| | total beta pCi/m$^3$ | $^{7}Be$ | $^{90}Sr$ | $^{137}Cs$ | $^{144}Ce$ | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 0.03 | 57.3 | 0.34 | 1.07 | 2.40 | | | | | |
| February | 0.02 | 56.8 | 0.48 | 1.04 | 1.88 | | | | | |
| March | 0.02 | 40.5 | 0.71 | 2.53 | 2.68 | | | | | |
| April | 0.02 | 49.5 | 0.79 | 1.12 | 2.95 | | | | | |
| May | 0.02 | 53.8 | 0.62 | 1.48 | 2.75 | | | | | |
| June | 0.02 | 45.6 | 1.03 | 1.00 | 1.72 | | | | | |
| July | 0.02 | 44.8 | 0.63 | 0.92 | 1.57 | | | | | |
| August | 0.01 | 39.5 | 0.26 | 0.84 | 1.49 | | | | | |
| September | 0.02 | 40.5 | 0.33 | 0.68 | 1.43 | | | | | |
| October | 0.02 | 43.8 | 0.40 | 1.79 | 1.07 | | | | | |
| November | 0.01 | 29.6 | 9.5 | 0.58 | 0.59 | | | | | |
| December | 0.02 | 33.9 | 0.32 | 0.63 | 1.15 | | | | | |
| M | 0.02 | 44.6 | 1.28 | 1.14 | 1.81 | | | | | |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2 • 4

RISØ - DENMARK

$10^{-3}$ pCi/m$^3$

| | total beta pCi/m$^3$ | $^{90}Sr$ | $^{103}Ru$ | $^{106}Ru$ | $^{137}Cs$ | $^{140}Ba$ | $^{140}La$ | $^{144}Ce$ | $^{141}Ce$ |
|---|---|---|---|---|---|---|---|---|---|
| January | 0.03 | 0.32 | 0.46 | 1.86 | 0.75 | 1.27 | 1.23 | 2.3 | 0.46 |
| February | 0.03 | 0.36 | 0 | 1.89 | 0.89 | 0 | 0 | 2.5 | 0 |
| March | 0.03 | 0.44 | 0 | 2.2 | 1.05 | 0 | 0 | 2.8 | 0 |
| April | 0.04 | 0.61 | 0 | 3.2 | 1.60 | 0 | 0 | 3.9 | 0 |
| May | 0.04 | 0.66 | 0 | 3.5 | 1.81 | 0 | 0 | 4.6 | 0 |
| June | 0.05 | 0.69 | 0 | 3.7 | 1.92 | 0 | 0 | 6.2 | 0 |
| July | 0.02 | 0.39 | 0 | 1.06 | 0.56 | 0 | 0 | 1.70 | 0 |
| August | 0.03 | 0.41 | 0 | 1.07 | 0.61 | 0 | 0 | 1.68 | 0 |
| September | 0.03 | 0.26 | 0 | 0.57 | 0.41 | 0 | 0 | 0.89 | 0 |
| October | 0.07 | 0.21 | 0 | 0.35 | 0.30 | 0 | 0 | 0.65 | 0 |
| November | 0.02 | 0.157 | 0 | 0.25 | 0.179 | 0 | 0 | 0.42 | 0 |
| December | 0.02 | 0.171 | 0 | 0.18 | 0.170 | 0 | 0 | 0.28 | 0 |
| M | 0.03 | 0.39 | 0.038 | 1.65 | 0.85 | 0.106 | 0.103 | 2.4 | 0.038 |

SPECIFIC RADIONUCLIDES MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.5

BRAUNSCHWEIG - DEUTSCHLAND

$10^{-3}$pCi/m3

| | $^{7}Be$ | $^{54}Mn$ | $^{95}Zr$ | $^{95}Nb$ | $^{103}Ru$ | $^{106}Rh$ | $^{125}Sb$ | $^{137}Cs$ | $^{141}Ce$ | $^{144}Ce$ | $^{155}Eu$ | $^{120}Pb$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 48.87 | 0.006 | 0.036 | 0.038 | 0.120 | 1.000 | 0.140 | 0.319 | 0.281 | 1.499 | 0.048 | 14.985 |
| February | 58.05 | 0.021 | n.n. | 0.029 | n.n. | 1.299 | 0.22 | 0.44 | 0.003 | 1.998 | 0.065 | 11.988 |
| March | 45.09 | 0.017 | n.n. | 0.024 | n.n. | 1.099 | 0.20 | 0.359 | n.n. | 1.998 | 0.069 | 4.887 |
| April | 66.96 | 0.020 | n.n. | 0.022 | n.n. | 1.899 | 0.351 | 0.64 | n.n. | 2.889 | 0.11 | 7.884 |
| May | 83.97 | 0.035 | n.n. | 0.021 | n.n. | 2.498 | 0.499 | 0.929 | n.n. | 3.186 | 0.12 | 5.994 |
| June | 55.89 | 0.020 | n.n. | 0.010 | n.n. | 1.499 | 0.329 | 0.551 | n.n. | 2.498 | 0.11 | 6.399 |
| July | 51.84 | 0.012 | n.n. | 0.011 | n.n. | 1.199 | 0.24 | 0.44 | n.n. | 1.698 | 0.075 | 5.697 |
| August | 65.88 | 0.010 | n.n. | n.n. | n.n. | 0.940 | 0.19 | 0.37 | n.n. | 1.199 | 0.062 | 7.587 |
| September | 58.05 | 0.005 | n.n. | n.n. | n.n. | 0.599 | 0.12 | 0.24 | n.n. | 0.74 | 0.044 | 9.099 |
| October | 61.02 | n.n. | n.n. | n.n. | n.n. | 0.551 | 0.097 | 0.22 | n.n. | 0.489 | 0.04 | 13.986 |
| November | 49.95 | n.n. | n.n. | n.n. | n.n. | 0.451 | 0.063 | 0.15 | n.n. | 0.319 | 0.025 | 9.801 |
| December | 45.09 | 0.002 | n.n. | n.n. | n.n. | 0.270 | 0.042 | 0.11 | n.n. | 0.23 | 0.019 | 6.696 |
| M | 57.56 | 0.012 | 0.003 | 0.013 | 0.010 | 1.109 | 0.208 | 0.397 | 0.024 | 1.562 | 0.066 | 8.75 |

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SPECIFIC RADIONUCLIDES MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.6

JÜLICH - DEUTSCHLAND

$10^{-3}$ pCi/m3

| | $^{7}Be$ | $^{95}Zr$ | $^{95}Nb$ | $^{103}Ru$ | $^{106}Ru$ | $^{125}Sb$ | $^{131}I$ | $^{137}Cs$ | $^{140}Ba/^{140}La$ | $^{141}Ce$ | $^{144}Ce$ | $^{147}Nd$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 45 | < 4 | < 2 | < 5 | < 4 | < 2 | < 2 | < 0.6 | < 2 | < 9 | < 6 | < 4 |
| February | 59 | < 4 | < 2 | < 5 | < 4 | < 2 | < 2 | < 0.6 | < 2 | < 9 | < 6 | < 4 |
| March | 70 | < 4 | < 2 | < 5 | < 4 | < 2 | < 2 | < 0.6 | < 2 | < 9 | < 6 | < 4 |
| April | 67 | < 4 | < 2 | < 5 | < 4 | < 2 | < 2 | < 0.6 | < 2 | < 9 | < 6 | < 4 |
| May | 180 | < 4 | < 2 | < 5 | < 4 | < 2 | < 2 | < 0.6 | < 2 | < 9 | < 6 | < 4 |
| June | 68 | < 4 | < 2 | < 5 | < 4 | < 2 | < 2 | < 0.6 | < 2 | < 9 | < 6 | < 4 |
| July | 51 | < 4 | < 2 | < 5 | < 4 | < 2 | < 2 | < 0.6 | < 2 | < 9 | < 6 | < 4 |
| August | 62 | < 4 | < 2 | < 5 | < 4 | < 2 | < 2 | < 0.6 | < 2 | < 9 | < 6 | < 4 |
| September | 56 | < 4 | < 2 | < 5 | < 4 | < 2 | < 2 | < 0.6 | < 2 | < 9 | < 6 | < 4 |
| October | 58 | < 4 | < 2 | < 5 | < 4 | < 2 | < 2 | < 0.6 | < 2 | < 9 | < 6 | < 4 |
| November | 53 | < 4 | < 2 | < 5 | < 4 | < 2 | < 2 | < 0.6 | < 2 | < 9 | < 6 | < 4 |
| December | 43 | < 4 | < 2 | < 5 | < 4 | < 2 | < 2 | < 0.6 | < 2 | < 9 | < 6 | < 4 |
| M | 68 | < 4 | < 2 | < 5 | < 4 | < 2 | < 2 | < 0.6 | < 2 | < 9 | < 6 | < 4 |

SPECIFIC RADIONUCLIDES MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.7

KARLSRUHE (FORSTHAUS) - DEUTSCHLAND

$10^{-3}$ pCi/m3

| | $^{7}Be$ | $^{51}Cr$ | $^{54}Mn$ | $^{57}Co$ | $^{59}Co$ | $^{59}Fe$ | $^{60}Co$ | $^{65}Zn$ | $^{95}Zr$ | $^{95}Nb$ |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 51.3 | < 3.9 | < 4 | < 0.1 | < 0.5 | < 0.9 | < 0.3 | < 0.8 | < 0.6 | < 0.5 |
| February | 64.6 | < 4.5 | < 4 | < 0.2 | < 0.6 | < 1 | < 0.4 | < 0.9 | < 0.7 | < 0.6 |
| March | 74.6 | < 4.5 | < 4 | < 0.2 | < 0.5 | < 1.2 | < 0.4 | < 1 | < 0.9 | < 0.7 |
| April | 41.7 | < 2.9 | < 2 | < 0.2 | < 0.3 | < 0.5 | < 0.2 | < 0.5 | < 0.5 | < 0.3 |
| May | 78.6 | < 4.1 | < 3 | < 0.1 | < 0.5 | < 0.9 | < 0.3 | < 0.7 | < 0.6 | < 0.5 |
| June | 96.6 | < 3.8 | < 4 | < 0.1 | < 0.5 | < 0.9 | < 0.3 | < 0.8 | < 0.6 | < 0.5 |
| July | 73.2 | < 3.8 | < 3 | < 0.1 | < 0.5 | < 0.9 | < 0.3 | < 0.7 | < 0.6 | < 0.5 |
| August | 117.3 | < 5.7 | < 5 | < 0.2 | < 0.6 | < 1.5 | < 0.4 | < 1.1 | < 1.1 | < 0.8 |
| September | 69.2 | < 4 | < 3 | < 0.1 | < 0.5 | < 0.9 | < 0.3 | < 0.7 | < 0.6 | < 0.5 |
| October | 67.7 | < 2.1 | < 3 | < 0.1 | < 0.4 | < 0.7 | < 0.3 | < 0.6 | < 0.5 | < 0.4 |
| November | 51.6 | < 3.7 | < 3 | < 0.1 | < 0.5 | < 0.8 | < 0.3 | < 0.7 | < 0.6 | < 0.5 |
| December | 30.9 | < 2.9 | < 3 | < 0.1 | < 0.4 | < 0.7 | < 0.3 | < 0.6 | < 0.5 | < 0.4 |
| M | 68.11 | < 3.83 | < 3.4 | < 0.13 | < 0.48 | < 0.91 | < 0.32 | < 0.76 | < 0.65 | < 0.52 |

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SPECIFIC RADIONUCLIDES MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.7a)
Continued

KARLSRUHE(FORSTHAUS) - DEUTSCHLAND

$10^{-3}$pCi/m3

| | $^{103}Ru$ | $^{106}Ru$ | $^{110m}Ag$ | $^{124}Sb$ | $^{125}Sb$ | $^{131}I$ | $^{134}Cs$ | $^{137}Cs$ | $^{140}Ba/^{140}La$ | $^{141}Ce$ | $^{144}Ce$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| January | < 0.4 | < 2.6 | < 0.4 | < 0.8 | < 0.7 | < 3.4 | < 0.3 | 0.4 | < 4.4 | < 0.5 | < 1.1 |
| February | < 0.5 | < 2.9 | < 0.5 | < 0.9 | < 0.7 | < 4.5 | < 0.3 | 1.2 | < 5.5 | < 0.5 | < 1.2 |
| March | < 0.5 | < 4.3 | < 0.6 | < 1 | < 1.1 | < 2.6 | < 0.4 | 1.2 | < 3.5 | < 0.5 | 2.2 |
| April | < 0.3 | < 1.7 | < 0.3 | < 0.5 | < 0.6 | < 1.6 | < 0.2 | 1.1 | < 2.0 | < 0.4 | 2.5 |
| May | < 0.4 | < 2.2 | < 0.4 | < 0.7 | < 0.6 | < 0.6 | < 0.3 | 1.4 | < 5.9 | < 0.5 | 2.4 |
| June | < 0.2 | < 2.6 | < 0.4 | < 0.8 | < 0.7 | < 2.9 | < 0.3 | 0.2 | < 4.1 | < 0.5 | 3.1 |
| July | < 0.4 | < 2.4 | < 0.4 | < 0.7 | < 0.6 | < 3.8 | < 0.3 | 0.8 | < 4.6 | < 0.4 | 1.2 |
| August | < 0.6 | < 4.1 | < 0.6 | < 1.1 | < 1.1 | < 6.3 | < 0.4 | < 0.7 | < 6.3 | < 0.7 | < 1.7 |
| September | < 0.4 | < 2.3 | < 0.4 | < 0.8 | < 0.6 | < 4.8 | < 0.3 | 0.9 | < 5.3 | < 0.5 | < 0.9 |
| October | < 0.3 | < 2.0 | < 0.3 | < 0.6 | < 0.5 | < 2.3 | < 0.2 | 0.8 | < 3.2 | < 0.4 | < 0.8 |
| November | < 0.4 | < 2.1 | < 0.4 | < 0.7 | < 0.5 | < 4.0 | < 0.2 | 1.3 | < 4.6 | < 0.4 | < 0.9 |
| December | < 0.3 | < 1.9 | < 0.3 | < 0.6 | < 0.5 | < 2.3 | < 0.2 | 1.4 | < 3.1 | < 0.3 | < 0.8 |
| M | < 0.39 | < 2.59 | < 0.42 | < 0.77 | < 0.68 | < 3.26 | < 0.28 | < 0.95 | < 4.38 | < 0.47 | < 1.57 |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.8

LE BARP - BORDEAUX (C.E.A.) - FRANCE

$10^{-3}$ pCi/m$^3$

| | total beta pCi/m$^3$ | $^{7}Be$ | $^{54}Mn$ | $^{90}Sr$ | $^{95}Zr$ | $^{95}Nb$ | $^{103}Ru$ | $^{106}Rh$ | $^{125}Sb$ | $^{131}I$ |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 0.007 | 53.9 | < 0.1 | 0.2 | < 0.1 | < 0.1 | < 0.1 | 1.0 | < 0.1 | < 0.1 |
| February | 0.010 | 49.1 | < 0.1 | 0.2 | 0.1 | < 0.1 | < 0.1 | 1.3 | 0.2 | - |
| March | 0.008 | 34.0 | < 0.1 | 0.2 | 0.1 | 0.1 | < 0.1 | 0.4 | 0.1 | - |
| April | 0.008 | 52.6 | < 0.1 | 0.3 | 0.1 | < 0.1 | < 0.1 | 1.3 | 0.3 | - |
| May | 0.011 | 85.8 | < 0.1 | 0.5 | 0.1 | < 0.1 | < 0.1 | 3.6 | 0.4 | - |
| June | 0.010 | 70.8 | < 0.1 | 0.5 | < 0.1 | < 0.1 | < 0.1 | 1.7 | 0.3 | - |
| July | 0.012 | 74.1 | < 0.1 | 0.2 | 0.1 | < 0.1 | < 0.1 | 1.6 | 0.3 | - |
| August | 0.006 | 56.9 | < 0.1 | 0.2 | < 0.1 | < 0.1 | < 0.1 | 0.3 | 0.1 | - |
| September | 0.014 | 57.8 | < 0.1 | 0.2 | 0.1 | < 0.1 | < 0.1 | 0.4 | 0.1 | - |
| October | 0.011 | 50.0 | - | 0.2 | - | - | - | 0.2 | < 0.1 | - |
| November | 0.007 | 50.0 | - | 0.1 | - | - | - | 0.1 | 0.1 | - |
| December | 0.011 | 57.8 | - | 0.2 | - | - | - | 0.2 | < 0.1 | - |
| M | 0.009 | 57.7 | < 0.1 | 0.3 | < 0.1 | < 0.1 | < 0.1 | 1.0 | < 0.2 | - |

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SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.8a)
continued

LE BARP - BORDEAUX (C.E.A.) - FRANCE

$10^{-3}$ pCi/m$^3$

| | $^{137}Cs$ | $^{140}Ba$ $^{140}La$ | $^{141}Ce$ | $^{144}Ce$ $^{144}Pr$ | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 0.3 | 0.3 | < 0.1 | 1.4 | | | | | | |
| February | 0.4 | - | < 0.1 | 1.3 | | | | | | |
| March | 0.3 | - | < 0.1 | 1.6 | | | | | | |
| April | 0.5 | - | < 0.1 | 2.0 | | | | | | |
| May | 0.8 | - | < 0.1 | 3.6 | | | | | | |
| June | 0.7 | - | < 0.1 | 3.1 | | | | | | |
| July | 0.6 | - | < 0.1 | 2.0 | | | | | | |
| August | 0.2 | - | < 0.1 | 0.6 | | | | | | |
| September | 0.2 | - | < 0.1 | 0.7 | | | | | | |
| October | 0.2 | - | - | 0.4 | | | | | | |
| November | 0.1 | - | - | 0.1 | | | | | | |
| December | 0.2 | - | - | 0.4 | | | | | | |
| M | 0.3 | - | < 0.1 | 1.4 | | | | | | |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.9

LE VESINET - SCPRI - FRANCE

$10^{-3}$ pCi/m$^3$

| | total beta pCi/m$^3$ | $^{7}Be$ | $^{54}Mn$ | $^{90}Sr$ | $^{95}Zr$ + $^{95}Nb$ | $^{103}Ru$ | $^{106}Ru$ + $^{106}Rh$ | $^{125}Sb$ | $^{131}I$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 0.020 | 74 | < 0.54 | < 0.34 | < 0.56 | < 1.1 | < 7.9 | < 1.8 | < 5.1 | < 1.3 |
| February | 0.019 | 70 | < 0.55 | < 0.43 | < 0.74 | < 0.83 | < 12 | < 3.2 | < 3.0 | < 1.3 |
| March | < 0.015 | 73 | < 0.45 | < 0.39 | < 0.64 | < 0.62 | < 13 | < 1.6 | < 3.1 | < 1.5 |
| April | < 0.018 | 89 | < 0.50 | < 0.59 | < 0.67 | < 0.75 | < 13 | < 2.8 | < 3.1 | < 1.5 |
| May | < 0.021 | 110 | < 0.60 | 0.45 | < 0.59 | < 0.65 | < 16 | < 1.6 | < 3.4 | < 2.2 |
| June | 0.016 | 79 | < 0.55 | 0.60 | < 0.67 | < 0.71 | < 11 | < 2.4 | < 2.7 | < 1.5 |
| July | 0.016 | 99 | < 0.67 | 0.56 | < 0.75 | < 0.87 | < 10 | < 1.6 | < 3.5 | < 1.6 |
| August | < 0.014 | 73 | < 0.89 | < 0.40 | < 0.72 | < 0.64 | < 6 | < 1.8 | < 3.0 | < 1.1 |
| September | 0.017 | 98 | < 0.68 | < 0.29 | < 1.4 | < 0.74 | < 14 | < 1.4 | < 6.0 | < 1.5 |
| October | < 0.020 | 81 | < 0.61 | < 0.24 | < 1.2 | < 0.61 | < 7.2 | < 1.3 | < 4.3 | < 1.2 |
| November | < 0.015 | 80 | < 0.99 | < 0.28 | < 1.3 | < 0.84 | < 6.6 | < 3.8 | < 7.1 | < 0.96 |
| December | < 0.015 | 91 | < 1.1 | < 0.45 | < 5.3 | < 1.7 | < 11 | < 1.7 | < 16 | < 1.7 |
| M | < 0.018 | 85 | < 0.67 | < 0.42 | < 1.2 | < 0.83 | < 11 | < 2.1 | < 5.0 | < 1.4 |

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SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.9a)
continued

LE VESINET - SCPRI - FRANCE

$10^{-3}$ pCi/$m^3$

| | $^{140}Ba$ + $^{140}La$ | $^{141}Ce$ | $^{144}Ce$ + $^{144}Pr$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| January | < 6.4 | < 2.5 | < 18 | | | | | | | |
| February | < 5.2 | < 2.9 | < 14 | | | | | | | |
| March | < 5.9 | < 1.7 | < 9.4 | | | | | | | |
| April | < 6.5 | < 1.6 | < 11 | | | | | | | |
| May | < 6.0 | < 1.7 | < 22 | | | | | | | |
| June | < 6.1 | < 1.4 | < 11 | | | | | | | |
| July | < 6.4 | < 1.8 | < 11 | | | | | | | |
| August | < 8.9 | < 1.7 | < 7.3 | | | | | | | |
| September | <12 | < 1.9 | < 9.6 | | | | | | | |
| October | < 6.9 | < 1.7 | < 6.5 | | | | | | | |
| November | <20 | < 2.4 | < 1.1 | | | | | | | |
| December | < 8.8 | < 3.3 | < 12 | | | | | | | |
| M | < 8.2 | < 2.1 | < 12 | | | | | | | |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.10

CCR - EURATOM - ISPRA - ITALIA

$10^{-3}$ pCi/m3

| | total beta pCi/m3 | $^{7}Be$ | $^{89}Sr$ | $^{90}Sr$ | $^{106}Ru$ | $^{137}Cs$ | $^{144}Ce$ | $^{238}Pu$ $10^{-5}$ | $^{239}Pu$ $10^{-5}$ |
|---|---|---|---|---|---|---|---|---|---|
| January | 0.05 | 77 | 0.5 | 0.4 | - | 1.0 | - | ≤ 0.2 | 0.9 |
| February | 0.03 | 53 | ≤ 0.1 | 0.4 | - | ≤ 1.0 | - | ≤ 0.2 | 0.6 |
| March | 0.03 | 43 | ≤ 0.1 | 0.3 | - | ≤ 1.0 | - | ≤ 0.2 | 0.7 |
| April | 0.03 | 50 | ≤ 0.1 | 0.5 | - | 1.0 | 5 | ≤ 0.2 | 0.9 |
| May | 0.04 | 100 | ≤ 0.1 | 1.1 | 1.1 | 2.0 | 6 | ≤ 0.2 | 2.1 |
| June | 0.04 | 78 | ≤ 0.1 | 0.9 | - | 1.0 | - | ≤ 0.2 | 1.2 |
| July | 0.04 | 91 | ≤ 0.1 | 1.1 | - | 3.0 | - | 0.7 | 1.5 |
| August | 0.03 | 53 | ≤ 0.1 | 0.4 | - | ≤ 1.0 | - | 0.3 | 0.8 |
| September | 0.04 | 58 | ≤ 0.1 | 0.4 | - | ≤ 1.0 | - | 0.2 | 0.5 |
| October | 0.03 | 43 | ≤ 0.1 | 0.2 | - | ≤ 1.0 | - | 0.2 | 0.5 |
| November | 0.04 | 59 | ≤ 0.1 | 0.3 | - | ≤ 1.0 | - | ≤ 0.2 | ≤ 0.2 |
| December | 0.03 | 73 | ≤ 0.1 | 0.3 | - | ≤ 1.0 | - | ≤ 0.2 | ≤ 0.2 |
| M | 0.04 | 65 | ≤ 0.1 | 0.5 | - | ≤ 1.3 | - | ≤ 0.3 | ≤ 0.8 |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

Table 2.11

1979

SEGRATE - ITALIA

pCi/m3 $10^{-3}$

| | $^{7}Be$ | $^{54}Mn$ | $^{95}Zr$ | $^{103}Ru$ | $^{106}Ru$ | $^{125}Sb$ | $^{131}I$ | $^{137}Cs$ | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ | $^{155}Eu$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 20 | <0.02 | <0.07 | 0.13 | 0.26 | <0.1 | 0.15 | 0.20 | 0.31 | 0.24 | 0.6 | <0.1 |
| February | 25 | <0.2 | <0.6 | <1.4 | <2.7 | <0.4 | (***) | 0.6 | (***) | <2.2 | <1.5 | <0.8 |
| March | 17 | <0.05 | <0.09 | <0.1 | <0.5 | <0.1 | (***) | 0.26 | (***) | <0.2 | 0.6 | <0.08 |
| April | 49 | <0.6 | <1.1 | <0.8 | <4.5 | <1.1 | (***) | 0.7 | (***) | <1.6 | <2.0 | <1.4 |
| May | 76 | 0.04 | <0.05 | <0.04 | 2.6 | 0.6 | <0.2 | 1.3 | <0.2 | <0.08 | 3.0 | 0.2 |
| June | 351 | <0.04 | <0.04 | <0.05 | 1.0 | 0.23 | <0.1 | 0.5 | <0.07 | <0.08 | 1.1 | <0.1 |
| July | 72 | <0.04 | <0.07 | <0.04 | 1.3 | 0.3 | <0.07 | 0.79 | <0.08 | <0.05 | 1.7 | <0.1 |
| August | 26 | <0.03 | <0.04 | <0.07 | <0.6 | <0.1 | <0.2 | 0.13 | <0.07 | <0.1 | 0.4 | <0.2 |
| September | 19 | <0.04 | <0.07 | <0.04 | <0.05 | <0.3 | <0.09 | 0.11 | <0.05 | <0.06 | 0.3 | <0.1 |
| October | 18 | <0.05 | <0.06 | <0.05 | <0.4 | <0.1 | <0.08 | 0.09 | <0.08 | <0.08 | <0.3 | <0.1 |
| November (*) | 21 | <0.07 | <0.1 | <0.06 | <0.8 | <0.2 | <0.1 | 0.06 | <0.1 | <0.1 | <0.3 | <0.2 |
| December (**) | 23 | <0.1 | <0.1 | <0.1 | <1.0 | <0.3 | <0.2 | 0.06 | <0.3 | <0.1 | <0.3 | <0.2 |
| M | 60 | <0.11 | <0.2 | <0.24 | <1.28 | <0.32 | <0.13 | 0.4 | <0.14 | <0.41 | 1.0 | <0.31 |

(*) Dati relativi ai giorni 1-19 nov. - (**) Dati relativi ai giorni 19-30 dic. - (***) Inferiore al limite di rivelabilità

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2. 12

CHILTON - UNITED KINGDOM

$10^{-3}$ pCi/m3

| | total beta pCi/m$^3$ | $^{54}$Mn | $^{95}$Zr | $^{95}$Nb | $^{103}$Ru | $^{106}$Ru | $^{125}$Sb | $^{131}$I(*) | $^{137}$Cs | $^{140}$Ba | $^{141}$Ce | $^{144}$Ce |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 0.024 | < 0.06 | <0.06 | <0.12 | 0.24 | 1.2 | 0.15 | 0.13 | 0.34 | 0.40 | 0.50 | 1.1 |
| February | 0.019 | < 0.06 | <0.06 | <0.12 | <0.06 | 2.4 | 0.41 | < 0.06 | 0.63 | <0.06 | <0.06 | 1.3 |
| March | 0.022 | < 0.06 | <0.06 | <0.12 | <0.06 | 2.6 | 0.49 | < 0.06 | 0.55 | <0.06 | <0.06 | 1.1 |
| April | 0.013 | < 0.06 | <0.06 | <0.12 | <0.06 | 1.5 | 0.38 | < 0.06 | 0.45 | <0.06 | <0.06 | 1.0 |
| May | 0.015 | < 0.06 | <0.06 | <0.12 | <0.06 | 1.7 | 0.24 | < 0.06 | 0.53 | <0.06 | <0.06 | 1.4 |
| June | 0.012 | < 0.06 | <0.06 | <0.12 | <0.06 | 1.7 | 0.39 | < 0.06 | 0.52 | <0.06 | <0.06 | 0.90 |
| July | 0.024 | < 0.06 | <0.06 | <0.12 | <0.06 | 1.8 | 0.36 | < 0.06 | 0.46 | <0.06 | <0.06 | 0.79 |
| August | 0.015 | < 0.06 | <0.06 | <0.12 | <0.06 | 0.61 | 0.18 | < 0.06 | 0.28 | <0.06 | <0.06 | 0.40 |
| September | 0.018 | < 0.06 | <0.06 | <0.12 | <0.06 | 0.87 | 0.16 | < 0.06 | 0.23 | <0.06 | <0.06 | 0.38 |
| October | 0.013 | < 0.06 | <0.06 | <0.12 | <0.06 | 0.87 | 0.16 | < 0.06 | 0.18 | <0.06 | <0.06 | 0.39 |
| November | 0.016 | < 0.06 | <0.06 | <0.12 | <0.06 | 0.40 | 0.15 | < 0.06 | 0.17 | <0.06 | <0.06 | 0.28 |
| December | 0.019 | < 0.06 | <0.06 | <0.12 | <0.06 | 0.22 | 0.16 | < 0.06 | 0.12 | <0.06 | <0.06 | 0.22 |
| M | 0.017 | < 0.06 | <0.06 | <0.12 | <0.075 | 1.3 | 0.27 | < 0.066 | 0.37 | <0.088 | <0.097 | 0.77 |

(*) Particulate component only

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.13

ESKDALEMUIR - UNITED KINGDOM

$10^{-3}$ pCi/m3

| | total beta pCi/m$^3$ | $^{54}Mn$ | $^{95}Zr$ | $^{95}Nb$ | $^{103}Ru$ | $^{106}Ru$ | $^{125}Sb$ | $^{131}I$(*) | $^{137}Cs$ | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 0.004 | < 0.5 | < 0.12 | < 0.12 | < 0.7 | 0.85 | 0.13 | < 0.05 | 0.05 | 0.49 | 0.13 | 0.83 |
| February | 0.007 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 0.70 | 0.11 | < 0.06 | 0.20 | < 0.12 | < 0.06 | 0.46 |
| March | 0.004 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 0.67 | 0.09 | < 0.06 | 0.06 | < 0.12 | < 0.06 | 0.17 |
| April | 0.009 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 1.6 | 0.21 | < 0.06 | 0.44 | < 0.12 | < 0.06 | 0.81 |
| May | 0.007 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 1.3 | 0.29 | < 0.06 | 0.41 | < 0.12 | < 0.06 | 0.69 |
| June | 0.015 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 1.5 | 0.27 | < 0.06 | 0.55 | < 0.12 | < 0.06 | 0.96 |
| July | 0.023 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 1.4 | 0.17 | < 0.06 | 0.46 | < 0.12 | < 0.06 | 0.68 |
| August | 0.015 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 2.0 | 0.24 | < 0.06 | 0.46 | < 0.12 | < 0.06 | 0.66 |
| September | 0.005 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 0.45 | 0.07 | < 0.06 | 0.25 | < 0.12 | < 0.06 | 0.49 |
| October | 0.007 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 0.30 | 0.16 | < 0.06 | 0.35 | < 0.12 | < 0.06 | 0.29 |
| November | 0.007 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 0.50 | 0.16 | < 0.06 | 0.27 | < 0.12 | < 0.06 | 0.30 |
| December | 0.004 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 0.24 | 0.15 | < 0.06 | 0.19 | < 0.12 | < 0.06 | 0.24 |
| M | 0.009 | < 0.10 | < 0.12 | < 0.12 | < 0.11 | 0.96 | 0.17 | < 0.06 | 0.31 | < 0.15 | < 0.066 | 0.55 |

(*) Particulate component only

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.14

GLASGOW - UNITED KINGDOM

$10^{-3}$ pCi/m3

| | total beta pCi/m$^3$ | $^{54}$Mn | $^{95}$Zr | $^{103}$Ru | $^{106}$Ru | $^{125}$Sb | $^{131}$I (*) | $^{137}$Cs | $^{140}$Ba | $^{141}$Ce | $^{144}$Ce |
|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 0.035 | - | 0.05 | 0.16 | 1.1 | - | 0.16 | 0.19 | - | 0.05 | 1.0 |
| February | 0.024 | - | - | - | 2.5 | 0.57 | - | 0.92 | - | - | 3.1 |
| March | 0.015 | - | - | - | 1.1 | 0.35 | - | 0.65 | - | - | 1.7 |
| April | 0.010 | - | - | - | 1.2 | 0.32 | - | 0.51 | - | - | 1.4 |
| May | 0.010 | - | - | - | 1.3 | 0.51 | - | 0.65 | - | - | 1.4 |
| June | 0.007 | 0.03 | 0.08 | 0.05 | 0.89 | 0.46 | - | 0.54 | - | - | 1.3 |
| July | 0.012 | - | - | - | 0.86 | 1.20 | - | 0.73 | - | - | 1.2 |
| August | 0.006 | 0.03 | 0.05 | - | 0.78 | - | - | 0.43 | - | - | 1.0 |
| September | 0.009 | - | - | - | 0.51 | - | - | 0.32 | - | - | 0.38 |
| October | 0.009 | - | - | - | 0.43 | - | - | 0.24 | - | - | 0.32 |
| November | 0.010 | 0.05 | - | 0.24 | - | 0.43 | - | 0.16 | - | - | 0.19 |
| December | 0.012 | - | - | - | 0.41 | - | - | 0.16 | - | - | 0.35 |
| M | <0.013 | < 0.02 | < 0.06 | <0.07 | <0.94 | <0.40 | < 0.11 | 0.46 | <0.01 | < 0.05 | 1.11 |

(*) Particulate component only.
Dashes indicate values below the limit of detection; these values have been taken into account when computing the mean values.

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2·15

LERWICK - UNITED KINGDOM

$10^{-3}$ pCi/m3

| | total beta pCi/m$^3$ | $^{54}$Mn | $^{95}$Zr | $^{95}$Nb | $^{103}$Ru | $^{106}$Ru | $^{125}$Sb | $^{131}$I (*) | $^{137}$Cs | $^{140}$Ba | $^{141}$Ce | $^{144}$Ce |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 0.009 | <0.6 | < 0.12 | < 0.88 | < 0.07 | 1.3 | 0.25 | <0.06 | 0.23 | 0.14 | 0.08 | 1.2 |
| February | 0.013 | <0.06 | < 0.12 | < 0.07 | < 0.06 | 1.0 | 0.16 | <0.06 | 0.18 | <0.12 | <0.06 | 0.63 |
| March | 0.010 | <0.06 | < 0.12 | < 0.12 | < 0.06 | 1.1 | 0.19 | <0.06 | 0.27 | <0.12 | <0.06 | 0.55 |
| April | 0.010 | <0.06 | < 0.12 | < 0.12 | < 0.06 | 1.4 | 0.22 | <0.06 | 0.27 | <0.12 | <0.06 | 0.68 |
| May | 0.007 | <0.06 | < 0.12 | < 0.12 | < 0.06 | 0.91 | 0.15 | <0.06 | 0.20 | <0.12 | <0.06 | 0.40 |
| June | 0.004 | <0.06 | < 0.12 | < 0.12 | < 0.06 | 1.1 | 0.19 | <0.06 | 0.27 | <0.12 | <0.06 | 0.56 |
| July | 0.006 | <0.06 | < 0.12 | < 0.12 | < 0.06 | 0.84 | 0.12 | <0.06 | 0.23 | <0.12 | <0.06 | 0.40 |
| August | 0.005 | <0.06 | < 0.12 | < 0.12 | < 0.06 | 1.2 | 0.12 | <0.06 | 0.19 | <0.12 | <0.06 | 0.38 |
| September | 0.006 | <0.06 | < 0.12 | < 0.12 | < 0.06 | 0.51 | 0.08 | <0.06 | 0.12 | <0.12 | <0.06 | 0.41 |
| October | 0.004 | <0.06 | < 0.12 | < 0.07 | < 0.06 | 0.15 | < 0.06 | <0.06 | 0.10 | <0.12 | <0.06 | 0.14 |
| November | 0.004 | <0.06 | < 0.12 | < 0.07 | < 0.06 | 0.13 | 0.06 | <0.06 | 0.06 | <0.12 | <0.06 | 0.08 |
| December | 0.004 | <0.06 | < 0.12 | < 0.07 | < 0.06 | <0.2 | < 0.05 | <0.06 | 0.10 | <0.12 | <0.06 | 0.06 |
| M | 0.007 | <0.10 | < 0.12 | < 0.17 | < 0.06 | 0.82 | 0.13 | <0.06 | 0.19 | <0.12 | <0.06 | 0.46 |

(*) Particulate component only

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.16

MILFORD HAVEN - UNITED KINGDOM

$10^{-3}$ pCi/m3

| | total beta pCi/m$^3$ | $^{54}Mn$ | $^{95}Zr$ | $^{95}Nb$ | $^{103}Ru$ | $^{106}Ru$ | $^{125}Sb$ | $^{131}I$ (*) | $^{137}Cs$ | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 0.010 | < 0.06 | < 0.12 | < 0.08 | 0.13 | 1.6 | 0.16 | < 0.12 | 0.21 | 0.20 | < 0.18 | 1.4 |
| February | 0.009 | < 0.06 | < 0.12 | < 0.07 | < 0.06 | 1.1 | 0.24 | < 0.06 | 0.24 | < 0.12 | < 0.06 | 0.41 |
| March | 0.010 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 1.6 | 0.24 | < 0.06 | 0.45 | < 0.12 | < 0.06 | 1.1 |
| April | 0.012 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 1.7 | 0.32 | < 0.06 | 0.44 | < 0.12 | < 0.06 | 1.1 |
| May | 0.009 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 0.97 | 0.22 | < 0.06 | 0.30 | < 0.12 | < 0.06 | 0.83 |
| June | 0.007 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 1.4 | 0.24 | < 0.06 | 0.36 | < 0.12 | < 0.06 | 0.66 |
| July | 0.010 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 1.6 | 0.20 | < 0.06 | 0.40 | < 0.12 | < 0.06 | 0.68 |
| August | 0.009 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 1.6 | 0.24 | < 0.06 | 0.23 | < 0.12 | < 0.06 | 0.38 |
| September | 0.007 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 0.30 | 0.10 | < 0.06 | 0.12 | < 0.12 | < 0.06 | 0.35 |
| October | 0.009 | < 0.06 | < 0.12 | < 0.07 | < 0.06 | 0.28 | 0.19 | < 0.06 | 0.12 | < 0.12 | < 0.06 | 0.36 |
| November | 0.008 | < 0.06 | < 0.12 | < 0.07 | < 0.06 | 0.20 | 0.06 | < 0.06 | 0.12 | < 0.12 | < 0.06 | 0.28 |
| December | 0.006 | < 0.06 | < 0.12 | < 0.07 | < 0.06 | 0.89 | 0.13 | < 0.06 | 0.18 | < 0.12 | < 0.06 | 0.28 |
| M | 0.009 | < 0.06 | < 0.12 | < 0.10 | < 0.066 | 1.1 | 0.20 | < 0.065 | 0.26 | < 0.13 | < 0.07 | 0.66 |

(*) Particulate component only

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.17

ORFORDNESS - UNITED KINGDOM

$10^{-3}$ pCi/m3

| | total beta pCi/m$^3$ | $^{54}Mn$ | $^{95}Zr$ | $^{95}Nb$ | $^{103}Ru$ | $^{106}Ru$ | $^{125}Sb$ | $^{131}I$ (*) | $^{137}Cs$ | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 0.021 | < 0.6 | < 0.12 | < 0.08 | 0.18 | 1.6 | 0.39 | < 0.6 | 0.41 | 0.59 | 0.25 | 2.1 |
| February | 0.007 | < 0.06 | < 0.12 | < 0.07 | < 0.06 | 1.2 | 0.17 | < 0.06 | 0.25 | < 0.12 | < 0.06 | 0.57 |
| March | 0.012 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 1.9 | 0.32 | < 0.06 | 0.41 | < 0.12 | < 0.06 | 1.1 |
| April | 0.017 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 2.6 | 0.30 | < 0.06 | 0.57 | < 0.12 | < 0.06 | 1.2 |
| May | 0.021 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 2.0 | 0.73 | < 0.06 | 0.64 | < 0.12 | < 0.06 | 1.5 |
| June | 0.011 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 1.9 | 0.40 | < 0.06 | 0.52 | < 0.12 | < 0.06 | 0.73 |
| July | 0.009 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 1.2 | 0.22 | < 0.06 | 0.42 | < 0.12 | < 0.06 | 0.75 |
| August | 0.006 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 0.8 | 0.19 | < 0.06 | 0.16 | < 0.12 | < 0.06 | 0.46 |
| September | 0.009 | < 0.06 | < 0.12 | < 0.12 | < 0.06 | 0.16 | 0.08 | < 0.06 | 0.11 | < 0.12 | < 0.06 | 0.13 |
| October | 0.011 | < 0.06 | < 0.12 | < 0.07 | < 0.06 | 0.83 | 0.13 | < 0.06 | 0.10 | < 0.12 | < 0.06 | 0.17 |
| November | 0.008 | < 0.06 | < 0.12 | < 0.07 | < 0.06 | 0.30 | 0.06 | < 0.06 | 0.10 | < 0.12 | < 0.06 | 0.17 |
| December | 0.008 | < 0.06 | < 0.12 | < 0.07 | < 0.06 | < 0.12 | < 0.07 | < 0.06 | 0.16 | < 0.12 | < 0.06 | 0.24 |
| M | 0.012 | < 0.10 | < 0.12 | < 0.10 | < 0.07 | < 1.2 | < 0.26 | < 0.10 | 0.32 | < 0.16 | < 0.08 | 0.76 |

(*) Particulate component only

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1979

Table 2.18

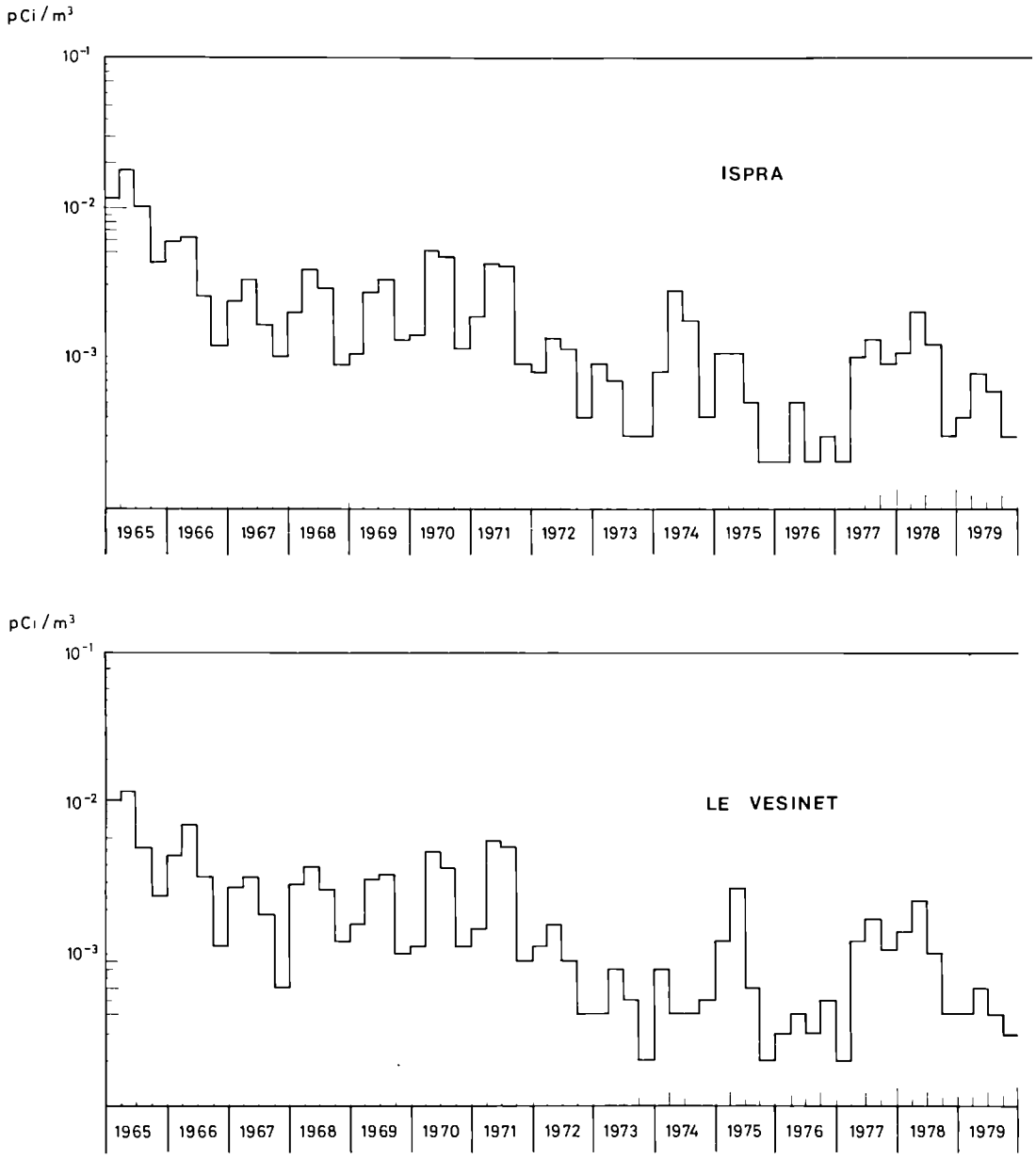
SHRIVENHAM - UNITED KINGDOM

$10^{-3}$ pCi/m3

| | total beta pCi/m$^3$ | $^{54}Mn$ | $^{95}Zr$ | $^{103}Ru$ | $^{106}Ru$ | $^{125}Sb$ | $^{131}I$ (*) | $^{137}Cs$ | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 0.015 | - | 0.24 | 1.05 | 1.7 | 1.0 | - | 0.65 | - | 0.76 | 2.0 |
| February | 0.015 | - | - | 0.19 | 1.6 | - | 1.4 | 0.65 | - | - | 2.5 |
| March | 0.006 | - | - | - | 1.4 | - | - | 0.68 | - | - | 2.1 |
| April | 0.012 | 0.05 | - | - | 1.8 | - | - | 0.78 | - | - | 2.6 |
| May | 0.009 | 0.05 | 0.05 | - | 2.0 | - | - | 0.76 | 0.32 | - | 2.1 |
| June | 0.012 | 0.05 | 0.08 | - | 1.4 | 1.2 | - | 0.84 | - | - | 2.4 |
| July | 0.009 | 0.03 | - | 0.05 | 1.1 | 0.38 | - | 0.65 | - | - | 1.4 |
| August | 0.005 | - | - | - | 0.73 | - | - | 0.43 | - | - | 0.67 |
| September | 0.007 | - | - | - | 0.73 | 0.54 | - | 0.30 | - | - | 0.54 |
| October | 0.013 | - | - | 0.05 | 0.73 | | - | 0.24 | - | - | 0.32 |
| November | 0.009 | - | - | | 0.27 | | - | 0.24 | - | - | 0.35 |
| December | 0.007 | - | - | | - | | - | 0.24 | - | - | 0.51 |
| M | 0.010 | < 0.03 | < 0.07 | < 0.14 | < 1.14 | < 0.41 | < 0.22 | 0.54 | < 0.13 | < 0.11 | 1.46 |

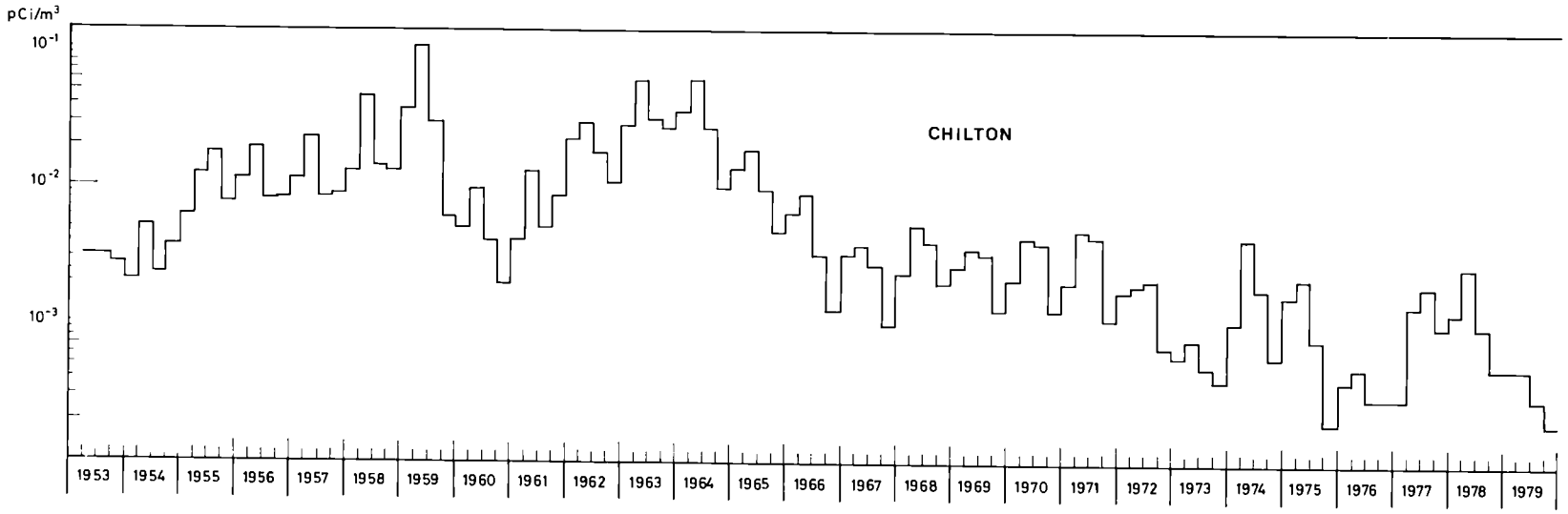
(*) Particulate component only.
Dashes indicate values below the limit of detection; these values have been taken into account when computing the mean values.

ARIATION OF THE STRONTIUM-90 ATMOSPHERIC CONCENTRATION AT ISPRA (ITALY)
AND LE VESINET (FRANCE)



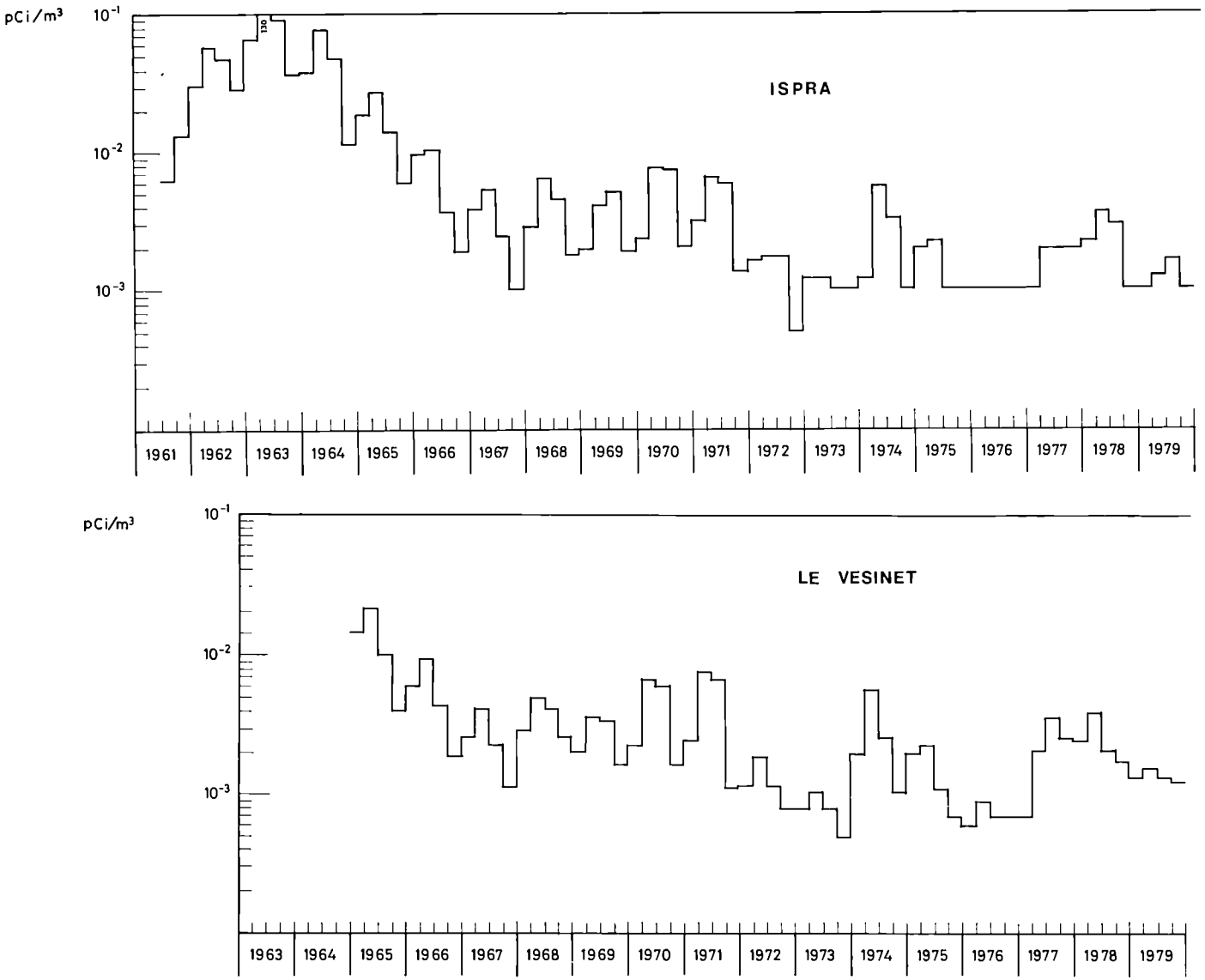

Graph 1

VARIATION OF THE CESIUM-137 ATMOSPHERIC CONCENTRATION AT CHILTON (U.K.)




Graph 2a)

VARIATION OF THE CESIUM-137 ATMOSPHERIC CONCENTRATION AT ISPRA (ITALY) AND LE VESINET (FRANCE)




Graph 2b)

## $^{90}Sr$ IN AIR NEAR GROUND LEVEL

Table 3

1967 - 1979

$10^{-3}$ pCi/m$^3$ $\bar{x}_a$

| | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BELGIQUE/BELGIË | | | | | | | | | | | | | |
| Mol..... | 1.55 | 2.01 | 2.03 | 2.61 | 2.77 | 1.07 | 0.40 | 1.34 | 0.83 | 0.35 | 1.09 | 1.26 | 1.28 |
| Brasschaat ..... | 1.58 | 2.13 | 2.02 | 2.55 | 2.78 | 0.97 | 0.44 | 1.23 | 0.83 | 0.28 | 0.84 | 1.19 | 1.17 |
| Florennes ..... | 1.72 | 2.29 | 2.09 | 2.62 | 2.91 | 1.10 | 0.51 | 1.44 | 0.86 | 0.33 | 0.91 | 1.23 | 1.00 |
| Kleine-Brogel ..... | 1.73 | 2.15 | 1.97 | 2.44 | 2.70 | 1.06 | 0.47 | 1.39 | 0.87 | 0.34 | 0.93 | 1.17 | 1.36 |
| Koksijde ..... | - | - | - | - | - | - | - | - | - | 0.30 | 0.78 | 1.16 | 1.07 |
| Schaffen ..... | 1.66 | 2.04 | 2.03 | 2.61 | 2.82 | 1.10 | 0.42 | 1.39 | 0.85 | 0.34 | 0.97 | 1.19 | 1.07 |
| Bruxelles, IHE ..... | - | - | - | - | - | - | 0.30 | 0.91 | 0.52 | 0.26 | 0.72 | 0.75 | 0.85 |
| DENMARK | | | | | | | | | | | | | |
| Risø ..... | 1.09 | 1.70 | 1.37 | 2.10 | 1.93 | 0.80 | 0.38 | 1.42 | 0.89 | 0.21 | 0.71 | 1.12 | 0.39 |
| DEUTSCHLAND (BR) | | | | | | | | | | | | | |
| Heidelberg ..... | 1.34 | 1.40 | ~0.95 | - | - | - | - | - | - | - | - | - | - |
| EURATOM : Ispra ..... | 2.07 | 2.42 | 2.10 | 3.16 | 2.77 | 0.95 | 0.55 | 1.5 | 0.7 | 0.3 | 0.9 | 1.2 | 0.5 |
| FRANCE | | | | | | | | | | | | | |
| Le Vésinet (SCPRI)... | 2.2 | 2.5 | 2.3 | 2.8 | 3.3 | 1.1 | 0.45 | 1.7 | 1.2 | <0.37 | 1.1 | 1.3 | <0.42 |
| Orsay (CEA) ..... | - | - | - | 1.89 | 1.90 | 0.98 | 0.40 | 1.24 | 0.75 | 0.27 | 0.89 | 0.89 | 0.28 |
| Le Barp-Bordeaux(CEA) | - | 0.78 | 0.77 | 1.83 | 2.52 | 1.02 | 0.39 | 1.01 | 0.56 | 0.32 | 0.74 | 0.98 | 0.30 |
| Verdun (CEA) ..... | 0.43 | 0.39 | 0.30 | 1.67 | 1.49 | 1.14 | 0.33 | 0.94 | 0.57 | 0.32 | 0.83 | 0.97 | 0.32 |
| UNITED KINGDOM | | | | | | | | | | | | | |
| Chilton ..... | 1.56 | 2.07 | 1.22 | 1.80 | 1.86 | - | - | - | - | - | - | - | - |

Table 4

## $^{137}Cs$ IN AIR NEAR GROUND LEVEL

1967 - 1979

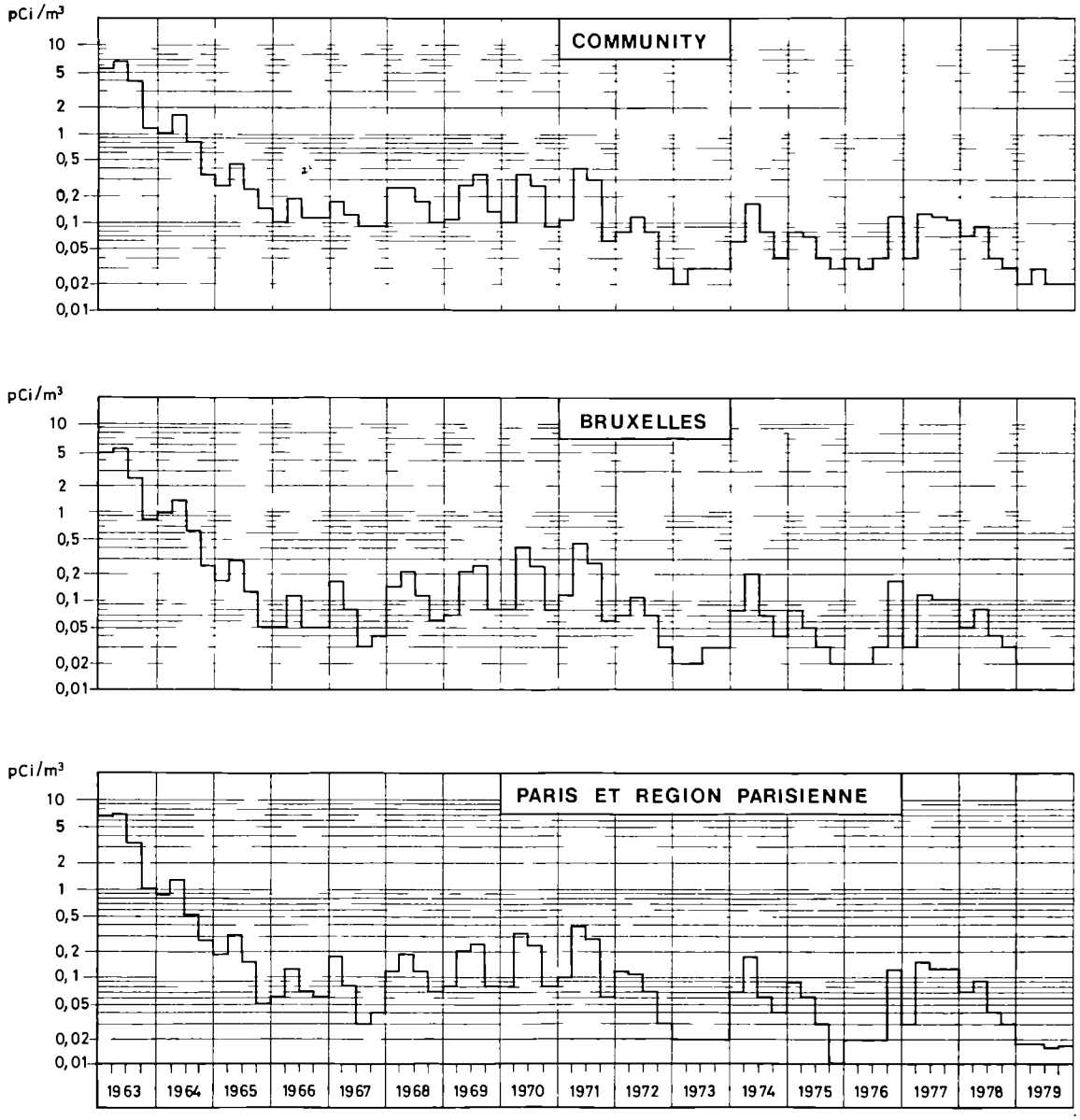
$10^{-3}$ pCi/m$^3$

$\bar{x}_a$

| | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BELGIQUE/BELGIË** | | | | | | | | | | | | | |
| Mol ..... | - | - | - | 5.0 | 6.0 | 3.6 | 2.8 | 4.4 | 2.3 | 1.6 | 2.53 | 2.1 | 1.14 |
| Bruxelles I.H.E. ... | - | - | - | - | - | - | 0.63 | 3.3 | <1.1 | <0.4 | < 1.5 | <1.6 | <0.4 |
| **DENMARK** | | | | | | | | | | | | | |
| Risø ..... | 2.26 | 2.38 | 2.45 | 3.4 | 2.67 | 1.37 | 0.47 | 1.96 | 1.30 | 0.42 | 1.62 | 3.14 | 0.85 |
| **DEUTSCHLAND** | | | | | | | | | | | | | |
| Karlsrühe..... | - | - | - | - | - | - | - | - | - | - | - | - | <0.95 |
| Braunschweig ..... | - | 2.22 | 2.32 | 3.19 | 3.32 | 1.14 | 0.49 | 1.76 | 0.94 | 0.27 | 1.004 | 1.152 | 0.397 |
| Jülich ..... | - | - | - | - | - | - | - | - | - | - | (1.84) | 2.015 | <0.6 |
| **EURATOM** | | | | | | | | | | | | | |
| Ispra ..... | 3.21 | 3.94 | 3.32 | 4.9 | 4.20 | 1.43 | 1.16 | <2.8 | <1.6 | <1.0 | ≤ 1.8 | ≤ 3 | ≤ 1.3 |
| **FRANCE** | | | | | | | | | | | | | |
| Biarritz (SCPRI) .. | <2.25 | <3.12 | <2.58 | 3.71 | <3.77 | <1.29 | <0.81 | <2.2 | <1.4 | <0.85 | < 2.4 | 2.0 | < 1.1 |
| Brest " .. | <2.78 | <3.24 | <2.67 | 3.59 | <3.83 | <1.29 | <0.86 | <2.1 | <1.3 | <0.47 | < 1.7 | <2.1 | < 1.1 |
| Bourges " .. | <1.92 | <2.94 | <2.97 | <3.24 | <3.68 | <1.40 | <0.76 | <2.1 | <1.3 | <0.56 | 1.5 | <1.9 | < 1.1 |
| Cherbourg " .. | <1.69 | <2.68 | <2.76 | <3.05 | <3.15 | <1.13 | <0.80 | <1.9 | <1.3 | <0.57 | < 1.6 | 1.8 | < 0.87 |
| Le Vésinet " .. | <2.61 | <3.53 | <2.71 | <4.31 | <4.56 | <1.38 | <0.77 | 2.6 | <1.6 | <0.73 | < 2.3 | <2.7 | < 1.4 |
| Lille " .. | <2.02 | <2.66 | <2.14 | <3.72 | <3.50 | <0.87 | <0.58 | <1.5 | <0.94 | <0.46 | < 1.2 | <1.9 | < 0.81 |
| Nice " .. | <3.57 | <4.28 | <3.48 | 5.47 | <5.50 | <1.68 | <0.92 | <2.3 | <1.4 | <0.62 | 1.8 | <2.0 | < 1.1 |
| Nîmes " .. | <2.65 | <3.76 | 2.98 | 4.33 | 4.11 | <1.26 | <0.67 | <2.4 | <1.3 | <0.72 | < 1.3 | <1.7 | < 0.82 |
| Strasbourg " .. | <2.98 | <3.59 | <2.69 | <4.54 | <4.07 | <1.32 | <0.71 | <2.5 | <1.4 | <0.59 | < 1.5 | 1.8 | < 1.0 |
| Tours " .. | <2.11 | <2.97 | 2.51 | <3.30 | <3.19 | <1.05 | <0.51 | <2.3 | <1.1 | <0.75 | < 1.3 | <1.4 | < 0.94 |
| Le Barp-Bordeaux(CEA) | - | - | - | 2.55 | 3.45 | 1.00 | 0.49 | 1.72 | 1.02 | 0.44 | 1.03 | 1.31 | 0.45 |
| Orsay ..... " | - | 2.94 | 2.64 | 3.31 | 4.50 | 1.55 | 0.82 | 2.66 | 1.44 | 0.35 | 1.42 | 1.9 | 0.73 |
| Verdun ..... " | 1.78 | 1.69 | 1.76 | 2.42 | 3.67 | 1.44 | 0.73 | 2.28 | 1.09 | 0.33 | 1.05 | 1.48 | 0.39 |
| **UNITED KINGDOM** | | | | | | | | | | | | | |
| Chilton (AERE)..... | 2.67 | 3.52 | 2.79 | 3.28 | 3.20 | 1.68 | 0.57 | 2.01 | 1.2 | 0.38 | 1.11 | 1.4 | 0.37 |
| Milford Haven ..... | 1.94 | 2.31 | 1.82 | 2.31 | 2.71 | 1.32 | 0.58 | 2.67 | 1.2 | 0.4 | 1.15 | 1.2 | 0.26 |
| Eskdalemuir ..... | 2.55 | 1.58 | 1.58 | 1.51 | 1.85 | 1.10 | 0.46 | 0.83 | 0.5 | 0.2 | 0.37 | 0.66 | 0.31 |
| Orfordness ..... | 1.58 | 3.52 | 3.04 | 3.64 | 3.78 | 1.32 | 0.71 | 2.28 | 1.1 | 0.5 | 0.98 | 1.2 | 0.32 |
| Lerwick ..... | 2.67 | 3.16 | 2.79 | 2.77 | 2.95 | 1.76 | 0.72 | 1.49 | 1.4 | 0.3 | 0.57 | 1.3 | 0.19 |
| Chilton (NRPB)..... | - | - | - | - | - | - | - | - | - | 0.44 | 1.4 | (*) | (*) |
| Glasgow ..... | - | - | - | - | - | - | - | - | - | 0.26 | 1.0 | 1.6 | 0.46 |
| Shrivenham ..... | - | - | - | - | - | - | - | - | - | 0.33 | 1.3 | 2.1 | 0.54 |

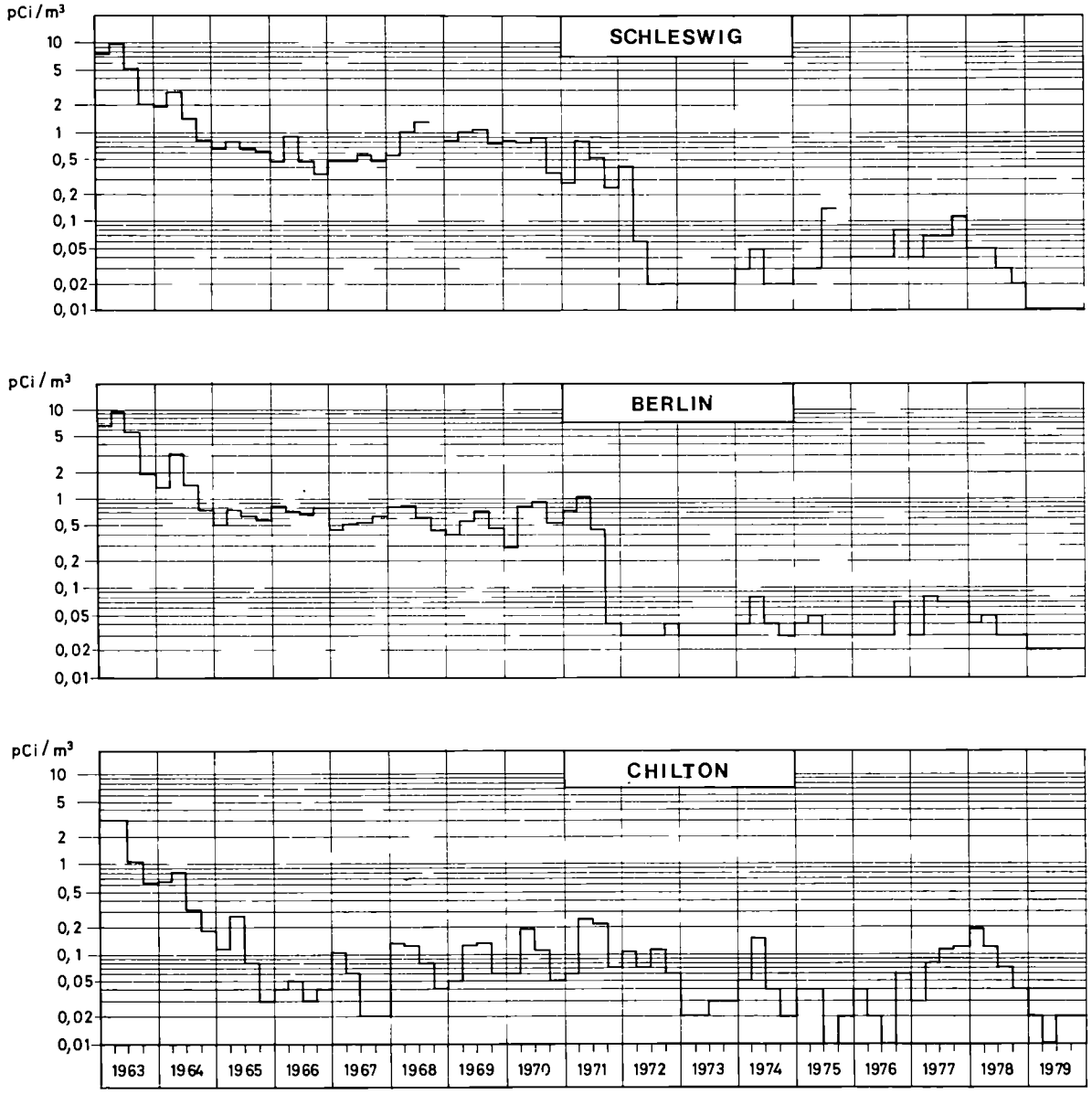
(*) No longer sampled

VARIATION OF THE TOTAL BETA ACTIVITY OF THE ATMOSPHERE AT SEVERAL STATIONS OF THE NETWORK ESTABLISHED ON THE TERRITORY OF THE EUROPEAN COMMUNITY AND AVERAGE TOTAL BETA ACTIVITY FOR THE COMMUNITY



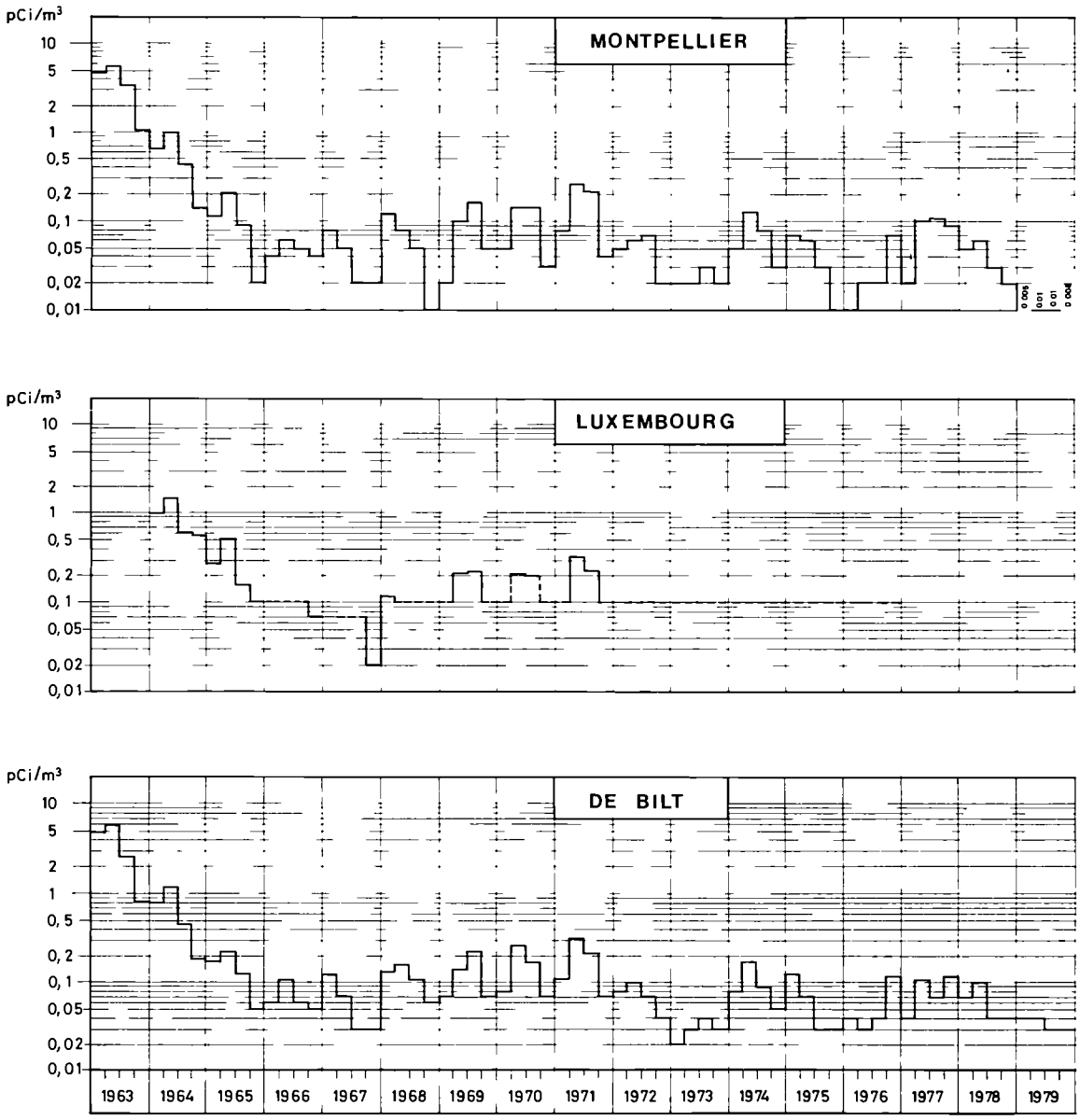

Graph 3a)

VARIATION OF THE TOTAL BETA ACTIVITY OF THE ATMOSPHERE AT SEVERAL STATIONS OF THE NETWORK ESTABLISHED ON THE TERRITORY OF THE EUROPEAN COMMUNITY AND AVERAGE TOTAL BETA ACTIVITY FOR THE COMMUNITY



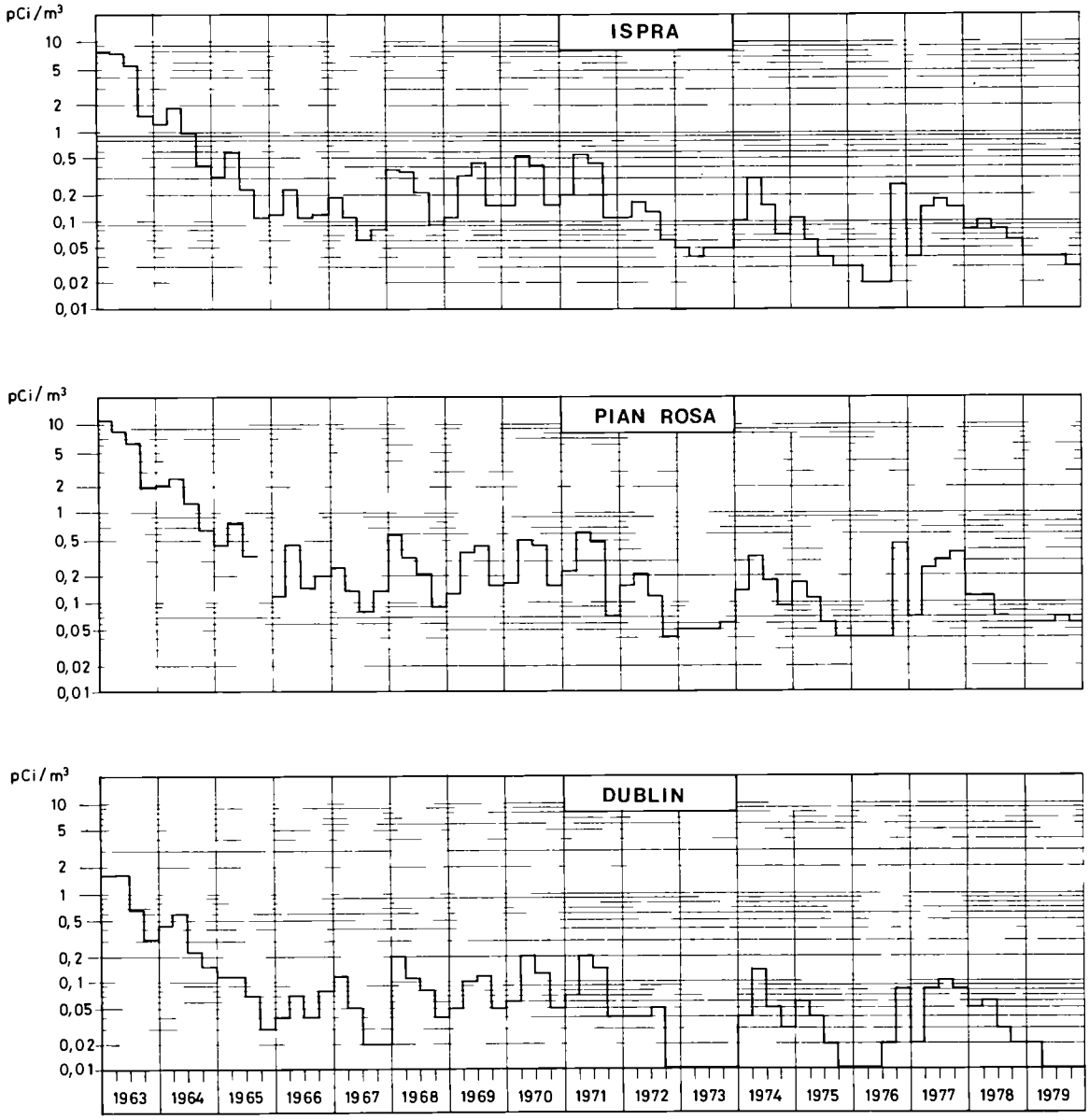

Graph 3b)

VARIATION OF THE TOTAL BETA ACTIVITY OF THE ATMOSPHERE AT SEVERAL STATIONS OF THE NETWORK ESTABLISHED ON THE TERRITORY OF THE EUROPEAN COMMUNITY AND AVERAGE TOTAL BETA ACTIVITY FOR THE COMMUNITY




Graph 3c)

VARIATION OF THE TOTAL BETA ACTIVITY OF THE ATMOSPHERE AT SEVERAL STATIONS OF THE NETWORK ESTABLISHED ON THE TERRITORY OF THE EUROPEAN COMMUNITY AND AVERAGE TOTAL BETA ACTIVITY FOR THE COMMUNITY




Graph 3d)

TOTAL BETA IN AIR

1979

Table 5

pCi/m3

| | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | | 11 | | 12 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_a = \frac{\sum \bar{x}}{12}$ |
| Belgique/België | 0.02 | 9 | 0.02 | 8 | 0.01 | 9 | 0.02 | 9 | 0.02 | 9 | 0.02 | 9 | 0.02 | 9 | 0.01 | 9 | 0.02 | 9 | 0.02 | 9 | 0.01 | 9 | 0.02 | 9 | 0.02 |
| Denmark | 0.03 | 1 | 0.03 | 1 | 0.03 | 1 | 0.04 | 1 | 0.04 | 1 | 0.05 | 1 | 0.02 | 1 | 0.03 | 1 | 0.03 | 1 | 0.07 | 1 | 0.02 | 1 | 0.02 | 1 | 0.03 |
| Deutschland (BR) | <0.04 | 11 | <0.03 | 11 | <0.03 | 11 | <0.03 | 11 | <0.03 | 11 | <0.03 | 11 | <0.03 | 11 | <0.03 | 11 | <0.03 | 11 | <0.03 | 11 | <0.03 | 11 | <0.03 | 11 | < 0.03 |
| France (SCPRI) | <0.021 | 17 | <0.019 | 17 | <0.016 | 18 | <0.019 | 18 | <0.024 | 18 | 0.021 | 18 | 0.021 | 18 | < 0.018 | 19 | 0.023 | 18 | < 0.021 | 18 | <0.017 | 18 | <0.018 | 19 | < 0.02 |
| France (CEA) | 0.027 | 23 | <0.017 | 24 | 0.015 | 24 | 0.031 | 23 | 0.024 | 24 | 0.022 | 24 | 0.025 | 23 | 0.013 | 23 | 0.023 | 24 | 0.017 | 24 | 0.014 | 24 | 0.016 | 23 | 0.02 |
| Irlande | 0.01 | 2 | 0.02 | 2 | 0.02 | 2 | 0.02 | 2 | 0.02 | 2 | 0.02 | 2 | 0.02 | 2 | 0.02 | 2 | 0.01 | 2 | 0.01 | 2 | 0.02 | 1 | 0.03 | 1 | 0.02 |
| Italia | 0.05 | 17 | 0.05 | 17 | <0.05 | 16 | <0.05 | 17 | <0.06 | 16 | 0.06 | 18 | 0.07 | 18 | <0.07 | 18 | 0.06 | 18 | < 0.06 | 17 | <0.06 | 18 | <0.05 | 17 | < 0.06 |
| Luxembourg (G.D.) | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - |
| Nederland | 0.03 | 5 | 0.03 | 5 | 0.03 | 5 | 0.03 | 5 | 0.03 | 5 | 0.03 | 5 | 0.03 | 5 | 0.03 | 5 | 0.05 | 5 | 0.04 | 5 | 0.02 | 5 | 0.03 | 5 | 0.03 |
| United-Kingdom | 0.016 | 7 | 0.013 | 7 | 0.016 | 7 | 0.016 | 7 | 0.011 | 7 | 0.010 | 7 | 0.013 | 7 | 0.009 | 7 | 0.009 | 7 | 0.010 | 7 | 0.009 | 7 | 0.009 | 7 | 0.01 |
| M | <0.03 | 92 | <0.03 | 92 | <0.02 | 93 | <0.03 | 93 | <0.03 | 93 | <0.03 | 95 | <0.03 | 94 | <0.03 | 94 | <0.03 | 95 | < 0.03 | 94 | <0.02 | 94 | <0.02 | 93 | < 0.03 |

TOTAL BETA IN AIR $\bar{x}_m$

1962 - 1979

Table 6.1

pCi/m$^3$

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BELGIQUE/BELGIË | | | | | | | | | | | | |
| 1962 ..... | 4.7 | 3.4 | 3.2 | 2.6 | 2.5 | 2.4 | 1.9 | 1.9 | 3.8 | 3.9 | 6.8 | 6.4 |
| 1963 ..... | 5.37 | 4.62 | 5.62 | 5.66 | 5.35 | 6.10 | 4.07 | 2.86 | 1.79 | 1.33 | 0.93 | 0.77 |
| 1964 ..... | 0.78 | 1.12 | 0.94 | 1.06 | 1.81 | 1.51 | 1.01 | 0.52 | 0.33 | 0.25 | 0.35 | 0.12 |
| 1965 ..... | 0.13 | 0.17 | 0.24 | 0.23 | 0.27 | 0.43 | 0.22 | 0.10 | 0.06 | 0.07 | 0.04 | 0.03 |
| 1966 ..... | 0.04 | 0.05 | 0.06 | 0.07 | 0.11 | 0.24 | 0.08 | 0.06 | 0.04 | 0.03 | 0.10 | 0.04 |
| 1967 ..... | 0.16 | 0.17 | 0.14 | 0.11 | 0.08 | 0.04 | 0.04 | 0.03 | 0.03 | 0.04 | 0.04 | 0.03 |
| 1968 ..... | 0.18 | 0.15 | 0.17 | 0.23 | 0.19 | 0.17 | 0.16 | 0.13 | 0.09 | 0.08 | 0.05 | 0.06 |
| 1969 ..... | 0.06 | 0.06 | 0.11 | 0.11 | 0.26 | 0.32 | 0.32 | 0.32 | 0.20 | 0.13 | 0.07 | 0.05 |
| 1970 ..... | 0.05 | 0.07 | 0.10 | 0.17 | 0.37 | 0.53 | 0.30 | 0.26 | 0.14 | 0.08 | 0.08 | 0.05 |
| 1971 ..... | 0.07 | 0.08 | 0.18 | 0.38 | 0.45 | 0.38 | 0.43 | 0.25 | 0.13 | 0.09 | 0.04 | 0.05 |
| 1972 ..... | 0.08 | 0.07 | 0.10 | 0.08 | 0.14 | 0.13 | 0.11 | 0.06 | 0.04 | 0.04 | 0.02 | 0.03 |
| 1973 ..... | 0.02 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.02 | 0.03 | 0.02 |
| 1974 ..... | 0.04 | 0.06 | 0.11 | 0.20 | 0.20 | 0.16 | 0.10 | 0.06 | 0.04 | 0.02 | 0.03 | 0.04 |
| 1975 ..... | 0.07 | 0.11 | 0.08 | 0.05 | 0.06 | 0.05 | 0.04 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 |
| 1976 ..... | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.02 | 0.36 | 0.10 | 0.04 |
| 1977 ..... | 0.02 | 0.02 | 0.04 | 0.06 | 0.17 | 0.18 | 0.13 | 0.11 | 0.12 | 0.23 | 0.06 | 0.06 |
| 1978 ..... | 0.05 | 0.05 | 0.10 | 0.10 | 0.08 | 0.08 | 0.04 | 0.03 | 0.02 | 0.03 | 0.02 | 0.03 |
| 1979 ..... | 0.02 | 0.02 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.02 | 0.01 | 0.02 |

TOTAL BETA IN AIR $\bar{x}_m$

1962 - 1979

Table 6.2

pCi/m3

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DENMARK | | | | | | | | | | | | |
| 1962 ..... | | January/June | | | | 4.7 | | July/December | | | | 2.7 |
| 1963 ..... | | " | | | | 9.8 | | " | | | | 2,9 |
| 1964 ..... | | " | | | | 2.1 | | " | | | | 0.48 |
| 1965 ..... | | " | | | | 0,24 | | " | | | | 0.09 |
| 1966 ..... | | " | | | | 0.05 | | " | | | | 0.04 |
| 1967 ..... | | " | | | | 0.07 | | " | | | | 0.03 |
| 1968 ..... | | " | | | | 0.11 | | " | | | | 0,07 |
| 1969 ..... | | " | | | | 0,12 | | " | | | | 0.12 |
| 1970 ..... | | " | | | | 0.06 | | " | | | | 0.06 |
| 1971 ..... | | " | | | | 0.12 | | " | | | | 0.07 |
| 1972 ..... | | " | | | | 0.11 | | " | | | | 0.07 |
| 1973 ..... | | " | | | | 0.04 | | " | | | | 0.04 |
| 1974 ..... | | " | | | | 0.15 | | " | | | | 0.06 |
| 1975 ..... | | " | | | | 0.11 | | " | | | | 0.05 |
| 1976 ..... | 0.02 | 0.04 | 0.04 | 0.04 | 0.04 | 0.03 | 0.03 | 0.05 | 0.05 | 0.28 | 0,14 | 0.05 |
| 1977 ..... | 0.02 | 0,03 | 0.05 | 0,07 | 0.23 | 0.24 | 0.14 | 0.17 | 0.12 | 0.20 | 0.06 | 0.05 |
| 1978 ..... | 0.08 | 0.08 | 0.12 | 0.15 | 0.23 | 0.14 | 0.07 | 0.06 | 0.02 | 0.04 | 0.04 | 0.04 |
| 1979 ..... | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.05 | 0.02 | 0.03 | 0.03 | 0.07 | 0.02 | 0.02 |

TOTAL BETA IN AIR $\bar{x}_m$

1962 - 1979

Table 6.3

pCi/m3

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEUTSCHLAND (BR) | | | | | | | | | | | | |
| 1962 ..... | 6.0 | 4.2 | 4.1 | 4.4 | 4.0 | 4.5 | 3.1 | 2.5 | 4.9 | 5.7 | 7.7 | 6.5 |
| 1963 ..... | 6.07 | 5.88 | 8.20 | 10.19 | 9.13 | 10.42 | 8.40 | 5.24 | 3.22 | 2.72 | 1.93 | 1.41 |
| 1964 ..... | 1.36 | 1.62 | 1.66 | 2.44 | 3.45 | 2.76 | 2.18 | 1.46 | 1.26 | 1.10 | 0.97 | 0.48 |
| 1965 ..... | 0.44 | 0.40 | 0.58 | 0.73 | 0.65 | 0.91 | 0.65 | 0.63 | 0.63 | 0.89 | 0.50 | 0.37 |
| 1966 ..... | 0.44 | 0.54 | 0.49 | 0.50 | 0.65 | 0.90 | 0.53 | 0.56 | 0.77 | 0.74 | 0.56 | 0.38 |
| 1967 ..... | 0.40 | 0.51 | 0.47 | 0.63 | 0.57 | 0.49 | 0.59 | 0.56 | 0.62 | 0.58 | 0.51 | 0.36 |
| 1968 ..... | 0.48 | 0.58 | 0.60 | 0.88 | 0.62 | 0.65 | 0.68 | 0.66 | 0.48 | 0.41 | 0.42 | 0.41 |
| 1969 ..... | 0.42 | 0.36 | 0.48 | 0.47 | 0.67 | 0.75 | 0.79 | 0.70 | 0.84 | 0.84 | 0.43 | 0.34 |
| 1970 ..... | 0.20 | 0.20 | 0.20 | 0.13 | 0.29 | 0.48 | 0.25 | 0.22 | 0.17 | 0.08 | 0.09 | <0.18 |
| 1971 ..... | 0.14 | 0.15 | 0.23 | 0.36 | 0.35 | 0.37 | 0.43 | 0.21 | 0.16 | <0.09 | 0.09 | <0.11 |
| 1972 ..... | <0.11 | <0.12 | <0.11 | <0.11 | <0.07 | <0.10 | <0.10 | <0.08 | <0.07 | <0.05 | <0.06 | <0.05 |
| 1973 ..... | <0.04 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | <0.05 | <0.05 | <0.05 | 0.04 |
| 1974 ..... | <0.03 | <0.04 | <0.06 | 0.09 | 0.08 | 0.07 | <0.05 | 0.04 | 0.04 | <0.04 | <0.04 | 0.04 |
| 1975 ..... | 0.05 | <0.06 | <0.06 | <0.05 | <0.06 | 0.05 | <0.05 | <0.05 | 0.05 | 0.04 | <0.04 | <0.04 |
| 1976..... | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | 0.04 | 0.13 | 0.05 | <0.04 |
| 1977 ..... | <0.04 | <0.03 | 0.04 | <0.04 | <0.09 | <0.09 | 0.07 | <0.07 | <0.06 | <0.11 | <0.04 | 0.04 |
| 1978 ..... | <0.04 | <0.04 | <0.06 | <0.07 | <0.05 | <0.05 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 |
| 1979 ..... | <0.04 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 |

TOTAL BETA IN AIR $\bar{x}_m$ Table 6.4

1962 - 1979 pCi/m$^3$

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FRANCE 1962..... | 4.5 | 3.5 | 3.3 | 3.4 | 3.3 | 3.4 | 2.7 | 1.9 | 3.2 | 3.5 | 4.7 | 4.5 |
| 1963..... | 4.99 | 4.67 | 6.07 | 6.12 | 6.11 | 5.43 | 5.18 | 2.72 | 1.78 | 1.47 | 1.03 | 0.93 |
| 1964..... | 0.90 | 0.89 | 0.92 | 1.01 | 1.61 | 1.50 | 0.98 | 0.52 | 0.32 | 0.28 | 0.31 | 0.14 |
| 1965..... | 0.14 | 0.17 | 0.20 | 0.17 | 0.22 | 0.37 | 0.24 | 0.09 | 0.06 | 0.06 | 0.04 | 0.03 |
| 1966..... | 0.04 | 0.05 | 0.06 | 0.06 | 0.10 | 0.20 | 0.09 | 0.06 | 0.05 | 0.03 | 0.12 | 0.04 |
| 1967..... | 0.15 | 0.16 | 0.15 | 0.10 | 0.08 | 0.05 | 0.04 | 0.03 | 0.03 | 0.04 | 0.04 | 0.05 |
| 1968..... | 0.28 | 0.16 | 0.18 | 0.22 | 0.17 | 0.18 | 0.17 | 0.14 | 0.09 | 0.08 | 0.05 | 0.06 |
| 1969..... | 0.07 | 0.06 | 0.10 | 0.11 | 0.24 | 0.31 | 0.35 | 0.29 | 0.17 | 0.15 | 0.07 | 0.06 |
| 1970..... | 0.06 | 0.07 | 0.12 | 0.18 | 0.33 | 0.43 | 0.30 | 0.26 | 0.14 | 0.09 | 0.09 | 0.05 |
| 1971..... | 0.07 | 0.09 | 0.15 | 0.35 | 0.37 | 0.39 | 0.48 | 0.22 | 0.14 | 0.09 | 0.04 | 0.04 |
| 1972..... | 0.10 | 0.05 | 0.08 | 0.09 | 0.11 | 0.12 | 0.12 | 0.07 | 0.04 | 0.04 | 0.03 | 0.04 |
| 1973 (SCPRI) | 0.024 | 0.015 | 0.025 | 0.021 | 0.020 | 0.022 | 0.022 | 0.038 | 0.030 | 0.028 | 0.029 | 0.027 |
| 1973 (CEA).. | 0.021 | 0.017 | 0.024 | 0.022 | 0.021 | 0.024 | 0.021 | 0.027 | 0.026 | 0.025 | 0.028 | 0.026 |
| 1974 (SCPRI) | 0.045 | 0.059 | 0.12 | 0.20 | 0.23 | 0.18 | 0.11 | 0.086 | 0.040 | 0.022 | 0.040 | 0.057 |
| 1974 (CEA).. | 0.036 | 0.048 | 0.094 | 0.171 | 0.196 | 0.172 | 0.085 | 0.163 | 0.048 | 0.026 | 0.039 | 0.050 |
| 1975 (SCPRI) | 0.071 | 0.11 | 0.082 | 0.069 | 0.072 | 0.056 | 0.039 | 0.030 | 0.023 | 0.021 | <0.015 | <0.016 |
| 1975 (CEA).. | 0.061 | 0.082 | 0.071 | 0.069 | 0.067 | 0.049 | 0.039 | 0.029 | 0.025 | 0.024 | 0.016 | 0.015 |
| 1976 (SCPRI) | <0.018 | <0.029 | <0.025 | <0.021 | <0.021 | <0.031 | <0.019 | <0.024 | <0.020 | 0.32 | 0.085 | 0.030 |
| 1976 (CEA).. | 0.017 | 0.024 | 0.023 | 0.021 | 0.020 | 0.023 | 0.021 | 0.024 | 0.019 | 0.267 | 0.078 | 0.032 |
| 1977 (SCPRI) | <0.02 | 0.019 | 0.046 | 0.083 | 0.17 | 0.18 | 0.16 | 0.13 | 0.13 | 0.26 | 0.07 | 0.065 |
| 1977 (CEA).. | 0.015 | 0.015 | 0.046 | 0.082 | 0.14 | 0.156 | 0.144 | 0.117 | 0.122 | 0.228 | 0.06 | 0.058 |
| 1978 (SCPRI) | 0.052 | 0.060 | 0.11 | 0.11 | 0.090 | 0.087 | 0.066 | 0.042 | 0.034 | 0.030 | 0.032 | 0.027 |
| 1978 (CEA).. | 0.051 | 0.055 | 0.096 | 0.103 | 0.082 | 0.080 | 0.061 | 0.041 | 0.030 | 0.028 | 0.029 | 0.027 |
| 1979 (SCPRI) | <0.021 | <0.019 | <0.016 | <0.019 | <0.024 | 0.021 | 0.021 | <0.018 | 0.023 | <0.021 | <0.017 | <0.018 |
| 1979 (CEA).. | 0.027 | <0.017 | 0.015 | 0.031 | 0.024 | 0.022 | 0.025 | 0.013 | 0.023 | 0.017 | 0.014 | 0.016 |

TOTAL BETA IN AIR $\bar{x}_m$

1962 - 1979

Table 6.5

pCi/m$^3$

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IRELAND | | | | | | | | | | | | |
| 1962 ..... | 2.71 | 2.44 | 1.78 | 1.78 | 1.83 | 1.71 | 1.26 | 0.54 | 2.11 | 2.28 | 3.25 | 4.25 |
| 1963 ..... | 3.59 | 2.57 | 2.47 | 2.48 | 2.79 | 2.71 | 1.30 | 0.85 | 0.97 | 0.68 | 0.39 | 0.45 |
| 1964 ..... | 0.52 | 0.68 | 0.56 | 0.61 | 0.91 | 0.86 | 0.48 | 0.24 | 0.14 | 0.15 | 0.29 | 0.09 |
| 1965 ..... | 0.09 | 0.15 | 0.16 | 0.13 | 0.12 | 0.18 | 0.14 | 0.05 | 0.03 | 0.04 | 0.03 | 0.02 |
| 1966 ..... | 0.03 | 0.05 | 0.05 | 0.04 | 0.04 | 0.09 | 0.05 | 0.03 | 0.02 | 0.02 | 0.15 | 0.03 |
| 1967 ..... | 0.11 | 0.11 | 0.11 | 0.06 | 0.04 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 |
| 1968 ..... | 0.43 | 0.09 | 0.09 | 0.12 | 0.10 | 0.09 | 0.09 | 0.10 | 0.06 | 0.05 | 0.03 | 0.04 |
| 1969 ..... | 0.04 | 0.03 | 0.06 | 0.05 | 0.08 | 0.15 | 0.13 | 0.11 | 0.10 | 0.08 | 0.05 | 0.04 |
| 1970 ..... | 0.03 | 0.07 | 0.07 | 0.10 | 0.22 | 0.24 | 0.14 | 0.12 | 0.08 | 0.07 | 0.04 | 0.04 |
| 1971 ..... | 0.04 | 0.07 | 0.12 | 0.18 | 0.21 | 0.20 | 0.22 | 0.14 | 0.08 | 0.06 | 0.03 | 0.03 |
| 1972 ..... | 0.07 | 0.04 | 0.03 | 0.08 | 0.06 | 0.06 | 0.06 | 0.04 | 0.04 | 0.04 | 0.01 | 0.02 |
| 1973 ..... | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.02 | 0.02 | 0.02 |
| 1974 ..... | 0.03 | 0.04 | 0.06 | 0.16 | 0.11 | 0.11 | 0.07 | 0.04 | 0.03 | 0.02 | 0.03 | 0.04 |
| 1975 ..... | 0.04 | 0.08 | 0.06 | 0.05 | 0.06 | 0.04 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| 1976 ..... | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.13 | 0.05 | 0.02 |
| 1977 ..... | 0.03 | 0.02 | 0.03 | 0.04 | 0.09 | 0.11 | 0.09 | 0.08 | 0.11 | 0.12 | 0.05 | 0.04 |
| 1978 ..... | 0.03 | 0.04 | 0.07 | 0.07 | 0.06 | 0.05 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 |
| 1979 ..... | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.02 | 0.03 |

TOTAL BETA IN AIR $\bar{x}_m$ Table 6.6

1962 - 1979 pCi/m$^3$

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ITALIA | 1962 ... | 5.6 | 5.2 | 4.2 | 4.6 | 3.9 | 4.0 | 3.8 | 2.6 | 1.7 | 4.2 | 6.7 | 7.1 |
| | 1963 ... | 6.71 | 5.69 | 6.03 | 6.57 | 7.57 | 6.89 | 7.98 | 4.54 | 2.52 | 1.71 | 1.11 | 1.08 |
| | 1964 ... | 1.36 | 1.19 | 1.02 | 1.58 | 2.11 | 2.08 | 1.57 | 0.96 | 0.49 | 0.51 | 0.37 | 0.19 |
| | 1965 ... | 0.22 | 0.26 | 0.27 | 0.32 | 0.40 | 0.81 | 0.49 | 0.49 | 0.20 | 0.12 | 0.13 | 0.08 |
| | 1966 ... | 0.08 | 0.09 | 0.12 | 0.12 | 0.14 | 0.44 | 0.17 | <0.12 | <0.09 | <0.06 | 0.25 | 0.08 |
| | 1967 ... | 0.13 | 0.21 | 0.19 | 0.15 | 0.12 | <0.08 | <0.08 | <0.07 | <0.08 | <0.09 | <0.08 | 0.10 |
| | 1968 ... | 0.43 | 0.19 | 0.21 | 0.27 | 0.25 | 0.21 | 0.22 | 0.17 | 0.12 | 0.08 | <0.07 | 0.10 |
| | 1969 ... | <0.10 | <0.09 | <0.08 | 0.16 | 0.31 | 0.37 | 0.52 | 0.43 | 0.24 | 0.20 | <0.11 | <0.08 |
| | 1970 ... | 0.08 | 0.10 | 0.19 | 0.28 | 0.42 | 0.55 | 0.53 | 0.32 | 0.22 | 0.13 | 0.13 | 0.08 |
| | 1971 ... | 0.08 | 0.12 | 0.19 | 0.43 | 0.53 | 0.57 | 0.63 | 0.36 | 0.15 | 0.10 | 0.06 | 0.07 |
| | 1972 ... | 0.09 | <0.06 | <0.11 | 0.13 | 0.15 | <0.20 | 0.17 | 0.09 | <0.05 | <0.05 | <0.05 | <0.05 |
| | 1973 ... | <0.04 | <0.04 | <0.04 | <0.04 | <0.05 | <0.06 | <0.06 | <0.06 | <0.06 | <0.05 | <0.05 | <0.06 |
| | 1974 ... | <0.07 | <0.08 | <0.17 | 0.23 | 0.29 | <0.26 | 0.21 | 0.17 | 0.09 | 0.06 | <0.07 | <0.08 |
| | 1975 ... | 0.10 | <0.12 | <0.14 | <0.13 | <0.11 | <0.09 | 0.06 | <0.05 | 0.05 | 0.04 | 0.04 | 0.04 |
| | 1976 ... | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | 0.51 | 0.11 | 0.11 |
| | 1977 ... | <0.04 | <0.04 | 0.09 | 0.13 | 0.25 | 0.25 | 0.28 | 0.22 | 0.18 | 0.37 | 0.12 | 0.10 |
| | 1978 ... | 0.08 | 0.07 | 0.13 | 0.11 | 0.10 | 0.12 | 0.11 | 0.09 | 0.05 | 0.05 | 0.05 | 0.05 |
| | 1979 ... | <0.05 | 0.05 | <0.05 | <0.05 | <0.06 | 0.06 | 0.07 | <0.07 | 0.06 | <0.06 | <0.06 | <0.05 |

TOTAL BETA IN AIR $\bar{x}_m$ Table 6.7

1962 - 1979 pCi/m$^3$

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GRAND-DUCHE de LUXEMBOURG | | | | | | | | | | | | |
| 1962 ..... | 5,2 | 2.7 | 3,1 | 2,8 | 2,6 | 1,8 | 1.8 | 1,4 | 2,6 | 4,1 | 4,4 | 5,4 |
| 1963 ..... | 3.8 | 4.5 | 5.7 | 6,2 | 6,3 | 6,9 | 4,6 | 4,2 | 2,7 | 1.7 | 0,9 | 0.5 |
| 1964 ..... | 0.8 | 1,2 | 0,94 | 1.4 | 1,6 | 1,8 | - | 0,75 | 0.5 | 0.3 | 0,4 | <1.0 |
| 1965 ..... | 0.23 | 0.30 | 0.31 | 0,39 | 0.56 | 0,60 | 0,20 | 0,18 | 0,10 | 0,10 | 0.10 | 0,10 |
| 1966 ..... | <0.1 | <0,1 | <0,1 | <0.1 | <0,1 | <0,1 | <0,1 | <0.1 | <0,1 | <0.05 | 0,11 | 0,05 |
| 1967 ..... | <0.1 | <0.1 | <0,1 | <0,1 | <0,1 | <0,1 | <0,1 | <0,1 | <0,1 | 0.03 | 0.02 | 0.02 |
| 1968 ..... | 0.14 | 0,11 | 0,2 | <0,1 | <0.1 | <0,1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| 1969 ..... | <0.1 | <0,1 | 0,11 | 0,12 | 0,2 | 0,3 | 0.24 | 0,22 | 0.19 | - | <0,1 | <0,1 |
| 1970 ..... | <0.1 | <0.1 | <0,1 | 0.16 | 0.20 | 0,27 | 0,2 | 0,3 | 0,1 | <0.1 | <0,1 | <0,1 |
| 1971 ..... | <0.1 | <0,1 | <0,1 | 0.3 | 0,4 | 0,3 | 0,4 | 0.2 | <0,1 | <0.1 | <0.1 | <0,1 |
| 1972 ..... | <0,1 | <0.1 | <0,1 | <0,1 | <0.1 | <0,1 | <0.1 | - | <0.1 | <0.1 | <0,1 | - |
| 1973 ..... | <0.1 | <0,1 | <0,1 | <0,1 | <0,1 | <0.1 | <0,1 | <0,1 | <0,1 | <0,1 | <0,1 | <0.1 |
| 1974 ..... | <0,1 | <0,1 | <0,1 | <0,1 | <0,1 | <0.1 | <0,1 | <0,1 | <0.1 | <0,1 | <0,1 | <0,1 |
| 1975 ..... | <0,1 | <0.1 | <0,1 | <0,1 | <0,1 | <0.1 | <0,1 | <0,1 | <0,1 | <0,1 | <0,1 | <0.1 |
| 1976 ..... | <0,1 | <0.1 | <0,1 | <0,1 | <0,1 | - | <0.1 | <0,1 | <0.1 | <0,1 | <0.1 | <0,1 |
| 1977 ..... | - | | - | - | - | - | - | - | - | - | - | - |
| 1978 ..... | - | - | - | - | - | - | - | - | - | - | - | - |
| 1979 ..... | - | - | - | - | - | - | - | - | - | - | - | - |

TOTAL BETA IN AIR $\bar{x}_m$ Table 6.8

1962 - 1979 pCi/m3

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NEDERLAND | | | | | | | | | | | | |
| 1962 ..... | 4.3 | 3.4 | 3.0 | 2.6 | 2.3 | 2.5 | 1.6 | 1.0 | 2.6 | 3.5 | 5.3 | 4.7 |
| 1963 ..... | 5.36 | 4.12 | 5.24 | 5.82 | 5.30 | 6.54 | 3.78 | 2.46 | 1.52 | 1.04 | 1.86 | 0.60 |
| 1964 ..... | 0.66 | 0.85 | 0.78 | 0.95 | 1.57 | 1.18 | 0.73 | 0.42 | 0.28 | 0.20 | 0.29 | 0.10 |
| 1965 ..... | 0.14 | 0.18 | 0.23 | 0.18 | 0.23 | 0.33 | 0.21 | 0.11 | 0.07 | 0.07 | 0.05 | 0.03 |
| 1966 ..... | 0.05 | 0.06 | 0.06 | 0.06 | 0.09 | 0.21 | 0.12 | 0.07 | 0.06 | 0.04 | 0.06 | 0.04 |
| 1967 ..... | 0.13 | 0.14 | 0.12 | 0.09 | 0.07 | 0.04 | 0.03 | 0.03 | 0.03 | 0.04 | 0.03 | 0.04 |
| 1968 ..... | 0.14 | 0.15 | 0.15 | 0.19 | 0.16 | 0.18 | 0.14 | 0.14 | 0.08 | 0.07 | 0.05 | 0.06 |
| 1969 ..... | 0.07 | 0.06 | 0.09 | 0.09 | 0.21 | 0.24 | 0.27 | 0.28 | 0.16 | 0.11 | 0.06 | 0.06 |
| 1970 ..... | 0.06 | 0.06 | 0.10 | 0.14 | 0.30 | 0.43 | 0.23 | 0.24 | 0.13 | 0.08 | 0.07 | 0.06 |
| 1971 ..... | 0.08 | 0.09 | 0.16 | 0.32 | 0.38 | 0.36 | 0.35 | 0.21 | 0.12 | 0.08 | 0.05 | 0.06 |
| 1972 ..... | 0.07 | 0.07 | 0.07 | 0.08 | 0.10 | 0.10 | 0.11 | 0.07 | 0.04 | 0.04 | 0.03 | 0.04 |
| 1973 ..... | 0.03 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 |
| 1974 ..... | 0.05 | 0.07 | 0.12 | 0.20 | 0.21 | 0.18 | 0.11 | 0.08 | 0.05 | 0.04 | 0.05 | 0.06 |
| 1975 ..... | 0.08 | 0.12 | 0.10 | 0.07 | 0.06 | 0.06 | 0.05 | 0.04 | 0.03 | 0.03 | 0.03 | 0.02 |
| 1976 ..... | 0.03 | 0.03 | 0.04 | 0.03 | 0.04 | 0.03 | 0.02 | 0.04 | 0.04 | 0.22 | 0.09 | 0.05 |
| 1977 ..... | 0.03 | 0.03 | 0.05 | 0.07 | 0.15 | 0.16 | 0.11 | 0.11 | 0.10 | 0.21 | 0.09 | 0.10 |
| 1978 ..... | 0.08 | 0.05 | 0.11 | 0.11 | 0.10 | 0.08 | 0.05 | 0.04 | 0.03 | 0.05 | 0.03 | 0.03 |
| 1979 ..... | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.05 | 0.04 | 0.02 | 0.03 |

TOTAL BETA IN AIR $\overline{x}_m$

1962 - 1979

Table 6.9

pCi/m$^3$

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UNITED-KINGDOM | | | | | | | | | | | | |
| 1962 ..... | 3.6 | 2.4 | 2.8 | 2.6 | 2.3 | 1.56 | 1.12 | 0.58 | 1.77 | 1.80 | 4.4 | 3.5 |
| 1963 ..... | 3.1 | 2.9 | 3.7 | 3.2 | 3.4 | 2.6 | 2.0 | 1.81 | 1.30 | 0.94 | 0.60 | 0.70 |
| 1964 ..... | 0.57 | 0.71 | 0.71 | 0.65 | 0.89 | 0.78 | 0.43 | 0.28 | 0.21 | 0.22 | 0.24 | 0.06 |
| 1965 ..... | 0.11 | 0.14 | 0.16 | 0.12 | 0.14 | 0.17 | 0.11 | 0.05 | 0.04 | 0.04 | 0.02 | 0.02 |
| 1966 ..... | 0.03 | 0.04 | 0.04 | 0.04 | 0.05 | 0.07 | 0.04 | 0.02 | 0.02 | 0.01 | 0.06 | 0.02 |
| 1967 ..... | 0.08 | 0.08 | 0.12 | 0.07 | 0.04 | 0.02 | 0.02 | 0.01 | 0.02 | 0.01 | 0.02 | 0.02 |
| 1968 ..... | 0.12 | 0.11 | 0.09 | 0.16 | 0.11 | 0.07 | 0.08 | 0.07 | 0.04 | 0.04 | 0.03 | 0.03 |
| 1969 ..... | 0.03 | 0.03 | 0.04 | 0.04 | 0.09 | 0.15 | 0.12 | 0.11 | 0.09 | 0.07 | 0.03 | 0.03 |
| 1970 ..... | 0.03 | 0.03 | 0.06 | 0.08 | 0.16 | 0.19 | 0.10 | 0.11 | 0.05 | 0.05 | 0.04 | 0.02 |
| 1971 ..... | 0.03 | 0.04 | 0.06 | 0.21 | 0.29 | 0.31 | 0.25 | 0.15 | 0.10 | 0.07 | 0.05 | 0.04 |
| 1972 ..... | 0.10 | 0.05 | 0.05 | 0.05 | 0.06 | 0.06 | 0.09 | 0.05 | 0.04 | 0.04 | 0.01 | 0.02 |
| 1973 ..... | 0.01 | 0.02 | 0.02 | 0.01 | 0.02 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 |
| 1974 ..... | 0.02 | 0.03 | 0.06 | 0.17 | 0.12 | 0.10 | 0.06 | 0.04 | 0.01 | 0.01 | 0.01 | 0.02 |
| 1975 ..... | 0.03 | 0.032 | 0.033 | 0.028 | 0.034 | 0.028 | 0.017 | 0.014 | 0.009 | 0.014 | 0.009 | 0.007 |
| 1976 ..... | 0.013 | 0.022 | 0.017 | 0.013 | 0.012 | 0.010 | 0.009 | 0.013 | 0.012 | 0.062 | 0.036 | 0.014 |
| 1977 ..... | 0.011 | 0.017 | 0.022 | 0.035 | 0.087 | 0.087 | 0.092 | 0.077 | 0.076 | 0.113 | 0.050 | 0.047 |
| 1978 ..... | 0.047 | 0.093 | 0.128 | 0.086 | 0.079 | 0.061 | 0.032 | 0.029 | 0.029 | 0.023 | 0.018 | 0.017 |
| 1979 ..... | 0.016 | 0.013 | 0.016 | 0.016 | 0.011 | 0.010 | 0.013 | 0.009 | 0.009 | 0.010 | 0.009 | 0.009 |

TOTAL BETA IN AIR $\bar{x}_m$ Table 6.10

1962 - 1979 pCi/m$^3$

| COMMUNITY | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1962....(+) | 5.1 | 4.2 | 3.7 | 3.8 | 3.5 | 3.6 | 3.0 | 2.2 | 2.9 | 4.0 | 5.9 | 6.1 |
| 1963....(+) | 5.65 | 5.04 | 6.20 | 6.61 | 6.74 | 6.46 | 6.16 | 3.52 | 2.14 | 1.64 | 1.13 | 0.98 |
| 1964....(+) | 1.05 | 1.07 | 1.02 | 1.34 | 1.97 | 1.80 | 1.27 | 0.76 | 0.47 | 0.42 | 0.40 | 0.19 |
| 1965....(+) | 0.22 | 0.25 | 0.31 | 0.34 | 0.39 | 0.58 | 0.34 | 0.22 | 0.17 | 0.22 | 0.13 | 0.11 |
| 1966....(+) | 0.09 | 0.10 | 0.11 | 0.11 | 0.15 | 0.31 | 0.14 | 0.12 | 0.11 | 0.10 | 0.18 | 0.07 |
| 1967....(+) | 0.16 | 0.20 | 0.19 | 0.16 | 0.13 | 0.09 | 0.09 | <0.09 | 0.09 | 0.10 | 0.08 | 0.08 |
| 1968....(+) | 0.32 | 0.21 | 0.22 | <0.29 | <0.23 | <0.23 | <0.22 | 0.19 | <0.12 | <0.11 | <0.08 | <0.10 |
| 1969....(+) | <0.11 | <0.10 | <0.13 | 0.15 | 0.29 | 0.36 | 0.42 | 0.36 | 0.25 | 0.22 | <0.11 | <0.09 |
| 1970....(+) | <0.07 | <0.08 | <0.14 | 0.20 | 0.35 | 0.47 | 0.35 | 0.27 | 0.16 | <0.10 | <0.10 | <0.07 |
| 1971....(+) | <0.08 | <0.10 | <0.16 | 0.37 | 0.42 | 0.43 | 0.50 | 0.26 | <0.14 | <0.09 | <0.05 | <0.05 |
| 1972....(+) | <0.09 | <0.06 | <0.09 | <0.10 | <0.12 | <0.14 | <0.13 | <0.07 | <0.05 | <0.04 | <0.03 | 0.03 |
| 1973..... | <0.02 | <0.02 | <0.03 | <0.02 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 |
| 1974..... | <0.04 | <0.05 | <0.10 | 0.18 | 0.18 | 0.16 | 0.10 | 0.09 | 0.04 | 0.03 | 0.04 | 0.05 |
| 1975..... | <0.07 | <0.09 | <0.08 | <0.07 | <0.07 | <0.06 | <0.05 | <0.04 | <0.04 | <0.03 | <0.03 | <0.03 |
| 1976..... | <0.03 | <0.04 | <0.04 | <0.03 | <0.04 | <0.02 | <0.03 | <0.04 | <0.04 | <0.24 | <0.08 | <0.05 |
| 1977..... | <0.025 | <0.025 | 0.05 | <0.07 | <0.15 | <0.16 | 0.14 | <0.12 | <0.11 | <0.20 | <0.07 | 0.06 |
| 1978..... | <0.06 | <0.06 | <0.10 | <0.10 | <0.10 | <0.08 | <0.06 | <0.04 | <0.03 | <0.03 | <0.03 | <0.03 |
| 1979..... | <0.03 | <0.03 | <0.02 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.02 | <0.02 |

(+) Mean value calculated for Belgium, France, Luxembourg, Italy, Germany and Nederland

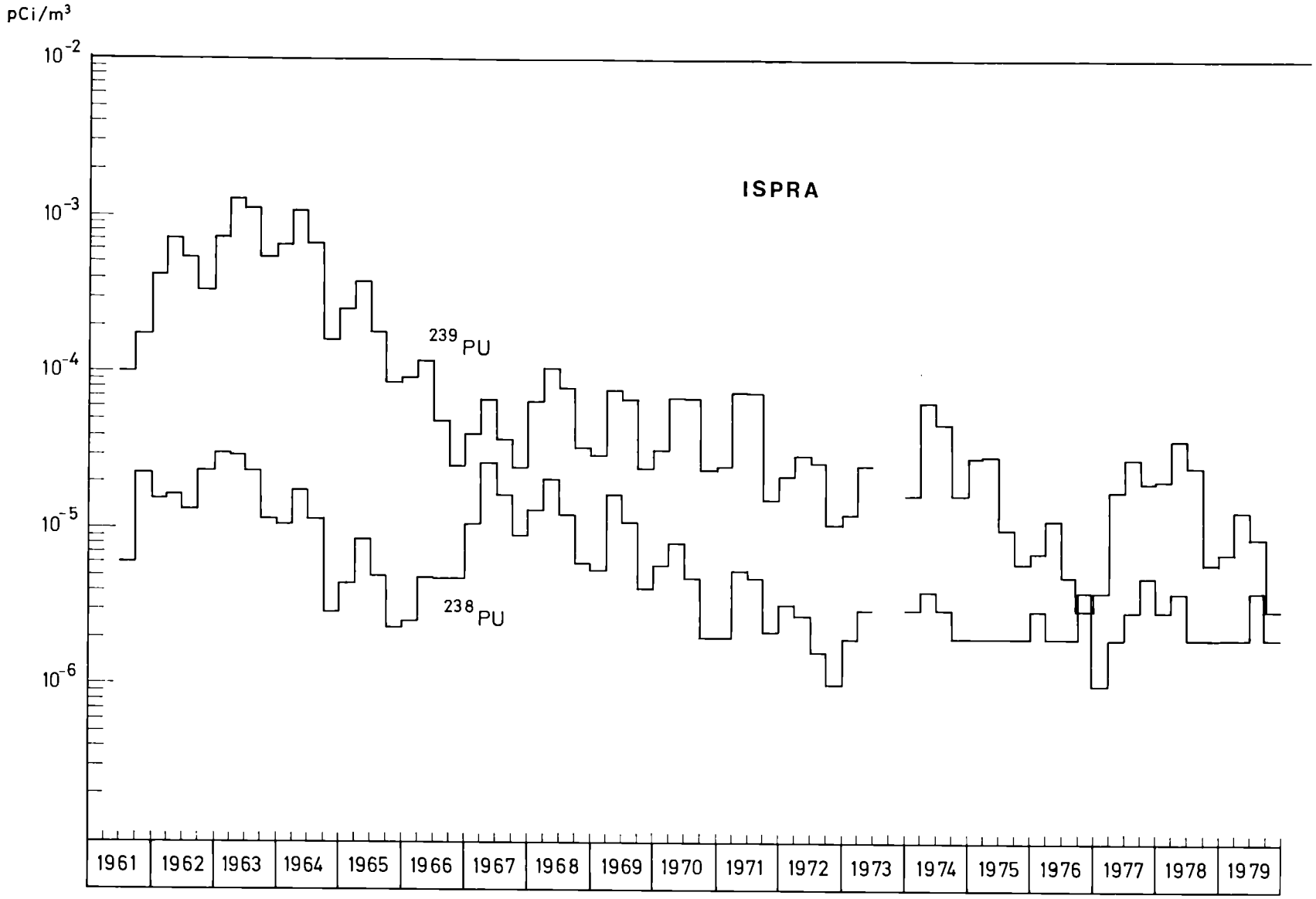
TOTAL BETA IN AIR $\bar{x}_a$ Table 7

1962 - 1979 pCi/m3

| | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BELGIQUE/BELGIË | 3.6 | 3.7 | 0.82 | 0.17 | 0.08 | 0.08 | 0.14 | 0.17 | 0.18 | 0.21 | 0.08 | 0.02 | 0.09 | 0.05 | 0.06 | 0.10 | 0.05 | 0.02 |
| DENMARK | 3.7 | 6.4 | 1.29 | 0.17 | 0.04 | 0.05 | 0.09 | 0.12 | 0.06 | 0.10 | 0.09 | 0.04 | 0.105 | 0.08 | 0.07 | 0.12 | 0.09 | 0.03 |
| DEUTSCHLAND(BR) | 4.8 | 6.1 | 1.7 | 0.62 | 0.58 | 0.52 | 0.57 | 0.59 | <0.21 | <0.23 | <0.09 | <0.05 | <0.05 | <0.05 | <0.05 | <0.06 | <0.05 | <0.03 |
| FRANCE | 3.6 | 3.9 | 0.78 | 0.15 | 0.08 | 0.08 | 0.15 | 0.17 | 0.18 | 0.20 | 0.07 | - | - | - | - | - | - | - |
| FRANCE (SCPRI) | - | - | - | - | - | - | - | - | - | - | - | 0.025 | 0.099 | 0.049 | <0.054 | <0.11 | 0.062 | <0.020 |
| FRANCE (CEA) | - | - | - | - | - | - | - | - | - | - | - | 0.023 | 0.094 | 0.045 | 0.05 | 0.098 | 0.057 | 0.020 |
| IRELAND | 2.2 | 1.8 | 0.46 | 0.10 | 0.05 | 0.05 | 0.11 | 0.08 | 0.10 | 0.12 | 0.05 | 0.02 | 0.06 | 0.04 | 0.033 | 0.07 | 0.04 | 0.02 |
| ITALIA | 4.5 | 4.9 | 1.1 | 0.28 | 0.15 | <0.12 | <0.19 | <0.22 | <0.25 | <0.27 | <0.10 | <0.06 | <0.15 | <0.08 | <0.09 | <0.17 | 0.096 | <0.06 |
| LUXEMBOURG | 3.2 | 4.0 | 0.97 | 0.26 | <0.1 | <0.08 | <0.11 | <0.16 | <0.15 | <0.19 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | - | - | - |
| NEDERLAND | 3.1 | 3.6 | 0.67 | 0.15 | 0.08 | 0.07 | 0.13 | 0.14 | 0.16 | 0.19 | 0.07 | 0.03 | 0.10 | 0.06 | 0.06 | 0.10 | 0.06 | 0.03 |
| UNITED KINGDOM | 2.4 | 2.2 | 0.48 | 0.09 | 0.04 | 0.04 | 0.08 | 0.07 | 0.08 | 0.13 | 0.05 | 0.02 | 0.05 | 0.02 | 0.02 | 0.059 | 0.053 | 0.012 |
| M | 4.0 (+) | 4.4 (+) | 0.98 (+) | 0.23 (+) | <0.13 (+) | <0.12 (+) | <0.19 (+) | <0.22 (+) | <0.20 (+) | <0.22 (+) | <0.08 (+) | <0.03 | <0.09 | <0.06 | <0.06 | <0.10 | <0.06 | <0.03 |

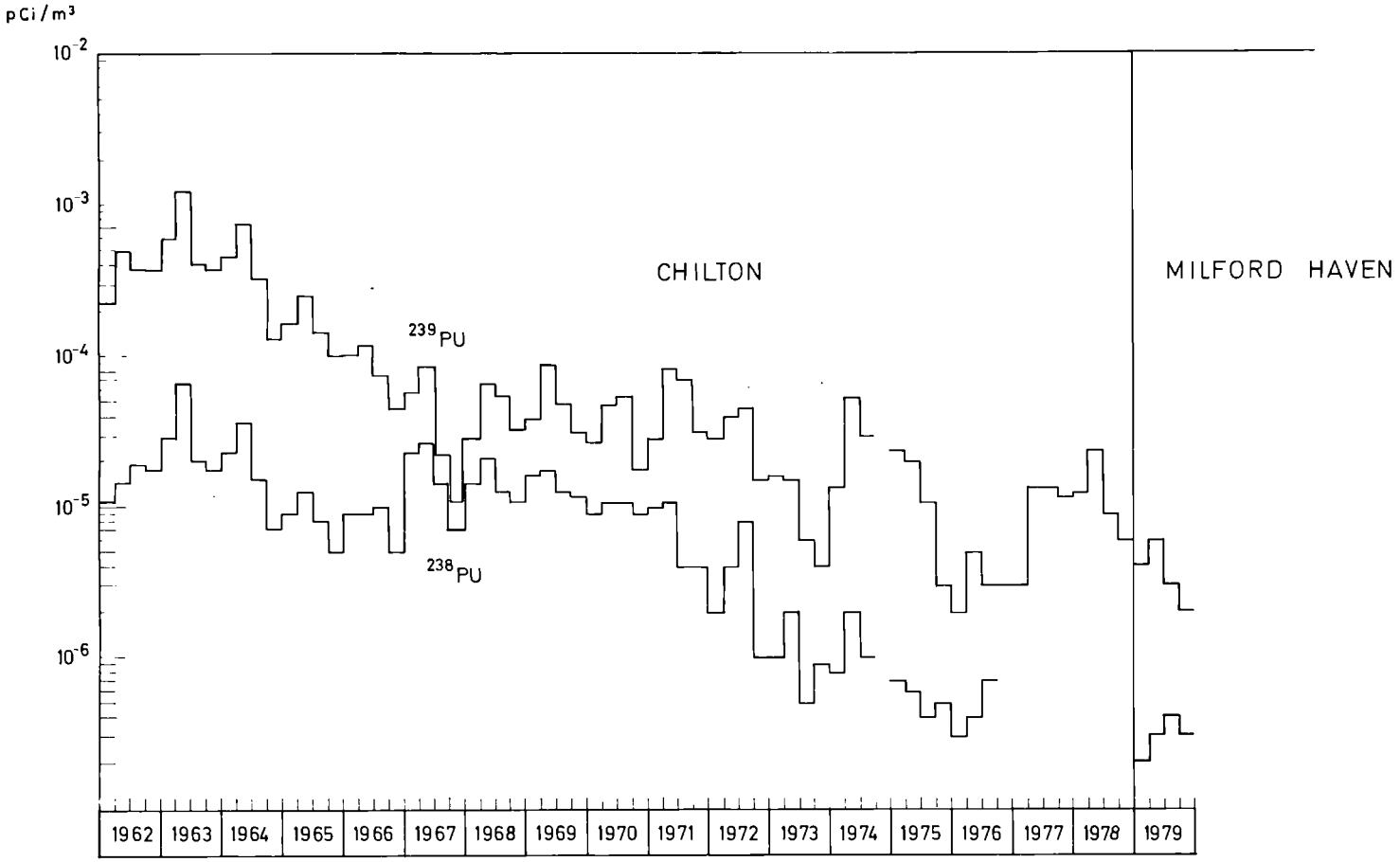
(+) Mean value calculated for Belgique, Deutschland, France, Italia, Luxembourg and Nederland only

VARIATION OF THE PLUTONIUM-238 AND PLUTONIUM-239 IN ATMOSPHERIC CONCENTRATION AT ISPRA (ITALY)




Graph 4a)

VARIATION OF THE PLUTONIUM-238 AND PLUTONIUM-239 IN ATMOSPHERIC CONCENTRATION AT CHILTON (U.K.) 1962-1978 AND MILFORD HAVEN (U.K.) 1979




Graph 4b)

Table 8

## $^{238}Pu$ - $^{239}Pu$ IN AIR

1979

$10^{-6}$ pCi/m3

| | MILFORD HAVEN (+) | | ISPRA | |
|---|---|---|---|---|
| | $^{238}Pu$ | $^{239}Pu$ | $^{238}Pu$ | $^{239}Pu$ |
| January | 0.30 | 4.4 | ≤ 2 | 9 |
| February | ≤ 0.2 | 3.4 | ≤ 2 | 6 |
| March | ≤ 0.2 | 5.3 | 2 | 7 |
| April | ~ 0.3 | 6.5 | ≤ 2 | 9 |
| May | ~ 0.2 | 6.5 | ≤ 2 | 21 |
| June | ≤ 0.3 | 4.7 | ≤ 2 | 12 |
| July | ≤ 0.4 | 3.8 | 7 | 15 |
| August | ≤ 0.3 | 2.2 | 3 | 8 |
| September | ≤ 0.3 | 2.3 | 2 | 5 |
| October | ≤ 0.3 | 1.7 | 2 | 5 |
| November | ≤ 0.3 | 1.7 | ≤ 2 | ≤ 2 |
| December | ≤ 0.3 | 1.5 | ≤ 2 | ≤ 2 |
| M | ≤ 0.28 | 3.7 | ≤ 3 | ≤ 8 |

(+) Chilton is no longer reported

Table 9

## $^{239}Pu$ + $^{240}Pu$ IN AIR

1979

UNITED KINGDOM (NRPB results)

$10^{-6}$ pCi/m3

| | SHRIVENHAM | GLASGOW |
|---|---|---|
| January<br>February<br>March | 9.5 | 6.2 |
| April<br>May<br>June | 13.2 | 7.0 |
| July<br>August<br>September | 6.2 | 5.1 |
| October<br>November<br>December | 5.7 | 4.9 |
| M | 8.6 | 5.8 |

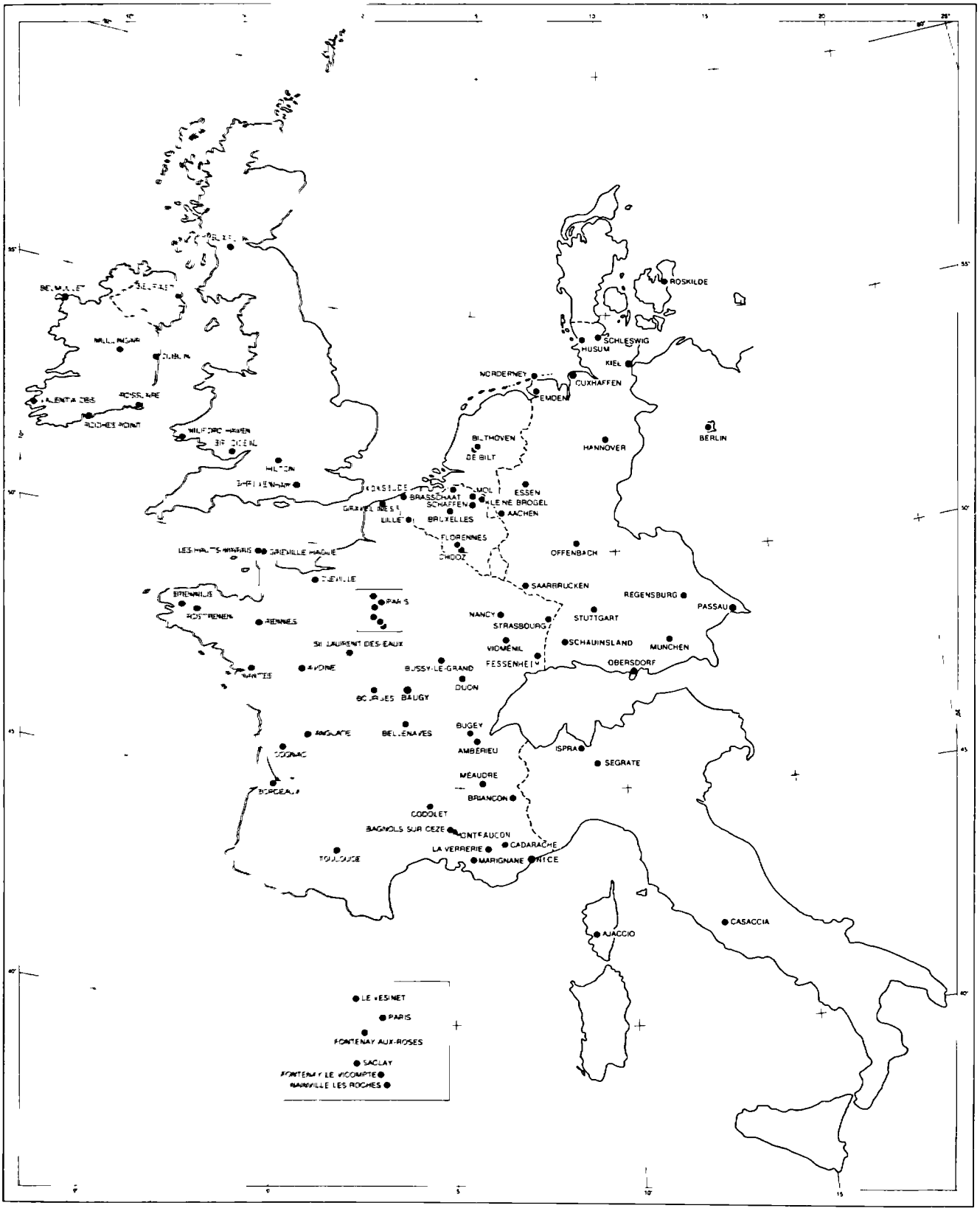
# ARTIFICIAL RADIOACTIVITY OF DEPOSITION

RADIOACTIVE FALLOUT

Sampling points and measuring stations for specific radionuclides


· Map 3

RADIOACTIVE FALLOUT
Sampling points and measuring stations for total beta




Map 4

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.1

BELGIQUE/BELGIË

mCi/km$^2$

| | Koksijde | | | Brasschaat | | | Florennes | | | Mol | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | rain l/m$^2$ | total beta | $^{90}Sr$ | rain l/m$^2$ | total beta | $^{90}Sr$ | rain l/m$^2$ | total beta | $^{90}Sr$ | rain l/m$^2$ | total beta | $^{90}Sr$ |
| January | 40.6 | 0.57 | 0.0073 | 58.9 | 0.61 | 0.0112 | 42.9 | 0.58 | 0.0093 | 44.3 | 0.49 | 0.0093 |
| February | 37.7 | 0.41 | 0.0119 | 42.0 | 0.45 | 0.0156 | 54.3 | 0.53 | 0.0117 | 47.6 | 0.39 | 0.0138 |
| March | 79.5 | 0.69 | 0.0215 | 117.1 | 0.99 | 0.0318 | 143.7 | 0.82 | 0.0290 | 114.6 | 0.92 | 0.0298 |
| April | 43.2 | 0.47 | 0.0213 | 62.0 | 0.64 | 0.0162 | 71.0 | 0.70 | 0.0258 | 46.7 | 0.62 | 0.0189 |
| May | 81.7 | 0.71 | 0.0498 | 103.9 | 1.20 | 0.0325 | 55.3 | 0.76 | 0.0241 | 91.1 | 1.01 | 0.0321 |
| June | 43.3 | 0.50 | 0.0249 | 55.8 | 0.74 | 0.0082 | 84.3 | 1.06 | 0.0427 | 49.2 | 0.60 | 0.0305 |
| July | 22.6 | 0.34 | 0.0056 | 29.9 | 0.32 | 0.0062 | 32.0 | 0.59 | 0.0275 | 25.4 | 0.29 | 0.0055 |
| August | 67.2 | 0.29 | 0.0105 | 79.3 | 0.40 | 0.0110 | 90.9 | 0.57 | 0.0132 | 56.7 | 0.35 | 0.0084 |
| September | 33.8 | 0.23 | 0.0052 | 19.8 | 0.17 | 0.0079 | 11.8 | 0.17 | 0.0053 | 32.1 | 0.27 | 0.0104 |
| October | 24.1 | 0.28 | 0.0086 | 46.8 | 0.34 | 0.0152 | 60.2 | 0.34 | 0.0038 | 39.1 | 0.22 | 0.0028 |
| November | 73.5 | 0.27 | 0.0083 | 85.6 | 0.50 | 0.0097 | 103.3 | 0.34 | 0.0073 | 78.7 | 0.38 | 0.0095 |
| December | 97.8 | 0.61 | 0.0154 | 124.8 | 0.70 | 0.0179 | 112.8 | 0.52 | 0.0142 | 131.9 | 0.61 | 0.0149 |
| Total | 645 | 5.37 | 0.190 | 826 | 7.06 | 0.183 | 863 | 6.98 | 0.214 | 757 | 6.15 | 0.186 |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10 .2

BELGIQUE/BELGIË

mCi/km$^2$

| | Kleine-Brogel | | | Schaffen | | | Uccle Bruxelles | | |
|---|---|---|---|---|---|---|---|---|---|
| | rain 1/m2 | total beta | $^{90}Sr$ | rain 1/m2 | total beta | $^{90}Sr$ | rain 1/m2 | total beta | $^{90}Sr$ |
| January | 38.2 | 0.47 | 0.0097 | 27.8 | 0.40 | 0.0035 | 68.1 | 0.46 | 0.025 |
| February | 42.6 | 0.32 | 0.0087 | 32.9 | 0.30 | 0.0200 | 46.7 | 0.29 | 0.0136 |
| March | 116.8 | 0.74 | 0.0208 | 97.2 | 0.79 | 0.0258 | 130.7 | 0.64 | 0.0352 |
| April | 49.1 | 0.59 | 0.0230 | 47.2 | 0.59 | 0.0189 | 68 | 0.43 | 0.0254 |
| May | 63.7 | 0.70 | 0.0169 | 70.3 | 0.70 | 0.0236 | 60.7 | 0.35 | 0.0149 |
| June | 46.6 | 0.57 | 0.0280 | 60.9 | 0.69 | 0.0357 | 67 | 0.49 | 0.0289 |
| July | 20.3 | 0.33 | 0.0124 | 14.1 | 0.29 | 0.0039 | 19 | 0.19 | - |
| August | 62.5 | 0.35 | 0.0128 | 63.2 | 0.32 | 0.0126 | 105.7 | 0.31 | - |
| September | 40.7 | 0.31 | 0.0092 | 7.9 | 0.10 | 0.0018 | 6.6 | 0.07 | 0.0297 |
| October | 28.9 | 0.27 | 0.0104 | 36.9 | 0.23 | 0.0059 | 41.9 | 0.24 | - |
| November | 69.0 | 0.29 | 0.0116 | 67.3 | 0.28 | 0.0087 | 106.5 | 0.24 | 0.0135 |
| December | 112.3 | 0.55 | 0.0106 | 94.1 | 0.46 | 0.0064 | 117 | 0.38 | 0.0190 |
| Total | 691 | 5.49 | 0.174 | 620 | 5.15 | 0.167 | 838 | 4,09 | 0.205 |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.3

RISØ - DENMARK

mCi/Km$^2$

| | rain 1/m2 | total beta | $^{7}Be$ | $^{54}Mn$ | $^{106}Ru$ | $^{125}Sb$ | $^{137}Cs$ | $^{144}Ce$ |
|---|---|---|---|---|---|---|---|---|
| January | 15.0 | 0.47 | - | - | - | - | - | - |
| February | 10.3 | 0.21 | - | - | - | - | - | - |
| March | 40.8 | 0.84 | - | - | - | - | - | - |
| April | 27.7 | 0.55 | - | - | - | - | - | - |
| May | 45.7 | 0.99 | 3.7 | 0.0009 | 0.060 | 0.004 | 0.045 | 0.056 |
| June | 22.1 | 0.22 | 1.58 | 0.0005 | 0.022 | 0.0023 | 0.0108 | 0.022 |
| July | 27.1 | 0.165 | 0.98 | 0.0002 | 0.0168 | 0.0019 | 0.0077 | 0.0127 |
| August | 75.6 | 0.21 | 2.60 | 0.0004 | 0.0249 | 0.0022 | 0.0107 | 0.0198 |
| September | 25.9 | 0.119 | 1.30 | 0.0002 | 0.0076 | 0.0018 | 0.0053 | 0.0102 |
| October | 21.8 | 0.061 | 1.23 | B.D.L. | 0.0037 | 0.0013 | 0.0041 | 0.0081 |
| November | 64.9 | 0.27 | 1.59 | - " - | 0.0037 | 0.0017 | 0.0060 | 0.0166 |
| December | 73.4 | 0.31 | 1.88 | - " - | B.D.L. | 0.0031 | 0.0082 | 0.0159 |
| Total | 450 | 4.4 | 14.9 | 0.0022 | 0.139 | 0.0183 | 0.098 | 0.161 |

B.D.L. = Below Detection Limit

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.4

DUBLIN CITY - IRELAND

$mCi/Km^2$

| | rain l/m2 | total beta | $^{90}Sr$ |
|---|---|---|---|
| January | 31.3 | 0.26 | 0.03 |
| February | 87.1 | 0.45 | - |
| March | 67.6 | 0.34 | 0.02 |
| April | 51.5 | 0.26 | 0.01 |
| May | 80.0 | 0.29 | 0.03 |
| June | 46.5 | 0.34 | 0.04 |
| July | 22.7 | 0.12 | 0.03 |
| August | 59.9 | 0.19 | 0.02 |
| September | 34.7 | 0.14 | 0.01 |
| October | 90.1 | 0.17 | - |
| November | - | - | - |
| December | - | - | - |
| Total | (571.4) | (2.56) | (0.19) |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.5

JÜLICH - DEUTSCHLAND

mCi/Km$^2$

| | rain 1/m2 | total beta (ohne $^3H$) | $^7Be$ | $^{54}Mn$ | $^{95}Zr$ | $^{95}Nb$ | $^{103}Ru$ | $^{106}Ru$ | $^{125}Sb$ | $^{131}J$ |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 49.9 | 0.32 | 1.60 | < 0.01 | < 0.014 | < 0.009 | < 0.013 | < 0.05 | < 0.03 | < 0.06 |
| February | 40.1 | < 0.32 | 0.83 | < 0.01 | < 0.014 | < 0.009 | < 0.013 | < 0.05 | < 0.03 | < 0.06 |
| March | 104.7 | 0.51 | 3.30 | < 0.01 | < 0.014 | < 0.009 | < 0.013 | < 0.05 | < 0.03 | < 0.06 |
| April | 57.2 | 0.38 | 4.90 | < 0.01 | < 0.014 | < 0.009 | < 0.013 | < 0.05 | < 0.03 | < 0.06 |
| May | 58.6 | 0.44 | 7.10 | < 0.01 | < 0.014 | < 0.009 | < 0.013 | < 0.05 | < 0.03 | < 0.06 |
| June | 60.5 | 0.57 | 1.80 | < 0.01 | < 0.014 | < 0.009 | < 0.013 | < 0.05 | < 0.03 | < 0.06 |
| July | 53.9 | 0.38 | 2.10 | < 0.01 | < 0.014 | < 0.009 | < 0.013 | < 0.05 | < 0.03 | < 0.06 |
| August | 44.9 | 0.32 | 2.20 | < 0.01 | < 0.014 | < 0.009 | < 0.013 | < 0.05 | < 0.03 | < 0.06 |
| September | 39.3 | < 0.21 | 0.77 | < 0.01 | < 0.014 | < 0.009 | < 0.013 | < 0.05 | < 0.03 | < 0.06 |
| October | 30.7 | < 0.23 | 0.82 | < 0.01 | < 0.014 | < 0.009 | < 0.013 | < 0.05 | < 0.03 | < 0.06 |
| November | 85.7 | < 0.50 | 2.50 | < 0.01 | < 0.014 | < 0.009 | < 0.013 | < 0.05 | < 0.03 | < 0.06 |
| December | 120.8 | < 0.50 | 4.60 | < 0.01 | < 0.014 | < 0.009 | < 0.013 | < 0.05 | < 0.03 | < 0.06 |
| Total | 746.3 | < 4.68 | 32.52 | < 0.12 | < 0.168 | < 0.108 | < 0.156 | < 0.60 | < 0.36 | < 0.72 |

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SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.5a)
Continued

JÜLICH - DEUTSCHLAND

mCi/Km$^2$

| | $^{137}Cs$ | $^{140}Ba/^{140}La$ | $^{141}Ce$ | $^{144}Ce$ | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| January | 0.019 | < 0.1 | < 0.026 | 0.160 | | | | | |
| February | 0.0073 | < 0.1 | < 0.026 | 0.051 | | | | | |
| March | 0.043 | < 0.1 | < 0.026 | 0.230 | | | | | |
| April | 0.090 | < 0.1 | < 0.026 | 0.059 | | | | | |
| May | 0.073 | < 0.1 | < 0.026 | < 0.050 | | | | | |
| June | 0.021 | < 0.1 | < 0.026 | < 0.050 | | | | | |
| July | 0.0045 | < 0.1 | < 0.026 | < 0.050 | | | | | |
| August | < 0.010 | < 0.1 | < 0.026 | < 0.050 | | | | | |
| September | < 0.010 | < 0.1 | < 0.026 | < 0.050 | | | | | |
| October | < 0.010 | < 0.1 | < 0.026 | < 0.050 | | | | | |
| November | 0.0083 | < 0.1 | < 0.026 | < 0.050 | | | | | |
| December | 0.0049 | < 0.1 | < 0.026 | < 0.050 | | | | | |
| Total | < 0.301 | < 1.2 | < 0.312 | < 0.900 | | | | | |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.6

OFFENBACH - DEUTSCHLAND

mCi/Km$^2$

| | rain 1/m2 | total beta | $^{89}Sr$ | $^{90}Sr$ | $^{91}Y$ | $^{95}Zr$ | $^{95}Nb$ | $^{103}Ru/^{103}Rh$ | $^{125}Sb$ | $^{131}J$ |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 27.7 | 0.276 | n.n. | 0.004 | 0.006 | 0.003 | 0.002 | 0.007 | 0.006 | n.n. |
| February | 45.7 | 0.250 | 0.004 | 0.006 | <0.005 | < 0.002 | < 0.001 | 0.020 | 0.012 | n.n. |
| March | 82.7 | 0.311 | 0.005 | 0.013 | 0.011 | n.n. | < 0.008 | 0.026 | 0.030 | n.n. |
| April | 66.9 | 1.366 | n.n. | 0.017 | 0.004 | n.n. | < 0.001 | 0.031 | 0.027 | n.n. |
| May | 57.2 | 0.581 | n.n. | 0.014 | <0.003 | 0.002 | < 0.001 | 0.034 | 0.027 | n.n. |
| June | 47.1 | 1.964 | n.n. | 0.018 | <0.002 | n.n. | n.n. | 0.034 | 0.019 | n.n. |
| July | 80.3 | 0.529 | n.n. | 0.013 | 0.014 | n.n. | n.n. | 0.013 | 0.024 | n.n. |
| August | 34.0 | 1.089 | n.n. | 0.013 | 0.005 | n.n. | n.n. | 0.012 | 0.011 | n.n. |
| September | 19.2 | 0.107 | n.n. | 0.004 | 0.003 | n.n. | n.n. | 0.004 | < 0.001 | n.n. |
| October | 32.0 | 0.135 | n.n. | 0.004 | 0.007 | n.n. | 0.003 | 0.008 | 0.004 | n.n. |
| November | 78.5 | 0.506 | n.n. | 0.005 | 0.007 | < 0.002 | < 0.002 | 0.016 | 0.009 | n.n. |
| December | 130.0 | 0.384 | n.n. | 0.008 | 0.005 | n.n. | n.n. | 0.016 | 0.007 | n.n. |
| Total | 701.3 | 7.498 | 0.009 | 0.119 | 0.072 | < 0.009 | < 0.018 | 0.221 | < 0.177 | n.n. |

n.n.=nicht nachgewiesen

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SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.6a)
Continued

OFFENBACH - DEUTSCHLAND

mCi/Km$^2$

| | $^{137}Cs$ | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ | SE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 0.011 | n.n. | 0.004 | 0.116 | 0.004 | | | | | |
| February | 0.024 | n.n. | < 0.185 | 0.002 | 0.005 | | | | | |
| March | 0.043 | n.n. | < 0.004 | 0.154 | 0.007 | | | | | |
| April | 0.050 | n.n. | 0.005 | 0.208 | <0.007 | | | | | |
| May | 0.053 | n.n. | n.n. | 0.242 | <0.006 | | | | | |
| June | 0.042 | n.n. | n.n. | 0.127 | <0.005 | | | | | |
| July | 0.045 | n.n. | n.n. | 0.138 | 0.009 | | | | | |
| August | 0.018 | n.n. | n.n. | 0.064 | 0.003 | | | | | |
| September | 0.005 | n.n. | n.n. | 0.013 | 0.002 | | | | | |
| October | 0.007 | n.n. | n.n. | 0.028 | 0.003 | | | | | |
| November | 0.006 | n.n. | n.n. | 0.020 | 0.006 | | | | | |
| December | 0.009 | n.n. | n.n. | 0.014 | <0.004 | | | | | |
| Total | 0.313 | n.n. | < 0.198 | 1.126 | <0.061 | | | | | |

n.n.=nicht nachgewiesen

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.7

LE VESINET - SCPRI - FRANCE

mCi/Km$^2$

| | rain 1/m2 | total beta | $^{7}Be$ | $^{54}Mn$ | $^{90}Sr$ | $^{95}Zr$ + $^{95}Nb$ | $^{103}Ru$ | $^{106}Ru$ + $^{106}Rh$ | $^{125}Sb$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 36.0 | 0.36 | 0.79 | <0.0028 | 0.0065 | <0.014 | < 0.0058 | <0.11 | < 0.011 | < 0.014 |
| February | 69.1 | 0.44 | 1.8 | <0.0025 | 0.014 | <0.0039 | < 0.0040 | 0.12 | < 0.0074 | 0.021 |
| March | 116.8 | 0.53 | 2.9 | <0.0033 | 0.026 | <0.0040 | < 0.0049 | 0.21 | < 0.032 | 0.031 |
| April | 44.9 | 0.19 | 1.3 | <0.0032 | 0.014 | <0.0051 | < 0.0060 | <0.15 | < 0.012 | 0.014 |
| May | 52.2 | 0.31 | 2.1 | <0.0037 | 0.023 | <0.0053 | < 0.0069 | <0.17 | < 0.016 | 0.031 |
| June | 47.5 | 0.47 | 1.9 | <0.0056 | 0.018 | <0.0043 | < 0.0053 | <0.14 | < 0.016 | 0.027 |
| July | 14.6 | 0.16 | 1.0 | <0.0022 | 0.0088 | <0.0047 | < 0.0039 | <0.11 | < 0.0063 | 0.015 |
| August | 54.2 | < 0.21 | 1.8 | <0.0054 | 0.0061 | <0.0070 | < 0.0043 | <0.034 | < 0.023 | 0.0092 |
| September | 23.5 | < 0.094 | 0.79 | <0.0032 | 0.0036 | <0.0093 | < 0.0057 | <0.041 | < 0.0067 | < 0.0087 |
| October | 78.0 | 0.45 | 2.4 | <0.0092 | 0.0062 | <0.012 | < 0.0060 | <0.041 | < 0.0066 | < 0.011 |
| November | 62.7 | 0.21 | 1.9 | <0.0017 | 0.0031 | <0.010 | < 0.0044 | <0.096 | < 0.0079 | 0.0083 |
| December | 111.3 | <0.36 | 2.1 | <0.0037 | 0.0053 | <0.012 | < 0.0080 | <0.040 | < 0.012 | < 0.0089 |
| Total | 711.2 | 3.5 | 21 | <0.047 | 0.13 | <0.092 | < 0.066 | <1.3 | < 0.16 | < 0.20 |

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SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.7a)
continued

LE VESINET - SCPRI - FRANCE

mCi/Km$^2$

| | $^{140}Ba$ + $^{140}La$ | $^{141}Ce$ | $^{144}Ce$ + $^{144}Pr$ | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | < 0.032 | < 0.023 | < 0.16 | | | | | | | | | |
| February | < 0.041 | < 0.0063 | < 0.28 | | | | | | | | | |
| March | < 0.054 | < 0.016 | < 0.25 | | | | | | | | | |
| April | < 0.080 | < 0.013 | < 0.087 | | | | | | | | | |
| May | < 0.074 | < 0.017 | < 0.11 | | | | | | | | | |
| June | < 0.044 | < 0.014 | < 0.091 | | | | | | | | | |
| July | < 0.029 | < 0.011 | < 0.060 | | | | | | | | | |
| August | < 0.036 | < 0.012 | < 0.042 | | | | | | | | | |
| September | < 0.062 | < 0.0099 | < 0.033 | | | | | | | | | |
| October | < 0.070 | < 0.0057 | < 0.039 | | | | | | | | | |
| November | < 0.017 | < 0.011 | < 0.088 | | | | | | | | | |
| December | < 0.042 | < 0.012 | < 0.032 | | | | | | | | | |
| Total | < 0.59 | < 0.15 | < 1.3 | | | | | | | | | |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.8

LE BARP - BORDEAUX (C.E.A.) - FRANCE

mCi/km$^2$

| | rain 1/m$^2$ | $^{7}Be$ | $^{54}Mn$ | $^{90}Sr$ | $^{95}Zr$ | $^{95}Nb$ | $^{103}Rh$ | $^{106}Rh$ | $^{125}Sb$ | $^{137}Cs$ | $^{141}Ce$ | $^{144}Ce$ $^{144}Pr$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 150 | 4.350 | 0.006 | 0.003 | 0.020 | 0.008 | 0.008 | 0.071 | 0.015 | 0.044 | 0.003 | 0.177 |
| February | 112 | 3.584 | 0.003 | 0.007 | 0.011 | 0.004 | 0.004 | - | 0.009 | 0.031 | 0.002 | 0.076 |
| March | 190 | 7.410 | - | 0.023 | 0.011 | 0.006 | 0.006 | 0.203 | 0.025 | 0.068 | 0.004 | 0.308 |
| April | 116 | 4.292 | 0.001 | 0.015 | 0.005 | 0.003 | 0.004 | 0.104 | 0.020 | 0.070 | 0.003 | 0.046 |
| May | 135 | 6.345 | 0.003 | 0.036 | 0.022 | 0.011 | 0.012 | 0.184 | 0.024 | 0.081 | 0.008 | 0.147 |
| June | 34 | 1.632 | 0.001 | 0.006 | 0.003 | 0.002 | 0.002 | 0.035 | 0.004 | 0.024 | 0.003 | 0.066 |
| July | 21 | 1.260 | - | 0.005 | - | - | - | 0.006 | - | 0.018 | - | 0.041 |
| August | 43 | 2.408 | - | 0.006 | - | - | - | 0.012 | 0.009 | 0.004 | - | 0.036 |
| September | 91 | 3.913 | - | 0.008 | - | - | - | 0.028 | 0.012 | 0.027 | - | 0.061 |
| October | 59 | 2.065 | - | - | - | - | - | 0.010 | - | 0.012 | - | 0.030 |
| November | 111 | 2.664 | - | 0.003 | - | - | - | 0.004 | - | 0.009 | - | 0.012 |
| December | 138 | 5.106 | - | - | - | - | - | 0.018 | - | 0.006 | - | 0.046 |
| Total | 1200 | 45.029 | 0.014 | 0.112 | 0.072 | 0.034 | 0.036 | 0.675 | 0.118 | 0.394 | 0.023 | 1.046 |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN

1979

Table 10.9

CASACCIA - Italia

mCi/Km$^2$

| | rain 1/m2 | $^{7}Be$ | $^{54}Mn$ | $^{90}Sr$ | $^{95}Zr$ | $^{103}Ru$ | $^{106}Ru$ | $^{125}Sb$ | $^{137}Cs$ | $^{141}Ce$ |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 149 | 8.00 | N.M. | 0.072 | N.M. | N.M. | 0.130 | 0.030 | 0.080 | N.M. |
| February | 169 | 8.20 | 0.002 | 0.047 | N.M. | N.M. | 0.140 | 0.032 | 0.075 | N.M. |
| March | 126 | 7.75 | 0.004 | 0.075 | N.M. | N.M. | 0.200 | 0.045 | 0.109 | N.M. |
| April | 158 | 8.20 | N.M. | 0.067 | N.M. | N.M. | 0.160 | 0.047 | 0.104 | N.M. |
| May | - | 0.20 | N.M. | 0.006 | N.M. | N.M. | 0.006 | 0.003 | 0.006 | N.M. |
| June | 66 | 3.50 | 0.002 | 0.040 | N.M. | N.M. | 0.008 | 0.002 | 0.050 | N.M. |
| July | - | 0.27 | N.M. | | N.M. | N.M. | N.M. | 0.003 | 0.006 | N.M. |
| August | 58 | 3.60 | N.M. | | N.M. | N.M. | 0.037 | 0.010 | 0.003 | N.M. |
| September | 103 | 4.32 | N.M. | | N.M. | N.M. | 0.035 | 0.010 | 0.024 | N.M. |
| October | 198 | 5.75 | N.M. | | N.M. | N.M. | 0.014 | 0.007 | 0.020 | N.M. |
| November | 74 | 3.40 | N.M. | | N.M. | N.M. | 0.015 | 0.003 | 0.010 | N.M. |
| December | 135 | 8.11 | N.M. | | N.M. | N.M. | 0.020 | 0.014 | 0.052 | N.M. |
| Total | 1236 | 61.30 | - | | N.M. | N.M. | 0.765 | 0.206 | 0.539 | N.M. |

N.M. non misurabile

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.10

SEGRATE - ITALIA

mCi/Km$^2$

| | rain l/m2 | total beta | $^{7}Be$ | $^{54}Mn$ | $^{95}Zr$ | $^{103}Ru$ | $^{106}Ru$ | $^{125}Sb$ | $^{131}I$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 70 | 0.43 | 1.40 | < 0.003 | < 0.004 | < 0.006 | 0.043 | < 0.01 | < 0.015 | 0.013 |
| February | 107 | 0.53 | 1.62 | < 0.004 | < 0.01 | < 0.01 | 0.032 | < 0.01 | (*) | 0.024 |
| March | 156 | 1.02 | 4.05 | < 0.003 | < 0.005 | < 0.009 | 0.18 | 0.009 | (*) | 0.063 |
| April | 97 | 0.73 | 2.71 | < 0.004 | < 0.005 | < 0.009 | 0.12 | 0.013 | (*) | 0.048 |
| May | 15 | 1.23 | 1.62 | < 0.005 | < 0.004 | < 0.006 | < 0.05 | < 0.01 | < 0.03 | 0.035 |
| June | 66 | 3.27 | 4.87 | < 0.004 | < 0.005 | 0.008 | 0.14 | 0.014 | < 0.03 | 0.065 |
| July | 35 | 0.33 | 1.27 | < 0.004 | < 0.004 | < 0.005 | < 0.05 | < 0.02 | < 0.01 | 0.014 |
| August | 199 | 1.21 | 8.90 | < 0.005 | < 0.005 | < 0.01 | 0.12 | 0.021 | < 0.06 | 0.058 |
| September | 105 | 0.35 | 2.16 | < 0.005 | < 0.007 | < 0.006 | < 0.04 | < 0.02 | < 0.02 | 0.011 |
| October | 233 | 1.03 | 7.00 | < 0.005 | < 0.005 | < 0.006 | 0.04 | < 0.02 | < 0.03 | 0.034 |
| November | 84 | 0.20 | 1.13 | < 0.005 | < 0.007 | < 0.005 | < 0.04 | < 0.008 | < 0.01 | 0.004 |
| December | 114 | 0.29 | 2.96 | < 0.003 | < 0.005 | < 0.004 | < 0.03 | < 0.01 | < 0.03 | 0.010 |
| Total | 1281 | 10.62 | 39.69 | < 0.050 | < 0.066 | < 0.084 | < 0.885 | < 0.165 | < 0.235 | 0.379 |

(*) Inferiore al limite di rivelabilità

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SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.10a)
Continued

SEGRATE - ITALIA

mCi/Km$^2$

| | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ | $^{155}Eu$ | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 0.009 | < 0.003 | 0.06 | < 0.003 | | | | | | |
| February | (*) | < 0.02 | 0.05 | < 0.005 | | | | | | |
| March | (*) | < 0.03 | 0.14 | 0.005 | | | | | | |
| April | (*) | < 0.009 | 0.09 | < 0.004 | | | | | | |
| May | < 0.02 | < 0.009 | 0.05 | < 0.004 | | | | | | |
| June | < 0.01 | < 0.009 | 0.12 | 0.012 | | | | | | |
| July | < 0.02 | < 0.008 | < 0.02 | < 0.007 | | | | | | |
| August | < 0.03 | < 0.01 | 0.08 | < 0.008 | | | | | | |
| September | < 0.02 | < 0.007 | < 0.02 | < 0.005 | | | | | | |
| October | < 0.02 | < 0.01 | 0.04 | < 0.006 | | | | | | |
| November | < 0.009 | < 0.002 | < 0.006 | < 0.001 | | | | | | |
| December | < 0.02 | < 0.01 | 0.016 | < 0.007 | | | | | | |
| Total | < 0.158 | < 0.127 | < 0.692 | < 0.067 | | | | | | |

(*) Inferiore al limite di rivelabilità

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.11

CCR - EURATOM - ISPRA - ITALIA

mCi/Km$^2$

| | rain 1/m2 | total beta | $^{7}Be$ | $^{89}Sr$ | $^{90}Sr$ | $^{106}Ru$ | $^{125}Sb$ | $^{137}Cs$ | $^{144}Ce$ |
|---|---|---|---|---|---|---|---|---|---|
| January | 66.8 | 0.64 | 0.69 | ≤ 0.005 | 0.010 | 1.31 | - | 0.03 | 0.02 |
| February | 136.4 | 0.37 | 0.58 | ≤ 0.005 | 0.011 | 1.16 | - | 0.02 | 0.03 |
| March | 340.2 | 1.33 | 4.74 | ≤ 0.005 | 0.067 | 1.19 | 0.05 | 0.11 | 0.11 |
| April | 94.6 | 1.14 | 2.58 | ≤ 0.005 | 0.046 | 1.14 | - | 0.08 | 0.13 |
| May | 29.4 | 0.31 | 0.93 | ≤ 0.005 | 0.021 | 1.08 | - | 0.03 | - |
| June | 132.4 | 0.79 | 2.68 | ≤ 0.005 | 0.037 | 0.94 | - | 0.06 | - |
| July | 118.4 | 1.41 | 2.19 | ≤ 0.005 | 0.048 | 0.85 | - | 0.07 | 0.04 |
| August | 96.8 | 0.84 | 2.12 | ≤ 0.005 | 0.029 | 0.35 | - | 0.04 | 0.02 |
| September | 57.2 | 0.19 | 0.32 | ≤ 0.005 | ≤ 0.005 | 0.25 | - | 0.01 | - |
| October | 448.6 | 0.47 | 5.37 | ≤ 0.005 | 0.028 | 0.76 | - | 0.03 | - |
| November | 97.1 | 0.15 | 0.53 | ≤ 0.005 | 0.007 | 0.66 | - | ≤ 0.01 | - |
| December | 158.4 | 0.41 | 2.08 | ≤ 0.010 | 0.013 | 0.71 | - | ≤ 0.01 | - |
| Total | 1776.3 | 8.05 | 24.81 | ≤ 0.065 | ≤ 0.322 | 10.40 | 0.05 | ≤ 0.50 | 0.35 |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.12

BILTHOVEN - NEDERLAND

mCi/Km$^2$

| | rain 1/m2 | $^{3}H$ | $^{7}Be$ | $^{89}Sr$ | $^{90}Sr$ | $^{137}Cs$ | $^{144}Ce$ | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 45 | 20 | 2.2 | < 0.01 | 0.02 | 0.029 | 0.13 | | | |
| February | 54 | 11 | 1.6 | < 0.01 | 0.02 | 0.027 | 0.13 | | | |
| March | 109 | 23 | 4.1 | < 0.01 | 0.05 | 0.039 | 0.15 | | | |
| April | 94 | 8.5 | 7.5 | < 0.01 | 0.03 | 0.067 | 0.18 | | | |
| May | 156 | 23 | 7.1 | < 0.01 | 0.06 | 0.071 | 0.18 | | | |
| June | 66 | 11 | 4.0 | < 0.01 | 0.06 | 0.065 | 0.22 | | | |
| July | 37 | 8.4 | 2.5 | < 0.01 | < 0.01 | 0.044 | 0.07 | | | |
| August | 64 | 6.5 | 2.1 | < 0.01 | 0.03 | 0.026 | 0.05 | | | |
| September | 32 | 3.9 | 1.6 | < 0.01 | < 0.01 | 0.016 | 0.05 | | | |
| October | 47 | 9.4 | 1.7 | < 0.01 | < 0.01 | 0.012 | 0.03 | | | |
| November | 85 | 6.0 | 4.0 | < 0.01 | < 0.01 | 0.017 | 0.04 | | | |
| December | 133 | 11 | 4.6 | < 0.01 | < 0.01 | 0.019 | 0.02 | | | |
| Total | 922 | 141.7 | 43 | < 0.12 | < 0.32 | 0.432 | 1.25 | | | |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.13

BELFAST - UNITED KINGDOM

mCi/Km$^2$

| | rain l/m2 | total beta | $^{54}Mn$ | $^{90}Sr$ | $^{95}Zr$ | $^{103}Ru$ | $^{106}Ru$ | $^{125}Sb$ | $^{137}Cs$ | $^{141}Ce$ | $^{144}Ce$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 101.8 | 0.17 | - | | - | 0.21 | - | - | 0.017 | - | 0.077 |
| February | 22.3 | 0.22 | - | 0.038 | - | 0.043 | - | - | 0.016 | - | 0.048 |
| March | 76.2 | 0.14 | - | | - | - | 0.082 | 0.035 | 0.045 | - | 0.10 |
| April | 104.6 | 0.51 | - | | - | 0.042 | 0.065 | - | 0.054 | - | 0.20 |
| May | 81.8 | 0.49 | - | 0.092 | - | 0.013 | - | - | 0.060 | - | 0.12 |
| June | 40.0 | 0.34 | - | | - | 0.018 | 0.082 | 0.016 | 0.041 | - | 0.089 |
| July | 19.3 | NM | - | | - | - | - | 0.029 | 0.006 | - | 0.010 |
| August | 77.2 | 0.21 | - | 0.023 | - | 0.023 | 0.073 | 0.050 | 0.019 | - | 0.060 |
| September | 23.4 | 0.063 | - | | - | - | 0.035 | - | 0.004 | - | 0.029 |
| October | 135.4 | 0.29 | - | | 0.037 | - | - | - | 0.037 | - | 0.037 |
| November | 137.3 | 0.19 | - | 0.040 | 0.045 | - | 0.18 | - | 0.022 | - | 0.059 |
| December | 101.8 | 0.22 | 0.0055 | | - | 0.014 | - | - | 0.014 | - | - |
| Total | 921.1 | 2.84 | < 0.050 | 0.19 | < 0.15 | < 0.43 | < 0.71 | < 0.42 | 0.33 | < 0.12 | < 0.85 |

NM = not measured.
Dashes indicate values below the limit of detection; these values have been taken into account when computing the totals.

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.14

BRIDGEND - UNITED KINGDOM

mCi/Km$^2$

| | rain 1/m2 | total beta | $^{54}Mn$ | $^{90}Sr$ | $^{95}Zr$ | $^{103}Ru$ | $^{106}Ru$ | $^{125}Sb$ | $^{137}Cs$ | $^{141}Ce$ | $^{144}Ce$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 130.5 | | | | | | | | | | |
| February | 52.7 | 1.22 | - | 0.15 | - | 0.073 | 0.36 | 0.15 | 0.13 | - | 0.68 |
| March | 117.5 | | | | | | | | | | |
| April | 68.7 | 0.43 | - | | - | - | - | 0.16 | 0.048 | - | 0.20 |
| May | 150.6 | 0.49 | - | 0.14 | - | - | 0.28 | - | 0.090 | - | 0.20 |
| June | 21.6 | 0.22 | - | | - | - | 0.036 | 0.015 | 0.021 | - | 0.059 |
| July | 55.4 | 0.18 | 0.0015 | | 0.0090 | - | 0.079 | - | 0.009 | - | 0.039 |
| August | 149.5 | 0.20 | 0.016 | 0.082 | - | - | - | - | 0.032 | - | - |
| September | 71.5 | NM | NM | | NM | NM | NM | NM | NM | NM | NM |
| October | 81.6 | | | | | | | | | | |
| November | 156.3 | 0.77 | 0.013 | 0.044 | - | - | 0.15 | - | 0.045 | - | 0.17 |
| December | 164.6 | 0.44 | - | | - | - | - | 0.098 | 0.031 | - | 0.018 |
| Total | 1220.5 | 4.14 | | 0.41 | < 0.15 | < 0.19 | < 1.11 | < 0.69 | 0.42 | < 0.14 | < 1.44 |

NM = not measured.
Dashes indicate values below the limit of detection; these values have been taken into account when computing the totals.

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.15

CHILTON - UNITED KINGDOM

mCi/Km$^2$

| | rain 1/m2 | total beta | $^{54}Mn$ | $^{95}Zr$ | $^{95}Nb$ | $^{103}Ru$ | $^{106}Ru$ | $^{125}Sb$ | $^{131}I$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|---|---|---|---|
| January | 58.7 | 1.2 | < 0.003 | < 0.006 | < 0.004 | < 0.006 | 0.044 | 0.012 | < 0.006 | 0.020 |
| February | 50.0 | 1.0 | < 0.003 | < 0.005 | < 0.003 | < 0.003 | 0.084 | 0.012 | < 0.003 | 0.024 |
| March | 131.5 | 1.9 | < 0.006 | < 0.01 | < 0.01 | < 0.006 | 0.20 | 0.015 | < 0.006 | 0.055 |
| April | 50.8 | 1.3 | < 0.003 | < 0.005 | < 0.005 | < 0.003 | 0.077 | 0.010 | < 0.003 | 0.022 |
| May | 120.0 | 1.7 | < 0.006 | < 0.01 | < 0.01 | < 0.006 | 0.31 | 0.034 | < 0.006 | 0.050 |
| June | 22.0 | 0.22 | < 0.001 | < 0.002 | < 0.002 | < 0.001 | 0.035 | 0.0044 | < 0.001 | 0.010 |
| July | 18.1 | 0.35 | < 0.001 | < 0.002 | < 0.002 | < 0.001 | 0.015 | 0.0042 | < 0.001 | 0.009 |
| August | 54.5 | 0.55 | < 0.003 | < 0.006 | < 0.006 | < 0.003 | 0.016 | < 0.004 | < 0.003 | 0.010 |
| September | 12.6 | 0.23 | < 0.0006 | < 0.001 | < 0.001 | < 0.001 | 0.013 | < 0.001 | < 0.001 | 0.009 |
| October | 49.6 | 0.74 | < 0.003 | < 0.005 | < 0.005 | < 0.003 | 0.024 | 0.004 | < 0.003 | 0.007 |
| November | 62.6 | 0.38 | < 0.003 | < 0.006 | < 0.006 | < 0.003 | 0.009 | 0.004 | < 0.003 | 0.006 |
| December | 127.4 | 0.38 | < 0.006 | < 0.01 | < 0.01 | < 0.001 | < 0.01 | < 0.004 | < 0.006 | 0.010 |
| Total | 757.8 | 9.95 | < 0.0386 | < 0.068 | < 0.064 | < 0.037 | < 0.84 | < 0.11 | < 0.042 | 0.23 |

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SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10 • 15a)
Continued

CHILTON - UNITED KINGDOM

$mCi/Km^2$

| | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| January | < 0.006 | < 0.006 | 0.080 | | | | | | | |
| February | < 0.005 | < 0.003 | 0.077 | | | | | | | |
| March | < 0.01 | < 0.006 | 0.13 | | | | | | | |
| April | < 0.005 | < 0.003 | 0.075 | | | | | | | |
| May | < 0.01 | < 0.006 | 0.091 | | | | | | | |
| June | < 0.002 | < 0.001 | 0.029 | | | | | | | |
| July | < 0.002 | < 0.0007 | 0.0155 | | | | | | | |
| August | < 0.006 | < 0.003 | 0.034 | | | | | | | |
| September | < 0.001 | < 0.006 | 0.022 | | | | | | | |
| October | < 0.005 | < 0.003 | 0.026 | | | | | | | |
| November | < 0.006 | < 0.003 | 0.011 | | | | | | | |
| December | < 0.01 | < 0.006 | 0.013 | | | | | | | |
| Total | < 0.068 | < 0.0467 | 0.60 | | | | | | | |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.16

GLASGOW - UNITED KINGDOM

mCi/Km$^2$

| | rain l/m2 | total beta | $^{54}Mn$ | $^{90}Sr$ | $^{95}Zr$ | $^{103}Ru$ | $^{106}Ru$ | $^{125}Sb$ | $^{137}Cs$ | $^{141}Ce$ | $^{144}Ce$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 62.1 | 0.21 | - | | - | - | 0.086 | - | 0.017 | 0.054 | 0.12 |
| February | 13.4 | 0.13 | - | 0.057 | - | 0.29 | 0.16 | 0.069 | 0.010 | - | 0.040 |
| March | 115.6 | 0.59 | - | | - | - | 0.21 | 0.034 | 0.041 | - | 0.16 |
| April | 65.8 | 0.34 | 0.0036 | | - | - | 0.014 | - | 0.030 | - | 0.11 |
| May | 45.4 | 0.21 | - | 0.065 | - | - | - | - | 0.025 | - | 0.10 |
| June | 49.6 | 0.31 | 0.0040 | | - | 0.020 | 0.067 | - | 0.034 | - | 0.091 |
| July | 52.9 | 0.26 | - | | - | - | 0.033 | 0.056 | 0.049 | - | 0.093 |
| August | 136.1 | 0.37 | - | 0.036 | - | - | - | - | 0.018 | - | 0.085 |
| September | 79.9 | 0.13 | 0.0022 | | 0.0086 | - | - | - | 0.019 | - | 0.028 |
| October | 113.4 | 0.18 | - | | 0.055 | - | 0.067 | 0.070 | 0.0092 | - | 0.046 |
| November | 168.8 | 0.18 | - | NM | - | - | - | - | 0.032 | 0.078 | - |
| December | 145.2 | 0.08 | - | | - | < 0.024 | 0.043 | - | 0.012 | - | 0.035 |
| Total | 1048.2 | 2.99 | < 0.056 | 0.181 | < 0.16 | < 0.42 | < 0.85 | < 0.53 | 0.30 | < 0.22 | < 0.94 |

NM = not measured
Dashes indicate values below the limit of detection; these values have been taken into account when computing the totals.

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

Table 10.17

MILFORD HAVEN - UNITED KINGDOM

mCi/Km$^2$

| | rain 1/m2 | total beta | $^{54}Mn$ | $^{95}Zr$ | $^{95}Nb$ | $^{103}Ru$ | $^{106}Ru$ | $^{125}Sb$ | $^{137}Cs$ | $^{140}Ba$ | $^{141}Ce$ | $^{144}Ce$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 116.0 | 1.3 | <0.006 | <0.01 | <0.008 | 0.026 | 0.21 | 0.021 | 0.050 | 0.28 | 0.028 | 0.22 |
| February | 64.6 | 1.3 | <0.003 | <0.006 | <0.006 | <0.003 | 0.18 | 0.021 | 0.021 | <0.006 | 0.016 | 0.12 |
| March | 109.6 | 1.5 | <0.006 | <0.01 | <0.01 | <0.006 | 0.22 | 0.027 | 0.041 | <0.01 | <0.006 | 0.105 |
| April | 96.4 | 1.4 | <0.005 | <0.01 | <0.01 | <0.005 | 0.22 | 0.028 | 0.032 | <0.01 | <0.005 | 0.105 |
| May | 91.5 | 0.7 | <0.005 | <0.01 | <0.01 | <0.005 | 0.105 | 0.009 | 0.024 | <0.01 | <0.005 | 0.081 |
| June | 21.5 | 1.1 | <0.001 | <0.002 | <0.002 | <0.001 | 0.086 | 0.008 | 0.018 | <0.002 | <0.001 | 0.024 |
| July | 9.0 | 0.22 | <0.001 | <0.001 | <0.001 | <0.0005 | 0.023 | 0.009 | 0.0052 | <0.001 | <0.001 | 0.014 |
| August | 108.9 | 1.2 | <0.005 | <0.01 | <0.01 | <0.005 | 0.42 | 0.072 | 0.057 | <0.01 | <0.005 | 0.22 |
| September | 46.5 | 0.4 | <0.002 | <0.005 | <0.005 | <0.007 | 0.047 | <0.005 | 0.016 | <0.005 | <0.002 | 0.073 |
| October | 137.8 | 1.2 | <0.007 | <0.01 | <0.01 | <0.007 | 0.115 | 0.008 | 0.017 | <0.01 | <0.007 | 0.058 |
| November | 140.6 | 1.1 | <0.007 | <0.01 | <0.01 | <0.007 | 0.037 | <0.007 | 0.020 | <0.01 | <0.007 | 0.059 |
| December | 193.9 | 1.5 | <0.010 | <0.02 | <0.02 | <0.010 | 0.058 | 0.008 | 0.045 | <0.02 | <0.010 | 0.058 |
| Total | 1136.3 | 13 | <0.058 | <0.104 | <0.102 | <0.0825 | 1.7 | 0.22 | 0.35 | <0.374 | <0.093 | 1.14 |

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1979

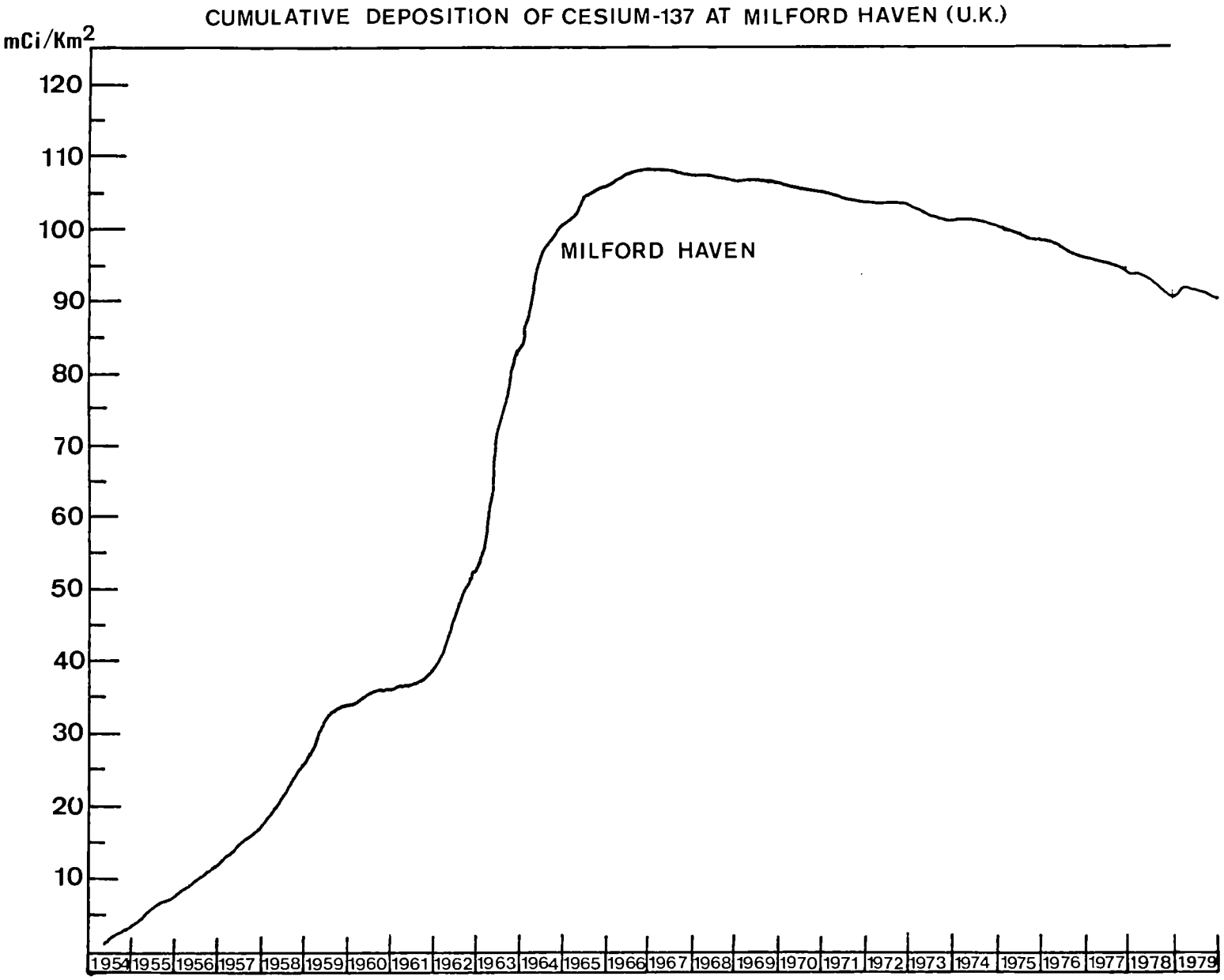
Table 10.18

SHRIVENHAM - UNITED KINGDOM

mCi/Km$^2$

| | rain 1/m2 | total beta | $^{54}Mn$ | $^{90}Sr$ | $^{95}Zr$ | $^{103}Ru$ | $^{106}Ru$ | $^{125}Sb$ | $^{137}Cs$ | $^{141}Ce$ | $^{144}Ce$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 43.8 | 0.13 | 0.0035 | | - | - | 0.051 | - | 0.012 | - | 0.062 |
| February | 45.1 | 0.10 | - | 0.043 | - | - | 0.073 | - | 0.023 | - | 0.076 |
| March | 109.8 | 0.33 | - | | - | 0.11 | 0.074 | - | 0.042 | - | 0.12 |
| April | 46.8 | 0.20 | - | | - | - | 0.13 | - | 0.030 | - | 0.082 |
| May | 83.3 | 0.43 | - | 0.065 | - | 0.029 | 0.038 | 0.088 | 0.032 | - | 0.10 |
| June | 31.4 | 0.20 | - | | - | 0.014 | 0.15 | - | 0.020 | - | 0.081 |
| July | 15.3 | 0.27 | - | | 0.0074 | - | 0.031 | 0.030 | 0.013 | - | 0.045 |
| August | 42.1 | 0.10 | - | 0.025 | - | 0.040 | - | - | 0.013 | - | 0.039 |
| September | 14.1 | 0.091 | | | - | - | 0.030 | - | 0.0038 | - | 0.017 |
| October | 46.9 | 0.063 | 0.0076 | | 0.019 | - | 0.061 | - | 0.010 | - | 0.011 |
| November | 48.8 | 0.13 | - | 0.018 | | - | 0.12 | - | 0.0092 | - | 0.007 |
| December | 128.5 | 0.14 | 0.0069 | | 0.021 | - | 0.045 | - | 0.0069 | - | 0.069 |
| Total | 655.9 | 2.19 | <0.042 | 0.15 | < 0.097 | < 0.24 | < 0.83 | < 0.34 | 0.21 | <0.07 | 0.71 |

Dashes indicate values below the limit of detection; these values have been taken into account when computing the totals.


CUMULATIVE DEPOSITION OF CESIUM-137 AT MILFORD HAVEN (U.K.)
mCi/Km2
120
110
100
90
80
70
60
50
40
30
20
10
MILFORD HAVEN
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979

Graph 5

Table 11.1

## $^{90}Sr$ DEPOSITION $\Sigma \bar{x}_m$

1967 - 1979

mCi/km$^2$

| | 1967 | | 1968 | | 1969 | | 1970 | | 1971 | | 1972 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) |
| **Belgique/België** | | | | | | | | | | | | |
| Mol | 0.806 | 731.2 | 0.9994 | 698.7 | 0.9216 | 639.3 | 1.0971 | 822.7 | 1.1718 | 611.3 | 0.4831 | 613.9 |
| Brasschaat | 0.831 | 713.1 | 0.9764 | 793.2 | 0.8883 | 690.9 | 1.1997 | 826.2 | 1.2096 | 593.0 | 0.5245 | 705.1 |
| Florennes | 0.833 | 854.1 | 1.0886 | 743.4 | 0.8739 | 718.8 | 1.5282 | 833.5 | - | 711.4 | 0.5261 | 779.9 |
| Kleine-Brogel | 0.924 | 780.0 | 0.9292 | 703.0 | 0.9729 | 662.0 | 1.0854 | 779.7 | 1.0710 | 477.9 | 0.4723 | 629.6 |
| Schaffen | 0.677 | 584.5 | 0.8760 | 574.5 | 0.7911 | 584.3 | - | 541.6 | 0.9507 | 474.8 | 0.5232 | 587.6 |
| Bruxelles IHE | - | - | - | - | - | - | - | - | - | - | - | - |
| **Denmark** | | | | | | | | | | | | |
| Tylstrup | 1.010 | 742 | 1.610 | 664 | 1.584 | 521 | 1.660 | 595 | 1.720 | 557 | 0.434 | 577 |
| Studsgaard | 1.060 | 851 | 1.700 | 913 | 1.206 | 621 | 1.920 | 873 | 2.210 | 672 | 0.449 | 742 |
| Ødum | 0.950 | 814 | 1.310 | 668 | 0.938 | 413 | 1.500 | 472 | 1.190 | 481 | 0.410 | 507 |
| Askov | 1.440 | 946 | 1.640 | 870 | 1.312 | 608 | 2.590 | 918 | 1.860 | 682 | 0.475 | 670 |
| St. Jyndevad | 1.440 | 879 | 1.580 | 702 | 1.163 | 551 | 2.300 | 890 | 1.650 | 668 | 0.542 | 758 |
| Blangstedgård | 1.320 | 752 | 1.300 | 633 | 0.701 | 475 | 0.860 | 632 | 1.050 | 592 | 0.434 | 701 |
| Tystofte | 0.770 | 661 | 1.330 | 482 | 0.853 | 341 | 1.640 | 547 | 1.640 | 457 | 0.433 | 577 |
| Virumgård | 0.770 | 747 | 1.030 | 554 | 0.906 | 443 | 1.280 | 684 | 1.120 | 513 | 0.410 | 434 |
| Abed | 0.840 | 651 | 0.960 | 575 | 0.634 | 458 | 0.900 | 578 | 1.170 | 409 | 0.397 | 600 |
| Åkirkeby | 0.890 | 523 | 1.560 | 628 | 1.053 | 388 | 1.820 | 586 | 1.450 | 397 | 0.412 | 536 |
| **Deutschland (BR)** | | | | | | | | | | | | |
| Jülich | 0.503 | 704 | 0.550 | 734 | 0.754 | 690 | 0.587 | 814.4 | 0.041 | 491.9 | 0.3461 | 592.2 |
| Königstein | 0.966 | 934 | 0.685 | 975 | 0.767 | 826 | 0.745 | 924.8 | 0.535 | 637.2 | 0.169 | 689.9 |

./. continued in next page

(1) height of precipitations l/m$^2$

Table 11.1a)

## $^{90}Sr$ DEPOSITION $\Sigma \bar{x}_m$

1967 - 1979

mCi/km$^2$

| | 1973 | | 1974 | | 1975 | | 1976 | | 1977 | | 1978 | | 1979 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) |
| **Belgique/België** | | | | | | | | | | | | | | |
| Mol | 0.208 | 610.9 | 0.708 | 908.9 | 0.365 | 602.3 | 0.104 | 448.8 | 0.424 | 786,9 | 0.431 | 634.8 | 0.186 | 757 |
| Brasschaat | 0.220 | 627.9 | 0.571 | 943.8 | 0.364 | 649.6 | 0.133 | 419.0 | 0.407 | 815,1 | 0.509 | 677.4 | 0.183 | 826 |
| Florennes | 0.203 | 631.6 | 0.799 | 975.6 | 0.375 | 651.5 | 0.119 | 504.2 | 0.480 | 801,6 | 0.638 | 712.7 | 0.214 | 863 |
| Kleine-Brogel | 0.203 | 666.7 | 0.638 | 918.6 | 0.364 | 567.1 | 0.101 | 462.8 | 0.531 | 759,8 | 0.493 | 648.7 | 0.174 | 691 |
| Schaffen | 0.178 | 620.7 | 0.644 | 813.3 | 0.349 | 476.6 | 0.103 | 377.0 | 0.448 | 635,3 | 0.398 | 553.5 | 0.167 | 620 |
| Bruxelles IHE | 0.017 | 689.8 | 0.649 | 1039.6 | 0.306 | 734.3 | 0.098 | 540.9 | 0.446 | 855,9 | 0.427 | 767.7 | 0.205 | 838 |
| Koksijde | - | - | - | - | - | - | 0.091 | 395.8 | 0.371 | 637,5 | 0.387 | 547.7 | 0.190 | 645 |
| **Denmark** | | | | | | | | | | | | | | |
| Tylstrup | 0.203 | 653 | 0.721 | 628 | 0.448 | 520 | 0.110 | 489 | 0.403 | 633 | 0.491 | 608 | 0.151 | 662 |
| Studsgaard | 0.213 | 763 | 0.809 | 914 | 0.439 | 624 | 0.095 | 503 | 0.489 | 818 | 0.570 | 648 | 0.183 | 751 |
| Ødum | 0.180 | 546 | 0.516 | 621 | 0.384 | 440 | 0.075 | 374 | 0.260 | 500 | 0.372 | 400 | 0.143 | 619 |
| Askov | 0.222 | 723 | 0.991 | 979 | 0.508 | 649 | 0.152 | 556 | 0.472 | 773 | 0.581 | 792 | 0.181 | 688 |
| Bt. Jyndevad | 0.257 | 847 | 0.858 | 920 | 0.481 | 569 | 0.147 | 579 | 0.402 | 709 | 0.675 | 792 | 0.213 | 785 |
| Blangstedgård | 0.127 | 532 | 0.706 | 707 | 0.311 | 496 | 0.094 | 381 | 0.300 | 569 | 0.371 | 526 | 0.163 | 613 |
| Tystofte | 0.159 | 411 | 0.654 | 554 | 0.373 | 413 | 0.091 | 320 | 0.337 | 411 | 0.421 | 474 | 0.174 | 532 |
| Virumgård (Ledreborg) | 0.229 | 715 | 0.545 | 577 | 0.647 | 430 | 0.076 | 369 | 0.272 | 511 | 0.306 | 428 | 0.155 | 485 |
| Abed | 0.152 | 495 | 0.597 | 631 | 0.336 | 487 | 0.101 | 376 | 0.349 | 580 | 0.421 | 490 | 0.150 | 574 |
| Åkirkeby | 0.175 | 496 | 0.711 | 725 | 0.484 | 445 | 0.091 | 368 | 0.552 | 627 | 0.419 | 424 | 0.136 | 464 |
| Risø | - | - | - | - | - | - | - | - | 0.297 | 454 | 0.268 | 526 | - | - |
| **Deutschland** (BR) | | | | | | | | | | | | | | |
| Jülich | 0.070 | 564.0 | < 0.187 | 770.0 | 0.2118 | 533.2 | 0.054 | 444 | 0.332 | 579.3 | 0.319 | 591.9 | 0.11 | 746.3 |
| Königstein | 0.035 | 446.9 | 0.350 | 701.1 | - | - | - | - | - | - | - | - | - | - |
| Offenbach | - | - | - | - | 0.145 | 587.8 | 0.052 | 379 | 0.251 | 749.6 | 0.322 | 565.0 | 0.119 | 701.3 |

(1) Height of precipitations l/m2

Table 11.2

## $^{90}Sr$ DEPOSITION $\Sigma \bar{x}_m$

1967 - 1979

mCi/km$^2$

| | 1967 | | 1968 | | 1969 | | 1970 | | 1971 | | 1972 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) |
| **France (SCPRI)** | | | | | | | | | | | | |
| Anglade . . . . . | 1.0 | 877,8 | 1,4 | 956.3 | 1.3 | 1091,1 | 1,3 | 968.6 | 1,4 | 953.1 | 0.52 | 808.7 |
| Bellenaves . . . . | 0.82 | 575,6 | 1,1 | 750,0 | 0.98 | 697,3 | - | - | - | - | 0,45 | 740,0 |
| Bordeaux . . . . . | - | - | 1,3 | 946.2 | 1.1 | 911.6 | 1.1 | 727 | 1,5 | 914.2 | - | - |
| Briançon . . . . . | - | - | 1.5 | 887.8 | 1,0 | 581.2 | 1,3 | 806.5 | - | - | 0.35 | 694.3 |
| Bussy-le-Grand . . | - | - | - | - | 0.83 | 656.1 | 1.5 | 913.6 | - | - | - | - |
| Cléville . . . . . | 0.83 | 790.4 | 0.66 | 524.8 | - | - | - | - | 0.90 | 506.1 | 0.29 | 607.3 |
| Le Vésinet . . . . | 0.76 | 604.8 | 1,0 | 747.6 | 0.90 | 581.1 | 1.1 | 687,2 | 1,0 | 567,6 | 0.54 | 778.6 |
| Lille . . . . . | - | - | 0,99 | 699.9 | 0.82 | 616.7 | 0.97 | 643.4 | - | - | 0.33 | 675.0 |
| Méaudre. . . . . | 1.3 | 1223.5 | 1.4 | 1401.4 | 1.5 | 1251.7 | 2.0 | 1435.6 | - | - | 0.69 | 1154.6 |
| Nancy . . . . . | 0.93 | 735.9 | 0.94 | 776.2 | 0.85 | 653.7 | 1.2 | 890.2 | - | - | 0.46 | 670.3 |
| Nainville-les-R . | 0.67 | 520.3 | 0.99 | 651,2 | 0.72 | 541,2 | 1.1 | 647.5 | - | - | 0.39 | 649.3 |
| Rennes . . . . . | - | - | - | - | - | - | - | - | 1.0 | 565.5 | 0.36 | 581.1 |
| Sauveterre . . . . | 0.77 | 368,6 | - | - | 0.96 | 568.9 | - | - | - | - | 0.49 | 869.9 |
| Vioménil . . . . . | 1.5 | 1113.5 | 1.3 | 1088.7 | 1.1 | 890.4 | 1.8 | 1212.7 | 1.6 | 790.0 | 0.52 | 899.3 |
| **France (CEA)** | | | | | | | | | | | | |
| Orsay . . . . . | 0.40 | 590 | 0.30 | 633 | 0.26 | 618 | 0.73 | 631 | 0.70 | 508 | 0.29 | 740 |
| Le Barp (Bordeaux) | - | - | 0.90 | 998 | 0.58 | 1139 | 1.00 | 802 | 0.95 | 330 | 0.52 | 790 |
| Verdun . . . . . | - | - | - | - | - | - | 1,16 | 1062 | 0.40 | 662 | 0.40 | 806 |
| **Ireland** | | | | | | | | | | | | |
| Dublin City . . . . | 0.93 | 711,8 | 0.86 | 665.9 | 0,79 | 688.1 | 0.76 | 652.5 | (2) 0.99 | (3) 570.8 | 0.47 | 655.0 |

(1) height of precipitations l/m$^2$
(2) for 11 months (October 1971 sampling failed)
(3) Fall-out for 12 months (excluding October - 536,9)

./. continued in next page

Table 11.2a)
(continued)

## $^{90}Sr$ DEPOSITION $\Sigma \bar{x}_m$

1967 - 1979

mCi/km2

| | 1973 | | 1974 | | 1975 | | 1976 | | 1977 | | 1978 | | 1979 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $^{90}Sr$ | $l/m^2$ (1) | $^{90}Sr$ | $l/m^2$ (1) | $^{90}Sr$ | $l/m^2$ (1) | $^{90}Sr$ | $l/m^2$ (1) | $^{90}Sr$ | $l/m^2$ (1) | $^{90}Sr$ | $l/m^2$ (1) | $^{90}Sr$ | $l/m^2$ (1) |
| France (SCPRI) | | | | | | | | | | | | | | |
| Anglade | 0.19 | 936.7 | 0.68 | 939.2 | 0.26 | 705.0 | 0.17 | 879.7 | 0.48 | 1006.8 | 0.54 | 674.8 | < 0.20 | 939.0 |
| Bellenaves | - | - | - | - | 0.28 | 636.8 | < 0.14 | 779.5 | 0.54 | 877.7 | 0.52 | 626.8 | < 0.22 | 791.5 |
| Bordeaux | - | - | - | - | 0.33 | 803.5 | 0.16 | 970.9 | 0.57 | 946.0 | 0.89 | 938.1 | < 0.27 | 1205.9 |
| Briançon | 0.27 | 758.8 | 0.53 | 557.4 | 0.32 | 598.4 | < 0.16 | 642.3 | 0.79 | 1005.4 | 0.58 | 784.9 | < 0.23 | 857.8 |
| Bussy-le-Grand | 0.16 | 644.0 | - | - | 0.34 | 909.0 | 0.081 | 497.8 | 0.46 | 824.0 | 0.47 | 719.8 | 0.18 | 946.7 |
| Cléville | 0.12 | 667.2 | 0.45 | 750.9 | 0.28 | 673.2 | < 0.18 | 423.7 | 0.31 | 600.2 | 0.48 | 741.7 | < 0.13 | 712.0 |
| Le Vésinet | 0.14 | 591.8 | 0.41 | 760.0 | 0.34 | 647.4 | 0.087 | 408.4 | 0.34 | 693.0 | 0.52 | 756.6 | 0.13 | 711.2 |
| Lille | - | - | - | - | 0.27 | 751.1 | < 0.13 | 446.6 | 0.45 | 737.5 | 0.50 | 614.2 | < 0.18 | 810.2 |
| Méaudre | - | - | - | - | 0.47 | 1535.5 | 0.16 | 1098.1 | 0.99 | 1537.4 | 1.2 | 1423.0 | 0.28 | 1486.8 |
| Nancy | 0.13 | 534.7 | 0.51 | 707.0 | 0.24 | 546.9 | < 0.11 | 500.3 | - | - | - | - | - | - |
| Nainville-les-Rs | - | - | - | - | 0.28 | 718.1 | < 0.11 | 400.7 | 0.42 | 698.7 | 0.45 (3) | 648.4 (3) | < 0.17 | 794.5 |
| Rennes | - | - | 0.45 | 572.5 | 0.27 | 580.9 | < 0.14 | 567.6 | 0.42 | 645.6 | 0.44 | 688.6 | < 0.16 | 724.7 |
| Montfaucon | - | - | - | - | - | - | - | - | 0.71 | 799.3 | 0.65 | 543.9 | 0.19 | 703.0 |
| Vioménil | 0.21 | 898.0 | 0.66 | 1040.0 | 0.39 | 890.3 | < 0.15 | 706.6 | 0.63 | 1194.5 | 0.74 | 1004.0 | 0.24 | 1088.4 |
| France (CEA) | | | | | | | | | | | | | | |
| Orsay | 0.13 | 576 | 0.29 | 668 | 0.17 | 659 | 0.056 | 410 | 0.225 | 700 | 0.222 | 789 | 0.094 | 853 |
| Le Barp (Bordeaux) | 0.28 | 797 | 0.44 | 819 | 0.18 | 745 | 0.110 | 785 | 0.293 | 960 | 0.570 | 1085 | 0.112 | 1200 |
| Verdun | 0.29 | 764 | 0.40 | 979 | 0.29 | 769 | 0.046 | 571 | 0.282 | 840 | 0.352 | 1013 | 0.099 | 1203 |
| Ireland | | | | | (2) | | | | | | | | (4) | (4) |
| Dublin City | 0.36 | 656.7 | 0.55 | 600.1 | 0.37 | 464.6 | 0.17 | 631.7 | 0.43 | 635.3 | 0.44 | 729.5 | 0.19 | 394.2 |

(1) height of precipitations $l/m^2$
(2) for 11 months (September 1975 sampling failed)
(3) for 11 months (June 1978 sampling failed)
(4) for 8 months (Feb.sampling failed); measurements discontinued from 30th September 1979

Table 11.3

## $^{90}Sr$ DEPOSITION $\Sigma \bar{x}_m$

1967 - 1979

mCi/km$^2$

| | 1967 | | 1968 | | 1969 | | 1970 | | 1971 | | 1972 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) | $^{90}Sr$ | l/m$^2$ (1) |
| **Italia** | | | | | | | | | | | | |
| Udine . . . . . | - | - | - | - | 1.219 | 1244.5 | 0.792 | 288.2 | 0.653 | 126.3 | 0.629 | 147.9 |
| Segrate (Milano) | - | - | - | - | 1.21 | 566.9 | - | 896.9 | <2.088 | 768.2 | - | 1043.1 |
| Casaccia (Roma) . | - | - | - | - | 1.403 | 863.4 | 1.59 | 630.5 | <2.134 | 901.0 | <0.85 | 987.8 |
| Caltagirone . . . | - | - | - | - | 0.355 | 574.4 | - | 307.4 | 0.504 | 512.6 | 0.061 | - |
| Ispra (CCR) . . . | 1.851 | 364.8 | 2.012 | 1826.0 | 1.655 | 1274.6 | 1.809 | 1188.9 | 2.397 | 1534.0 | 0.876 | 1967.0 |
| **Nederland** | | | | | | | | | | | | |
| Bilthoven . . . | 0.89 | 812 | 1.31 | 853 | 0.92 | 729 | - | - | - | - | - | - |
| De Bilt . . . . . | - | - | - | - | - | - | 1.10 | 808.0 | 1.18 | 547.0 | 0.43 | 596.0 |
| **United Kingdom** | | | | | | | | | | | | |
| Abingdon . . . . | 0.87 | 670.8 | 0.91 | 756.8 | 0.81 | 604.7 | 0.57 | 590.1 | 1.05 | 702.0 | - | - |
| Milford-Haven . . | 1.22 | 1042.3 | 1.24 | 991.3 | 0.85 | 1036.9 | 1.19 | 1018.5 | 1.41 | 999.3 | - | - |

(1) Height of precipitations l/m$^2$

./. continued in next page

Table 11.3a)
(continued)

## $^{90}Sr$ DEPOSITION $\Sigma \bar{x}_m$

1967 - 1979

mCi/km2

| | 1973 | | 1974 | | 1975 | | 1976 | | 1977 | | 1978 | | 1979 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $^{90}Sr$ | $l/m^2$ (1) | $^{90}Sr$ | $l/m^2$ (1) | $^{90}Sr$ | $l/m^2$ (1) | $^{90}Sr$ | $l/m^2$ (1) | $^{90}Sr$ | $l/m^2$ (1) | $^{90}Sr$ | $l/m^2$ (1) | $^{90}Sr$ | $l/m^2$ (1) |
| **Italia** | | | | | | | | | | | | | | |
| Udine | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Segrate (Milano) | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Casaccia (Roma) | 0.28 | 596.2 | 0.675 | 818.6 | <0.48 | 947 | <0.25 | 844 | - | - | 1.101 | 826 | - | - |
| Caltagirone | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ispra (CCR) | 0.310 | 1276.2 | 0.806 | 1326.6 | [illegible] | [illegible] | <0.219 | 1309.[illegible] | 1.232 | 2444 | 1.243 | 1859.4 | <0.322 | 1776.3 |
| **Nederland** | | | | | | | | | | | | | | |
| De Bilt | 0.31 | 778 | 0.83 | 980 | 0.5 | 642 | 0.49 | 648 | 0.55 | 897 | 0.61 | 669 | <0.32 | 922 |
| **United Kingdom** | | | | | | | | | | | | | | |
| Abingdon | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Milford-Haven | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Chilton (NRPB) | - | - | - | - | - | - | - | - | 0.22 | 769 | (2) | (2) | (2) | (2) |
| Belfast | - | - | - | - | - | - | - | - | 0.36 | 847 | 0.32 | 1124 | 0.19 | 921 |
| Bridgend | - | - | - | - | - | - | - | - | 0.42 | 1094 | 0.33 | 1090 | 0.41 | 1220 |
| Glasgow | - | - | - | - | - | - | - | - | 0.38 | 971 | 0.54 | 788 | 0.18 | 1048 |
| Leeds | | | | | - | - | - | - | 0.36 | 766 | (2) | (2) | (2) | (2) |
| Shrivenham | - | - | - | - | - | - | - | - | 0.63 | 763 | 0.35 | 595 | 0.15 | 656 |

(1) Height of precipitations l/m2
(2) No longer sampled

Table 12.1

## $^{137}Cs$ DEPOSITION $\Sigma \bar{x}_m$

1967 - 1979

mCi/km$^2$

| | 1967 | | 1968 | | 1969 | | 1970 | | 1971 | | 1972 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $^{137}Cs$ | 1/m$^2$ (1) | $^{137}Cs$ | 1/m$^2$ (1) | $^{137}Cs$ | 1/m$^2$ (1) | $^{137}Cs$ | 1/m$^2$ (1) | $^{137}Cs$ | 1/m$^2$ (1) | $^{137}Cs$ | 1/m$^2$ (1) |
| **Deutschland (BR)** | | | | | | | | | | | | |
| Braunschweig | - | - | - | - | - | - | 1.960 | 694.9 | 1.902 | 400.7 | 0.948 | 465.0 |
| Jülich | 1.499 | 704 | 1.729 | 734 | 2.189 | 690 | 1.625 | 814.4 | 0.882 | 491.9 | 0.116 | 592.2 |
| Karlsruhe | 1.610 | - | <1.700 | - | - | - | - | - | - | - | - | - |
| Königstein | 1.414 | 934 | 1.674 | 975 | 1.400 | 826 | 1.890 | 924.8 | 1.362 | 637.2 | 0.607 | 689.9 |
| Königslutter | - | - | - | - | - | - | 2.730 | 780.0 | 4.293 | 472.8 | 2.970 | 622.0 |
| **France (SCPRI)** | | | | | | | | | | | | |
| Anglade | <1.1 | 877.8 | 1.6 | 956.3 | 1.9 | 1091.1 | 1.8 | 968.6 | 1.4 | 953.1 | <0.69 | 808.7 |
| Bellenaves | <0.86 | 575.6 | <1.4 | 750.0 | 1.2 | 697.3 | - | - | - | - | <0.64 | 740.0 |
| Bordeaux | - | - | 1.7 | 946.2 | 1.6 | 911.6 | 1.2 | 727 | 1.6 | 914.2 | - | - |
| Briançon | - | - | 1.7 | 887.8 | 1.6 | 581.2 | 1.4 | 806.5 | - | - | <0.54 | 694.3 |
| Bussi-le-Grand | - | - | - | - | 1.1 | 656.1 | 1.8 | 913.6 | - | - | - | - |
| Cléville | <1.1 | 790.4 | <1.4 | 524.8 | - | - | - | - | 0.97 | 506.1 | <0.42 | 607.3 |
| Le Vésinet | <0.74 | 604.8 | 1.3 | 747.6 | 1.1 | 581.1 | 1.4 | 687.1 | 1.1 | 567.6 | <0.56 | 778.6 |
| Lille | - | - | 1.4 | 699.9 | 1.2 | 616.7 | 1.2 | 643.4 | - | - | <0.50 | 675.0 |
| Méaudre | 1.5 | 1223.5 | 1.7 | 1401.4 | 1.8 | 1251.7 | 2.6 | 1435.6 | - | - | <0.85 | 1154.6 |
| Nancy | <1.1 | 735.9 | 1.1 | 776.2 | 0.83 | 653.7 | 1.4 | 890.2 | - | - | <0.42 | 670.3 |
| Nainville-les-Roches | <0.98 | 520.3 | <1.2 | 651.2 | <0.84 | 541.2 | 1.2 | 647.5 | - | - | <0.57 | 649.3 |
| Rennes | - | - | - | - | - | - | - | - | 1.4 | 565.5 | <0.45 | 581.2 |
| Sauveterre | 0.93 | 368.6 | - | - | 1.0 | 568.9 | - | - | - | - | <0.47 | 869.9 |
| Vioménil | 1.6 | 1113.5 | 1.3 | 1088.7 | 1.6 | 890.4 | 2.1 | 1212.7 | 1.9 | 790.0 | <0.68 | 899.3 |

./. Continued in next page

Table 12.1a)
(continued)

## $^{137}Cs$ DEPOSITION $\Sigma \overline{x}_m$
1967 - 1979

mCi/km$^2$

| | 1973 | | 1974 | | 1975 | | 1976 | | 1977 | | 1978 | | 1979 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $^{137}Cs$ | l/m$^2$ (1) | $^{137}Cs$ | l/m$^2$ (1) | $^{137}Cs$ | l/m$^2$ (1) | $^{137}Cs$ | l/m$^2$ (1) | $^{137}Cs$ | l/m$^2$ (1) | $^{137}Cs$ | l/m$^2$ (1) | $^{137}Cs$ | l/m$^2$ (1) |
| **Deutschland** (BR) | | | | | | | | | | | | | | |
| Braunschweig . . . | 0.586 | 410.2 | 1.423 | 488.0 | 0.912 | 388.9 | 0.642 | 374.8 | 0.216 | 412.7 | 0.325 | 333.4 | 0.134 | 338.6 |
| Jülich . . . . . | 0.070 | 564.0 | 0.383 | 740.2 | 0.297 | 539.3 | (3.838) | 444.0 | 0.574 | 579.3 | 0.801 | 567.4 | 0.301 | 746.3 |
| Karlsruhe . . . . | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Königstein . . . . | 0.146 | 446.9 | 0.908 | 701.1 | - | - | - | - | - | - | - | - | - | - |
| Königslutter . . . | 1.861 | 546.1 | 4.126 | 566.9 | 2.577 | 502.1 | 2.079 | 496.6 | 1.070 | 628.9 | 1.189 | 465.2 | 0.998 | 639.4 |
| Offenbach . . . . | - | - | - | - | 0.545 | 587.8 | 0.230 | 379.0 | 1.014 | 749.6 | 0.833 | 565.0 | 0.313 | 701.3 |
| **France** (SCPRI) | | | | | | | | | | | | | | |
| Anglade . . . . . | <0.45 | 936.7 | <1.2 | 939.2 | <0.53 | 705.0 | <0.38 | 879.7 | <0.73 | 1006.8 | <1.0 | 674.8 | <0.48 | 939.0 |
| Bellenaves . . . . | - | - | - | - | <0.66 | 636.8 | <0.25 | 779.5 | <0.76 | 877.7 | <0.94 | 626.8 | <0.53 | 791.5 |
| Bordeaux . . . . | - | - | - | - | <0.57 | 803.5 | <0.34 | 970.9 | <0.80 | 946.0 | 1.4 | 939.1 | <0.60 | 1205.9 |
| Briançon . . . . . | <0.36 | 758.8 | <0.69 | 557.4 | <0.54 | 598.4 | <0.31 | 642.3 | <0.89 | 1005.4 | <1.1 | 784.9 | <0.56 | 857.8 |
| Bussy-le-Grand . . | <0.31 | 644.0 | - | - | <0.67 | 909.0 | <0.21 | 497.8 | <0.91 | 824.0 | <0.91 | 719.8 | <0.49 | 946.7 |
| Cléville . . . . . | <0.27 | 667.2 | <0.88 | 750.9 | <0.62 | 673.2 | <0.25 | 423.7 | <0.72 | 600.2 | <1.1 | 741.7 | <0.48 | 712.0 |
| Le Vésinet . . . . | <0.18 | 591.8 | 0.87 | 760.0 | <0.45 | 647.4 | <0.15 | 408.4 | <0.47 | 693.0 | 0.77 | 756.6 | <0.20 | 711.2 |
| Lille . . . . . | - | - | - | - | <0.68 | 751.1 | <0.27 | 446.6 | <0.82 | 737.5 | <0.93 | 614.2 | <0.52 | 810.2 |
| Méaudre . . . . . | - | - | - | - | <0.82 | 1535.5 | <0.36 | 1098.1 | <1.2 | 1537.4 | 1.5 | 1423.0 | <0.79 | 1486.8 |
| Nancy . . . . . | <0.30 | 534.7 | <0.83 | 707.0 | <0.45 | 546.9 | <0.25 | 500.3 | - | - | - | - | - | - |
| Nainville-les-Rs . | - | - | - | - | <0.52 | 718.1 | <0.24 | 400.7 | <0.59 | 698.7 | 0.6(2) | (2)648.4 | <0.47 | 794.5 |
| Rennes . . . . . | - | - | <0.95 | 572.5 | <0.56 | 580.9 | <0.21 | 561.6 | <0.62 | 645.6 | <0.99 | 688.6 | <0.44 | 724.7 |
| Montfaucon . . . . | - | - | - | - | - | - | - | - | <0.68 | 799.3 | <0.92 | 543.9 | <0.45 | 703.0 |
| Viomenil . . . . . | <0.36 | 898.0 | <0.99 | 1040.0 | <0.77 | 890.3 | <0.40 | 706.6 | <0.99 | 1194.5 | 0.98 | 1004.0 | <0.58 | 1088.4 |

(1) height of precipitations l/m$^2$
(2) for 11 months (June 1978 sampling failed)

Table 12.2

## $^{137}Cs$ DEPOSITION $\Sigma \bar{x}_m$

1967 - 1979

mCi/km$^2$

| | 1967 | | 1968 | | 1969 | | 1970 | | 1971 | | 1972 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $^{137}Cs$ | l/m$^2$ (1) | $^{137}Cs$ | l/m$^2$ (1) | $^{137}Cs$ | l/m$^2$ (1) | $^{137}Cs$ | l/m$^2$ (1) | $^{137}Cs$ | l/m$^2$ (1) | $^{137}Cs$ | l/m$^2$ (1) |
| **France** (CEA) | | | | | | | | | | | | |
| Orsay . . . . . | 0.81 | 590 | 1.06 | 633 | 0.82 | 618 | 1.06 | 631 | 1.48 | 508 | 0.86 | 740 |
| Le Barp (Bordeaux) | - | - | 2.55 | 998 | 1.76 | 1139 | 2.21 | 802 | 3.17 | 930 | 1.33 | 790 |
| Verdun . . . . . | - | - | - | - | - | - | 2.68 | 1062 | 2.38 | 662 | 1.38 | 806 |
| **Italia** | | | | | | | | | | | | |
| Segrate (Milano) . | - | - | - | - | 1.98 | 566.9 | - | 896.0 | - | 768.1 | - | 1043.1 |
| Casaccia (Roma) . . | - | - | - | - | 2.56 | 863.4 | 1.90 | 630.5 | 2.024 | 901.0 | 1.651 | 987.8 |
| Ispra (CCR) . . . . | 2.906 | 364.8 | 4.671 | 1826.6 | 2.301 | 1274.6 | 2.692 | 1188.0 | 3.826 | 1534.0 | 1.382 | 1967.0 |
| **Nederland** | | | | | | | | | | | | |
| Bilthoven . . . . | 1.51 | 812 | 2.16 | 853 | 1.69 | 729 | - | - | - | - | - | - |
| De Bilt . . . . . | - | - | - | - | - | - | 2.05 | 808 | 2.17 | 547 | 0.69 | 596 |
| **United Kingdom** | | | | | | | | | | | | |
| Chilton . . . . . | 1.15 | 752.1 | 1.38 | 716.3 | 1.04 | 557.4 | 1.17 | 726.0 | 1.09 | 695.3 | 0.69 | 616.5 |
| Milford-Haven . . . | 1.79 | 1042.3 | 1.78 | 991.3 | 1.23 | 1036.9 | 1.61 | 1018.5 | 1.64 | 1005.3 | 1.12 | 1113.6 |

(1) Height of precipitations l/m$^2$

./. continued in next page

Table 12.2a)
(continued)

$^{137}Cs$ DEPOSITION $\Sigma \bar{x}_m$

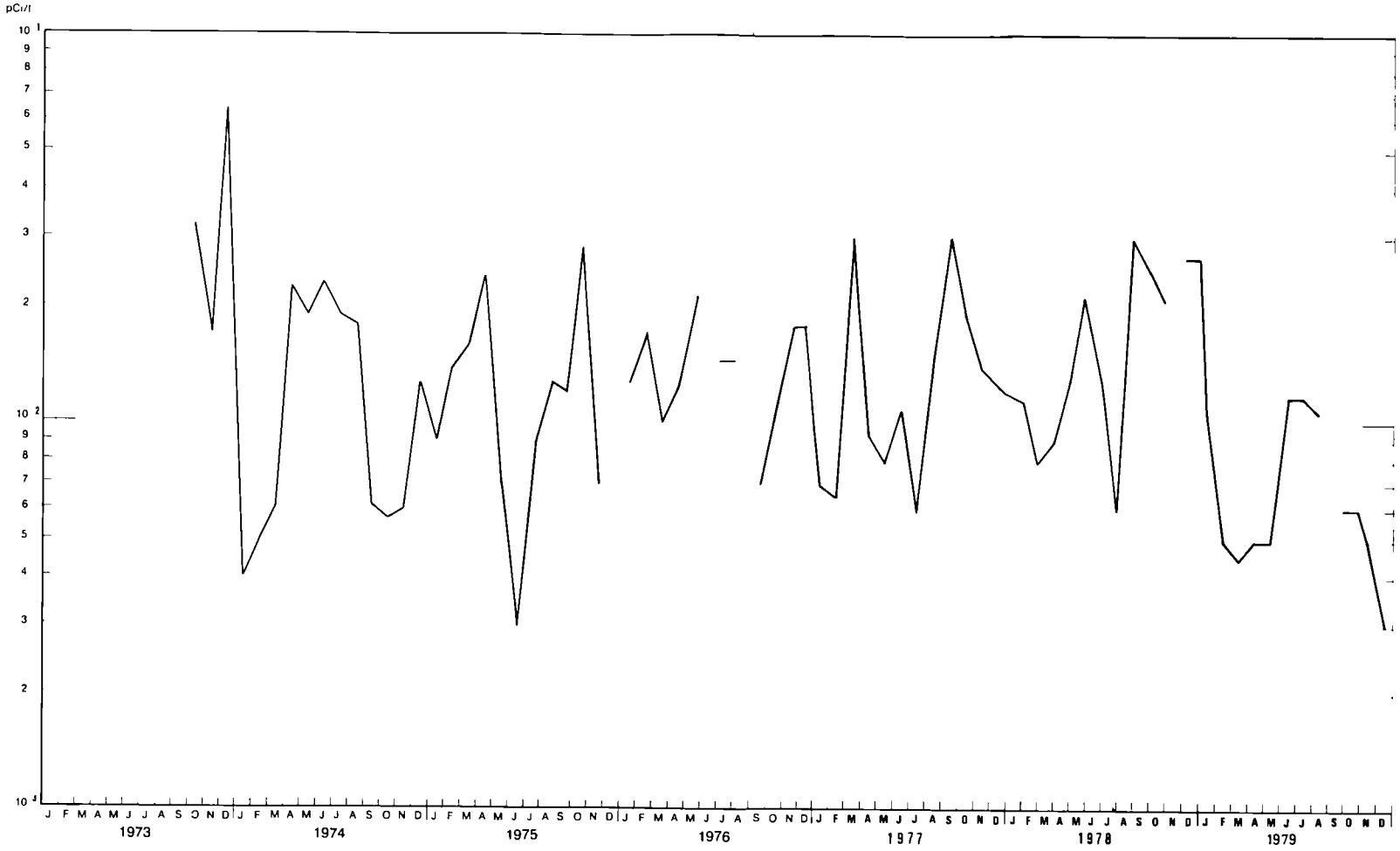
1967 - 1979

$mCi/km^2$

| | 1973 | | 1974 | | 1975 | | 1976 | | 1977 | | 1978 | | 1979 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $^{137}Cs$ | $l/m^2$ (1) | $^{137}Cs$ | $l/m^2$ (1) | $^{137}Cs$ | $l/m^2$ (1) | $^{137}Cs$ | $l/m^2$ (1) | $^{137}Cs$ | $l/m^2$ (1) | $^{137}Cs$ | $l/m^2$ (1) | $^{137}Cs$ | $l/m^2$ (1) |
| France (CEA) | | | | | | | | | | | | | | |
| Orsay ..... | 0.30 | 576 | 1.09 | 668 | 0.28 | 659 | 0.028 | 410 | 0.357 | 700 | 0.926 | 789 | 0.158 | 853 |
| Le Barp(Bordeaux) | 0.50 | 797 | 1.49 | 817 | 0.44 | 745 | 0.080 | 785 | 0.697 | 960 | 1.261 | 1085 | 0.394 | 1200 |
| Verdun ..... | 0.89 | 764 | 1.08 | 979 | 0.67 | 769 | 0.107 | 571 | 0.413 | 840 | 0.878 | 1013 | 0.361 | 1203 |
| Italia | | | | | | | | | | | | | | |
| Segrate (Milano) | 0.470 | 658.8 | 1.074 | 784.2 | 0.77 | 1303.6 | <0.32 | 1235 | <1.26 | 1306 | 1.59 | 1205 | 0.379 | 1281 |
| Casaccia (Roma). | 0.304 | 596.2 | 0.771 | 818.6 | <0.62 | 947 | <0.31 | 844 | 0.96 | 667 | 1.73 | 826 | 0.539 | 1236 |
| Ispra (CCR)..... | 0.504 | 1276.2 | 1.65 | 1326.6 | 1.5 | 1923.4 | 0.38 | 1809.8 | 2.23 | 2444 | 2.33 | 1859.4 | 0.500 | 1776.3 |
| Nederland | | | | | | | | | | | | | | |
| De Bilt ..... | 0.40 | 778 | 0.97 | 969 | 0.36 | 642 | 0.32 | 648 | 0.95 | 897 | 0.70 | 669 | 0.43 | 922 |
| United Kingdom | | | | | | | | | | | | | | |
| Chilton (AERE).. | 0.33 | 552.6 | 0.53 | 800.7 | 0.45 | 568.6 | 0.28 | 521.7 | 0.57 | 819.8 | 0.61 | 665.2 | 0.23 | 757.8 |
| Milford Haven .. | 0.48 | 838.9 | 1.15 | 1164.9 | 0.55 | 873.4 | 0.45 | 1189.2 | 0.87 | 1118.2 | 0.98 | 924.3 | 0.35 | 1136.3 |
| Chilton (NRPB).. | - | - | - | - | - | - | 0.14 | 475 | 0.73 | 769 | (2) | (2) | (2) | (2) |
| Belfast ..... | - | - | - | - | - | - | 0.20 | 991 | 0.52 | 847 | 0.75 | 1124 | 0.33 | 921 |
| Bridgend ..... | - | - | - | - | - | - | 0.32 | 1049 | 0.68 | 1094 | 1.00 | 1090 | 0.42 | 1220 |
| Glasgow ..... | - | - | - | - | - | - | 0.19 | 908 | 0.80 | 971 | 0.75 | 788 | 0.30 | 1048 |
| Leeds ..... | - | - | - | - | - | - | 0.22 | 807 | 0.50 | 766 | (2) | (2) | (2) | (2) |
| Shrivenham ..... | - | - | - | - | - | - | 0.12 | 515 | 0.63 | 763 | 0.60 | 595 | 0.21 | 656 |

(1) Height of precipitations
(2) No longer sampled

## $^{239}$PU MEASUREMENTS IN RAIN AT ORSAY (France)




Graph 6

TOTAL BETA DEPOSITION

1979

Table 13

mCi/km$^2$

| | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | | 11 | | 12 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\bar{x}_m$ | N | $\Sigma \bar{x}_m$ |
| Belgique/België | (1) | 0.51 | 7 | 0.38 | 7 | 0.79 | 7 | 0.58 | 7 | 0.78 | 7 | 0.66 | 7 | 0.36 | 7 | 0.37 | 7 | 0.19 | 7 | 0.27 | 7 | 0.33 | 7 | 0.55 | 7 | 5.77 |
| | (2) | 45.8 | | 43.4 | | 114.2 | | 55.3 | | 75.2 | | 58.2 | | 23.3 | | 75.1 | | 21.8 | | 39.7 | | 83.4 | | 112.9 | | 748.3 |
| Denmark | (1) | 0.47 | 1 | 0.21 | 1 | 0.84 | 1 | 0.55 | 1 | 0.99 | 1 | 0.22 | 1 | 0.165 | 1 | 0.21 | 1 | 0.119 | 1 | 0.061 | 1 | 0.27 | 1 | 0.31 | 1 | 4.42 |
| | (2) | 15 | | 10.3 | | 40.8 | | 27.7 | | 45.7 | | 22.1 | | 27.1 | | 75.6 | | 25.9 | | 21.8 | | 64.9 | | 73.4 | | 450 |
| Deutschland (BR) | (1) | 0.532 | 17 | 0.467 | 17 | 0.644 | 17 | 0.565 | 17 | 0.581 | 17 | 0.790 | 17 | 0.482 | 17 | 0.481 | 17 | 0.258 | 17 | 0.246 | 17 | 0.639 | 17 | 0.803 | 17 | 6.488 |
| | (2) | 57.5 | | 60.4 | | 109.6 | | 74.2 | | 78.8 | | 103.1 | | 71.1 | | 91.8 | | 61.4 | | 35.9 | | 113.6 | | 120.9 | | 978.3 |
| France (SCPRI) | (1) | 0.41 | 13 | <0.48 | 13 | <0.48 | 13 | <0.39 | 13 | 0.63 | 13 | 0.61 | 13 | 0.33 | 13 | <0.43 | 13 | 0.28 | 13 | <0.47 | 13 | <0.26 | 13 | <0.47 | 13 | < 5.3 |
| | (2) | 73.7 | | 85.4 | | 122.0 | | 66.1 | | 74.9 | | 56.1 | | 22.1 | | 77.1 | | 29.1 | | 107.4 | | 70.2 | | 121.4 | | 905.6 |
| France (CEA) | (1) | 1.82 | 6 | 1.32 | 6 | 1.68 | 6 | 1.03 | 6 | 0.94 | 6 | 0.51 | 6 | 0.52 | 6 | 0.74 | 6 | 0.24 | 6 | 1.37 | 6 | 0.59 | 6 | 1.14 | 6 | 11.9 |
| | (2) | 94.4 | | 79.1 | | 111.4 | | 65.6 | | 52.9 | | 37.1 | | 18.9 | | 55.9 | | 23.1 | | 166.5 | | 58.1 | | 118.5 | | 881.5 |
| Irlande | (1) | 0.38 | 8 | 0.36 | 8 | 0.39 | 8 | 0.22 | 8 | 0.32 | 8 | 0.24 | 8 | 0.14 | 8 | 0.20 | 8 | 0.20 | 8 | 0.31 | 8 | 0.36 | 7 | 0.23 | 7 | 3.35 |
| | (2) | 91.0 | | 89.0 | | 91.6 | | 54.7 | | 101.6 | | 52.3 | | 33.7 | | 113.2 | | 57.8 | | 137.3 | | 119.3 | | 174.3 | | 1115.8 |
| Italia | (1) | 0.53 | 2 | 0.45 | 2 | 1.17 | 2 | 0.93 | 2 | 0.77 | 2 | 2.03 | 2 | 0.87 | 2 | 1.02 | 2 | 0.27 | 2 | 0.75 | 2 | 0.17 | 2 | 0.35 | 2 | 9.31 |
| | (2) | 68 | | 121 | | 248 | | 96 | | 22 | | 99 | | 76 | | 148 | | 81 | | 341 | | 90 | | 136 | | 1526 |
| Nederland | (1) | 0.82 | 1 | 0.42 | 1 | 0.66 | 1 | 0.83 | 1 | 1.31 | 1 | 2.49 | 1 | 1.02 | 1 | 0.40 | 1 | 0.22 | 1 | 0.40 | 1 | 0.34 | 1 | 0.68 | 1 | 9.6 |
| | (2) | 73 | | 40 | | 89 | | 56 | | 64 | | 170 | | 39 | | 59 | | 34 | | 49 | | 70 | | 96 | | 839 |
| United Kingdom | (1) | 0.59 | 6 | 0.49 | 6 | 0.82 | 6 | 0.70 | 6 | 0.67 | 6 | 0.38 | 6 | 0.26 | 5 | 0.44 | 6 | 0.18 | 5 | 0.46 | 6 | 0.41 | 6 | 0.46 | 6 | 5.86 |
| | (2) | 85.5 | | 41.4 | | 110.0 | | 72.2 | | 95.4 | | 31.0 | | 30.1 | | 94.7 | | 35.3 | | 94.1 | | 119.1 | | 143.6 | | 952 |
| M | (1) | 0.67 | 60 | 0.51 | 61 | 0.83 | 61 | 0.64 | 61 | 0.78 | 61 | 0.88 | 61 | 0.46 | 60 | 0.48 | 61 | 0.22 | 60 | 0.48 | 61 | 0.37 | 60 | 0.56 | 60 | 6.9 |
| | (2) | 67.1 | | 63.3 | | 115.2 | | 63.1 | | 66.7 | | 69.9 | | 37.9 | | 87.8 | | 41.0 | | 110.3 | | 87.6 | | 121.9 | | 932 |

(1) $\beta$G-mCi/km2
(2) Height of precipitations l/m2

./. continued in next page

Table 14

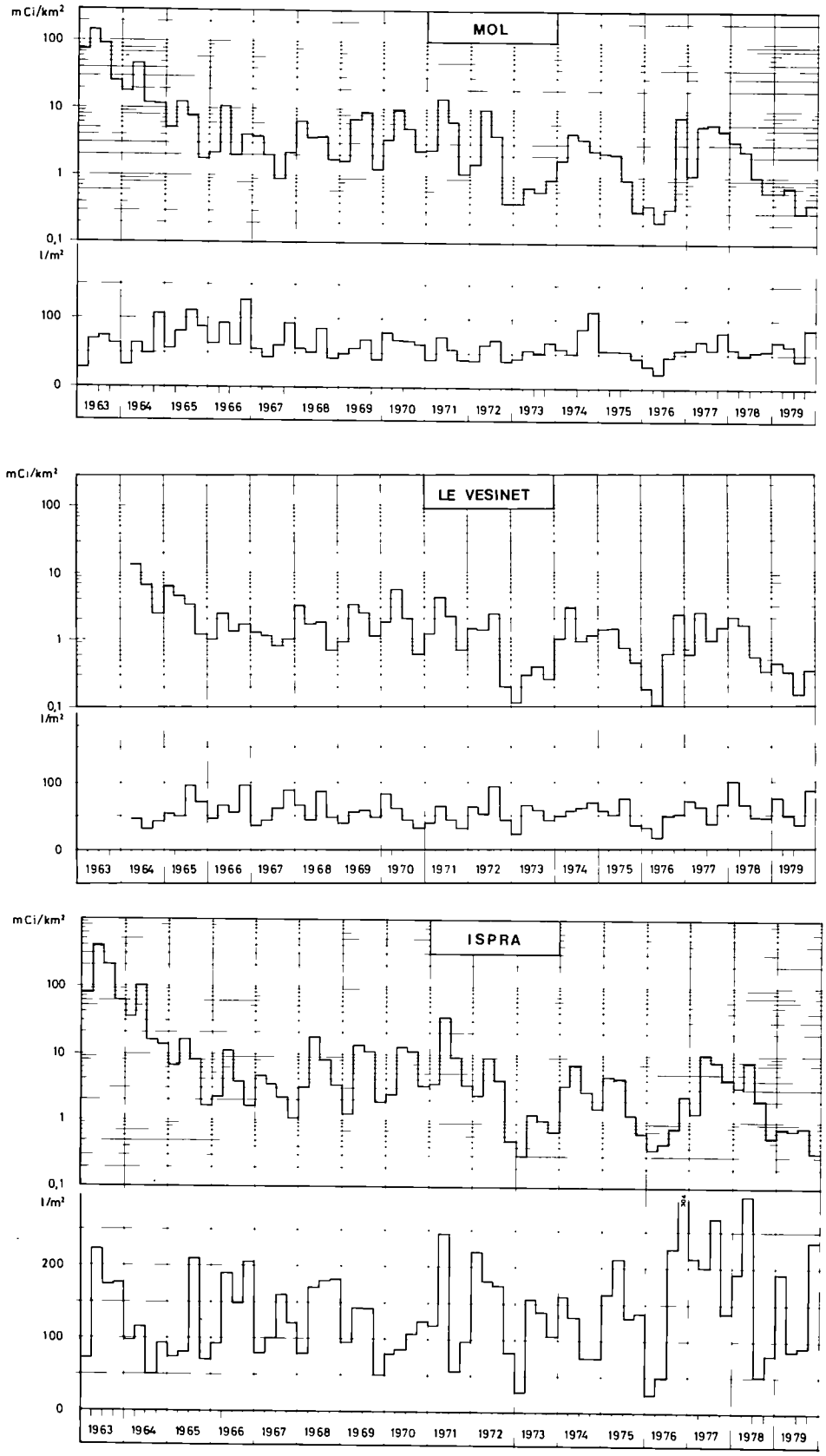
## TOTAL BETA DEPOSITION $\Sigma \bar{x}_m$

1962 - 1979

mCi/km$^2$

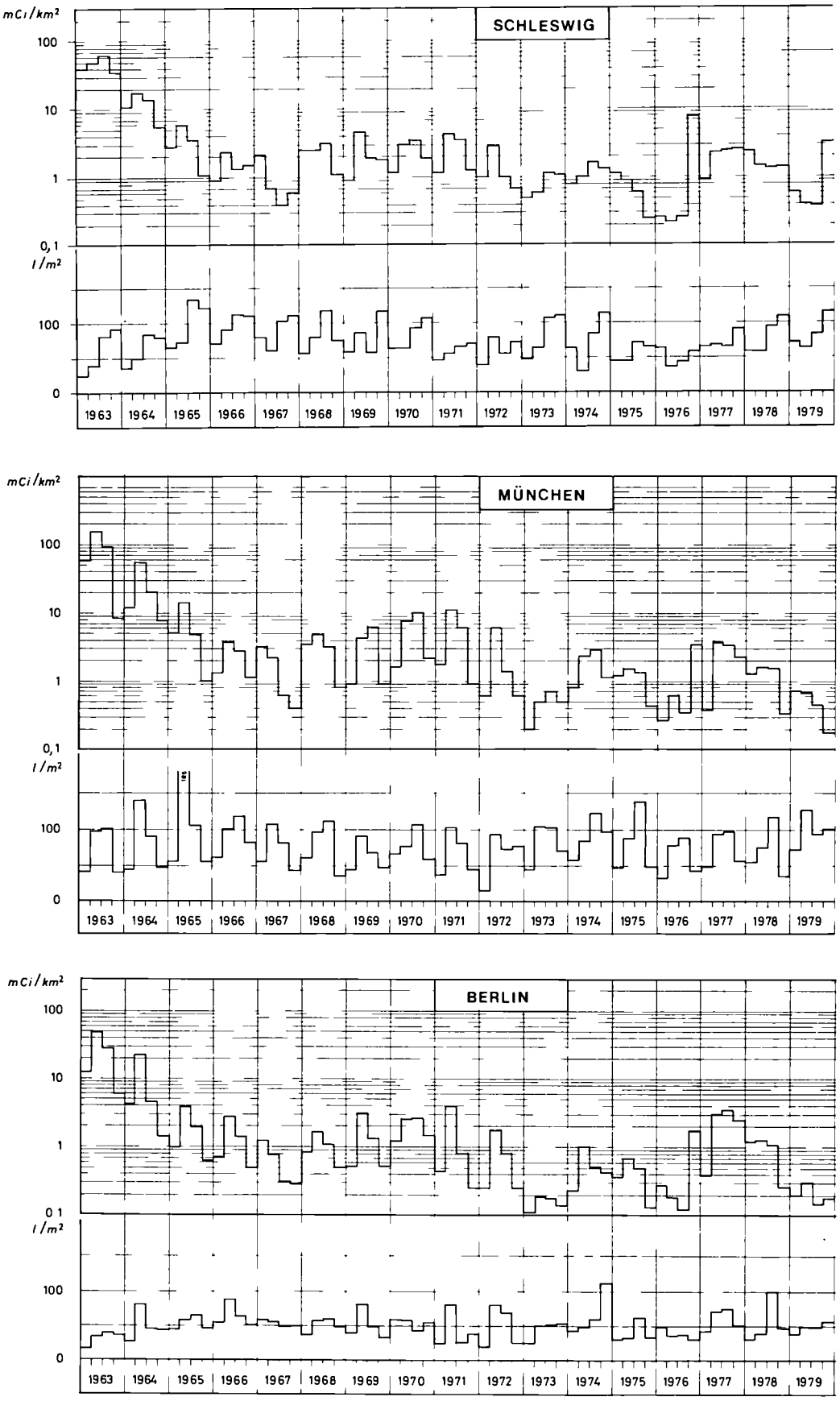
| | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BELGIQUE/BELGIË | 1304 | 1035 | 246 | 81 | 46 | 22 | 43 | 46 | 51 | 62 | 35 | 7.3 | 32.3 | 15.3 | 19.9 | 47.15 | 19.47 | 5.77 |
| DENMARK | 260 | 360 | 126 | 23 | 13 | 9 | 11 | 12 | 9 | 23 | 14 | 7.4 | 13 | - | 13.2 | 13.9 | 9.62 | 4.42 |
| DEUTSCHLAND (BR) | 605 | 579 | 153 | 55 | 28 | 17 | 28 | 24 | 36 | 32 | 16 | 6.3 | 20 | 10.4 | 15.5 | 25.35 | 16.24 | 6.49 |
| FRANCE (SCPRI) | 760 | 1100 | 310 | 64 | 21 | < 13 | 25 | 29 | 33 | 33 | 12 | < 4.5 | 18 | < 8.8 | 11.2 | 29 | 15 | < 5.3 |
| FRANCE (CEA) | - | - | - | - | 30 | 28 | 41 | 42 | 53 | 56 | 24 | 6.2 | 22.5 | - | - | 43.09 | 21.45 | 11.9 |
| IRELAND | 537 | 582 | 136 | 43 | 18 | 17 | 20 | 17 | 22 | 24 | 16 | 3.5 | 15 | 6.9 | 15.3 | 16.18 | 10.29 | 3.35 |
| ITALIA | 834 | 924 | 251 | 50 | 25 | 16 | 83 | 87 | 93 | 151 | 47 | 11 | 35 | 26.3 | 14.3 | 56.38 | 37.29 | 9.31 |
| NEDERLAND | 1623 | 1950 | 397 | 110 | 65 | 30 | 65 | 117 | 51 | 55 | 28 | 6.1 | 43 | 21.9 | 23.6 | 60.6 | 26 | 9.6 |
| UNITED KINGDOM | 1394 | 1389 | 338 | 106 | 54 | 87 | 59 | 46 | 64 | 84 | 50 | 15 | 39 | 8.95 | 17.7 | 39.7 | 23.06 | 5.86 |
| $\bar{x}$ COMMUNITY | 915 | 990 | 245 | 67 | 33 | 27 | 42 | 47 | 46 | 58 | 27 | 7.5 | 26.4 | 14.1 | 16.3 | 36.8 | 19.81 | 6.9 |

ARIATION OF THE TOTAL BETA ACTIVITY ON THE FALL-OUT AT SEVERAL STATIONS OF THE NETWORK ESTABLISHED ON THE TERRITORY OF THE EUROPEAN COMMUNITY



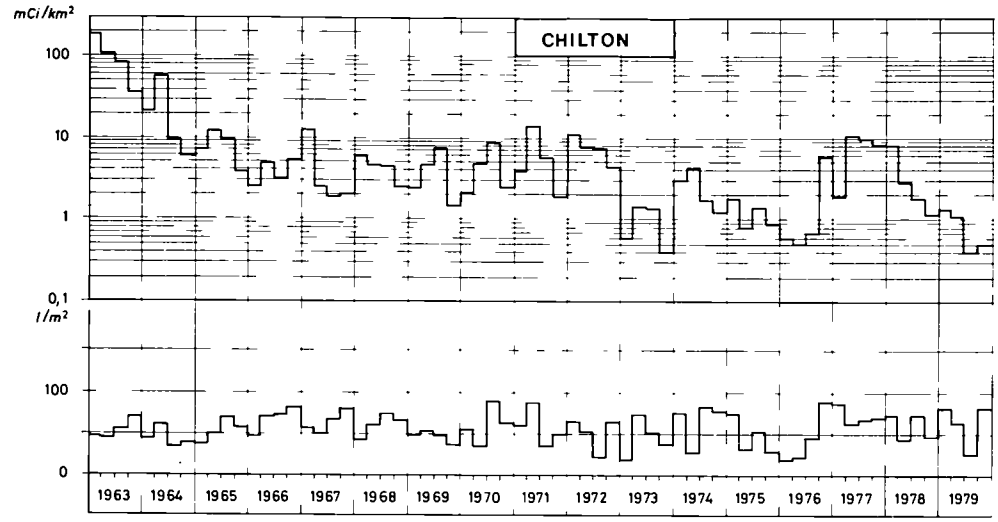

Graph 7a)

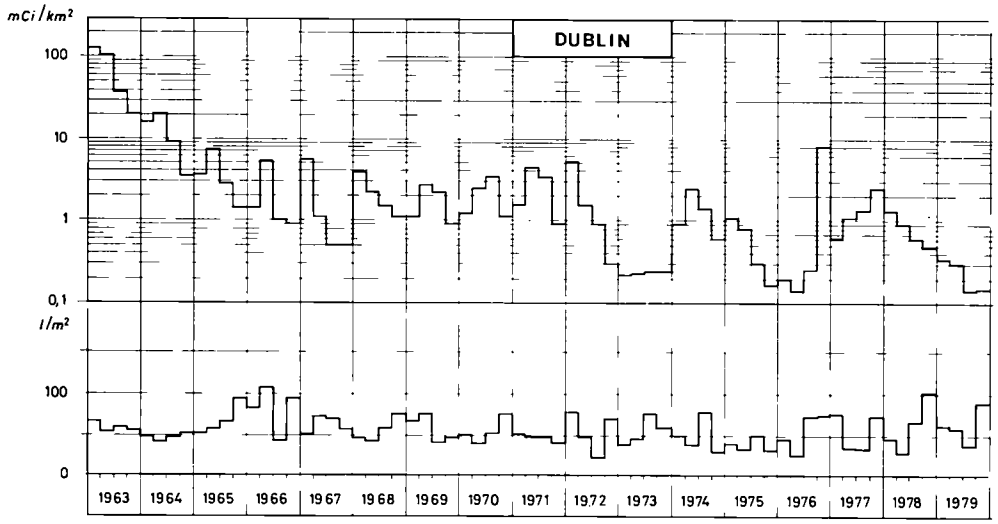
**ARIATION OF THE TOTAL BETA ACTIVITY ON THE FALL-OUT AT SEVERAL STATIONS OF THE NETWORK ESTABLISHED ON THE TERRITORY OF THE EUROPEAN COMMUNITY**

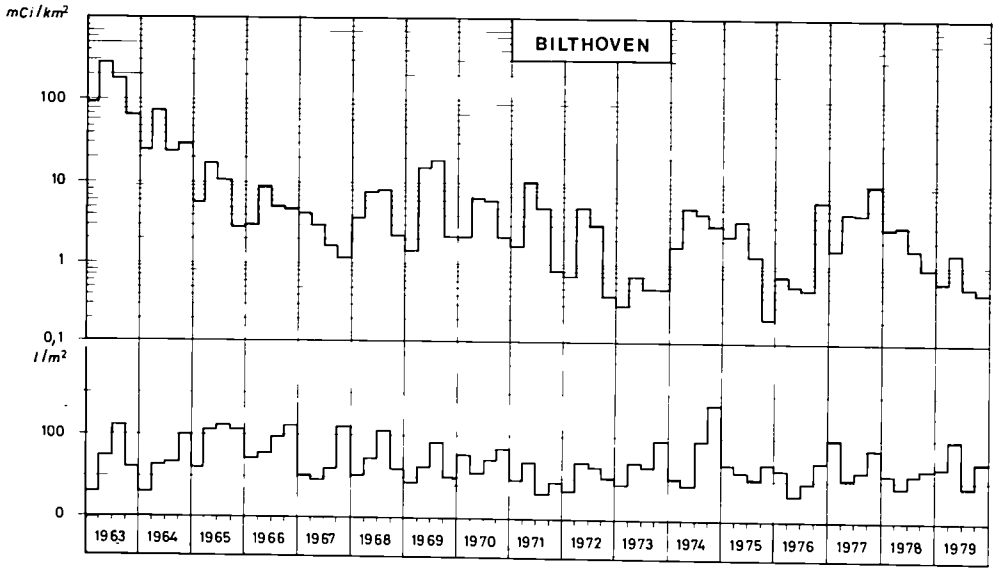



Graph 7b)

ARIATION OF THE TOTAL BETA ACTIVITY ON THE FALL-OUT AT SEVERAL STATIONS OF THE NETWORK ESTABLISHED ON THE TERRITORY OF THE EUROPEAN COMMUNITY




Graph 7c)

# RADIOACTIVITY OF WATER

RADIOACTIVITY OF WATER - GENERAL SITUATION

1979

Table 15.1

$\beta_R$-pCi/l

| | | Minim. | 0 < 10 | ≤10 < 30 | ≤30 < 50 | > 50 | Maxim. | N. |
|---|---|---|---|---|---|---|---|---|
| Drinking water | Belgique | < 5 | 87 % | 13 % | - | - | 29 | 60 |
| | Deutschland | 1 | 96 % | 3 % | < 1 % | - | 44 | ca. 1000 |
| | France (SCPRI) | < 1 | 95 % | 4 % | - | 1 % | 80 | 411 |
| | Ireland | < 0.5 | 100 % | - | - | - | 4 | 96 |
| | United Kingdom (++) | 0.20 | 100 % | - | - | - | < 8 | 12 |
| Surface water suitable for drinking water supply | Belgique | < 5 | 97 % | - | - | 3 % | 60 | 30 |
| | Deutschland | < 1 | 92 % | 8 % | - | - | 65 | ca. 400 |
| | Nederland | 2 | 100 % | - | - | - | 6 | 3 |
| | United Kingdom | < 8 | 100 % | - | - | - | < 8 | 3 |
| Surface water | Belgique | < 5 | 80 % | 17 % | 1.5 % | 1.5 % | 70 | 70 |
| | Deutschland (+) | 1 | 93.7% | 6.2% | 0.1 % | - | 49 | 3036 |
| | France (SCPRI) | < 1 | 94 % | 1 % | 2 % | 3 % | 90 | 3711 |
| | Nederland | 1.5 | 98 % | 2 % | - | - | 11.3 | 48 |
| | United Kingdom | < 6 | 67 % | - | - | 33 % | 1280 | 12 |
| Sea water | Belgique | 10 | - | 50 % | - | 50 % | 510 | 8 |
| | France (SCPRI) | - | 100 % | - | - | - | 10 | 232 |

(+) $\beta_R$ and total beta

(++) Measured only for specific nuclides

Table 15.2

## RADIOACTIVITY OF WATER - DENMARK

1979

$pCi/l^{-1}$

| | Min. | Max. | Geometric mean | N. |
|---|---|---|---|---|
| $^{90}Sr$ | | | | |
| Drinking water | 0.0006 | 1.88 | 5.2 | 10 |
| Lakes water | 0.25 | 2.79 | 1.24 | 8 |
| Streames water | 0.134 | 0.57 | 0.33 | 8 |
| Sea water surface | 0.53 | 0.69 | 0.61 | 10 |
| Sea water bottom | 0.31 | 1.10 | 0.59 | 4 |
| $^{137}Cs$ | | | | |
| Sea water surface | 0.52 | 2.15 | 1.15 | 21 |
| Sea water bottom | 0.80 | 3.60 | 2.58 | 15 |
| $^{134}Cs$ | | | | |
| Sea water surface | 0 | 0.12 | 0.05 | 21 |
| Sea water bottom | 0 | 0.24 | 0.15 | 15 |

# RADIOACTIVITY OF MILK

## pCi $^{90}$Sr/g Ca DIET TO MILK RATIO

1961 - 1979

Table 16

| pCi $^{90}$Sr/gCa Diet/Milk | Belgique/ België | Denmark (c) | Deutsch-land (BR) | France | | Italia | Neder-land | United Kingdom (a) | M |
|---|---|---|---|---|---|---|---|---|---|
| | | | | SCPRI(e) | CEA | | | | |
| 1961 | - | - | - | - | 1.6 | - | - | 1.05 | - |
| 1962 | - | - | - | - | 1.4 | - | - | 0.85 | - |
| 1963 | 1.58 | 1.33 | 1.8 | - | 1.35 | 1.76 | 1.58 | 0.89 | 1.70 |
| 1964 | 1.54 | 1.64 | 1.6 | - | 1.9 | 1.83 | 1.31 | 0.92 | 1.56 |
| 1965 | 1.71 | 1.34 | 1.6 | - | 1.45 | 1.92 | 1.33 | 0.94 | 1.54 |
| 1966 | 1.72 | 1.60 | 1.7 | - | 1.75 | 1.89 | 1.36 | (b) | 1.62 |
| 1967 | 1.65 | 1.19 | 1.6 | - | 1.8 | 1.57 | 1.38 | (b) | 1.48 |
| 1968 | 2.04 | 1.30 | 1.6 | - | 1.9 | 1.69 | 1.39 | (b) | 1.59 |
| 1969 | 1.94 | 1.40 | 1.5 | - | 2.0 | 1.55 | 1.56 | (b) | 1.67 |
| 1970 | 2.30 | 1.14 | 1.5 | 1.5 | - | 1.67 | (d) | (b) | 1.69 |
| 1971 | 2.05 | 1.11 | 1.8 | 1.3 | - | 1.95 | (d) | (b) | 1.75 |
| 1972 | 2.35 | 1.47 | 1.7 | 1.6 | - | - | (d) | (b) | - |
| 1973 | 1.55 | 1.66 | 1.6 | 1.7 | - | - | (d) | (b) | - |
| 1974 | 2.39 | 1.93 | 1.8 | 1.7 | - | - | (d) | (b) | - |
| 1975 | 2.16 | 1.56 | 1.7 | 1.8 | - | - | (d) | (b) | - |
| 1976 | 2.70 | 1.10 | 2.3 | 1.6 | - | - | (d) | (b) | - |
| 1977 | 2.07 | 1.52 | 1.8 | 1.7 | - | - | (d) | (b) | - |
| 1978 | 1.93 | 1.38 | 2.1 | 1.7 | - | - | (d) | (b) | - |
| 1979 | 2.39 | 1.48 | 3.1 | 1.8 | - | - | (d) | (b) | - |

(a) The mixed diet included about 200 mg/day mineral calcium as creta praeparata.
(b) Measurements of radioactivity in mixed diet were discontinued after 1965 when it was considered that measurements on milk provided sufficient information for the assessment of radiation doses to the population. Between 1958 and 1965 the diet/milk ratio ranged from 0,84 to 1,05 the mean being 0,93.
(c) The mixed diet included 200-250 g/year mineral calcium as creta praeparata (~600 mg Ca/day).
(d) No measurements of total diet : the $^{90}$Sr content is calculated from the milk-contamination =

$$\frac{\text{pCi } ^{90}\text{Sr/g Ca diet}}{\text{pCi } ^{90}\text{Sr/g Ca milk}} = 1{,}6 \text{ (ratio 1,6)}$$

(e) Mean coefficients determined from monthly measurements made on total diet and milk consumed in seven schools.

Table 17

QUARTERLY AND ANNUAL MEANS FOR ALL THE SAMPLING AREAS AND POINTS IN THE COMMUNITY

1979

$^{90}Sr$ - pCi/gCa in milk

| | 1st quarter | 2nd quarter | 3rd quarter | 4th quarter | $\bar{x}_a$ |
|---|---|---|---|---|---|
| BELGIQUE/BELGIË | 3.08 | 4.00 | 3.15 | 3.72 | 3.49 |
| DENMARK | | | | | |
| Hjørring ..... | 3.0 | 3.9 | 3.1 | 3.3 | 3.3 |
| Aarhus ..... | 3.2 | 2.9 | 3.1 | 3.4 | 3.1 |
| Videbaek ..... | 3.7 | 3.9 | 3.2 | 3.4 | 3.5 |
| Åbenrå ..... | 3.5 | 4.1 | 3.4 | 3.5 | 3.6 |
| Odense ..... | 1.76 | 3.1 | 2.1 | 2.8 | 2.4 |
| Ringsted ..... | 2.6 | 2.8 | 2.1 | 3.0 | 2.6 |
| Lolland-Falster-Møn. | 1.90 | 2.0 | 1.61 | 1.87 | 1.85 |
| DEUTSCHLAND (BR) | | | | | |
| Schleswig-Holstein.. | 2.3 | 2.7 | 2.7 | 2.25 | 2.5 |
| Baden-Württemberg .. | 3.6 | 3.75 | 3.7 | 4.2 | 3.8 |
| Bayern ..... | 3.3 | 3.6 | 3.7 | 2.7 | 3.3 |
| Berlin-West ..... | - | - | - | - | - |
| Hamburg ..... | 2.3 | 2.4 | 2.3 | 2.2 | 2.3 |
| Hessen ..... | 3.25 | 3.0 | 2.9 | 3.0 | 3.0 |
| Niedersachsen ..... | 2.7 | 2.75 | 3.25 | 2.9 | 2.9 |
| Nordrhein-Westfalen. | 2.6 | 2.4 | 2.5 | 2.7 | 2.6 |
| Rheinland-Pfalz .... | 3.1 | 3.25 | 2.7 | 2.8 | 3.0 |
| FRANCE (SCPRI) | | | | | |
| Viomenil ..... | 8.2 | 8.8 | 7.2 | 7.7 | 8.0 |
| Méaudre ..... | 7.6 | 7.6 | 5.4 | 7.3 | 7.0 |
| Montfaucon ..... | 2.3 | 2.7 | 2.3 | 2.1 | 2.4 |
| Nainville ..... | 4.4 | 3.1 | 1.6 | 2.5 | 2.9 |
| Cléville ..... | 1.9 | 1.9 | 1.3 | 1.5 | 1.7 |
| Bellenaves ..... | 2.7 | 3.5 | 3.6 | 1.9 | 2.9 |
| Anglade ..... | 9.6 | 9.3 | 9.3 | 8.7 | 9.2 |
| Bussy ..... | 3.7 | 2.9 | 2.4 | 2.9 | 3.0 |
| Le Vésinet ..... | 1.6 | 1.3 | < 1.3 | 1.1 | 1.3 |
| 90 départements: moyennes générales (1) | 4.4 | 4.6 | 4.1 | 4.1 | 4.3 |

(1) Mean weighted on the basis of the production of each department distributed as milk for consumption

Table 17 a)
continued

QUARTERLY AND ANNUAL MEANS FOR ALL THE SAMPLING AREAS AND POINTS IN THE COMMUNITY

1979

$^{90}Sr$ - pCi/gCa in milk

| | 1st quarter | 2nd quarter | 3rd quarter | 4th quarter | $\bar{x}_a$ |
|---|---|---|---|---|---|
| FRANCE (CEA) | | | | | |
| Alsace ..... | 2.8 | 2.6 | 2.2 | 2.3 | 2.5 |
| Anjou-Vendée ..... | 4.9 | 4.5 | 5.0 | 4.1 | 4.6 |
| Auvergne ..... | 10.9 | 10.2 | - | - | 10.5 |
| Bresse-Lyonnais .... | 5.7 | 4.8 | 5.8 | 5.3 | 5.4 |
| Bretagne ..... | 4.6 | 4.4 | 4.3 | 4.0 | 4.3 |
| Charente ..... | - | 4.7 | 4.2 | 4.8 | 4.6 |
| Garonne ..... | 6.1 | 4.8 | 4.3 | 4.8 | 5.0 |
| Ile-de-France ..... | 4.4 | 4.3 | 4.2 | 3.8 | 4.2 |
| Jura ..... | 4.6 | 4.5 | 3.8 | 4.8 | 4.4 |
| Landes ..... | 13.2 | - | 7.4 | 5.3 | 8.6 |
| Lorraine ..... | 6.6 | 3.7 | 5.2 | 4.3 | 5.0 |
| Nord ..... | 2.6 | 1.7 | 1.9 | 2.1 | 2.1 |
| Normandie ..... | 4.5 | 5.2 | 3.7 | 4.4 | 4.5 |
| Savoie-Dauphiné .... | 5.9 | 4.7 | 4.9 | 4.4 | 5.0 |
| ITALIA | | | | | |
| Alessandria ..... | 2.5 | < 1.5 | - | - | 2.0 |
| Ancona ..... | 1.8 | - | - | 4.4 | 3.1 |
| Bari ..... | 4.7 | 3.7 | 6.9 | 4.2 | 4.9 |
| Catania ..... | - | - | - | - | - |
| Firenze ..... | - | - | - | - | - |
| Genova ..... | 7.5 | 6.0 | 12.0 | 8.2 | 8.4 |
| Milano ..... | - | - | - | - | - |
| Roma ..... | 3.1 | 4.2 | 2.0 | 2.0 | 2.8 |
| Torino ..... | 8.4 | 6.6 | - | 8.5 | 7.8 |
| Varese ..... | - | - | - | - | - |
| Verona ..... | 7.7 | 3.1 | 2.0 | 4.8 | 4.4 |
| NEDERLAND | 1.9 | 1.3 | 0.7 | 1.0 | 1.2 |
| UNITED KINGDOM | | | | | |
| England ..... | 2.4 | 2.2 | 2.4 | 2.2 | 2.3 |
| Wales ..... | 4.1 | 4.1 | 4.3 | 3.5 | 4.0 |
| Scotland ..... | 3.2 | 3.2 | 3.5 | 3.2 | 3.3 |
| Northern Ireland ... | 3.2 | 3.0 | 3.0 | 3.2 | 3.1 |

Table 18

CALCULATED QUARTERLY MEANS BY MEMBER STATES AND FOR THE COMMUNITY
1979

$^{90}Sr$ pCi/g Ca in milk

| | 1st quarter | 2nd quarter | 3rd quarter | 4th quarter | $\bar{x}_a$ |
|---|---|---|---|---|---|
| Belgique/België | 3.08 | 4.00 | 3.15 | 3.72 | 3.49 |
| Denmark | 2.8 | 3.3 | 2.7 | 3.0 | 2.9 |
| Deutschland (BR) | 2.9 | 3.0 | 3.0 | 2.8 | 2.9 |
| France (SCPRI) | 4.4 | 4.6 | 4.1 | 4.1 | 4.3 |
| France (CEA) | 5.0 | 4.3 | 4.0 | 3.6 | 4.2 |
| Italia | 5.1 | 4.2 | 5.7 | 5.4 | 5.0 |
| Nederland | 1.9 | 1.3 | 0.7 | 1.0 | 1.2 |
| United Kingdom | 2.7 | 2.5 | 2.7 | 2.5 | 2.6 |
| $\bar{x}$ Community | 3.5 | 3.4 | 3.3 | 3.3 | 3.4 |

Table 19

CALCULATED QUARTERLY MEANS FOR THE COMMUNITY
1972-1979

$^{90}Sr$ pCi/g Ca in milk

| year | 1st quarter | 2nd quarter | 3rd quarter | 4th quarter |
|---|---|---|---|---|
| 1972 | 6.8 | 7.2 | 5.7 | 5.3 |
| 1973 | 5.4 | 5.6 | 5.4 | 4.9 |
| 1974 | 5.0 | 5.4 | 4.9 | 5.2 |
| 1975 | 4.2 | 4.5 | 3.8 | 3.8 |
| 1976 | 3.7 | 3.7 | 3.1 | 3.2 |
| 1977 | 3.4 | 3.8 | 4 | 3.9 |
| 1978 | 3.8 | 4.2 | 4 | 3.5 |
| 1979 | 3.5 | 3.4 | 3.3 | 3.3 |

## ANNUAL MEAN RATIOS OF STRONTIUM-90 TO CALCIUM IN MILK

1958 - 1979

Table 20

pCi $^{90}Sr$/g Ca

| | BELGIQUE BELGIE | DENMARK | DEUTSCHLAND (BR) | FRANCE | | ITALIA | NEDERLAND | UNITED KINGDOM |
|---|---|---|---|---|---|---|---|---|
| | | | | SCPRI(1) | CEA | | | |
| 1958 | | | 6 | | 8 (2) | | | 7.0 |
| 1959 | | | 8 | | 10 (2) | | | 9.8 |
| 1960 | | 4.0 | 6 | | 8 (2) | | | 6.4 |
| 1961 | | 4.0 | 6 | | 6 (2) | | | 5.9 |
| 1962 | 8.9 | 10.1 | 10 | | 12 (2) | | | 11.7 |
| 1963 | 23.2 | 23.8 | 27 | | 34 (3) | 17.86 | 26 | 25.6 |
| 1964 | 24.9 | 24.7 | 28 | | 34 (3) | 23.94 | 26 | 28.0 |
| 1965 | 18.9 | 17.4 | 21 | | 30 (4) | 19.11 | 22 | 19.0 |
| 1966 | 12.9 | 12.0 | 16 | 19 | 18 (4) | 12.63 | 15 | 12.1 |
| 1967 | 8.9 | 9.0 | 11 | 14 | 15 (4) | 9.62 | 10 | 8.8 |
| 1968 | 8.4 | 8,6 | 9 | 12 | 12 (4) | 9.85 | 8 | 7.6 |
| 1969 | 8.8 | 7,2 | 9 | 8.9 | 12 (4) | 8.14 | 7 | 6.8 |
| 1970 | 6.16 | 7.3 | 9 | 8.4 | 12 (4) | 7.06 | 6 | 6.1 |
| 1971 | 6.45 | 7.2 | 8 | 8.6 | 11 (4) | 5.85 | 5 | 5.5 |
| 1972 | 5.75 | 6.6 | 7 | 7.5 | 10 (4) | 5.35 | 5 | 4.5 |
| 1973 | 6.33 | 4.7 | 6 | 5.7 | 7 (4) | 6.01 | 4 | 4.1 |
| 1974 | 4.70 | 4.5 | 6 | 5.9 | 6 (4) | - | 4 | 3.3 |
| 1975 | 4.48 | 4.1 | 5 | 5.4 | 6 (4) | 3.03 | 3 | 2.8 |
| 1976 | 3.33 | 3.4 | 3 | 4.5 | 5.3(4) | 5.1 | 2 | 2.3 |
| 1977 | 3.65 | 2.9 | 3 | 4.7 | 5.0(4) | 4.9 | 3 | 2.4 |
| 1978 | 3.81 | 3.2 | 4 | 4.9 | 4.4(4) | 5.9 | 3 | 2.2 |
| 1979 | 3.49 | 2.9 | 3 | 4.3 | 4.2(4) | 5.0 | 1 | 2.6 |

(1) National means calculated from the results of the control carried out in each of the 90 departments (an important milk center in each department) and weighted on the basis of the production of each department distributed as milk for consumption.
(2) Mean of the peaks
(3) Regional means (incomplete network)
(4) Regional means (complet network)

Table 21

QUARTERLY AND ANNUAL MEANS FOR ALL THE SAMPLING AREAS AND POINTS IN THE COMMUNITY

1979

$^{137}$Cs-pCi/l in milk

| | 1st quarter | 2nd quarter | 3rd quarter | 4th quarter | $\bar{x}_a$ |
|---|---|---|---|---|---|
| BELGIQUE/BELGIË | 4.70 | 5.13 | 4.27 | 4.27 | 4.59 |
| DENMARK | | | | | |
| Hjørring ..... | 5.8 | 6.4 | 7.7 | 4.6 | 6.1 |
| Aarhus ..... | 5.0 | 4.8 | 6.5 | 4.4 | 5.1 |
| Videbaek ..... | 8.0 | 7.5 | 8.9 | 5.2 | 7.3 |
| Åbenrå ..... | 6.8 | 6.2 | 7.9 | 4.5 | 6.3 |
| Odense ..... | 3.7 | 3.4 | 3.0 | 3.1 | 3.3 |
| Ringsted ..... | 3.0 | 3.6 | 3.3 | 1.78 | 2.9 |
| Lolland-Falster-Møn. | 3.6 | 3.3 | 2.3 | 2.4 | 2.9 |
| DEUTSCHLAND (BR) | | | | | |
| Schleswig-Holstein.. | 5.3 | 4.5 | 4.2 | 3.0 | 4.25 |
| Baden-Württemberg .. | < 8.5 | < 7.2 | 6.0 | 6.6 | 7.0 |
| Bayern ..... | 5.6 | 5.5 | 4.8 | 3.7 | 4.9 |
| Berlin-West ..... | - | - | - | - | - |
| Hamburg ..... | 9.3 | 8.2 | 9.5 | 8.1 | 8.8 |
| Hessen ..... | 5.8 | 4.8 | 3.2 | 2.8 | 4.2 |
| Niedersachsen ..... | 9.8 | 8.9 | 15.1 | 9.8 | 10.9 |
| Nordrhein-Westfalen. | < 4.2 | < 4.0 | 4.3 | < 3.2 | 3.9 |
| Rheinland-Pfalz .... | 5.5 | 4.1 | 2.8 | 2.4 | 3.7 |
| FRANCE (SCPRI) | | | | | |
| Viomenil ..... | 13 | 7.3 | < 4.6 | < 5.0 | < 7.4 |
| Méaudre ..... | 12 | 9.0 | 7.9 | < 5.4 | < 8.5 |
| Montfaucon ..... | 8.3 | 7.2 | < 5.6 | < 7.3 | < 7.1 |
| Nainville ..... | < 4.1 | < 3.6 | < 3.2 | < 3.1 | < 3.5 |
| Cléville ..... | 5.1 | < 4.0 | < 3.8 | < 4.2 | < 4.3 |
| Bellenaves ..... | 5.6 | 6.4 | < 4.2 | < 3.7 | < 5.0 |
| Anglade ..... | 12 | 11 | 7.5 | 5.1 | 8.9 |
| Bussy ..... | 8.0 | < 5.3 | < 4.5 | < 3.6 | < 5.4 |
| Le Vésinet ..... | 5.1 | < 4.7 | < 3.9 | < 3.4 | < 4.3 |
| 90 départements: moyennes générales (1) | 8.2 | 6.2 | 6.9 | 4.4 | 6.5 |

(1) Mean weighted on the basis of the production of each department distributed as milk for consumption

./. continued in next page

Table 21 a)
continued

QUARTERLY AND ANNUAL MEANS FOR ALL THE SAMPLING AREAS AND POINTS IN THE COMMUNITY

1979

$^{137}$Cs-pCi/l in milk

| | 1st quarter | 2nd quarter | 3rd quarter | 4th quarter | $\bar{x}_a$ |
|---|---|---|---|---|---|
| FRANCE (CEA) | | | | | |
| Alsace ..... | 3.3 | 3.0 | < 1 | 1.6 | < 2.2 |
| Anjou-Vendée ..... | 5.3 | 2.6 | 1.9 | 2.2 | 3.0 |
| Auvergne ..... | 20.1 | 25.1 | - | - | 22.6 |
| Bresse-Lyonnais .... | 5.8 | 4.9 | 1.9 | 1.7 | 3.6 |
| Bretagne ..... | 3.7 | 4.3 | 2.0 | < 1 | < 2.7 |
| Charente ..... | - | 6.0 | 1.9 | 3.2 | 3.7 |
| Garonne ..... | 5.8 | 4.7 | 2.3 | < 1 | < 3.4 |
| Ile-de-France ..... | 4.6 | 6.2 | 3.8 | 2.3 | 4.2 |
| Jura ..... | 5.8 | 5.5 | 2.7 | < 1 | < 3.7 |
| Landes ..... | 7.1 | - | 3.4 | 4.5 | 5.0 |
| Lorraine ..... | 17.8 | 4.4 | 12.1 | 1.0 | 8.8 |
| Nord ..... | 2.0 | 3.0 | 1.9 | < 1 | < 2.0 |
| Normandie ..... | 4.1 | 2.6 | 1.7 | < 1 | < 2.3 |
| Savoie-Dauphiné .... | 6.5 | 5.6 | 1.6 | < 1 | < 3.7 |
| ITALIA | | | | | |
| Alessandria ..... | 4.6 | 6.9 | - | - | 5.7 |
| Ancona ..... | 10.7 | - | - | < 3 | 6.8 |
| Bari ..... | 3.6 | 6.8 | 4.0 | 4.0 | 4.6 |
| Catania ..... | - | - | - | - | - |
| Firenze ..... | - | - | - | - | - |
| Genova ..... | 13.6 | 14.5 | 6.8 | < 3 | 9.5 |
| Milano ..... | - | - | - | - | - |
| Roma ..... | 10.0 | 4.5 | < 3 | 8.0 | 6.4 |
| Torino ..... | 8.4 | 4.0 | - | 5.2 | 5.9 |
| Varese ..... | - | - | - | - | - |
| Verona ..... | 7.2 | 5.6 | < 3 | < 3 | 4.7 |
| NEDERLAND | 5.9 | 6.2 | 6.6 | < 4.8 | 5.9 |
| UNITED KINGDOM | | | | | |
| England ..... | 5.4 | 4.3 | 2.7 | 2.7 | 3.8 |
| Wales ..... | 7.3 | 5.4 | 4.3 | 3.8 | 5.2 |
| Scotland ..... | 5.9 | 5.4 | 7.0 | 4.9 | 5.8 |
| Northern Ireland ... | 12.4 | 9.7 | 9.2 | 8.9 | 10.1 |

Table 22

CALCULATED QUARTERLY MEANS BY MEMBER STATES AND FOR THE COMMUNITY
1979

$^{137}Cs$ pCi/l milk

| | 1st quarter | 2nd quarter | 3rd quarter | 4th quarter | $\bar{x}_a$ |
|---|---|---|---|---|---|
| Belgique/België | 4.70 | 5.13 | 4.27 | 4.27 | 4.59 |
| Denmark | 5.1 | 5.0 | 5.6 | 3.7 | 4.8 |
| Deutschland | 6.75 | 5.9 | 6.2 | 4.95 | 5.95 |
| France (SCPRI) | 8.2 | 6.2 | 6.9 | 4.4 | 6.5 |
| France (CEA) | 5.6 | 4.6 | 2.4 | 1.4 | 3.5 |
| Italia | 8.3 | 7.0 | 4.2 | 4.4 | 6.2 |
| Nederland | 5.9 | 6.2 | 6.6 | 4.8 | 5.9 |
| United Kingdom | 6.1 | 4.9 | 3.7 | 3.3 | 4.5 |
| $\bar{x}$ Community | 6.3 | 5.6 | 5.0 | 3.9 | 5.2 |

Table 23

CALCULATED QUARTERLY MEANS FOR THE COMMUNITY
1972-1979

$^{137}Cs$ pCi/l in milk

| year | 1st quarter | 2nd quarter | 3rd quarter | 4th quarter |
|---|---|---|---|---|
| 1972 | 19.4 | 15.6 | 14.2 | 11.6 |
| 1973 | 11.1 | 9.1 | 10.0 | 9.4 |
| 1974 | 8.5 | 11 | 12.7 | 10.7 |
| 1975 | < 11.5 | < 10.6 | < 10.5 | < 9.2 |
| 1976 | < 8.2 | 5.5 | 5.2 | 5.2 |
| 1977 | 4 | 4.6 | 7.9 | 8.1 |
| 1978 | 6.9 | 7.7 | 8.7 | 7 |
| 1979 | 6.3 | 5.6 | 5.0 | 3.9 |

Table 24

## ANNUAL MEAN CONCENTRATION OF CAESIUM-137 IN MILK

1958 - 1979

$^{137}Cs$ - pCi/l

| | BELGIQUE BELGIE | DENMARK | DEUTSCHLAND (BR) | FRANCE | | ITALIA | NEDERLAND | UNITED KINGDOM |
|---|---|---|---|---|---|---|---|---|
| | | | | SCPRI(1) | CEA | | | |
| 1958 | | | | | 96 (2) | | | |
| 1959 | | | | | 99 (2) | | | |
| 1960 | | 19,9 | | | 44 (2) | | | |
| 1961 | | 16,9 | | | 25 (2) | | | 21 |
| 1962 | | 51.5 | | | 66 (2) | | | 62 |
| 1963 | 162 | 122.8 | | 220 | 400 (3) | 158.9 | 185 | 135 |
| 1964 | 114 | 112.9 | | 190 | 190 (3) | 170.3 | 154 | 153 |
| 1965 | 73 | 54.8 | | 95 | 130 (4) | 100.5 | 107 | 98 |
| 1966 | 36 | 27.2 | | 50 | 62 (4) | 57.7 | 59 | 46 |
| 1967 | 16.4 | 16.8 | | 30 | 34 (4) | 55.3 | 37 | 20 |
| 1968 | 19.5 | 18.9 | 27 | 23 | 24 (4) | 20.1 | 28 | 16 |
| 1969 | 15 | 16.1 | 25 | 19 | 24 (4) | 36.3 | 23 | 14 |
| 1970 | 13.6 | 13.9 | 31 | 21 | 26 (4) | 26.4 | 17 | 17 |
| 1971 | 13.1 | 14.4 | 29 | 22 | 28 (4) | 33.0 | 16 | 18 |
| 1972 | 11.8 | 10.9 | 25 | 15 | 20 (4) | 19.5 | 10 | 13 |
| 1973 | 7.2 | 6 | 18 | 7.6 | 13 (4) | < 20 | 7 | 8 |
| 1974 | 6.7 | 7.3 | < 20 | 9.0 | 12 (4) | - | 8 | 9 |
| 1975 | 7.9 | 6.1 | < 15 | 7.8 | 12 (4) | < 20 | 8 | 7 |
| 1976 | 4.2 | 4.3 | < 10 | 4.5 | 7.3 (4) | 17.9 | 6 | 4 |
| 1977 | 5.2 | 5.1 | < 8 | 6.5 | 6.0 (4) | < 6.9 | 5 | 6 |
| 1978 | 6.8 | 7.0 | < 9 | 8.6 | 9.1 (4) | 7.5 | 6 | 7 |
| 1979 | 4.6 | 4.8 | < 6 | 6.5 | 3.5 (4) | 6.2 | 6 | 5 |

(1) National means calculated from the results of the control carried out in each of the 90 departments (an important milk center in each department) and weighted on the basis of the production of each department distributed as milk for consumption.
(2) Mean of the peaks
(3) Regional means (incomplet network)
(4) Regional means (complet network)

# LIST OF
# MEASURING LABORATORIES AND
# SAMPLING STATIONS
# FOR AIR, DEPOSITION AND MILK

# LIST OF THE SAMPLING STATIONS AND OF THE MEASURING LABORATORIES

## EXPLANATION OF THE ABBREVIATIONS

BELGIQUE/BELGIË

IHE : Institut d'Hygiène et d'Epidémiologie - Institut voor Hygiëne en Epidemiologie
CEN : Centre d'Etude de l'Energie Nucléaire - Studiecentrum voor Kernenergie
IRM : Institut royal météorologique de Belgique - Koninklijk Meteorologisch Instituut van België

DENMARK - Risø National Laboratory

DEUTSCHLAND (B.R.)

DWD : Deutscher Wetterdienst

FRANCE

SCPRI : Service central de protection contre les rayonnements ionisants
CEA : Commissariat à l'énergie atomique
IR : Institut du Radium
LPA : Laboratoire de physique de l'atmosphère
LHVP : Laboratoire d'hygiène de la ville de Paris
CSM : Centre scientifique de Monaco

IRELAND

IMS : Meteorological Service, Department of Transport, Dublin

ITALIA

CNEN : Comitato nazionale per l'energia nucleare, Roma
CNR-IFA-MDA-SERV. METEO : Consiglio nazionale delle ricerche - Istituto di fisica dell'atmosfera - Ministero difesa aeronautica - Servizio meteorologico - Roma
CISE : Centro Informazioni Studi Esperienze - Segrate (Milano)

LUXEMBOURG (G.D.) - Service de radioprotection - Direction de la Santé Publique

NEDERLAND

KNMI : Koninklijk Nederlands Meteorologisch Instituut, De Bilt
RIV : Rijks Instituut voor de Volksgezondheid, Bilthoven
RIZA : Rijks Instituut voor de Zuivering van Afvalwater, Lelystad
RIKILT : Rijks-Kwaliteitsinstituut voor Land- en Tuinbouwprodukten in Wageningen

COMMISSION OF THE EUROPEAN COMMUNITIES - Euratom, Ispra

CCR : Gemeinsame Kernforschungsstelle - Joint Research Centre - Centre commun de recherche - Centro comune di ricerca - Gemeenschapperlijk Centruum voor Onderzoek

UNITED KINGDOM

AERE : Atomic Energy Research Establishment, Harwell
NRPB : National Radiological Protection Board, Harwell

| Sampling stations | Latitude | Longitude | Measuring Laboratories | | | |
|---|---|---|---|---|---|---|
| | | | Air | Depo-sition | Specific radionuclides | Milk |
| BELGIQUE/BELGIË | | | | | | |
| Ixelles (Bruxelles) ..... | 50°54'N | 4°29'E | IHE | | IHE | CEN |
| Uccle (Bruxelles) ..... | 50°50'N | 4°21'E | IRM | IRM | | |
| Mortsel ..... | 51°10'N | 4°28'E | Ets Gevaert | | | |
| Dourbes ..... | | | IRM | | | |
| Mol ..... | 51°11'N | 5°07'E | CEN | CEN | CEN | |
| Kleine-Brogel ..... | 51°10'N | 5°27'E | CEN | CEN | CEN | |
| Koksijde ..... | 51°06'N | 2°39'E | CEN | CEN | CEN | |
| Schaffen ..... | 51°00'N | 5°05'E | CEN | CEN | CEN | |
| Brasschaat ..... | 51°17'N | 4°30'E | CEN | CEN | CEN | |
| Florennes ..... | 50°15'N | 4°36'E | CEN | CEN | CEN | |
| DENMARK | | | | | | |
| Risø ..... | 55°40'N | 12°08'E | Risø | Risø | Risø | |
| Tylstrup ..... | 57°12'N | 9°58'E | | Risø | | |
| Studgård ..... | 56°06'N | 8°55'E | | Risø | | |
| Askov ..... | 55°28'N | 9°07'E | | Risø | | |
| Ødum ..... | 56°13'N | 10°10'E | | Risø | | |
| Jyndevad ..... | 54°56'N | 9°09'E | | Risø | | |
| Blangstadgård ..... | 55°25'N | 10°28'E | | Risø | | |
| Tystofte ..... | 55°16'N | 11°20'E | | Risø | | |
| Virumgård ..... | 55°44'N | 12°35'E | | Risø | | |
| Abed ..... | 54°52'N | 11°17'E | | Risø | | |
| Åkirkeby ..... | 55°04'N | 14°56'E | | Risø | | |
| Hjørring ..... | 57°25'N | 9°59'E | | | | Risø |
| Århus ..... | 56°10'N | 10°13'E | | | | Risø |
| Videbak ..... | 56°56'N | 8°38'E | | | | Risø |
| Åbenrå ..... | 55°03'N | 9°26'E | | | | Risø |
| Odense ..... | 55°24'N | 10°25'E | | | | Risø |
| Ringsted ..... | 55°28'N | 11°48'E | | | | Risø |
| Lolland-Falster-Mon ..... | 54°50'N | 11°40'E | | | | Risø |

| Sampling stations | Latitude | Longitude | Measuring Laboratories | | | |
|---|---|---|---|---|---|---|
| | | | Air | Deposition | Specific radionuclides | Milk |
| DEUTSCHLAND (Bundesrepublik) | | | | | | |
| Aachen ..... | 50°46'N | 6°06'E | DWD | DWD | | |
| Berlin..... | 52°32'N | 13°25'E | DWD | DWD | | |
| Cuxhaven ..... | 53°52'N | 8°42'E | | DWD | | |
| Emden ..... | 53°23'N | 7°13'E | DWD | DWD | | |
| Essen ..... | 51°30'N | 7°05'E | DWD | DWD | | |
| Hannover ..... | 52°23'N | 9°44'E | DWD | DWD | | |
| Kiel ..... | 54°20'N | 10°08'E | | DWD | | |
| Offenbach ..... | 50°06'N | 8°46'E | DWD | DWD | DWD | |
| München ..... | 48°08'N | 11°35'E | DWD | DWD | | |
| Norderney ..... | 53°43'N | 7°09'E | | DWD | | |
| Oberstdorf ..... | 47°25'N | 10°18'E | | DWD | | |
| Passau ..... | 48°35'N | 13°28'E | | DWD | | |
| Regensburg ..... | 49°01'N | 12°07'E | DWD | DWD | | |
| Saarbrücken ..... | 49°15'N | 6°58'E | DWD | DWD | | |
| Schauinsland ..... | 47°55'N | 7°53'E | | DWD | | |
| Schleswig ..... | 54°32'N | 9°34'E | DWD | DWD | | |
| Stuttgart ..... | 48°47'N | 9°12'E | DWD | DWD | | |
| Jülich ..... | 50°55'N | 6°21'E | | | Kernforschungsanlage | |
| Braunschweig ..... | 52°15'N | 10°30'E | | | Phys. Techn. Bundesanstalt | |
| Königslutter ..... | 52°15'N | 10°49'E | | | Phys.Techn. Bundesanstalt | |
| Karlsruhe ..... | 49°00'N | 8°24'E | | | Kernforschungszentrum | |

| Sampling stations | Latitude | Longitude | Measuring Laboratories | | | |
|---|---|---|---|---|---|---|
| | | | Air | Deposition | Specific radionuclides | Milk |
| Deutschland (continued) | | | | | | |
| M I L C H | | | | | | |
| Baden-Württenberg | | | | | | |
| Öhringen . . . . . .) | 49°12'N | 9°30'E | | | | |
| Ludwigsburg . . . . . .) | 48°54'N | 9°12'E | | | | |
| Ravensburg . . . . . .) | 47°47'N | 9°37'E | | | | |
| Langenau . . . . . .) | 48°30'N | 10°07'E | | | | |
| Ummendorf . . . . . .) | 48°03'N | 9°50'E | | | | Chem. |
| Karlsruhe . . . . . .) | 49°00'N | 8°24'E | | | | Landes |
| Offenburg . . . . . .) | 49°29'N | 7°57'E | | | | unter- |
| Radolfzell . . . . . .) | 47°44'N | 8°59'E | | | | suchungs |
| Triberg . . . . . .) | 48°07'N | 8°14'E | | | | anstalt |
| Crailsheim . . . . . .) | 49°09'N | 10°06'E | | | | Stuttgart |
| Rottweil . . . . . .) | 48°10'N | 8°38'E | | | | |
| Mannheim . . . . . .) | 49°30'N | 8°28'E | | | | |
| Pforzheim . . . . . .) | 48°53'N | 8°41'E | | | | |
| Freiburg . . . . . .) | 48°00'N | 7°52'E | | | | |
| Heilbronn . . . . . .) | 49°08'N | 9°14'E | | | | |
| Esslingen . . . . . .) | 48°49'N | 10°02'E | | | | |
| Stuttgart . . . . . .) | 48°47'N | 9°12'E | | | | |

| Sampling stations | Latitude | Longitude | Measuring Laboratories | | | |
|---|---|---|---|---|---|---|
| | | | Air | Deposition | Specific radionuclides | Milk |
| Deutschland (continued) | | | | | | |
| Nordsrhein-Westfalen | | | | | | |
| Münsterland . . . . . .) | 51°53'N | 7°30'E | | | | Chem.Landes-untersuchungs amt Nordrhein Westfalen Münster |
| Ost-Westfalen . . . . . .) | 51°42'N | 8°50'E | | | | |
| Sauerland . . . . . .) | 50°50'N | 7°45'E | | | | |
| Rheinland . . . . . .) | 50°18'N | 7°35'E | | | | |
| Rheinland-Pfalz | | | | | | |
| Speyer . . . . . .) | 49°18'N | 8°26'E | | | | Chemisches Unter-suchungsamt Speyer |
| Worms . . . . . .) | 49°38'N | 8°23'E | | | | |
| Mainz . . . . . .) | 50°00'N | 8°16'E | | | | |
| Kaiserslautern . . . . . | 49°27'N | 7°47'E | | | | |
| Fischbach . . . . . .) | 49°45'N | 7°24'E | | | | |
| Kastellaun . . . . . .) | 50°04'N | 7°26'E | | | | |
| Trier . . . . . .) | 49°25'N | 6°39'E | | | | |
| Thalfang . . . . . .) | 49°45'N | 7°00'E | | | | |
| Bitburg . . . . . .) | 49°58'N | 6°32'E | | | | |
| Mettendorf . . . . . .) | 49°56'N | 6°20'E | | | | |
| Hillesheim . . . . . .) | 50°17'N | 6°40'E | | | | |
| Pronsfeld . . . . . .) | 50°09'N | 6°20'E | | | | |
| Hachenburg . . . . . .) | 50°40'N | 7°50'E | | | | |
| Westerburg . . . . . .) | 50°34'N | 7°59'E | | | | |
| Giershausen . . . . . .) | 50°21'N | 7°47'E | | | | |
| Schleswig-Holstein | | | | | | |
| Kiel . . . . . .) | 54°20'N | 10°08'E | | | | Bundesanstalt für Milch-forschung Kiel |
| St. Peter . . . . . .) | 54°20'N | 8°30'E | | | | |
| Lentföhrden . . . . . .) | 53°30'N | 9°55'E | | | | |

| Sampling stations | Latitude | Longitude | Measuring Laboratories | | | |
|---|---|---|---|---|---|---|
| | | | Air | Deposition | Specific radionuclides | Milk |
| Deutschland (continued) | | | | | | |
| Bayern | | | | | | |
| Schwaben . . . . . .) | 48°10'N | 11°53'E | | | | Landesuntersuchungsamt für das Gesundsheitswesen Südbayern Fachbereich Chemie München |
| Niederbayern/Oberpfalz . . .) | 49°05'N | 12°05'E | | | | |
| Oberbayern . . . . . .) | 48°10'N | 12°00'E | | | | |
| Franken . . . . . .) | 50°15'N | 11°40'E | | | | |
| Berlin | | | | | | |
| Berlin . . . . . .) | 52°32'N | 13°25'E | | | | Landesanstalt für Lebensmittel- Arzneimittel- und gerichtliche Chemie Berlin |
| Brandenburg . . . . . .) | 52°25'N | 12°34'E | | | | |
| Nauen . . . . . .) | 52°37'N | 12°53'E | | | | |
| Hamburg | | | | | | |
| Hamburg . . . . . | 53°33'N | 10°00'E | | | | Hyg.Institut der Freien und Hansestadt Hamburg Messtelle für Radioaktivität in Lebensmitteln der Chem. und Lebensmittelunter-suchungsanstalt Hamburg |

| Sampling stations | Latitude | Longitude | Measuring Laboratories | | | |
|---|---|---|---|---|---|---|
| | | | Air | Deposition | Specific radionuclides | Milk |
| Deutschland (continued) | | | | | | |
| Hessen | | | | | | |
| Kassel . . . . . .) | 51°18'N | 9°30'E | | | | Staatl. Chem. Untersuchungsamt Wiesbaden |
| Westerwald . . . . . .) | 50°30'N | 7°30'E | | | | |
| Darmstadt . . . . . .) | 49°52'N | 8°39'E | | | | |
| Wiesbaden . . . . . .) | 50°05'N | 8°15'E | | | | |
| Niedersachsen | | | | | | |
| Rodenkirchen . . . . . .) | 53°24'N | 8°27'E | | | | Staatl. Che. Untersuchungsamt Braunschweig |
| Zeven . . . . . .) | 53°18'N | 9°17'E | | | | |
| Rehburg . . . . . .) | 52°28'N | 9°14'E | | | | |
| Leer . . . . . .) | 53°14'N | 7°27'E | | | | |
| Uelzen . . . . . .) | 52°58'N | 10°34'E | | | | |
| Holdorf . . . . . .) | 52°36'N | 8°08'E | | | | |
| FRANCE | | | | | | |
| Pays Armoricains | | | | | | |
| Brennilis (SCPRI) (2) . . . | 48°22'N | 3°51'W | SCPRI | SCPRI | | |
| Brest . . . . . | 48°27'N | 4°25'W | | | SCPRI | |
| Cherbourg (4) . . . . . | 49°39'N | 1°38'W | SCPRI | | SCPRI (4) | |
| Flers . . . . . | 48°49'N | 0°34'W | CEA | | | |
| Gréville-Hague . . . . . | 49°41'N | 1°48'W | CEA | CEA-SCPRI | | SCPRI |
| Les Hauts-Marais . . . . . | 49°41'N | 1°53'W | CEA | CEA | | |
| Rennes . . . . . | 48°06'N | 1°40'W | | SCPRI | SCPRI | |
| Vauville. . . . . | 49°38'N | 1°51'W | CEA | | | |

| Sampling stations | Latitude | Longitude | Measuring Laboratories | | | |
|---|---|---|---|---|---|---|
| | | | Air | Deposition | Specific radionuclides | Milk |
| France (continued) | | | | | | |
| Bassin Parisien | | | | | | |
| Avoine (2) ..... | 47°14'N | 0°10'E | SCPRI | SCPRI | | |
| Baugy ..... | 47°05'N | 2°44'E | SCPRI | | | |
| Bourges ..... | 47°04'N | 2°22'E | | CEA | SCPRI (4) | |
| Bussy-le-Grand ..... | 47°34'N | 4°31'E | | SCPRI | SCPRI | SCPRI |
| Château-Malabry ..... | 48°47'N | 2°16'E | CEA | | | |
| Châtillon-sous-Bagneux ..... | 48°48'N | 2°15'E | CEA | | | |
| Clamart ..... | 48°47'N | 2°15'E | CEA | | | |
| Cléville ..... | 49°09'N | 0°06'W | | SCPRI | SCPRI | SCPRI |
| Dijon ..... | 47°16'N | 5°06'E | CEA | CEA (4) | | |
| Fontenay-aux-Roses (CEA) ... | 48°47'N | 2°17'E | CEA | CEA | | |
| Fontenay-aux-Roses (SCPRI) . | 48°47'N | 2°17'E | SCPRI | SCPRI | SCPRI | |
| Gravelines ..... | 51°00'N | 2°19'E | SCPRI | SCPRI | | |
| Lille (SCPRI) (4) ..... | 50°34'N | 3°06'E | SCPRI | SCPRI | SCPRI (4) | |
| Nainville-les-Roches (1) ... | 48°30'N | 2°29'E | SCPRI | SCPRI | SCPRI (1) | SCPRI |
| Orsay (CEA) ..... | 48°42'N | 2°11'E | CEA | | | |
| Orsay (IR) ..... | 48°42'N | 2°12'E | IR | | | |
| Paris Lab. d'Hygiène (VP)(5) | 48°51'N | 2°22'E | SCPRI | | | |
| Paris Lab. Municipal (3) ... | 48°50'N | 2°18'E | SCPRI | | | |
| Paris Bld. Mac-Donald (3) .. | 48°54'N | 2°24'E | SCPRI | | | |
| Paris Parc Montsouris ..... | 48°49'N | 2°20'E | CEA | | | |
| Saclay (CEN) ..... | 48°43'N | 2°09'E | CEA | CEA | | |
| Saclay ..... | 48°44'N | 2°10'E | SCPRI | | | |
| Saint-Laurent-des-Eaux (2) . | 47°43'N | 1°35'E | SCPRI | SCPRI | | |
| Savigny (2) ..... | 47°12'N | 0°09'E | SCPRI | | | |
| Tours (4) ..... | 47°27'N | 0°43'E | | | SCPRI | |
| Le Vésinet ..... | 48°53'N | 2°08'E | SCPRI | SCPRI | SCPRI | SCPRI |
| Pays de l'Est | | | | | | |
| Chooz (2) ..... | 50°06'N | 4°49'E | SCPRI | SCPRI | | |
| Fessenheim ..... | 47°56'N | 7°33'E | SCPRI | SCPRI | | |
| Nancy ..... | 48°42'N | 6°13'E | SCPRI | SCPRI | SCPRI | |

| Sampling stations | Latitude | Longitude | Measuring Laboratories | | | |
|---|---|---|---|---|---|---|
| | | | Air | Deposition | Specific radionuclides | Milk |
| Strasbourg ..... | 48°33'N | 7°38'E | | | SCPRI | |
| Verdun ..... | 49°10'N | 5°23'E | CEA | | | |
| Vioménil ..... | 48°06'N | 6°17'E | SCPRI | SCPRI | SCPRI | SCPRI |
| Bassin Aquitain | | | | | | |
| Anglade ..... | 45°53'N | 0°29'E | SCPRI | SCPRI | SCPRI | SCPRI |
| Biarritz ..... | 43°28'N | 1°32'W | | | SCPRI (4) | |
| Bordeaux ..... | 44°52'N | 0°35'W | SCPRI | SCPRI | SCPRI | |
| Fleuriais ..... | 46°59'N | 0°58'W | CEA | | | |
| La Rochelle ..... | 46°09'N | 1°09'W | SCPRI | | | |
| Le Barp ..... | 44°37'N | 0°46'W | CEA | | | |
| Massif Central | | | | | | |
| Bellenaves ..... | 46°12'N | 3°05'E | SCPRI | SCPRI | SCPRI | SCPRI |
| Guéret ..... | 46°10'N | 1°52'E | CEA | | | |
| Les Ramées ..... | 46°35'N | 4°04'E | CEA | | | |
| Région des Alpes | | | | | | |
| Briançon ..... | 44°53'N | 6°38'E | | SCPRI | SCPRI | |
| Grenoble (CEN) ..... | 45°12'N | 5°42'E | CEA | | | |
| Méaudre ..... | 45°07'N | 5°31'E | SCPRI | SCPRI | SCPRI | SCPRI |
| Pierrelatte-Nord ..... | 44°22'N | 4°43'E | CEA | | | |
| Pierrelatte-Sud ..... | 44°20'N | 4°43'E | CEA | | | |
| Pierrelatte S. 24 ..... | 44°21'N | 4°43'E | CEA | | | |
| Le Bugey ..... | 45°48'N | 5°16'E | SCPRI | SCPRI | | |
| Région Méditerranéenne | | | | | | |
| Ajaccio (4) ..... | 41°55'N | 8°48'E | SCPRI | CEA | | |
| Codolet (CEA)..... | 44°07'N | 4°42'E | CEA | CEA | | |
| Codolet (SCPRI)..... | 44°07'N | 4°42'E | SCPRI | SCPRI | | |
| La Grande Bastide ..... | 43°42'N | 5°45'E | CEA | | | |
| Monaco ..... | 43°44'N | 7°25'E | CSM | CSM | | |
| Montpellier ..... | 43°37'N | 3°53'E | CEA | | | |

| Sampling stations | Latitude | Longitude | Measuring Laboratories | | | |
|---|---|---|---|---|---|---|
| | | | Air | Deposition | Specific radionuclides | Milk |
| Nice ..... | 43°39'N | 7°12'E | SCPRI | | SCPRI | |
| Montfaucon ..... | 44°04'N | 4°45'E | SCPRI | SCPRI | SCPRI | SCPRI |
| La Verrerie ..... | 43°42'N | 5°45'E | | CEA | | |
| Nîmes (4) ..... | 43°52'N | 4°24'E | | | SCPRI | |
| Cadarache ..... | 43°43'N | 5°45'E | | SCPRI | | |
| IRELAND | | | | | | |
| Dublin City ..... | 53°21'N | 6°16'W | IMS | IMS | IMS | |
| Valentia Observatory ..... | 51°56'N | 10°16'W | IMS | IMS | | |
| Meteorological Station : | | | | | | |
| - Dublin Airport ..... | 53°26'N | 6°14'W | | IMS | | |
| - Belmullet ..... | 54°14'N | 10°00'W | | IMS | | |
| - Mullingar ..... | 53°32'N | 7°22'W | | IMS | | |
| - Rosslare ..... | 52°15'N | 6°20'W | | IMS | | |
| - Roche's Pt ..... | 51°48'N | 8°15'W | | IMS | | |
| ITALIA | | | | | | |
| Tarvisio ..... | 46°30'33"N | 13°34'58"E | (6) | | | |
| Monte Paganella ..... | 46°08'35"N | 11°02'13"E | (6) | | | |
| Pian Rosà ..... | 45°56'06"N | 7°42'22"E | (6) | | | |
| Pallanza ..... | 45°55'25"N | 8°33'06"E | (6) | | | |
| Milano-Malpensa ..... | 45°37'32"N | 8°43'22"E | (6) | | | |
| Verona-Villafranca ..... | 45°23'37"N | 10°53'23"E | (6) | | | |
| Monte Cimone ..... | 44°11'35"N | 10°41'55"E | (6) | | | |
| Capo Mele ..... | 43°57'26"N | 8°10'11"E | (6) | | | |
| Ancona ..... | 43°37'22"N | 13°30'53"E | (6) | | | |
| Monte Terminillo ..... | 42°27'35"N | 12°59'06"E | (6) | | | |
| Vigna di Valle ..... | 42°04'45"N | 12°13'00"E | (6) | | | |
| Casaccia ..... | 42°02'25"N | 12°08'03"E | CNEN | CNEN | CNEN | CNEN |
| Monte S. Angelo ..... | 41°42'28"N | 15°56'53"E | (6) | | | |
| Brindisi ..... | 40°39'39"N | 17°56'53"E | (6) | | | |
| Alghero ..... | 40°38'11"N | 8°17'02"E | (6) | | | |

| Sampling stations | Latitude | Longitude | Measuring Laboratories | | | |
|---|---|---|---|---|---|---|
| | | | Air | Depo-sition | Specific radionuclides | Milk |
| Monte Scuro ..... | 39°19'37"N | 16°24'04"E | (6) | | | |
| Cagliari-Elmas ..... | 39°15'15"N | 9°03'15"E | (6) | | | |
| Messina ..... | 38°11'38"N | 15°33'13"E | (6) | | | |
| Trapani-Birgi ..... | 37°54'43"N | 12°29'37"E | (6) | | | |
| Pantelleria ..... | 36°48'41"N | 11°56'32"E | (6) | | | |
| Cozzo Spadaro ..... | 36°41'04"N | 15°07'59"E | (6) | | | |
| Segrate ..... | 45°29'48"N | 9°16'48"E | | CISE | CISE | |
| Euratom-CCR - Ispra ..... | 45°48'11"N | 8°37'35"E | CCR | CCR | CCR | CCR |
| GRAND DUCHE DE LUXEMBOURG | | | | | | |
| Luxembourg-Ville ..... | 49°37'N | 6°08'E | Service de radio-protec-tion | | | |
| NEDERLAND | | | | | | |
| De Bilt ..... | 52°06'N | 5°11'E | KNMI | KNMI | | |
| Eelde ..... | 53°08'N | 6°34'E | KNMI | | | |
| Eindhoven ..... | 51°26'N | 5°30'E | KNMI | | | |
| Den Helder ..... | 52°58'N | 4°46'E | KNMI | | | |
| Vlissingen ..... | 51°27'N | 3°35'E | KNMI | | | |
| Bilthoven ..... | 52°07'N | 5°12'E | KNMI | RIV | RIV | |
| Bergeyk ..... | 51°19'N | 5°21'E | | | | RIKILT |
| Bodegraven ..... | 52°05'N | 4°45'E | | | | RIKILT |
| Deventer ..... | 52°15'N | 6°10'E | | | | RIKILT |
| Leeuwarden ..... | 53°12'N | 5°48'E | | | | RIKILT |
| Wageningen ..... | 51°58'N | 5°40'E | | | | RIKILT |

| Sampling stations | Latitude | Longitude | Measuring Laboratories | | | |
|---|---|---|---|---|---|---|
| | | | Air | Depo-sition | Specific radionuclides | Milk |
| UNITED KINGDOM | | | | | | |
| Chilton ..... | 51°27'N | 1°32'W | AERE | AERE | AERE | |
| Milford Haven ..... | 51°10'N | 0°40'W | AERE | AERE | AERE | |
| Eskdalemuir ..... | 55°19'N | 3°14'W | AERE | | AERE | |
| Orfordness ..... | 52°05'N | 1°34'E | AERE | | AERE | |
| Lerwick ..... | 60°09'N | 1°09'W | AERE | | AERE | |
| Shrivenham ..... | 51°36'N | 1°39'W | NRPB | NRPB | NRPB | |
| Glasgow ..... | 55°53'N | 4°15'W | NRPB | NRPB | NRPB | |
| Bridgend ..... | 51°30'N | 3°34'W | | NRPB | NRPB | |
| Belfast ..... | 54°35'N | 5°55'W | | NRPB | NRPB | |
| 74 milk depots throughout the country ..... | | | | | | NRPB |

(1) En coopération avec la Direction de la **Sécurité Civile**
(2) En coopération avec le Département de Radioprotection d'Electricité de France
(3) En coopération avec le Laboratoire Central de la Préfecture de Police de Paris
(4) En coopération avec la Météorologie Nationale
(5) En coopération avec le Laboratoire d'Hygiène de la Ville de Paris
(6) CNR-IFA-MDA-Serv. Météo.

# LIST OF
# ALL AVAILABLE REPORTS
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# PUBLISHED IN MEMBER STATES

BELGIQUE/BELGIË

- Résultats des mesures de radioactivité dans l'air, dans les précipitations et dans les eaux de 1958 à 1968
  Institut d'Hygiène et d'Epidémiologie;
  Ministère de la Santé Publique - Bruxelles
- Résultats des mesures de radioactivité dans l'air, dans les précipitations et dans les eaux de 1969 à 1974
  Institut d'Hygiène et d'Epidémiologie;
  Ministère de la Santé Publique - Bruxelles
- Contamination radioactive des denrées alimentaires en Belgique en 1972 et 1973
  Institut d'Hygiène et d'Epidémiologie;
  Ministère de la Santé Publique - Bruxelles
- Contamination radioactive des denrées alimentaires en Belgique en 1974 et 1975
  Institut d'Hygiène et d'Epidémiologie; J. Gillard-Baruh
  Ministère de la Santé Publique - Bruxelles
- Bilan de 6 années de recherche dans la radiocontamination des aliments 1964 - 1969
  G.E. Cantillon
  Journal belge de Radiologie - Vol.54 - 1971 - Fasc.III - pp. 433 - 439
- Bilan de 6 années de recherche dans la radiocontamination des aliments 1970 - 1975
  G.E. Cantillon, J. Gillard-Baruh
  Publication de l'Institut d'Hygiène et d'Epidémiologie - D/1977/2505/10
- La retombée radioactive mesurée à Mol
  Rapport d'avancement du département "Mesure et Contrôle des radiations" publiée chaque année
  Centre d'Etude de l'Energie Nucléaire - Mol
- Contamination radioactive des denrées alimentaires en Belgique en 1976 et 1977
  Institut d'Hygiène et d'Epidémiologie; J. Gillard-Baruh
  Ministère de la Santé Publique - Bruxelles
- Contamination radioactive des denrées alimentaires en Belgique en 1976 et 1977
  Institut d'Hygiène et d'Epidémiologie; J. Gillard-Baruh
  Ministère de la Santé Publique - Bruxelles

DENMARK

- Heydorn, K., Lippert, J. and Theodorson, P. :
Risø Report N° 1 - The Radioactivity in the Risø District Measurements up to 1st April, 1957, November 1962, pp. 157.
- Aarkrog, A. and Lippert J. :
Risø Report N° 3 - Environmental Radioactivity at Risø, April 1, 1958, March 31, 1959, June 1958, pp. 106.
- Aarkrog, A. and Lippert J. :
Risø Report N° 9 - Environmental Radioactivity at Risø, April 1, 1958, March 31, 1959, June 1959, pp. 50.
- Aarkrog, A. and Lippert J. :
Risø Report N° 14 - Environmental Radioactivity at Risø 1959, June 1960, pp. 48.
- Aarkrog, A. and Lippert J. :
Risø Report N° 23, Environmental Radioactivity in Denmark 1960, June 1961, pp. 51.
- Aarkrog, A. and Lippert J. :
Risø Report N° 41 - Environmental Radioactivity in Denmark 1961, June 1962, pp. 139.
- Aarkrog, A., Petersen, J. and Lippert J. :
Risø Report N° 63 - Environmental Radioactivity in Denmark in 1962, June 1963, pp. 147.
- Aarkrog, A. and Lippert J. :
Risø Report N° 85 - Environmental Radioactivity in Denmark in 1963, June 1964, pp. 112.
- Aarkrog, A. and Lippert J. :
Risø Report N° 107 - Environmental Radioactivity in Denmark in 1964, June 1965, pp. 98.
- Aarkrog, A. and Lippert J. :
Risø Report N° 130 - Environmental Radioactivity in Denmark in 1965, June 1966, pp. 99.
- Aarkrog, A. and Lippert J. :
Risø Report N° 154, Environmental Radioactivity in Denmark in 1966, June 1967, pp. 100.
- Aarkrog, A. and Lippert J. :
Risø Report N° 180 - Environmental Radioactivity in Denmark in 1967, June 1968, pp. 91
- Aarkrog, A. and Lippert J. :
Risø Report N° 201 - Environmental Radioactivity in Denmark in 1968, July 1969, pp. 81.
- Aarkrog, A. and Lippert J. :
Risø Report N° 220 - Environmental Radioactivity in Denmark in 1969, July 1970, pp. 95.
- Aarkrog, A. and Lippert J. :
Risø Report N° 245 - Environmental Radioactivity in Denmark in 1970, July 1971, pp. 95.
- Aarkrog, A. and Lippert J. :
Risø Report N° 265 - Environmental Radioactivity in Denmark in 1971, July 1972, pp. 100.

- Aarkrog, A. and Lippert J. :
  Risø Report N° 291 - Environmental Radioactivity in Denmark in 1972, July 1973, pp. 99.
- Aarkrog, A. and Lippert J. :
  Risø Report N° 305 - Environmental Radioactivity in Denmark in 1973, July 1974, pp. 96.
- Aarkrog, A. and Lippert J. :
  Risø Report N° 323 - Environmental Radioactivity in Denmark in 1974, June 1975, pp. 113.
- Aarkrog, A. and Lippert J. :
  Risø Report N° 345 - Environmental Radioactivity in Denmark in 1975, June 1976, pp. 122.
- Aarkrog, A. and Lippert J. :
  Risø Report N° 361 - Environmental Radioactivity in Denmark in 1976, June 1977, pp. 100.
- Aarkrog, A., Bøtter-Jensen, L., Dahlgaard, H., Hansen, H.J.M., Lippert, J., Nielsen, S.P. and Nilsson, K. :
  Risø Report N° 386 - Environmental Radioactivity in Denmark in 1977.
- Aarkrog, A., Bøtter-Jensen, L., Dahlgaard, H., Heinz Hansen, Lippert, J., Nielsen, S.P. and Nilsson, K. :
  Risø Report N° 403 - Environmental Radioactivity in Denmark in 1978.
- Aarkrog, A., Bøtter-Jensen, L., Dahlgaard, H., Heinz Hansen, Lippert, J., Nielsen, S.P. and Nilsson, K. :
  Risø Report N° 421 - Environmental Radioactivity in Denmark in 1979.

DEUTSCHLAND (Bundesrepublik)

- Umweltradioaktivität und Strahlenbelastung
  Zusammenfassender Bericht
  über die Umweltüberwachung 1956 bis 1968
  Der Bundesminister für Bildung und Wissenschaft

- Bundesrepublik Deutschland
  Sonderausschuss Radioaktivität
  Erster Bericht - Januar 1958

- Bundesrepublik Deutschland
  Sonderausschuss Radioaktivität
  Zweiter Bericht - März 1959

- Bundesrepublik Deutschland
  Sonderausschuss Radioaktivität
  Dritter Bericht - bis Mai 1963

- Umweltradioaktivität und Strahlenbelastung
  Vierteljahresberichte
  1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966 und 1967
  Der Bundesminister für wissenschaftliche Forschung

- Umweltradioaktivität und Strahlenbelastung
  Jahresbericht 1968
  Der Bundesminister für wissenschaftliche Forschung

- Umweltradioaktivität und Strahlenbelastung
  Jahresberichte 1969, 1970 und 1971
  Der Bundesminister für Bildung und Wissenschaft

- Umweltradioaktivität und Strahlenbelastung
  Jahresberichte 1972, 1973, 1974, 1975, 1976, 1977 und 1978
  Der Bundesminister des Innern

- Statusbericht über die Ueberwachung der Umweltradioaktivität
  in der Bundesrepublik Deutschland
  Institut für Strahlenhygiene des Bundesgesundheitsamtes
  Berlin - September 1976

- Dokumentation über den Umfang der allgemeinen Umweltradio-
  aktivitätsüberwachung 1977 in der Bundesrepublik Deutschland
  STH-Bericht 14/79
  Institut für Strahlenhygiene des Bundesgesundheitsamtes
  Berlin - September 1979

FRANCE

Service Central de Protection contre les Rayonnements Ionisants (SCPRI)

- Rapports d'activité publiés chaque mois par le SCPRI de 1961 à 1979 et présentant les résultats détaillés des mesures de radioactivité relatives à la surveillance de l'environnement (air, eau, chaîne alimentaire, etc.).
- Anonyme - Rapports d'activité annuels du SCPRI pour 1976, 1977, 1978 et 1979 (Progress Reports).
- Pellerin P., Rémy M.L., Ervet P. et Moroni J.P. : Premier bilan de 7 années de recherche sur les niveaux de la contamination du milieu ambiant et de la chaîne alimentaire par les retombées radioactives sur le territoire français - INSERM, T.22 (1967) N° 2 p. 357 - 382 - SCPRI (S) N° 115.
- Ervet P., Rémy M.L., Gahinet M.E. et Moroni J.P. : Recherches comparatives sur les contaminations radioactives du milieu marin et des eaux douces - Colloque ENEA sur la radioécologie marine - Cherbourg, 3-6/12/1968 - SCPRI (S) N° 120.
- Gahinet M.E., Rémy M.L., Moroni J.P. et Pellerin P. : Etude de la radioactivité du régime alimentaire total au niveau des établissements scolaires - Journées d'étude FAO/AIEA/OMS sur la contamination radioactive du milieu, du point de vue de l'agriculture et de la santé publique - Vienne - 24-28/03/1969 - SCPRI N° 121.
- Gahinet M.E., Rémy M.L., Moroni J.P., Chanteur J. et Pellerin P. : Radioactivité de l'alimentation - SCPRI N° 161 (1976).

Commissariat à l'Energie Atomique (CEA)

- Surveillance de la Radioactivité Atmosphérique (mensuel)
- Surveillance de la Radioactivité des Eaux (mensuel)
- Surveillance de la Radioactivité de la Chaîne Alimentaire (trimes.)

Edité : Département de Protection - Service de Protection Sanitaire
Centre d'Etudes Nucléaires de Fontenay-aux-Roses, B.P. N° 6
Fontenay-aux-Roses

IRELAND

- Measurements of radioactivity of Precipitation, Settled Dust, and Airborne Particles in Ireland:
  - (i) A single volume, covering the period May 1956 to December 1959 inclusive
  - (ii) Monthly issue, January 1960 to December 1964 inclusive
  - (iii) Quarterly issue, January 1965 to date. (Most recent issue October-December, 1979)
- Technical Note No. 27 - The Deposition of Airborne radioactive Particles and the Cleaning effect of Precipitation at Valentia - by M. Doporto.
- A Study on radioactive fallout in Ireland in 1960. Published by the Department of Health.

ITALIA

- Cardinale A., Fritelli L., Lembo G., Gera F., Ilari O.:
Studies of the natural background radiation in Italy - Health Physics, 20(3), 285 (1971).

- Cigna A.A., Clemente G.F., Giorcelli F.G.:
On $^{134}Cs$ in rainwater from 1960 to 1969. Health Physics, 21(5), 667 (1971).

- Schreiber B.:
Dieci anni di ricerche sul ciclo di alcuni radionuclidi nell'ambiente marino (Ten years of researches on the cycle of some radionuclides in the marine environment). L'Ateneo Parmense, vol. VII, p. 3, 1971.

- Bernhard M.:
The utilization of simple models in radioecology. Marine Radioecology, p. 129-187, 1971.

- De Franceschi L., Gentili A., Gremigni G., Guidi P.:
Ritrovamento di $^{181}W$ e $^{185}W$ nel fall-out (Finding of $^{181}W$ and $^{185}W$ in fall-out). Giornale di Fisica Sanitaria e Protezione contro le Radiazioni, vol. 15, N° 1, p. 10, 1971.

- Cigna-Rossi L.:
Misure di radioattività in alcuni licheni (Measures of Radioactivity in some lichens). Giornale di Fisica Sanitaria e Protezione contro le Radiazioni, vol. 15, N° 3, p. 124-129, 1971.

- Cigna-Rossi L.:
Ricerche ecologiche in un ambiente di acqua dolce (Ecological researches in freshwater). Giornale di Fisica Sanitaria e Protezione contro le Radiazioni, vol. 15, N° 3, p. 131, 1971.

- Pavesi B., Dietrich E. et coll.:
1961 - Elaborazione annuale dei dati di misura dell'attività beta totale rilevata sui campioni di pulviscolo atmosferico prelevati in Italia dalle stazioni della rete AM-CNR (1961 - Yearly elaboration of data of total beta activity measured on the samples of motes collected in Italy at the AM-CNR network stations). Pubbl. IFA-CNR, 1972.

- Pavesi B., Dietrich E. et coll.:
1962 - Elaborazione annuale dei dati di misura dell'attività beta totale rilevata sui campioni di pulviscolo atmosferico prelevati in Italia dalle stazioni della rete AM-CNR (1962 - Yearly elaboration of data of total beta activity measured on the samples of motes collected in Italy at the AM-CNR network stations). Pubbl. IFA-CNR, 1972.

- Pavesi B., Dietrich E. et coll.:
1963 - Elaborazione annuale dei dati di misura dell'attività beta totale rilevata sui campioni di pulviscolo atmosferico prelevati in Italia dalle stazioni della rete AM-CNR (1963 - Yearly elaboration of data of total beta activity measured on the samples of motes collected in Italy at the AM-CNR network stations). Pubbl. IFA-CNR, 1972.

- Pavesi B., Dietrich E. et coll.:
1964 - Elaborazione annuale dei dati di misura dell'attività beta totale rilevata sui campioni di pulviscolo atmosferico prelevati in Italia dalle stazioni della rete AM-CNR (1964 - Yearly elaboration of data of total beta activity measured on the samples of motes collected in Italy at the AM-CNR network stations). Pubbl. IFA-CNR, 1972.

- Pavesi B., Dietrich E. et coll.:
1965 - Elaborazione annuale dei dati di misura dell'attività beta totale rilevata sui campioni di pulviscolo atmosferico prelevati in Italia dalle stazioni della rete AM-CNR (1965 - Yearly elaboration of data of total beta activity measured on the samples of motes collected in Italy at the AM-CNR network stations). Pubbl. IFA-CNR, 1972.

- Pavesi B., Dietrich E. et coll.:
1966 - Elaborazione annuale dei dati di misura dell'attività beta totale rilevata sui campioni di pulviscolo atmosferico prelevati in Italia dalle stazioni della rete AM-CNR (1966 - Yearly elaboration of data of total beta activity measured on the samples of motes collected in Italy at the AM-CNR network stations). Pubbl. IFA-CNR, 1972.

- Pavesi B., Dietrich E. et coll.:
1967 - Elaborazione annuale dei dati di misura dell'attività beta totale rilevata sui campioni di pulviscolo atmosferico prelevati in Italia dalle stazioni della rete AM-CNR (1967 - Yearly elaboration of data of total beta activity measured on the samples of motes collected in Italy at the AM-CNR network stations). Pubbl. IFA-CNR, 1972.

- Bergamini P.G., Palmas G., Piantelli F., Rigato M.
Analysis of particle size and radioactivity of atmospheric dust. Health Physics, vol. 24, p. 655, 1973.

- Breuer F., De Bortoli M.:
Behaviour of radioiodine in the environment and in Man. CNEN, RT/PROT (73)13.

- Cardinale A., Sciocchetti G., Wardaszko T.:
Improved efficiency in the detection of $Rn^{220}$ in air. Giornale di Fisica Sanitaria e Protezione contro le Radiazioni, vol. 15, N° 4, p. 156-158, 1971.

- Pavesi B., Dietrich E.:
Prime indagini sull'inquinamento radioattivo dell'aria rilevato in Italia dopo le tre esplosioni nucleari del 14 ottobre 1970 (First investigations on the radioactive air pollution in Italy following the three nuclear explosions of October 14, 1970). Pubbl. CNR-IFA RDP, N° 38, 1971.

- Pavesi B.:
Meteorologia ed ambiente umano: casi tipici di inquinamento radioattivo dell'atmosfera (Meteorology and human environment: typical cases of radioactive pollution in the atmosphere). Pubbl. CNR-IFA RDP, N° 41, 1971.

- Calapaj G.G., Ongaro D.:
La radioattività ambientale del bacino termale Euganeo (A study on the radioactivity in the Euganean thermal basin). Giornale di Fisica Sanitaria e Protezione contro le Radiazioni, vol. 16, N° 3, p. 131, 1972.

- Pensko J., Wardaszko T., Wochna M.:
The influence of some geophysical factors on gamma background and $Rn^{222}$ concentration in soil and atmosphere. Giornale di Fisica Sanitaria e Protezione contro le Radiazioni, vol. 16, N° 4, p. 157, 1972.

- Albini A., Battaglia A., Quaini L., Triulzi C.:
Determination di $Sr^{90}$, $Cs^{137}$, $Ce^{144}$, $Pm^{147}$, $Eu^{155}$, $Zr^{95}$ e $Ru^{106}$ nelle ricadute mensili raccolte a Segrate (Milano) (Measurements of $Sr^{90}$, $Cs^{137}$, $Ce^{144}$, $Pm^{147}$, $Eu^{155}$, $Zr^{95}$ and $Ru^{106}$ in monthly fallout samples collected at Segrate (Milano)). Energia Nucleare, vol. 19, N° 4, p. 257, 1972.

- Pavesi B., Dietrich E. et coll.:
1968 - Elaborazione annuale dei dati di misura dell'attività beta totale rivelata sui campioni di pulviscolo atmosferico prelevati in Italia dalle stazioni della rete AM-CNR (1968 - Yearly elaboration of data of total beta activity measured on the samples of motes collected in Italy at the AM-CNR network stations). Pubbl. IFA-CNR, 1972.

- Pavesi B., Dietrich E. et coll.:
1969 - Elaborazione annuale dei dati di misura dell'attività beta totale rivelata sui campioni di pulviscolo atmosferico prelevati in Italia dalle stazioni della rete AM-CNR (1969 - Yearly elaboration of data of total beta activity measured on the samples of motes collected in Italy at the AM-CNR network stations). Pubbl. IFA-CNR, 1972.

- Pavesi B., Dietrich E. et coll.:
1970 - Elaborazione annuale dei dati di misura dell'attività beta totale rilevata sui campioni di pulviscolo atmosferico prelevati in Italia dalle stazioni della rete AM-CNR (1970 - Yearly elaboration of data of total beta activity measured on the samples of motes collected in Italy at the AM-CNR network stations). Pubbl. IFA-CNR, 1972.

- Cigna A.A., Polvani C.:
The radioactive fall-out in the mediterranean region: researches, results and perspectives. Proceedings Regional Conference Radiation Protection, Jerusalem, 1973.

- Clemente G.F.:
La determinazione degli elementi in traccia in aerosol atmosferici mediante attivazione neutronica. La Chimica e Industria, vol. 54, N° 9, p. 805, 1972.

- Clemente G.F., Giorcelli F.G., Mastinu G.G.:
Tungsten- 181 produced by the Schooner event: air concentration and deposition in Italy. Health Physics, vol. 24, p. 397, 1973.

- Colangelo S., Terrani S., Cortellessa G.C.:
Presentazione e commento dei risultati di misure di radioattività nelle fognature di alcune città italiane. CNEN, RT/PROT (73) 35.

- Fritelli L., Mastinu G.G.:
$^{226}$Ra doses due to bottle feeding. CNEN, RT/PROT (73) 4.

- Mastinu G.G.:
Le acque minerali italiane - I. Generalità e misure di radioattività CNEN, RT/PROT (73) 21.

- Pavesi B., Dietrich E. et coll.:
1973 - Elaborazione annuale dei dati di misura dell'attività beta totale rilevata nei campioni di pulviscolo atmosferico prelevati in Italia dalle stazioni della rete AM-CNR. Pubbl. IFA-CNR, Roma.

- Piro A., Bernhard M., Branica M., Verzi M.:
Incomplete exchange reaction between radioactive ionic zinc and stable natural zinc in sea-water. IAEA. SM. 158/2, p. 29, 1973.

- Smedile E., Triulzi C.:
Evoluzione della radioattività artificiale in sedimenti fluviali. Giorn. Fis.San.Radioprot., vol. 17, p. 119, 1973.

Reports of the COMITATO NAZIONALE PER L'ENERGIA NUCLEARE (CNEN) - ROMA

"DATA ON ENVIRONMENTAL RADIOACTIVITY COLLECTED IN ITALY" :

(English)

| | |
|---|---|
| - November 1956 - December 1957 | BIO/07/58 |
| - January - June 1958 | BIO/51/58 |
| - July - December 1958 | BIO/05/59 |
| - January - June 1959 | BIO/56/59 |
| - July - December 1959 | BIO/03/60 |
| - January - June 1960 | BIO/24/60 |
| - July - December 1960 | BIO/03/61 |
| - January - June 1961 | BIO/12/61 |
| - July - December 1961 | BIO/06/62 |
| - January - June 1962 | BIO/26/62 |
| - July - December 1962 | BIO/03/63 |
| - January - June 1963 | BIO/32/63 |
| - July - December 1963 | BIO/04/64 |
| - January - June 1964 | BIO/08/64 |
| - July - December 1964 | PROT.SAN./06/65 |
| - January - June 1965 | PROT.SAN./02/66 |
| - July - December 1965 | PROT.SAN./10/66 |
| - January - June 1966 | PROT.SAN./01/67 |
| - July - December 1966 | PROT.SAN./12/67 |
| - January - June 1967 | PROT.SAN./06/68 |
| - July - December 1967 | PROT.SAN./12/68 |
| - January - June 1968 | PROT.SAN./08/69 |
| - July - December 1968 | PROT.SAN./13/69 |
| - January - December 1969 | PROT.SAN./10/70 |
| - January - December 1970 | PROT.SAN./11/71 |
| - January - December 1971 | PROT.SAN./04/72 |
| - January - December 1972 | PROT.SAN./03/74 |
| - January - December 1973 | DISP-AMB/43/75 |
| - January - December 1974 | DISP-AMB/86/76 |
| - January - December 1975 | DISP-AMB/91/77 |
| - January - December 1976 | DISP-AMB/109/78 |
| - January - December 1977 | DISP-AMB/116/79 |

Serie in lingua italiana:

"CONSIDERAZIONI SULL'ANDAMENTO DELLA RADIOATTIVITA' AMBIENTALE IN ITALIA":

| | |
|---|---|
| Gennaio-Giugno 1967 | PROT.SAN./26/68 |
| Luglio-Dicembre 1967 | PROT.SAN./34/68 |
| Gennaio-Giugno 1968 | PROT.SAN./12/69 |
| Luglio-Dicembre 1968 | PROT.SAN./14/69 |
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| Gennaio-Dicembre 1971 | DISP-AMB/20/75 |
| Gennaio-Dicembre 1972 | DISP-AMB/21/75 |
| Gennaio-Dicembre 1973 | DISP-AMB/58/75 |

Rapporto annuale sulla radioattività ambientale in Italia - 1974:

- Volume I - Reti nazionali - DISP-AMB/103/78
- Volume II - Reti locali - DISP-AMB/103/78

Rapporto annuale sulla radioattività ambientale in Italia - 1975:

- Volume I - Reti nazionali - DISP-AMB/110/79
- Volume II - Reti locali - DISP-AMB/110/79

Rapporto annuale sulla radioattività ambientale in Italia - 1976:

- Volume I - Reti nazionali - DISP-AMB/117/79
- Volume II - Reti locali - DISP-AMB/117/79

NEDERLAND

Jaarverslagen van de Coördinatie-Commissie Radioactiviteitsmetingen (C.C.R.A.):

| | | |
|---|---|---|
| 1963- | Verslagen en Mededelingen betreffende de Volksgezondheid, | nr.11 van 1965 |
| 1964- | - idem - | nr. 9 van 1966 |
| 1965- | - idem - | nr. 1 van 1968 |
| 1966- | - idem - | nr.13 van 1968 |
| 1967- | - idem - | nr.30 van 1968 |
| 1968- | - idem - | nr.20 van 1969 |
| 1969- | - idem - | nr.24 van 1971 |
| 1970- | - idem - | nr.31 van 1971 |
| 1971- | - idem - | nr.30 van 1972 |
| 1972- | - idem - | nr.12 van 1973 |
| 1973- | Verslagen, Adviezen, Rapporten van het Ministerie van Volksgezondheid en Milieuhygiëne | nr.32 van 1974 |

Jaarverslagen van de Coördinatie-Commissie voor de Metingen van Radioactiviteit en Xenobiotische Stoffen (C.C.R.X.):

| | | |
|---|---|---|
| 1974- | Verslagen, Adviezen, Rapporten van het Ministerie van Volksgezondheid en Milieuhygiëne | nr.26 van 1975 |
| 1975- | - idem - | nr.23 van 1976 |
| 1976- | - idem - | nr.49 van 1977 |
| 1977- | - idem - | nr.45 van 1978 |
| 1978- | - idem - | nr.45 van 1979 |
| 1979- | - idem - | nr.65 van 1980 |

UNITED KINGDOM

- Stewart N.G., Osmond R.G., Crooks R.N. and Fisher Miss E.M.R.: The worldwide deposition of long-lived fission products from nuclear test explosions. AERE-HP/R 2354 (1958) (H.M.S.O.)
- Stewart N.G., Osmond R.G., Crooks R.N., Fisher Miss E.M.R. and Owers M.J.: The deposition of long-lived fission products from nuclear test explosions. AERE-HP/R 2790 (1959) (H.M.S.O.)
- Crooks R.N., Osmond R.G., Owers M.J. and Fisher Miss E.M.R.: The deposition of fission products from distant nuclear test explosions: results of middle 1959. AERE - R 3094 (1959) (H.M.S.O.)
- Peirson D.H., Crooks R.N. and Fisher Miss E.M.R.: Radioactive fallout in air and rain. AERE - R 3358 (1960) (H.M.S.O.).
- Crooks R.N., Osmond R.G., Fisher Miss E.M.R., Owers M.J. and Evett T.W.: The deposition of fission products from distant test explosion: results to the middle of 1960. AERE - R 3349 (1960) (H.M.S.O.)
- Crooks R.N., Evett T.W., Fisher Miss E.M.R., Lovett M.B. and Osmond R.G.: Radioactive fallout in air and rain: results to the middle of 1961 AERE - R 3766 (1961) (H.M.S.O.)
- Cambray R.S., Fisher Miss E.M.R., Spicer G.S., Wallace C.G. and Webber T.J.: Radioactive fallout in air and rain: results to the middle of 1962 AERE - R 4094 (1962) (H.M.S.O.)
- Cambray R.S., Fisher Miss E.M.R., Spicer G.S., Wallace C.G. and Webber T.J.: Radioactive fallout in air and rain: results to the middle of 1963 AERE - R 4392 (1963) (H.M.S.O.)
- Cambray R.S., Fisher Miss E.M.R., Spicer G.S., Wallace C.G. and Webber T.J.: Radioactive fallout in air and rain: results to the middle of 1964 AERE - R 4687 (1964) (H.M.S.O.)
- Cambray R.S., Fisher Miss E.M.R., Brooks W.L., Hughes A. and Spicer G.S.: Radioactive fallout in air and rain: results to the middle of 1965 AERE - R 4997 (1965) (H.M.S.O.)
- Cambray R.S., Fisher Miss E.M.R., Brooks W.L. and Peirson D.H.: Radioactive fallout in air and rain: results to the middle of 1966 AERE - R 5260 (1966) (H.M.S.O.)
- Cambray R.S., Fisher Miss E.M.R., Brooks W.L. and Peirson D.H.: Radioactive fallout in air and rain: results to the middle of 1967 AERE - R 5575 (1967) (H.M.S.O.)
- Cambray R.S., Fisher Miss E.M.R., Brooks W.L. and Peirson D.H.: Radioactive fallout in air and rain: results to the middle of 1968 AERE - R 5899 (1968) (H.M.S.O.)
- Cambray R.S., Fisher Miss E.M.R., Brooks W.L. and Peirson D.H.: Radioactive fallout in air and rain: results to the middle of 1969 AERE - R 6212 (1969) (H.M.S.O.)
- Cambray R.S., Fisher Miss E.M.R., Brooks W.L. and Peirson D.H.: Radioactive fallout in air and rain: results to the middle of 1970 AERE - R 6656 (1970) (H.M.S.O.)
- Cambray R.S., Fisher Miss E.M.R., Brooks W.L. and Peirson D.H.: Radioactive fallout in air and rain: results to the middle of 1971 AERE - R 6923 (1971) (H.M.S.O.)

- Cambray R.S., Fisher Miss E.M.R., Parker A. and Peirson D.H.:
  Radioactive fallout in air and rain: results to the middle of 1972
  AERE - R 7524 (1972) (H.M.S.O.)
- Cambray R.S., Fisher Miss E.M.R., Parker A. and Peirson D.H.:
  Radioactive fallout in air and rain: results to the middle of 1973
  AERE - R 7540 (1973) (H.M.S.O.)
- Cambray R.S., Eakins J.D., Fisher Miss E.M.R. and Peirson D.H.:
  Radioactive fallout in air and rain: results to the middle of 1974
  AERE - R 7832 (1974) (H.M.S.O.)
- Cambray R.S., Fisher Miss E.M.R., Eakins J.D. and Peirson D.H.:
  Radioactive fallout in air and rain: results to the end of 1975
  AERE - R 8267 (1976) (H.M.S.O.)
- Hunt G.J., Green B.M.R. and Elliot D.J.:
  Fallout in rainwater and airborne dust-levels in the UK during 1975
  NRPB R49 (1976) (H.M.S.O.)
- Cambray R.S., Fisher Miss E.M.R., Eakins J.D. and Peirson D.H.:
  Radioactive fallout in air and rain: results to the end of 1976
  AERE - R 8671 (1977) (H.M.S.O.)
- Hunt G.J., Green B.M.R. and Elliot D.J.:
  Fallout in rainwater and airborne dust-levels in the UK during 1976
  NRPB R55 (1977) (H.M.S.O.)
- Cambray R.S., Fisher Miss E.M.R., Playford K. and Peirson D.H.:
  Radioactive fallout in air and rain: results to the end of 1977
  AERE - R 9016 (1978) (H.M.S.O.)
- Green B.M.R., Knight A. and Hunt G.J.:
  Fallout in rainwater and airborne dust-levels in the UK during 1977
  NRPB R76 (1978) (H.M.S.O.)
- Anon: Annual survey of radioactive discharges in Great Britain 1977
  Department of the Environment, Scottish Office Welsh Office (1978)
- Cambray R.S., Fisher Miss E.M.R., Playford K., Eakins J.D. and Peirson D.H.:
  Radioactive fallout in air and rain: results to the end of 1978
  AERE - R 9441 (1979) (H.M.S.O.)
- Knight A. and Green B.M.R.:
  Fallout in rainwater and airborne dust-levels in the UK during 1978
  NRPB R90 (1979) (H.M.S.O.)
- Anon: Annual Survey of radioactive discharges in Great Britain 1978.
  Department of the Environment, Scottish Office, Welsh Office (1979)
- Cambray R.S., Fisher Miss E.M.R., Playford K., Eakins J.D. and
  Peirson D.H.:
  Radioactive Fallout in Air and Rain: Results to the end of 1979
  AERE - R 9672 (1980) (H.M.S.O.)
- Green B.M.R. and Knight A.:
  Fallout in rainwater and airborne dust-levels in the Uk during 1979
  NRPB R112 (1980) (H.M.S.O.)
- Anon: Annual survey of radioactive discharges in Great Britain 1979.
  Department of the Environment, Scottish Office, Welsh Office (1980)

Reports from Letcombe Laboratory

The reports listed below have been published by the Laboratory: Reports ARCRL 1 to ARCRL 18 were issued under its former name, the Radiobiological Laboratory.

- Strontium-90 in human diet in the United Kingdom 1958, ARCRL 1, 1959
- Strontium-90 in milk and agricultural materials in the United Kingdom 1958-1959, ARCRL 2, 1960
- Strontium-90 in human diet in the United Kingdom 1959, ARCRL, 3, 1960
- Strontium-90 in milk and agricultural materials in the United Kingdom 1959-1960 ARCRL 4, 1961
- Surveys of radioactivity in human diet and experimental studies: Report for 1960, ARCRL 5, 1961
- Radioactivity in milk: Interim report December 1961, ARCRL 6, 1962
- Interim Report on radioactivity in diet, ARCRL 7, 1962
- Annual Report 1961-62, ARCRL 8, 1962
- Interim Report on radioactivity in milk, ARCRL 9, 1963
- Annual Report 1962-63, ARCRL 10, 1963
- Interim Report: Radioactivity in milk, 1963, ARCRL 11, 1964
- Annual Report 1963-1964, ARCRL 12, 1964
- Interim Report: Radioactivity in milk, 1964, ARCRL 13, 1965
- Annual Report 1964-65, ARCRL 14, 1965
- Interim Report: Radioactivity in milk, 1965, ARCRL 15, 1966
- Annual Report 1965-66, ARCRL 16, 1966
- Annual Report 1966, ARCRL 17, 1967
- Annual Report 1967, ARCRL 18,1968
- Annual Report 1968, ARCRL 19, 1969
- Annual Report 1969, ARCRL 20, 1970
- Annual Report 1970, 1971
- Annual Report 1971, 1972
- Annual Report 1972, 1973
- Annual Report 1973, 1974
- Annual Report 1974, 1975
- Annual Report 1975, 1976
- Annual Report 1976, 1977
- Annual Report 1977, 1978
- Annual Report 1978, 1979

Reports from NRPB

- Green B.M.R., Knight A., Bruce R.S., Downs W., Ellis F.B. and Mercer E.R.; Milk report 1979 NRPB - R 115

PUBLICATIONS OF THE JOINT RESEARCH CENTRE - RADIATION PROTECTION
EURATOM - ISPRA - VARESE (Italy)

- A. Anzani, A. Benco, G. Dominici, P. Gaglione, C. Gandino, A. Malvicini
"Misure di radioattività ambientale, Ispra 1958-1959"
CNI-43

- A. Anzani, A. Benco, G. Dominici, P. Gaglione, C. Gandino, A. Malvicini
"Misure di radioattività ambientale, Ispra 1960"
CNI-95

- A. Anzani, A. Benco, M. De Bortoli, G. Dominici, P. Gaglione, C. Gandino, A. Malvicini
"Misure di radioattività ambientale, Ispra 1961"
EUR 223i (1963)

- M. De Bortoli, P. Gaglione, A. Malvicini, E. Van der Stricht
"Misure di radioattività ambientale, Ispra 1962"
EUR 481i (1964)

- M. De Bortoli, P. Gaglione, A. Malvicini, E. Van der Stricht
"Environmental Radioactivity, Ispra 1963"
EUR 2213e (1965)

- M. De Bortoli, P. Gaglione, A. Malvicini, E. Van der Stricht
"Environmental Radioactivity, Ispra 1964"
EUR 2509e (1965)

- M. De Bortoli, P. Gaglione, A. Malvicini
"Environmental Radioactivity, Ispra 1965"
EUR 2965e (1966)

- M. De Bortoli, P. Gaglione
"Environmental Radioactivity, Ispra 1966"
EUR 3554e (1967)

- M. De Bortoli, P. Gaglione
"Environmental Radioactivity, Ispra 1967"
EUR 4088e (1968)

- M. De Bortoli, P. Gaglione
"Environmental Radioactivity, Ispra 1968"
EUR 4412e (1970)

- M. De Bortoli, P. Gaglione
"Environmental Radioactivity, Ispra 1969"
EUR 4563e (1970)

- M. De Bortoli, P. Gaglione
"Environmental Radioactivity, Ispra 1970"
EUR 4805e (1972)

- M. De Bortoli, P. Gaglione
"Environmental Radioactivity, Ispra 1971"
EUR 4944e (1973)

- M. De Bortoli, P. Gaglione
"Environmental Radioactivity, Ispra 1972"
EUR 5118e (1974)

- G. Dominici
"Misure di radioattività ambientale, Ispra 1973-1974"
EUR 5475i (1976)

- G. Dominici
"Misure di radioattività ambientale, Ispra 1975"
EUR 5642i (1976)

- G. Dominici
"Misure di radioattività ambientale, Ispra 1976"
EUR 5805i (1977)

- G. Dominici
"Misure di radioattività ambientale, Ispra 1977"
EUR 6180i (1978)

- M. De Bortoli, P. Gaglione
"Osservazioni sui trasferimenti di radionuclidi in alcuni componenti dell'ambiente acquatico e terrestre"
Atti del I Convegno sullo stato di avanzamento della radioecologia in Italia, Parma 5-6 novembre 1970

- E. Van der Stricht, P. Gaglione, M. De Bortoli
"Prediction of strontium-90 levels in milk on the basis of deposition values"
Health Physics, 21 317 (1971)

- M. De Bortoli, P. Gaglione
"Radium-226 in environmental samples and foods"
Health Physics, 22 43 (1972)

- M. De Bortoli, P. Gaglione, C. Myttenaere
"Radioiodine transfer in an irrigated grassland ecosystem "marcita"
Giornale di Fisica Sanitaria 16 184-190 (1972)

- F. Breuer, M. De Bortoli
"Comportamento del radioiodio nell'ambiente e nell'uomo"
Rapporto CNEN RT/PROT (73) 13 (1973)

- G. Dominici
"Misure di radioattività ambientale, Ispra 1978"
EUR 6632i (1979)

- G. Dominici, A. Fenzi, E. Morniroli
"Concentrazione di tritio in alcune acque naturali dell'Italia Settentrionale"
Energia Nucleare, Vol. 26 N.11 - novembre 1979

## RADIOLOGICAL PROTECTION

Publications of the Commission of the European Communities
Directorate-General Employment and Social Affairs
Health and Safety Directorate - Luxembourg

---

N° 1 Technical Recommendations for Monitoring the Exposure of Individuals to External Radiation
Luxembourg, 1976 (EUR 5287 DE/FR/EN/IT/NL)

N° 2 Organization and Operation of Radioactivity Surveillance and Control in the Vicinity of Nuclear Plants
Luxembourg, 1975 (EUR 5176 DA/DE/FR/EN/IT/NL) (out of print)

N° 3 Technical Recommendations for the Use of Thermoluminescence for Dosimetry in Individual Monitoring for Photons and Electrons from External Sources
Luxembourg, 1976 (EUR 5358 DE/FR/EN/IT/NL)

N° 4 Radiation Protection Measurement - Philosophy and Implementation. Selected papers of the International Symposium at Aviemore (2 - 6 June 1974)
Luxembourg, 1975 (EUR 5397 FR/EN)

N° 5 Studie über die Radioaktivität in Verbrauchsgütern
F. Wachsmann
Luxembourg, 1976 (EUR 5460 DE/EN)

N° 6 Radioactive Isotopes in Occupational Health
A. Favino
Luxembourg, 1976 (EUR 5524 EN)

N° 7 Problems posed by the growing use of consomer goods containing radioactive substances. Conference papers of a seminar held at Luxembourg on 13-14 November 1975
Luxembourg, 1976 (EUR 5601 multilingual)

N° 8 Legislation
Council Directive of 1 June 1976 laying down the revised basic safety standards for the health protection of the general public and workers against the dangers of ionizing radiation.
Luxembourg, 1977 (EUR 5563 DA/DE/FR/EN/IT/NL)

N° 9 Problèmes relatifs à l'évaluation de l'aptitude au travail comportant un risque d'irradiation
E. Strambi
Luxembourg, 1976 (EUR 5624 FR) (out of print)

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Luxembourg, 1976 (EUR 5655 EN)

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Luxembourg, 1976 (EUR 5630 DA/DE/FR/EN/IT/NL)

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Luxembourg, 1976 (EUR 5441 FR/EN)

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Problems presented by the preparation and use of pharmaceuticals containing radioactive substances.
Luxembourg, 27 and 28 september 1976
Luxembourg, 1977 (EUR 5734 multilingual) (out of print)

N° 14 Results of environmental radioactivity measurements in the Member States of the European Community for
Air - Deposition - Water) 1975 - 1976
Milk )
Luxembourg, 1978 (EUR 5944 DA/DE/FR/EN/IT/NL)

N° 15 Results of environmental radioactivity measurements in the Member States of the European Community for
Air - Deposition - Water - Milk 1977
Luxembourg, 1979 (EUR 6212 DA/DE/FR/EN/IT/NL)

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Luxembourg, 1979 (EUR 6264 DE/EN/FR)
(The papers presented at the first and second seminars on information and training in radiation protection have been published by the Directorate General for Employment and Social Affairs in Luxembourg under the internal N° 1957/77 DE/FR/EN)

N° 17 Results of environmental radioactivity measurements in the Member States of the European Community for
Air - Deposition - Water - Milk 1978
Luxembourg, 1980 (EUR 6620 DA/DE/FR/EN/IT/NL)

(N° 18) A critical review of nuclear accident dosimeters
B. Majborn
Luxembourg, 1980 (EUR 6838 EN)

(N° 19) Entwicklung und Erprobung des Äquivalentdosisleistungsmessers Tandem für Beta- und Photonenstrahlung zur Anwendung im Strahlenschutz
J. Böhm, K. Hohlfeld
Luxembourg, 1980 (EUR 6845 DE,EN)

N° 20 Results of environmental radioactivity measurements in the Member States of the European Community for
Air - Deposition - Water - Milk 1979
Luxembourg, 1980 (EUR 7032 DA/DE/FR/EN/IT/NL)

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Dette dokument er den 19 rapport om radioaktivitet i omgivelserne udgivet af EF-Kommissionens Direktorat for Sundhed og Sikkerhed. Dokumentet er udarbejdet på basis af data indsamlet af de stationer, der forestår kontrollen med radioaktivitet i omgivelserne i de enkelte medlemsstater. Oplysningerne er uddrag af de data, der er indsendt til Kommissionen i medfør af artikel 36 i Rom-traktaten om oprettelse af Det europæiske Atomenergifællesskab.

Resultaterne i nærværende rapport dækker den radioaktive forurening af luft, nedfald, overfladevand og mælk for 1979 i Det europæiske Fællesskabs ni medlemslande. Belgien, Forbundsrepublikken Tyskland, Danmark, Frankrig, Italien, Irland, Luxembourg, Nederlandene og Det Forenede Kongerige.

Mit dem vorliegenden Dokument veröffentlicht die Direktion „Gesundheid und Sicherheit" der Kommission der Europäischen Gemeinschaften ihren 19 Bericht über die Umweltradioaktivität. Sie stützt sich dabei auf Daten aus den Stationen, die mit der Überwachung der Umweltradioaktivität in den Mitgliedstaaten beauftrag sind. Die angeführten Ergebnisse stellen eine Auswahl aus den Daten dar, die der Kommission gemäß Artikel 36 des Vertrags von Rom zur Gründung der Europäischen Atomgemeinschaft übermittel worden sind.

Die Ergebnisse dieses Berichts betreffen die radioaktive Kontamination von Luft, Ablagerungen, Oberflächengewässern und Milch in den neuen Mitgliedstaaten der Europäischen Gemeinschaft, nämlich Belgien, die Bundesrepublik Deutschland, Dänemark, Frankreich, Irland, Italien, Luxemburg, die Niederlande und das Vereinigte Königreich, für das Jahr 1979.

The present document is the 19th report published by the Health and Safety Directorate of the Commission of the European Communities concerning ambient radioactivity. It was drawn up using the data collected by the stations responsible for environmental radioactivity monitoring in the Member States. The results are extracts from the data sent to the Commission in application of Article 36 of the Treaty of Rome establishing the European Atomic Energy Community.

The results presented in this report deal with radioactive contamination of the air, precipitation and fallout, surface water and milk during 1979 in the nine Member States of the European Community, viz. Belgium, Denmark, the Federal Republic of Germany, France, Italy, Ireland, Luxembourg, the Netherlands and the United Kingdom.

Le présent document est le 19e rapport publié par la Direction santé et sécurité de la Commission des Communautés européennes sur la radioactivité ambiante. Il a été élaboré à partir des données recueillies dans les stations chargées de la surveillance de la radioactivité de l'environnement des Etats membres. Les résultats sont extraits des données envoyées à la Commission en application de l'article 36 du traité de Rome instituant la Communauté européenne de l'énergie atomique.

Les résultats présentés dans ce rapport concernent la radiocontamination de l'air, des retombées, des eaux de surface et du lait pendant l'année 1979 dans les neuf pays membres de la Communauté européenne, c'est-à-dire Belgique, république fédérale d'Allemagne, Danemark, France, Italie, Irlande, Luxembourg, Pays-Bas et Royaume-uni.

Il presente documento à la 19a relazione annuale sulla radioattività ambientale pubblicata dalla Direzione sicurezza e sanità della Commissione delle Comunità europee. È stata elaborata sulla scorta dei dati raccolti negli Stati membri dalle stazioni incaricate della sorveglian za generale della radioattività ambientale. I risultati sono stati desunti dai dati trasmessi alla Commissione in esecuzione dell'articolo 36 del Trattato di Roma che istituisce la Comunità europea dell'energia atomica.

I risultati esposti nella presente relazione si riferiscono alla contaminazione radioattiva dell'aria delle ricadute, delle acque di superficie e del latte per il 1979 nei dove paesi membri della Comunità europea, ossia: Belgio, Repubblica federale di Germania, Danimarca, Francia, Italia, Irlanda, Lussemburgo, Paesi Bassi e Regno Unito.

Dit document is het 19e rapport betreffende de omgevingsradioactiviteit dat door het directoraat Gezondheid en Veiligheid van de Commissie van de Europese Gemeenschappen wordt gepubliceerd. Het is opgesteld aan de hand van de gegevens die werden verzameld in de stations welke zijn belast met de bewaking van de omgevingsradioactiviteit in de Lid-Staten. De in dit rapport opgenomen resultaten werden ontleend aan de gegevens die aan de Commissie werden medegedeeld, krachtens artikel 36 van het Verdrag van Rome tot oprichting van de Europese Gemeenschap voor Atoomenergie.

De resultaten in dit rapport hebben betrekking op de radioactieve besmetting van de lucht, de neerslag, het oppervlaktewater en de melk in 1979 in de negen Lid-Staten van de Europese Gemeenschap, dat wil zeggen België, de Bondsrepubliek Duitsland, Denemarken, Frankrijk, Italië, Ierland, Luxemburg, Nederland en het Verenigd Koninkrijk.

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