

Radiological protection — no 22

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

for

air — deposition — water — milk

1980

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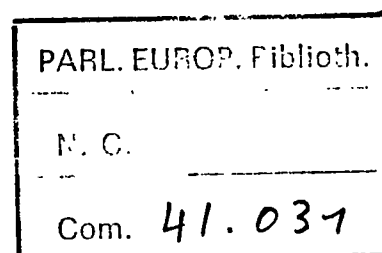
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Directorate-General 'Employment, Social Affairs and Education'
Directorate 'Health and Safety'
Luxembourg

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RESULTATER AF MÅLINGER AF RADIOAKTIVITETEN
I OMGIVELSERNE I EF-MEDLEMSSTATERNE FOR

Luft - Nedfald - Vand - Mælk 1980

MESSWERTE DER UMWELTRADIOAKTIVITÄT IN DEN
LAENDERN DER EUROPÄISCHEN GEMEINSCHAFT
FUER

Luft - Ablagerung - Wasser - Milch 1980

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

Air - Deposition - Water - Milk 1980

RESULTATS DES MESURES DES NIVEAUX DE RADIOACTIVITÉ DANS L'ENVIRONNEMENT DES ETATS MEMBRES DE LA COMMUNAUTÉ EUROPÉENNE POUR

Air - Retombées - Eaux - Lait 1980

RISULTATI DELLE MISURE DELLA RADIOATTIVITÀ AMBIENTALE NEGLI STATI MEMBRI DELLA COMUNITÀ EUROPEA PER

Aria - Ricadute - Acque - Latte 1980

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

Lucht - Depositie - Water - Melk 1980

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RESULTATER AF
MÅLINGER AF RADIOAKTIVITETEN I OMGIVELSERNE
I EF-MEDLEMSSTATERNE FOR

Luft - Nedfald - Vand - Mælk

1980

F O R O R D

Dette dokument er den tyvende 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 1980 i Det europæiske Fællesskabs ti medlemslande: Belgien, Forbundsrepublikken Tyskland, Danmark, Frankrig, Grækenland, 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 dette rapport er der især lagt vægt på resultaterne af målinger af visse specifikke radionukleider, men den indeholder også data om den totale betaaktivitet for at sikre kontinuiteten med de forudgående rapporter og for at have sammenlignelige værdier til rådighed.

x

x

x

I. INDLEDNING

Tabel 1 giver et generelt billede af nettet til kontrol med radioaktiviteten i omgivelserne i Fællesskabet i 1980, 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 1980 ingen ændring i den totale betaaktivitet i forhold til 1979.

Den 16. oktober 1980 blev der foretaget en atmosfærisk prøvesprængning i Det fjerne Østen. Dette medførte en generel, men midlertidig, stigning i radioaktiviteten i omgivelserne, og der opstod spaltningsprodukter med kort levetid, især i luft og nedbør; den registrerede maksimumaktivitet var imidlertid relativt svag.

Supplerende oplysninger om de radioaktive stoffer med kort levetid, der blev fundet efter denne sprængning, findes i bilaget.

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 1980 næsten er de samme som for 1979.

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.

Ad supplerende oplysninger henvises til den i bilaget gengivne liste over nationale rapporter.

Den målte ^{90}Sr og ^{137}Cs aktivitet har været meget svag og identisk med den aktivitet, der blev målt i 1979; 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 for Fællesskabet har man anvendt det aritmetiske gennemsnit af Fællesskabets månedsværdier.

II. MENNESKEDANNET RADIOAKTIVITET I LUFTEN MÅLT VED JORDOVERFLADEN

Målingen af den totale betaaktivitet og aktiviteten af specifikke radionukleider, som findes partikulært i atmosfæren, foretages ved en indsamling foretaget ved jordoverfladen, af disse partikler ved hjælp af papirfilter. Filtreringshastigheden er ca. 1000 m^3 luft pr. døgn.

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

I forhold til det foregående år er radioaktiviteten i luften forblevet uændret.

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

Tabel 2.1-2.18 gengiver for 1980 og for hver station de månedlige svingninger i og årsgennemnittet for betaaktiviteten af specifikke radionukleider og i den totale betaaktivitet, for således at give et samlet overblik over størrelsen af de lokale svingninger og de månedlige og sæsonmæssige variationer, der kan overskride mere end én størrelsesorden.

Årsgennemnittene for årene 1967-1980 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 gennemsnitsværdier og de årlige værdier for den totale betaaktivitet for 1980 i den enkelte EF-lande og i Fællesskabet findes i tabel 5.

I 1980 var gennemsnitsværdien for Fællesskabet for den totale betaaktivitet af partikler suspenderet i luften $0,03 \text{ pCi/m}^3$, med en maksimumaktivitet på $0,07 \text{ pCi/m}^3$ i november og december.

En sammenligning mellem de månedlige og årlige værdier for den totale betaaktivitet i luften i samtlige medlemsstater og i Fællesskabet som helhed mellem 1962 og 1980 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 1965.

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 Rosà 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 Chilton-stationen, da denne ikke længere foretager målinger af ^{238}Pu og ^{239}Pu i luften.

Tabel 9 viser resultaterne af de målinger af ^{239}Pu + ^{240}Pu , der blev foretaget ved Shrivvenham og Glasgow i 1980.

III. MENNESKEDANNET RADIOAKTIVITET I NEDFALD

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

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

Tabel 10.1-10.2¹ gengiver for 1980 for de enkelte stationer de gennemsnitlige månedlige svingninger for radionukleider, 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 størrelsen af de lokale svingninger og de månedlige og sæsonmæssige variationer.

Med henblik på at lette sammenligningen af værdierne målt ved de forskellige geografiske placeringer viser tabel 11 og 12 det årlige nedfald af ⁹⁰Sr og ¹³⁷Cs for årene 1967-1980.

De månedlige gennemsnitsværdier og den totale betaaktivitet i nedfald i Fællesskabets medlemsstater for 1980 er vist i tabel 13.

Den totale betaaktivitet i nedfald på jorden pr. år og pr. land for årene 1962-1980 er angivet i tabel 14.

Den totale betaaktivitet i nedbøren i 1980 har i det store og hele været den samme som den, der blev registreret i 1979. (6.9 mCi/km² i 1979 mod 7.25 mCi/km² i 1980).

Diagram 5 viser det samlede nedfald af ¹³⁷Cs siden 1954 ved Milford Haven (Det forenede Kongerige), idet der er taget hensyn til henfaldsfaktorerne. Det nye nedfald af ¹³⁷Cs efter 1967 udlignede ikke dette henfald, men man kan konstatere en langsom og kontinuerlig formindskelse af det totale akkumulerede nedfald.

Diagram 6 giver en oversigt over nedfald af ²³⁹Pu i regnvand ved Orsay (Frankrig) for perioden 1973-1980.

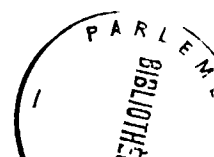


Diagram 7 a), 7 b) og 7 c) gengiver udviklingen i den totale betaaktivitet i det årlige nedfald på jorden ved ni repræsentative stationer fordelt over hele Fællesskabet: Mol, Le Vísinet, Ispra, Schleswig, München, Berlin, Chilton, Dublin og Bilthoven. Nedbørsmængden er også angivet.

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 hidrører fra den naturlige baggrundsradioaktivitet, og den, der hidrører fra udslip på ganske bestemte steder. I Fællesskabet er antallet af stationer, der foretager baggrundsmålinger i omgivelserne, lige så stort som antallet af 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 kontrolstationer, der foretager målinger af de forskellige kategorier af vand, og resultaterne af den samlede alfa- og betaaktivitet, af ^{226}Ra , af β ^{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 ...", og giver 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 nukleider, af alfa- og betaaktiviteten i overfladevand, havvand, drikkevand og spildevand gives i de årlige rapporter med titlen: "Umweltradioaktivität und Strahlenbelastung", udgivet af forbundsinderigsministeriet.

FRANKRIG

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

GRÆKENLAND

Resultaterne af målingerne af radioaktiviteten (total betaaktivitet, ^{90}Sr , ^{137}Cs , ^{226}Ra ...) i overfladevand, grundvand, drikkevand og havvand gives i de rapporter, som laboratoriet for den omgivende radioaktivitet har udgivet siden 1961.

IRLAND

Resultaterne af målingerne af radioaktiviteten i drikkevand offentliggøres i rapporten "Measurements of radioactivity of precipitation, settled dust and airborne particles in Ireland", der offentliggøres hvert kvartal af Meteorological Service of the Department of Transport og Nuclear Energy Board.

ITALIEN

Resultaterne af målingerne af koncentrationerne af ^{90}Sr og ^{137}Cs i ferskvand, vand til overrisling og havvand gives i de årlige rapporter med titlen "Data on Environmental Radioactivity collected in Italy", "Rapporto annuale sulla radioattività ambientale in Italia, Volume I - Reti nazionali", som offentliggøres af Comitato Nazionale per l'Energia Nucleare (CNEN).

NEDERLANDENE

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

Disse rapporter indeholder ligeledes resultaterne af de målinger af rest-betaaktiviteten, der er foretaget af de ansvarlige for kernekraftværker 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 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 nukleare anlæg har på omgivelserne. Disse undersøgelser indgår i én publikation, der omfatter de vigtigste oplysninger fra rapporter offentliggjort af Ministry of Agriculture, Fisheries and Food og rapporter udgivet af de ansvarlige for 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 særlige kilder.

BELGIEN

I Belgien har der siden 1958 eksisteret et overvågningsssystem, der viser basissituationen for forskellige kategorier af vand.

Detaljerede oplysninger fremgår af de dokumenter, som er omtalt under 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 over 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. Der foretages lejlighedsvis målinger af ^{137}Cs i vandløb og søer.

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. Fra og med 1979 vil der blive opsamlet drikkevand hvert tredje år.

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 akkumulerede nedfald i jorden og at sammenligne resultaterne med de teoretiske niveauer beregnet på grundlag af data om nedbør og afløb.

d) Havvand

Siden 1962 er der sommer og vinter blevet udtaget prøver ved 16 stationer på kysten. Ved hver af disse stationer er der taget 50 liter vand fra overfladen og 50 liter fra dybere lag. Prøverne analyseres med henblik på måling af ^{90}Sr -aktivitet og radio-caesium. Disse prøver udtages i Nordsøen, Kattegat og Østersøen.

FORBUNDSREPUBLIKKEN TYSKLAND

Overvågningsprogrammet i Forbundsrepublikken Tyskland er opdelt i følgende områder:

a) Overfladevand

(Hovedcenter: Bundesamt für Gewässerkunde, Koblenz).

Overvågningen af radioaktiviteten i overfladevand ($G\beta$, $R\beta$, H^3 - og andre nukleider) 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 af ^{90}Sr , ^{137}Cs og andre nukleider. 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 kontrol med overflade- og grundvand ved 143 prøvestationer; 19 af disse, som er beliggende ved de større nukleare anlæg, enten umiddelbart efter virksomheden i strømmens retning eller i nærheden af udløbet af de store floder, foretager kontinuerlige prøveudtagninger ved hjælp af automatiske vandopsamlere.

SCPRI kontrollerer desuden regelmæssigt 40 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 21 målestationer, som foretager prøveudtagninger mindst 1 gang om måneden. Desuden foretages der kontinuerlige prøveudtagninger ved kernekraftanlægget ved Gravelines, der er beliggende ved kysten.

SCPRI foretager grundige analyser af månedlige prøver af spildevand fra 16 kernekraftanlæg og 6 tilknyttede virksomheder. De kontrollerer desuden spildevand fra store byområder og fra en række mineområder.

GRÆKENLAND

Overvågningen af aktiviteten i det nationale drikkevandsanlæg omfatter fire adskilte områder. Det ansvarlige organ er laboratoriet for den omgivende radioaktivitet, der hører under Grækenlands Atomenergikommission, og som siden 1961 officielt foretager overvågningen af den omgivende radioaktivitet.

a) Flodvand

Overvågningen af flodvand foretages ved hjælp af målinger af den totale betaaktivitet, ^{137}Cs , ^{40}K , ^{226}Ra -aktiviteten, og af andre radionukleider i prøver af vand fra de store floder (disse prøver udtages ved grænserne).

b) Havvand

Overvågningen af havvandet foretages ved hjælp af målinger af den totale betaaktivitet, ^{137}Cs , ^{90}Sr og Pu-aktiviteten i prøver udtaget 4 steder: Lavrion, Rhodos, Lemnos og Kavala.

c) Brøndvand

Overvågningen af brøndvand foretages ved hjælp af målinger af den totale betaaktivitet i prøver udtaget af brønde, som fortrinsvis er beliggende i nærheden af CEN.

d) Søer (spildevand fra bebyggede områder)

Overvågningen af radioaktiviteten i søer (spildevand fra byområder) foretages ved hjælp af målinger af den totale betaaktivitet, ^{137}Cs , ^{90}Sr , ^{226}Ra -aktivitet, og af andre radionukleider i vandprøver udtaget to steder.

ITALIEN

Kontrollen med overfladevandet, der foretages af de nationale prøvestationer, består i målinger af ^{90}Sr og ^{137}Cs i prøver udtaget 8 steder (7 floder og 1 sø).

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

For havvands vedkommende foretages målingerne af ^{90}Sr og ^{137}Cs på prøver udtaget 4 steder.

NEDERLANDENE

Overvågningen af radioaktiviteten i vand omfatter, når det drejer sig om de store floder (prøveudtagning foretages ved grænserne) og Ijselmeer, den totale alfaaktivitet, rest-betaaktiviteten og ^3H , og desuden ^{90}Sr og ^{226}Ra , når det drejer sig om Rhinen, Maas og den vestlige Schelde. Desuden måles ^3H -aktiviteten i visse vandområder, 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 radioaktivt nedfald i drikkevand ikke længere var berettiget på grund af den meget ringe bestråling, som befolkningen blev udsat for ved at indtage vandet. Man har i stedet bibeholdt et forskningsprogram til undersøgelse af særlige spørgsmål som f.eks. bevægelsen af ^{90}Sr fra forsyningsbassiner til 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 prøveudtagningssteder indgår i tabel 15.1 under "drikkevand", og man har her foretaget målinger med henblik på at bestemme niveauet for specifikke radionukleider 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 betydelig nedgang 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 en enkelt stor flod.

De fleste prøveudtagninger er i den seneste tid blevet foretaget i Severn. Der er blevet udtaget prøver hver dag hele året rundt, som er blevet analyseret. Resultaterne viser meget lave radioaktivitetsniveauer.

Resultaterne for drikkevand findes i tabel 15.1.

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 bortskaffes radioaktivt spild, analyserer man ligeledes de specifikke og repræsentative radionukleider. Det vand, der indgår i tabel 15.1 under "overfladevand", og som udviser en høj værdi (over 10), anvendes ikke direkte til drikkevand.

x

x x

Tabel 15.1 viser for 1980 et uddrag af målinger af rest-betaaktiviteten foretaget i visse medlemsstater i drikkevand, overfladevand, der er egnet som drikkevand, overfladevand i al almindelighed og havvand.

Tabel 15.2 viser målinger af ^{90}Sr , ^{137}Cs og ^{134}Cs foretaget i Danmark.

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 nationale rapporter

I en række år har medlemslandene fortrinsvis koncentreret deres overvågningsprogram om mælk, der anses for at være en god biologisk indikator for tilstedeværelsen af menneskedannede radioaktive stoffer, hvoraf de vigtigste i øjeblikket er ^{90}Sr og ^{137}Cs hidrørende fra atmosfæriske atomprøvesprængninger.

Den aktivitet, der blev målt i 1980, er meget svag. Niveauet svarer næsten til det, der blev målt i 1978 og 1979, og der har ikke været tale om større variationer i årets løb.

Erfaringen har vist, at forholdet mellem $^{90}\text{Sr/g Ca}$ i kosten og $^{90}\text{Sr/g Ca}$ 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 giver de målte værdier for ^{137}Cs i mælk et indtryk af, hvorledes kosten som helhed kontamineres af dette nukleid.

Hvad angår de øvrige 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 1980. A. Aarkrog, L. Bøtter-Jensen, H. Dahlgaard, Heinz Hansen, J. Lippert, S.P. Nielsen og K. Nilsson: Risø Report nr. 447.
- Forbundsrepublikken Tyskland - Umweltradioaktivität und Strahlenbelastung. Jahresbericht 1979 - Der Bundesminister des Innern.
- Frankrig - Rapports d'activité mensuels et annuels du SCPRI-INSERM - Ministère de la Santé pour 1980.
- Grækenland - Månedsberegninger fra Laboratoriet for den omgivende Radioaktivitet, Atomenergikommissionen i Grækenland.
- Italien - Data on Environmental Radioactivity collected in Italy 1977 - Rapporto annuale sulla radioattività ambientale in Italia - 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". Disse rapporter offentliggøres årligt af "Volksgezondheid voor Milieuhygiene" i serien "Verslagen, Adviezen, Rapporten".

x x

I Nederlandene måler Rijks-Kwaliteitsinstituut voor Landen en Tuinbouwprodukten i Wageningen hver måned niveauet af ^{90}Sr og ^{137}Cs og eventuelt af ^{89}Sr og ^{131}I , og det analyserer i dette øjemed en blanding af standardiseret "mælk til industriel anvendelse", der tages fra den nordlige, den vestlige og den sydlige del af landet, og 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. ⁹⁰Sr-forurening

Tabel 17 giver for 1980 kvartals- og årsværdierne for pCi ⁹⁰Sr/g Ca-forholdet ved de forskellige prøveudtagningssteder i Fællesskabet.

Tabel 18 giver en oversigt, pr. medlemsstat og for Fællesskabet som helhed, over kvartalsværdierne for pCi ⁹⁰Sr/gCa-forholdet for året 1980. Tabel 19 giver en oversigt over de gennemsnitlige kvartals- og årsværdier siden 1972 for Fællesskabet.

Den årlige gennemsnitsværdi for 1980 er 3,2 pCi/g Ca mod 3,4 pCi/g Ca i 1979.

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

Disse niveauer svarer til blot en lille procentdel af de årlige grænseværdier, der er fastsat for befolkningens optagelse med føden.

V.3. ¹³⁷Cs-forurening

Tabel 21 giver for 1980 kvartals- og årsværdierne for forholdet pCi ¹³⁷Cs/liter mælk målt ved forskellige prøveudtagningssteder inden for Fællesskabet.

Tabel 22 giver en oversigt over kvartals- og årsværdierne for 1980 for hver enkelt medlemsstat og for Fællesskabet som helhed. Tabel 23 viser kvartals- og årsgennemsnittene for Fællesskabet siden 1972.

Fællesskabets årsgennemsnit for 1980 ligger på 4,8 pCi ¹³⁷Cs/liter mod 5,2 pCi ¹³⁷Cs/liter i 1979.

¹³⁷Cs-forureningen 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 årlige grænseværdier, der er fastsat for befolkningens optagelse af radiocaesium med drikkevandet 1).

1) De årlige grænseværdier for optagelsen af radionukleider med drikkevand er fastsat i de grundlæggende EURATOM-normer.

BEMÆRKNINGER TIL OPLYSNINGER FOR FRANKRIG

SCPRI (se tabellerne side 150, 151, 164, 198, 199, 223, 243, 256)

Fra og med 1. januar 1980 har man ændret opstillingen af måleresultaterne fra Service Central de Protection contre les Rayonnements Ionisants med henblik på at lette fortolkningen af deres betydning for den offentlige sundhed i henhold til CIPR-henstillingerne og de gældende bestemmelser i en lang række andre lande (USA, Det forenede Kongerige, Sverige, osv...).

Hvad især angår betegnelsen "A.A.S." (der betyder "aucune activité significative" - "ingen aktivitet af betydning") anvendes den herefter nu udelukkende for de måleresultater, for hvilke analysen, gennemført indtil den i slutningen af kolonnen angivne tærskel, ikke har gjort det muligt at registrere nogen som helst aktivitet.

Disse "registreringsniveauer" (CIPR's recording levels) som udtrykkeligt meddeles i hvert enkelt tilfælde, overstiger aldrig en hundrededel af de maksimalt tilladelige grænser eller de tilsvarende vejledende værdier, som allerede i sig selv medfører en meget bred sikkerhedsmargen.

Sideløbende med sine kontrolopgaver beskæftiger Service Central de Protection contre les Rayonnements Ionisants sig imidlertid også med forskning og kan som følge heraf i forbindelse med videnskabelige undersøgelser være nødt til at gennemføre analyser, der går ud over ovennævnte registreringsniveauer. Foran eventuelle resultater af sådanne analyser anføres tegnet \sqrt{d} .

CEA (se tabellerne side 148, 149, 196, 197)

I forbindelse med opstillingen for 1980 af resultaterne af målinger af radioelementer registreret i luft og nedbør er tærsklerne angivet. Disse tærskler, der udtrykkeligt meddeles i hvert enkelt tilfælde, overstiger aldrig en hundrededel af de maksimalt tilladelige grænser eller de tilsvarende vejledende værdier. Tværtimod ligger de ofte betydeligt under, således at værdierne ligger adskillige 10-styrker lavere.

Visse resultater udviser værdier, der ligger endnu lavere end disse tærskler; foran disse resultater anføres tegnet ∇ .

MESSWERTE
DER UMWELTRADIOAKTIVITAET IN DEN LAENDERN DER
EUROPAEISCHEN GEMEINSCHAFT
FUER

Luft - Ablagerung - Wasser - Milch

1980

V O R W O R T

Mit dem vorliegenden Dokument veröffentlicht die Direktion "Gesundheit und Sicherheit" der Kommission der Europäischen Gemeinschaften ihren zwanzigsten 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 zehn Mitgliedstaaten der Europäischen Gemeinschaft - Belgien, Bundesrepublik Deutschland, Dänemark, Frankreich, Griechenland, Italien, Luxemburg, Niederlande und Vereinigtes Königreich - für das Jahr 1980.

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 1980 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 boden-nahmen Luft und im Fallout zeigt, dass die Gesamt-Beta-Aktivität 1980 im Vergleich zu 1979 gleich geblieben ist.

Am 16. Oktober 1980 wurde in Asien ein Kernwaffenversuch in der Atmosphäre durchgeführt, der vorübergehend zu einem allgemeinen Ansteigen der Umweltradioaktivität geführt hat. Dabei traten kurzlebige Spaltprodukte vor allem in der Luft und in den Niederschlägen auf. Die maximale gemessene Aktivität war aber trotzdem relativ schwach.

In der Anlage sind zusätzliche Daten für die nach diesem Versuch festgestellten kurzlebigen Radioelemente enthalten.

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 1980 entsprechen aber in etwa denen von 1979.

Die Ueberwachung der radioaktiven Kontamination einzelner Nahrungsmittel wird in den Mitgliedstaaten durch Probenahmen aus den Grundnahrungsmitteln gewährleistet. Der Bericht enthält lediglich die Ergebnisse der Messungen des Sr90- und Cs137-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 1980 nachgewiesenen Aktivitäten von Sr^{90} und Cs^{137} sind sehr schwach und entsprechen den im Jahre 1979 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 ist im Vergleich zum Vorjahr unverändert geblieben.

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 1980 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 - 1980 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 1980 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 1980 der Mittelwert der Gesamt-Beta-Aktivität für atmosphärische Schwebstoffe bei $0,03 \text{ pCi/m}^3$ mit einem Maximum von $0,07 \text{ pCi/m}^3$ im November und im Dezember.

In den Tabellen 6 und 7 werden die während des Zeitraums 1962 - 1980 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 2 a) stellt die monatlichen Schwankungen der Cs^{137} -Konzentrationen in Chilton (Vereinigtes Königreich) seit 1953 dar; Graphik 2 b) die entsprechenden Werte für Ispra (Italien) und Le Vésinet (Frankreich) seit 1965.

Die Graphiken 3 a), 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 4 a) und 4 b) 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 durchgeföhrt.

Tabelle 9 gibt die Messergebnisse für Pu^{239} und Pu^{240} in Shrivensham und Glasgow aus dem Jahre 1980 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 1980 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 10.21 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 1980 jährlich abgelagerten Mengen von Sr^{90} und Cs^{137} .

Die monatlichen Mittelwerte und die im Jahre 1980 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 1980 am Boden abgelagerte Gesamt-Beta-Aktivität.

Die 1980 gemessene Gesamt-Beta-Aktivität in Niederschlägen weicht nur geringfügig von den 1979 gemessenen Werten ab ($6,9 \text{ mCi/km}^2$ im Jahre 1979 gegenüber $7,25 \text{ mCi/km}^2$ 1980).

Graphik 5 zeigt die seit 1954 in Milford Haven (Vereinigtes Königreich) kumulierten Ablagerungen von 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 1980 in Orsay (Frankreich) im Regenwasser abgelagerte Pu^{239} .

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

IV. RADIOAKTIVITÄT 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 Abteilungsstellen 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 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.

GRIECHENLAND

Die Ergebnisse der Radioaktivitätsmessungen (Gesamt-Beta-, Sr^{90} -, Cs^{137} -, Ra^{226} -Aktivität u.a.m.) in Oberflächengewässern, im Grund-, Trink- und Meerwasser sind in den seit 1961 vom Laboratorium für Radioaktivität veröffentlichten Tätigkeitsberichten enthalten.

IRLAND

Die Ergebnisse der Radioaktivitätsmessungen in Trinkwasser sind in dem vierteljährlich vom Meteorological Service of the Department of Transport and the Nuclear Energy Board herausgegebenen Bericht "Measurements of radioactivity of precipitation, settled dust and airborne particles in Ireland" enthalten.

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 und "Rapporto annuale sulla radioattività ambientale in Italia - Volume I (Reti nazionali).

NIEDERLANDE

Die Ergebnisse der Messungen zur Ueberwachung der verschiedenen Wasserarten werden in den Berichten 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 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 Berichte sowie der Berichte der Anlagenbetreiber in einer einzigen Veröffentlichung zusammengefasst.

IV.2. Beschreibung der Ueberwachungsprogramme

In den folgenden Abschnitten wird über 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 enthalte

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 Grupp 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 Seewasser

Seit 1970 werden jedes 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. Der Cs^{137} -Pegel in Flüssen und Seen wird in unregelmässigen Abständen gemessen.

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. Ab 1979 werden alle drei Jahre Trinkwasserproben entnommen.

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 Niederschlagsdaten und den abfliessenden Mengen errechneten theoretischen Werten zu vergleichen.

d) Meerwasser

Seit 1962 wird das Meerwasser im Sommer und im Winter in 16 Messstellen an der Küste kontrolliert. In jeder Messstelle werden 50 Liter Oberflächenwasser und 50 Liter Tiefenwasser entnommen. Die aus der Nordsee, aus dem Kattegat und aus der Ostsee stammenden Proben werden auf die Aktivität von Sr^{90} und radioaktivem Caesium hin untersucht.

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, H^3 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 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 an etwa flüssigen Anleitungen 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 140 Stellen. An 19 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 40 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 21 über das gesamte französische Küstengebiet verteilte Entnahmestellen zur Verfügung, an denen mindestens einmal monatlich Proben entnommen werden. In der Nähe der am Meer gelegenen Nuklearanlage Gravelines werden kontinuierlich Proben entnommen.

Der SCPRI führt detaillierte Analysen der monatlich aus Abwässern von 16 Nuklearzentren und 6 angeschlossenen Industrien gewonnenen Proben durch. Er kontrolliert überdies die Abwässer grosser Stadtgebiete sowie einiger Bergwerke.

GRIECHENLAND

Die Radioaktivität des nationalen Wasserversorgungsnetzes wird in vier einzelnen Bereichen kontrolliert. Zuständig für die Messungen ist das Laboratorium für Umweltradioaktivität der griechischen Atomenergiebehörde, die seit 1961 offiziell mit der Ueberwachung der Umweltradioaktivität beauftragt ist.

a) Flusswasser

Zur Ueberwachung des Flusswassers wird die Gesamt-Beta-, Cs¹³⁷-, K⁴⁰-, und Ra²²⁶-Aktivität sowie die Aktivität anderer Radionuklide in Wasserproben aus den grossen Flüssen gemessen (die Proben werden an den Landesgrenzen entnommen).

b) Meerwasser

Zur Ueberwachung des Meerwassers wird die Gesamt-Beta-, Cs¹³⁷-, Sr⁹⁰- und Pu-Aktivität in Proben gemessen, die an 4 Stellen entnommen werden : Lavrion, Rhodos, Lemnos, Kavala.

c) Brunnenwasser

Zur Ueberwachung des Brunnenwassers wird die Gesamt-Beta-Aktivität in Proben gemessen, die in erster Linie aus in der Nähe des CEN gelegenen Brunnen stammen.

d) Binnenseewasser (städtische Abwässer)

Zur Ueberwachung des Wassers aus Binnenseen (städtische Abwässer) wird die Gesamt-Beta- Cs¹³⁷-, Sr⁹⁰-, und Ra²²⁶-Aktivität sowie die Aktivität anderer Radionuklide in Proben gemessen, die an zwei Stellen entnommen werden.

ITALIEN

Die Ueberwachung des Oberflächenwassers der italienischen Binnengewässer geschieht in Form von Messungen des Sr⁹⁰- und des Cs¹³⁷-Gehalts der an 8 verschiedenen Punkten (7 Flüsse und 1 See) entnommenen Proben.

Was das zur künstlichen Bewässerung verwendete Wasser betrifft, so wird der Sr⁹⁰- und Cs¹³⁷-Gehalt bei an 2 Stellen entnommenen Proben gemessen.

Der Sr⁹⁰- und Cs¹³⁷-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 H³-Werte des Wassers der grossen Flüsse (wobei die Proben an den Landesgrenzen entnommen werden) und des Ijsselmeeres sowie Messungen des Sr⁹⁰- und Ra²²⁶-Gehalts von Rhein, Maas und Westerschelde. Ausserdem wird der H³-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 der 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 meisten Kontrollen wurden in letzter Zeit im Seven durchgeführt. Während des ganzen Jahres wurden täglich Proben entnommen und analysiert. Die Ergebnisse, die sich auf das Trinkwasser beziehen, sind in Tabelle 15.1 angeführt. 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 Abteilungs punktes 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 1980 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 Änderungen eingetreten sind.

V. RADIOAKTIVITÄT 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 1980 festgestellten Aktivitäten sind sehr niedrig; sie entsprechen in etwa den 1978 und 1979 gemessenen Werten und weisen im Jahresverlauf keine grossen Schwankungen auf.

Die Erfahrung hat gezeigt, dass der $\text{Sr}^{90}/\text{g Ca}$ -Anteil in der Nahrungskette gegenüber dem $\text{Sr}^{90}/\text{g Ca}$ 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 Mitgliedstaaten 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 1980
Aarkrog A., Bøtter-Jensen L., Dahlgaard H., Hansen Heinz, Lippert J., Nielsen S.P. and Nilsson K.: Risø Report No 447
- Bundesrepublik Deutschland - Umweltradioaktivität und Strahlenbelastung.
Jahresbericht 1979 - Der Bundesminister des Innern
- Frankreich - Rapports d'activité mensuels et annuels du SCPRI
- INSERM - Ministère de la Santé pour 1980
- Griechenland - Monatliche Tätigkeitsberichte des Laboratoriums für Umweltradioaktivität, Griechische Atomenergiebehörde
- Italien - Data on Environmental Radioactivity collected in Italy in 1977 und Rapporto annuale sulla radioattività ambientale in Italia - 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". Diese Berichte werden jedes Jahr veröffentlicht in : "Volksgezondheid, en Milieuhygiene in de serie" Verslagen, Adviezen Rapporten.

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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 Sr⁹⁰

Tabelle 17 enthält für 1980 die Vierteljahres- und Jahreswerte des an verschiedenen Entnahmestellen der Gemeinschaft gemessenen Verhältnisses pCi Sr⁹⁰/g Ca.

Tabelle 18 enthält die Vierteljahres- und Jahreswerte des Verhältnisses pCi Sr⁹⁰/g Ca für das Jahr 1980 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 1980 beträgt 3,2 pCi/g Ca gegenüber 3,4 pCi/g Ca im Jahre 1979.

Die Kontamination der Milch durch Sr⁹⁰ 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 Cs¹³⁷

Tabelle 21 enthält für 1980 die an verschiedenen Entnahmestellen der Gemeinschaft gemessenen Vierteljahres- und Jahreswerte des Verhältnisses pCi Cs¹³⁷/Liter Milch.

Tabelle 22 fasst die 1980 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 1980 3,8 pCi Cs¹³⁷/Liter gegenüber 5,2 pCi Cs¹³⁷/Liter im Jahre 1979.

Die Kontamination der Milch durch Cs¹³⁷ 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).

(1) Die Jahresgrenzwerte für die Inkorporation von Radionukliden mit dem Trinkwasser sind in den Euratom-Grundnormen festgesetzt.

ANMERKUNGEN ZU DEN FRANZOESISCHEN ANGABEN

SCPRI (Tabellen S. 150, 151, 164, 198, 199, 223, 243, 256)

Seit 1. Januar 1980 werden die Messergebnisse des Service Central de Protection contre les Rayonnements Ionisants zur Erleichterung ihrer Auswertung für Fragen der Volksgesundheit in einer geänderten Form vorgelegt, die auf Empfehlungen der ICRP und auf den Bestimmungen der meisten anderen Länder (USA, Vereinigtes Königreich, Schweden, usw.) beruht.

So erhält künftig jedes Messergebnis, für das die bis zu dem am Ende der Spalte angegebenen Schwellenwert durchgeführte Analyse keine Aktivität gezeigt hat, die Bezeichnung "A.A.S." ("aucune activité significative" = keine signifikante Aktivität).

Diese "registrierten Werte" (recording levels der ICRP), die in jedem Fall extra angegeben werden, überschreiten in keinem Fall den hundertsten Teil der zulässigen Grenzwerte oder der entsprechenden Richtwerte, die an sich schon eine grosse Sicherheitsspanne beinhalten.

Dem Service Central de Protection contre les Rayonnements Ionisants obliegen ausser seiner Kontrollfunktion auch Forschungsaufgaben. In diesem Rahmen kann er aus wissenschaftlichem Interesse bestimmte Analysen noch für Werte unterhalb der oben genannten registrierten Werte durchführen. Soweit vorhanden, sind die Ergebnisse solcher Analysen mit einem vorangestellten √ gekennzeichnet.

CEA (Tabellen S. 148, 149, 196, 197)

1980 werden zusätzlich zu den Messergebnissen für Radioelemente in Luft und Niederschlagswasser Schwellenwerte angegeben. Die in jedem Fall einzeln angegebenen Schwellenwerte überschreiten in keinem Fall den hundertsten Teil der zulässigen Grenzwerte oder der entsprechenden Richtwerte. Sie liegen häufig noch um einige Zehnerpotenzen darunter.

Einige Ergebnisse liegen noch unter diesen Schwellenwerten. Sie sind durch ein vorangestelltes ∇ gekennzeichnet.

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

Air - Deposition - Water - Milk

1980

P R E F A C E

This is the 20th 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 stations responsible for environmental radioactivity monitoring in 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 radioactivity contamination of the air, deposition, surface water and milk during 1980 in the ten Member States of the European Community, viz. Belgium, Denmark, the Federal Republic of Germany, France, Greece, 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 of 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 and provide comparative values.

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I. INTRODUCTION

Table 1 provides an overall view of the environmental radioactivity monitoring network in the Community in 1980, 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 the ground level and in deposition shows that 1980 saw no change in total beta activity as compared with 1979.

An atmospheric nuclear took place in the Far East on 16 October 1980. It brought about a general though short-term increase in radioactivity in the environment, with the appearance of short-lived fission products especially in the air and in precipitation; nevertheless the maximum activity observed was relatively low.

Further data for short-lived radioactive elements detected after this test are appended.

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 1980 results were similar to those of 1979.

Monitoring of radioactive contamination of various foodstuffs is carried out in the Member States of the Community by sampling the basic constituents of the diet. The report contain 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.

For additional information, please refer to the list of national reports given in the annex.

Activities detected in 1980 for ^{90}Sr and ^{137}Cs were very low and identical to those measured in 1979. There were no 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. ARTIFICIAL 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 1000 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 no change in airborne radioactivity as compared with the previous year.

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 in 1980, 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 1980 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 1980 in the different Member States and the Community.

In 1980 the mean value for the Community of total beta activity of atmospheric suspended particulates was 0.03 pCi/m^3 , with a peak of 0.07 pCi/m^3 in november and december.

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 1980.

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 1965.

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 stations 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 Shrivvenham and Glasgow in 1980.

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 precipitations are shown in Tables 10.1 to 10.21 for 1980 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 1980.

Tables 13 shows the monthly means and total beta activity deposited in the Member States of the Community in 1980.

Table 14 shows total beta activity deposited on the ground per year and per country from 1962 to 1980.

1980 saw little overall change in total beta activity in precipitation as compared with the level recorded in 1979 (6.9 mCi/km^2 in 1979 as opposed to 7.25 mCi/km^2 in 1980).

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) from the period 1973 - 1980.

Graphs 7a), 7b) and 7c) give an indication of trends in total beta activity deposited annually on the ground in nine typical 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 $\beta^{40}\text{K}$ and 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.

FEDERAL REPUBLIC OF GERMANY

A detailed description of monitoring networks for different aquatic systems and the results of alpha and beta activity in surface, 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, ^3H , ^{90}Sr , ^{137}Cs , etc.) in surface and groundwater, drinking water and sea water, municipal waste water and effluent from nuclear power stations are reported in the "Rapports d'activité" published monthly by the SCPRI since 1961 and in the annual reports.

GREECE

Since 1961 results of radioactivity (total beta activity, ^{90}Sr , ^{137}Cs , ^{226}Ra ...) in surface and ground water, drinking water and sea water are given in progress reports of the Ambient radioactivity laboratory.

IRELAND

Results of radioactivity measurements in drinking water are reported in Measurements of radioactivity of precipitation, settled dust and airborne particles in Ireland published quarterly by the Meteorological Service of the Department of Transport and the Nuclear Energy Board.

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" and "Rapporto annuale sulla radioattività ambientale in Italia - Volume I - Reti nazionali".

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 Radioactiviteit 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 establishments is given in a series of reports commencing in 1978 and entitled "Annual Survey of Radioactive Discharges in Great Britain". These surveys bring together in a single publication the main data contained in the reports issued by the Ministry of Agriculture, Fisheries and Food and 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 are to 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 lakes and eight streams in Denmark. One of the objectives of this programme is to estimate ^{90}Sr discharge into the sea and to see if there are any significant differences between the ^{90}Sr levels in aquiferous systems. Measures are occasionally taken of ^{137}Cs in Danish stream and lake water.

c) drinking water

"Tap water" samples have been collected throughout the country since 1965. The purpose of this programmes 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 groundwater. In recent years, however, increasing amounts have been taken from surface waters. Drinking water is sampled every third year starting from 1979.

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 assess accumulated deposition in the soil and to compare this assessment with the theoretical levels calculated from precipitation and runoff data.

d) Sea water

Since 1962 sea water is collected in summer and in winter from 16 stations on the coast. At every station two 50 l samples are taken, one from the surface and one from deep down. The samples are analyzed for ^{90}Sr and radiocesium. Further more samples are collected in the North Sea, the Kattegat and the Baltic.

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, Coblenz)

Monitoring of radioactivity in surface water (total beta activity, residual beta, ^3H 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 suspended material and approximately 30 for sludge samples.

b) sea water

(monitored by : Deutsches Hydrographisches Institut, Hamburg)

In 1965 the Deutsche 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 individual 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 : Insitut für Wasser-, Boden- und Lufthygiene des Bundesgesundheitsamtes, Berlin)

The area covered includes 18 official measuring stations which analyse drinking 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 140 points; in 19 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 40 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 21 sampling stations spread out along the French coast which take samples at least once each month. Sampling is carried out continuously near the Gravelines marine nuclear power station.

The SCPRI carries out detailed analyses of monthly samples of liquid effluent from 16 nuclear establishments and 6 associated industries. It also monitors the waste water of large conurbations and the effluent from several mining sites.

GREECE

Monitoring of radioactivity in the national water network covers four separate areas. The department in charge of this is the Ambient radioactivity laboratory of the Greek Atomic energy commission, which was officially given the task of monitoring ambient radioactivity in 1961.

a) river water

Monitoring of river water involves measuring total beta activity, ^{137}Cs , ^{40}K , ^{226}Ra and other radionuclides in samples of water from the main rivers (sampling is carried out at the borders).

b) sea water

Monitoring of sea water involves measuring total beta activity, ^{137}Cs , ^{90}Sr , and Pu in samples taken at four points : Lavrion, Rhodes, Lemnos and Kavala.

c) well water

Monitoring of well water involves measuring total beta activity in samples taken from wells mainly located near the nuclear research centre.

d) lake water (town waste water)

Monitoring the radioactivity in lake water (town waste water) involves measuring total beta activity, ^{137}Cs , ^{90}Sr , ^{226}Ra and other radionuclides in water samples collected from the two points.

ITALY

Monitoring of surface waters in the national network consists of measurements of ^{90}Sr and ^{137}Cs in samples taken at 8 stations (7 rivers and 1 lake)..

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

For sea water, 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 IJsselmeer, radiological monitoring relates to total alpha activity, residual beta activity and ^3H (sampling of river water is carried out at the borders). In the Rhine, the Meuse and the Western Scheldt ^{90}Sr and ^{226}Ra are also measured. Moreover, ^3H 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 river Severn was the river most recently sampled. Daily samples were taken throughout the year for bulking and analysis; the results are included in the drinking water results in table 15.1. 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 given in an appropriate manner on 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.

Table 15.1 shows a summary of the residual beta measurements carried out in certain Member States in 1980 for drinking water, surface waters suitable for drinking water supply, surface waters in general and sea water.

Table 15.2 contains measurements of ^{90}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 radioelements, the main elements at present being ^{90}Sr and ^{137}Cs from atmospheric nuclear tests.

The activities measured in 1980 are very low; they are similar to the 1978 and 1979 results and there were no significant fluctuations during the year.

Experience has shown that the ratio of $^{90}\text{Sr}/\text{g Ca}$ in the food chain to $^{90}\text{Sr}/\text{g Ca}$ 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 1980. Aarkrog A., Bøtter-Jensen L., Dahlgaard H., Hansen Heinz, Lippert J., Nielsen S.P. and Nilsson K.: Risø Report No 447.
- Federal Republic of Germany - Umweltradioaktivität und Strahlenbelastung. Jahresbericht 1979 - Der Bundesminister des Innern
- France - Rapports d'activité mensuels et annuels du SCPRI - INSERM - Ministère de la Santé pour 1980.
- Greece - Monthly status reports of the ambient radioactivity laboratory, Greek Atomic energy commission
- Italy - Data on Environmental Radioactivity collected in Italy in 1977 and Rapporto annuale sulla radioattività ambientale in Italia - 1977 (CNEN)
- Netherlands - Annual reports of the Coördinatie commissie voor de metingen van Radioactiviteit en Xenobiotische Stoffen entitled : "Algemene Radioactieve Besmetting van de Biosfeer . In Nederland verrichte metingen". These reports are published annually by the "Volksgezondheid en Milieuhygiene" in the series "Verslagen, Adviezen, Rapporten".

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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 Tuinbouwprodukten in Wageningen which to this end analyses a mixture of standardized "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 $^{90}\text{Sr}/\text{g Ca}$ ratio found at all the sampling points of the Community in 1980.

Table 18 summarizes by Member State and for the Community the quarterly and annual values of the pCi $^{90}\text{Sr}/\text{g Ca}$ ratio for 1980. Table 19 summarizes the mean quarterly and annual values for the Community from 1972 on.

The annual mean for 1980 is 3.2 pCi/g Ca as opposed to 3.4 pCi/g Ca in 1979.

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 laid down 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 various sampling stations in the Community for 1980.

Table 22 summarizes by Member State and for the Community the quarterly and annual values for 1980. Table 23 shows the quarterly and annual means for the Community from 1972 on.

The annual mean for the Community for 1980 is 3.8 pCi $^{137}\text{Cs}/\text{litre}$ as opposed to 5.2 pCi $^{137}\text{Cs}/\text{litre}$ in 1979.

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.

NOTICE CONCERNING DATA FOR FRANCE

SCPRI (Tables on pages 150, 151, 164, 198, 199, 223, 243, 256)

As from 1 January 1980, measurement results from the Service Central de Protection contre les Rayonnements Ionisants (French radiation protection department) have been presented differently for the sake of greater ease in interpreting their consequences for public health, in line with ICRP recommendations and the measures adopted by most other countries (USA, UK, Sweden, etc.).

For instance the reference "A.A.S." (which stands for "aucune activité significative" - no significant activity) shall apply henceforth to all measurement results showing no activity detected although analysis has been taken as far as the threshold mentioned at the end of the column.

These recording levels, stated explicitly in each case, are never higher than one hundredth of the maximum admissible limits or corresponding reference values, which themselves allow for a very wide safety margin.

Nevertheless, in addition to its monitoring duties, the Service Central de Protection contre les Rayonnements Ionisants has an interest in research and may therefore actually carry some analyses beyond the recording levels mentioned above, for scientific research purposes. Results of analyses of this sort, where they exist, are therefore preceded by the sign @.

CEA (Tables on pages 148, 149, 196, 197)

Thresholds are also indicated in the 1980 presentation of measurements of radioelements detected in the air and in rainfall. These thresholds, which are stated explicitly in each case, are never higher than one hundredth of the maximum admissible limits or corresponding reference values. They are even frequently much lower, reaching values several powers of 10 below.

Some results attain values which are lower than these thresholds. Where this occurs, they are preceded by the sign ∇ .

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

Air - Retombées - Eau - Lait

1980

P R E F A C E

Le présent document est le vingtième 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 ce rapport concernent la radiocontamination de l'air, des retombées, des eaux de surface et du lait pendant l'année 1980 dans les dix Pays membres de la Communauté Européenne, c'est-à-dire Belgique, République fédérale d'Allemagne, Danemark, France, Grèce, 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

Un aperçu général du réseau de surveillance des niveaux de la radioactivité de l'environnement dans la Communauté en 1980, dont les données sont présentées dans ce rapport, se trouve dans le tableau I.

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 1980 que l'activité bêta globale est restée stationnaire par rapport à 1979.

Un test nucléaire dans l'atmosphère a eu lieu en Extrême Orient le 16 octobre 1980. Il a entraîné une hausse générale mais transitoire de la radioactivité de l'environnement avec apparition de produits de fission à vie courte notamment dans l'air et les précipitations; les activités maximales observées ont été toutefois relativement faibles.

On trouvera en annexe des données complémentaires concernant les radioéléments à vie courte détectés après ce test.

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 1980 sont proches de ceux de 1979.

La surveillance de la radiocontamination des différentes denrées alimentaires est assurée dans les Etats membres de la Communauté par un échantillonnage 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 sur 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 en 1980 de ^{90}Sr et de ^{137}Cs sont très faibles et identiques à celles qui ont été mesurées en 1979 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 est resté stationnaire.

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 1980 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 1980, 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 de ^{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 1980 dans les différents Etats membres et pour la Communauté est donnée dans le tableau 5.

En 1980, la valeur moyenne pour la Communauté de l'activité bêta globale des particules en suspension dans l'air a été de 0.03 pCi/m³, avec un maximum de 0,07 pCi/m³ en novembre et décembre.

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 1980, 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 Shrivensham et Glasgow en 1980.

III. RADIOACTIVITE ARTIFICIELLE DES RETOMBÉES

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 1980 et par stations, sont données dans les tableaux 10.1 à 10.21.

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 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 1980.

Les moyennes mensuelles et le total de l'activité bêta globale déposée en 1980, dans les 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 1980 est indiquée dans le tableau 14.

En 1980, la radioactivité bêta globale des précipitations n'a guère différé dans son ensemble de celle enregistrée en 1979.

(6.9 mCi/km² en 1979 contre 7,25 mCi/km² en 1980).

Le graphique 5 représente 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 des retombées de ^{239}Pu dans les eaux de pluie à Orsay (France), pendant la période s'étendant de 1973 à 1980.



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 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 bêta 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 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 ⁹⁰Sr dans les eaux souterraines, les rivières, les lacs et l'eau de mer, et du ¹³⁷Cs 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 ^3H , ^{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.

GRECE

Les résultats de mesures de la radioactivité (bêta totale ^{90}Sr , ^{137}Cs , ^{226}Ra ...) dans les eaux de surface, les eaux souterraines, les eaux potables et l'eau de mer sont repris dans les rapports d'activité du Laboratoire de la radioactivité ambiante depuis 1961.

IRELAND

Les résultats de mesures de la radioactivité de l'eau potable sont publiés dans le rapport "measurements of radioactivity of precipitation, settled dust and airborne particles in Ireland" publié trimestriellement par le Meteorological Service of the Department of Transport and the Nuclear Energy Board.

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 "Data on Environmental Radioactivity collected in Italy", et "Rapporto annuale sulla radiattività ambientale in Italia" Volume I (Reti nazionali).

PAYS-BAS

Les résultats des mesures de contrôle des différents types d'eau sont présentés dans les rapports 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-Occidentales, 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 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 des rapports publiés par le Ministry of Agriculture, Fisheries and Food (ministère de l'agriculture, des pêches et des produits alimentaires), et 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 rivière 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. Le ^{137}Cs est mesuré occasionnellement dans les eaux des rivières et des lacs.

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 mesurés 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. L'eau potable sera collectée tous les trois ans, à compter de 1979.

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 évaluations avec les niveaux théoriques calculés à partir des renseignements sur les précipitations et les écoulements.

d) Eau de mer

Depuis 1962, l'eau de mer est prélevée en été et en hiver dans 16 stations sur le littoral. Dans chacune de celles-ci, 50 litres d'eaux de surface et 50 litres d'eaux profondes sont prélevés. Les échantillons font l'objet d'analyses en ce qui concerne les activités du ^{90}Sr et du radio-césium. Ils sont prélevés dans la Mer du Nord, le Cattegat et la Baltique.

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, Coblenz)

La surveillance de la radioactivité des eaux de surface (bêta globale, bêta 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 détecter 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'échantillonnage 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 d'eaux superficielles et d'eaux souterraines au niveau de 140 points; pour 19 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 40 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 21 stations de prélèvement réparties sur tout le littoral français, au niveau desquelles sont effectués des prélèvements au moins mensuels. Un échantillonnage continu est effectué près de la centrale nucléaire marine de Gravelines.

Le SCPRI effectue des analyses détaillées sur des échantillons mensuels d'effluents liquides de 16 centres nucléaires et 6 industries annexes. Il contrôle, en outre, les eaux usées de grands centres urbains, ainsi que les eaux résiduaires de plusieurs sites miniers.

GRECE

La surveillance de la radioactivité des eaux du réseau national comprend quatre domaines distincts. Le service responsable est le Laboratoire de la Radioactivité Ambiante du CEA de la Grèce, lequel est chargé officiellement, depuis 1961, de surveiller la radioactivité ambiante.

a) Eaux fluviales

La surveillance des eaux fluviales consiste en des mesures de la radioactivité bêta globale, ^{137}Cs , ^{40}K , ^{226}Ra et autres radionucléides sur des échantillons des eaux des grands fleuves (dont les échantillons sont prélevés aux frontières).

b) Eau de mer

La surveillance de l'eau de mer consiste en des mesures de la radioactivité bêta globale, ^{137}Cs , ^{90}Sr , Pu sur des échantillons prélevés en 4 points : Lavrion, Rhodes, Lemnos, Kavala.

c) Eaux des puits

La surveillance des eaux des puits consiste en des mesures de radioactivité bêta globale sur des échantillons prélevés des puits pour la plus part situés dans le voisinage du CEN.

d) Eaux lacustres (usées urbaines)

La surveillance de la radioactivité des eaux dans les lacs (usées urbaines) consiste en des mesures de la radioactivité bêta globale, ^{137}Cs , ^{90}Sr , ^{226}Ra , et autres radionucléides sur des échantillons d'eau prélevés en deux points.

ITALIE

Le contrôle des eaux superficielles du réseau national consiste en des mesures de ^{90}Sr et ^{137}Cs sur des échantillons prélevés en 8 points (7 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 ^3H 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 ^3H 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 justifié 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.

Le Severn est le fleuve dans lequel on a effectué récemment le plus de prélèvements. Des échantillons quotidiens ont été prélevés pendant toute l'année, rassemblés et analysés. **Les résultats indiquent des niveaux très faibles de radioactivité.**

Les résultats relatifs à l'eau potable figurent dans le tableau 15.1.

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 1980 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 1980 sont très faibles; elles sont proches de celles mesurées en 1978 et 1979 et n'ont pas présenté de fluctuations importantes au cours de l'année.

L'expérience a montré que la proportion de $^{90}\text{Sr/g Ca}$ dans la chaîne alimentaire par rapport au $^{90}\text{Sr/g Ca}$ 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 les 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 1980.
Aarkrog A., Bøtter-Jensen L., Dahlgaard H., Hansen Heinz, Lippert J., Nielsen S.P. and Nilsson K. : Risø Report No 447
- REPUBLIQUE FEDERALE D'ALLEMAGNE - Umweltradioaktivität und Strahlenbelastung. Jahresbericht 1979 - Der Bundesminister des Innern
- FRANCE - Rapports d'activité mensuels et annuels du SCPRI - INSERM - Ministère de la Santé pour 1980
- GRECE - Rapports mensuels d'activité du Laboratoire pour la Radioactivité ambiante, CEA de la Grèce
- ITALIE - Data on Environmental Radioactivity collected in Italy in 1977 et Rapporto annuale sulla radioattività ambientale in Italia - 1977 (CNEN)
- PAYS-BAS - Rapports annuels de la Coördinatie-Commissie voor de metingen van Radioactiviteit en Xenobiotische Stoffen intitulés : "Algemene Radioactieve Bepietting van de Biosfeer. In Nederland verrichte metingen". Ces rapports sont publiés tous les ans par le "Volksgezondheih on Milieuhygiene in de serie" Verslagen, Adviezen, Rapporten.

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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 Tuinbouwprodukten 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 1980, les valeurs trimestrielles et annuelles du rapport pCi $^{90}\text{Sr}/\text{g Ca}$ 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 $^{90}\text{Sr}/\text{g Ca}$ pour l'année 1980. Un résumé des moyennes trimestrielles et annuelles pour la Communauté, à partir de 1972, est donné dans le tableau 19.

La moyenne annuelle pour 1980 est de pCi/g Ca 3,2 contre 3,4 pCi/g Ca en 1979.

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 1980, les valeurs trimestrielles et annuelles du rapport pCi $^{137}\text{Cs}/\text{litre de lait}$ 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 1980. Le tableau 23 donne les moyennes trimestrielles et annuelles pour la Communauté à partir de 1972.

La moyenne annuelle communautaire pour 1980 se situe < 3,8 pCi $^{137}\text{Cs}/\text{litre}$ contre 5,2 pCi $^{137}\text{Cs}/\text{litre}$ en 1979.

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).

(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.

AVERTISSEMENT RELATIF AUX DONNEES DE LA FRANCE

SCPRI (tableaux pages 150, 151, 164, 198, 199, 223, 243, 256)

A dater du 1er janvier 1980, la présentation des résultats de mesure du Service Central de Protection contre les Rayonnements Ionisants est modifiée pour en faciliter l'interprétation sur le plan de leur signification pour l'hygiène publique, selon les recommandations de la CIPR, et les dispositions retenues par la plupart des autres pays (USA, Royaume-Uni, Suède, etc...).

En particulier, la mention "A.A.S." (qui signifie "aucune activité significative"), s'applique désormais à tout résultat de mesure pour lequel l'analyse, poussée jusqu'au seuil mentionné en fin de colonne, n'a permis de déceler aucune activité.

Ces "niveaux d'enregistrement" (recording levels de la CIPR), explicitement annoncés dans chaque cas, ne sont jamais supérieurs au centième des limites maximales admissibles ou des valeurs-guides correspondantes qui comportent elles-mêmes déjà une très grande marge de sécurité.

Cependant, parallèlement à sa mission de contrôle, le Service Central de Protection contre les Rayonnements Ionisants a une vocation de recherche et, à ce titre, peut être amené, pour des raisons d'investigation scientifique, à pousser certaines analyses au-dessous des niveaux d'enregistrement définis ci-dessus. Les résultats de telles analyses, lorsqu'ils existent, sont alors précédés du signe √d.

CEA (tableaux pages 148, 149, 196, 197)

La présentation 1980 des résultats de mesure des radioéléments identifiés dans l'air et dans la pluie est accompagnée de seuils. Ces seuils, explicitement annoncés dans chaque cas, ne sont jamais supérieurs au centième des limites maximales admissibles ou des valeurs-guides correspondantes. Ils sont même fréquemment beaucoup plus faibles, atteignant des valeurs inférieures de plusieurs puissances de 10.

Certains résultats atteignent des valeurs encore inférieures à ces seuils. Dans ce cas, ils sont précédés du signe ∇ .

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

Aria - Ricadute - Acque - Latte

1980

P R E F A Z I O N E

Il presente documento è la XX 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 1980 nei dieci Paesi membri della Comunità europea, ossia: Belgio, Repubblica federale di Germania, Danimarca, Francia, Grecia, 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 è 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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I. INTRODUZIONE

La tabella I fornisce un quadro globale della rete delle stazioni di controllo dei livelli della radioattività ambientale nella Comunità per il 1980, 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 osservare, per il 1980, che l'attività beta globale è rimasta stazionaria rispetto al 1979.

Un esperimento nucleare nell'atmosfera ha avuto luogo in Estremo Oriente il 16 ottobre 1980. Esso ha comportato un aumento generale ma transitorio della radioattività ambientale, con apparizione di prodotti di fissione a vita breve, in particolare nell'aria e nelle precipitazioni; le attività massime osservate sono state tuttavia relativamente deboli.

In allegato sono riportati dati complementari concernenti i radioelementi a vita breve riscontrati dopo tale esperimento.

La radioattività dell'acqua non ha potuto essere esaminata sistematicamente come quella dell'aria a causa dei diversi sistemi di controllo (campionamento e misurazioni) esistenti negli Stati membri. Tuttavia si è constatato che i risultati del 1980 sono simili a quelli del 1979.

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 della 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 identiche a quelle misurate nel 1979 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 radioattività 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 effettuate dopo 5 giorni di decadimento.

Rispetto all'anno precedente il tasso di radioattività presente nell'aria è rimasto stazionario.

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 1980 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 1980, 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 in dividuo della popolazione, secondo le norme fondamentali dell'Euratom.

La tabella 5 fornisce una quadro generale delle medie mensili e annuali della radioattività beta globale nei vari paesi della Comunità e in tutta la Comunità per il 1980.

Nel 1980 il valore medio per la Comunità dell'attività beta globale delle particelle in sospensione nell'aria è stato di $0,03 \text{ pCi/m}^3$, con un massimo di $0,07 \text{ pCi/m}^3$ in novembre e dicembre.

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 1980.

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 il Vésinet (Francia) a partire dal 1965.

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 Milford Haven figurano nella tabella 8. I grafici 4a) e 4b) mostrano gli andamenti a decorrere dal 1961. Va notato che, a partire dal 1969, la stazione di Milford 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 1980.

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 delle stazioni di prelievo, rispettivamente per i radionuclidi specifici e per l'attività beta globale.

Le tabelle da 10.1 a 10.21 riportano, per il 1980 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 1980.

Nella tabella 13 figurano le medie mensili e il totale dell'attività beta globale delle ricadute per il 1980 negli Stati membri della Comunità.

Nella tabella 14 è indicata la radioattività beta globale depositata al suolo, per anno e per paese, dal 1962 al 1980.

Nel 1980, la radioattività beta globale delle precipitazioni non è stata nel complesso diversa da quella registrata nel 1979.

(6,9 mCi/Km² nel 1979 rispetto a 7,25 mCi/Km² nel 1980).

Il grafico 5 presenta le ricadute cumulative del ^{137}Cs a decorrere dal 1954 per la stazione di Milford Haven (R.U.), tenendo conto dei fattori di decadimento. Dopo il 1967, le ricadute fresche di ^{137}Cs non hanno compensato il decadimento e si può registrare una costante lenta diminuzione del totale delle ricadute accumulate.

Il grafico 6 fornisce un quadro generale delle ricadute del ^{239}Pu nell'acqua piovana nella stazione di Orsay (Francia) per il periodo 1973-1980.

I grafici 7a), 7b) e 7c), mostrano l'andamento dell'attività beta globale annua depositata per 9 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 K 40 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

Lo stabilimento di ricerca di Risø pubblica relazioni annuali sulla "radioattività ambientale in Danimarca ...", (Environmental Radioactivity in Denmark in ...) e fornisce i risultati di misurazioni, effettuate nel paese, relative alla concentrazione dello ^{90}Sr nelle acque sotterranee, nelle acque dei fiumi, di lago e di mare, e del ^{137}Cs nell'acqua marina.

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, nelle 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, ^3H , ^{90}Sr , ^{137}Cs ...) nelle acque di superficie e sotterranee, potabili e marine, negli 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.

GRECIA

I risultati relativi alle misurazioni della radioattività (beta globale, ^{90}Sr , ^{137}Cs , ^{226}Ra ...) nelle acque di superficie, sotterranee, potabili e marine sono indicati nelle relazioni di attività del "Laboratoire de la radioactivité ambiante" fin dal 1961.

IRLANDA

I risultati relativi alle misurazioni della radioattività dell'acqua potabile vengono pubblicati nella relazione "Measurements of radioactivity of precipitation, settled dust and airborne particles in Ireland" (Misurazione della radioattività delle precipitazioni, della polvere depositata e delle particelle in sospensione in Irlanda), pubblicata trimestralmente dal Service of the Department of Transport and the Nuclear Energy Board.

ITALIA

I risultati relativi alle misurazioni delle concentrazioni dello ^{90}Sr e del ^{137}Cs nelle acque continentali, d'irrigazione e marine, vengono riportate nelle pubblicazioni annuali del Comitato nazionale per l'Energia Nucleare (CNEN), intitolate "Data on Environmental Radioactivity collected in Italy" e "Rapporto annuale sulla radioattività ambientale in Italia, Volume I (Reti nazionali)".

PAESI BASSI

I risultati delle misurazioni effettuate dalle reti di controllo di vari tipi di acqua sono presentati nelle relazioni annuali della COORDINATIE-COMMISSIE VOOR DE METINGEN VAN RADIOACTIVITEIT EN XENOBIOTISCHE STOFFEN (C.C.R.X.), intitolata "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, nonché in un certo numero di piccoli corsi d'acqua nei pressi di Dodewaard.

REGNO UNITO

Una descrizione degli effetti prodotti sull'ambiente dagli scarichi liquidi radioattivi dei principali centri nucleari viene pubblicata in una serie di relazioni 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 (Ministero dell'Agricoltura, della Pesca e dei Prodotti Alimentari), e dai centri stessi.

IV.2 Descrizione dei programmi di controllo

Qui di seguito diamo, per ciascuno Stato membro, 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 par. IV.1.

Sulla Mosa, tra Givet e Lanaken, sono entrati in servizio 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

Fin dal 1961 si effettuano misurazioni su campioni di acqua sotterranea prelevati annualmente in 9 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 9 stazioni.

b) Acque fluviali e lacustri

A decorrere dal 1970 sono stati prelevati ogni due anni campioni di acque 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 esistono differenze significative tra i livelli di ^{90}Sr nelle varie reti acquifere. E' stato anche misurato saltuariamente il ^{137}Cs nelle acque dei fiumi e dei laghi.

c) Acqua potabile

Dal 1965 si raccolgono campioni di acqua di rubinetto in tutto il paese. Lo scopo del programma è quello 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. L'acqua potabile verrà raccolta ogni 3 anni, a partire dal 1979.

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 studi è quello 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.

d) Acqua marina

Fin dal 1962 l'acqua marina viene prelevata d'estate e d'inverno presso 16 stazioni caratteristiche del litorale. In ciascuna di quest'ultime vengono prelevati 50 litri d'acqua di superficie e 50 litri di acqua di sottosuolo. I campioni vengono sottoposti ad analisi miranti ad accertare l'attività dello ^{90}Sr e del radiocesio. Essi vengono prelevati nel Mare del Nord, nel Cattegat e nel Baltico.

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, H3 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)

Fin 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 Mar 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 nucleari, cliniche specializzate in medicina nucleare ed altri centri in cui vengono utilizzate sostanze radioattive.

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

FRANCIA

Il controllo delle acque sotterranee e di superficie viene effettuato in 140 punti ad opera dello SCPRI; per 19 di questi punti di campionamento situati sia a valle dei principali centri nucleari, sia presso la foce di fiumi principali, il campionamento viene effettuato di continuo con idrocollettori automatici.

Lo SCPRI controlla inoltre regolarmente 40 punti di campionamento di acqua potabile situati vicino ai centri nucleari, oppure appartenenti alla rete di distribuzione delle grandi città. Per ogni progetto di fornitura di acqua potabile, e nell'ambito della "Istruzione sanitaria obbligatoria", lo SCPRI effettua inoltre uno studio completo della radioattività.

Per quanto concerne l'acqua marina, lo SCPRI dispone di 21 stazioni di prelievo dislocate su tutto il litorale francese, con campionamento almeno mensile. Un campionamento continuo viene effettuato presso la centrale nucleare marina di Gravelines.

Lo SCPRI effettua analisi particolareggiate su campioni mensili di scarichi liquidi di 16 centrali nucleari e di 6 industrie connesse. Esso controlla inoltre le acque usate di grandi centri urbani nonché le acque residue di numerosi centri minerari.

GRECIA

Il controllo della radioattività delle acque della rete nazionale abbraccia quattro settori distinti. Il servizio responsabile è il laboratorio della radioattività ambientale del CEA della Grecia, il quale è ufficialmente incaricato, dal 1961, di sorvegliare la radioattività ambientale.

a) Acque fluviali

Il controllo delle acque fluviali consiste in misurazioni della radioattività beta globale, del ^{137}Cs , del ^{40}K , del ^{226}Ra e di altri radionuclidi su campioni delle acque di grandi fiumi (i campioni sono prelevati alle frontiere).

b) Acque marine

Il controllo delle acque marine consiste in misurazioni della radioattività beta globale, del ^{137}Cs , dello ^{90}Sr , del Pu su campioni prelevati in quattro punti: Lavrion, Rhodes, Lemnos, Kavala.

c) Acque di pozzo

Il controllo delle acque di pozzo consiste in misurazioni della radioattività beta globale su campioni prelevati nella maggior parte dei casi in prossimità del CEN.

d) Acque lacustri (usate urbane)

Il controllo della radioattività delle acque lacustri (usate urbane) consiste in misurazioni della radioattività beta globale, del ^{137}Cs , dello ^{90}Sr , del ^{226}Ra , e di altri radionuclidi su campioni di acqua prelevati in due punti.

ITALIA

Il controllo delle acque di superficie della rete nazionale viene eseguito con misurazioni dello ^{90}Sr e del ^{137}Cs su campioni prelevati in 8 punti (7 fiumi e un lago).

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

Per le acque marine vengono eseguite misurazioni dello ^{90}Sr e del ^{137}Cs su campioni prelevati in quattro punti.

PAESI BASSI

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

REGNO UNITO

a) Quando nel 1967 si decise 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, venne mantenuto un programma di ricerche destinato a studiare aspetti specifici, quali il movimento del ^{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 costituito l'oggetto di un campionamento e di analisi per determinare il loro tenore di ^{90}Sr e di ^{137}Cs . Questi 5 punti di prelievo sono contenuti nella tabella 15.1., alla voce "Acque potabili", e hanno costituito l'oggetto di misurazioni destinate a determinare i radionuclidi specifici in essi contenuti, e non la loro radioattività beta globale. I valori forniti dalle acque sorgive restano relativamente elevati, come era del resto prevedibile, ma anche il livello più elevato registra una diminuzione considerevole rispetto ai valori massimi riscontrati verso la metà degli anni 60.

b) Esiste inoltre fin dal 1965 un programma approfondito di campionamento e di analisi delle acque, che viene realizzato annualmente per un solo grande fiume. Il Severn è il fiume nel quale sono stati recentemente effettuati il maggior numero di prelievi. Nel corso dell'intero anno sono stati prelevati i campioni quotidiani, i quali sono stati raccolti e analizzati. I risultati indicano livelli molto deboli di radioattività.

I risultati relativi all'acqua potabile figurano alla tabella 15.1.

c) Per determinate acque potabili, acque superficiali e acque di fiume vengono praticate verifiche tramite sondaggio. Tali acque vengono analizzate ai fini della misurazione della radioattività alfa globale, della radioattività beta globale e del tenore di tritio. I risultati dei controlli tramite sondaggio sono indicati in maniera adeguata alla tabella 15.1. Se 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 vengono utilizzate come fonte diretta di acqua potabile quelle che figurano alla tabella 15.1. sotto la voce "acque superficiali" e i cui valori sono elevati (ossia superano il valore 10).

La tabella 15.1. fornisce per il 1980 un compendio delle misurazioni dell'attività beta residua effettuata in taluni Stati membri per l'acqua potabile, le acque di superficie utilizzabili per i rifornimenti di acqua potabile, le acque di superficie in genere e l'acqua marina.

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

La mancanza di dati completi rende difficile la formulazione di conclusioni; dal 1972 non risultano tuttavia variazioni significative.

V. RADIOATTIVITA' DEL LATTE

V.1. Introduzione e relazioni nazionali disponibili

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 delle ricadute di 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 1980 sono molto deboli; esse sono pressoché analoghe a quelle misurate nel 1978 e nel 1979 e non hanno presentato fluttuazioni di rilievo nel corso dell'anno.

L'esperienza ha dimostrato che il rapporto di $^{90}\text{Sr/g Ca}$ nella catena alimentare rispetto a $^{90}\text{Sr/g Ca}$ 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. Le misurazioni di ^{137}Cs presente nel latte forniscono una indicazione dell'evoluzione della contaminazione radioattiva del regime alimentare da parte di questo nuclide.

Per quanto concerne gli altri alimenti, diamo in appresso un elenco delle 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 1980. Aarkrog A., Bøtter-Jensen L., Dahlgaard H., Hansen Heinz, Lippert J., Nielsen S.P. and Nilsson K.: Risø Report n. 447
- REPUBBLICA FEDERALE DI GERMANIA - Umweltradioaktivität und Strahlenbelastung. Jahresbericht 1979 - Der Bundesminister des Innern
- FRANCIA - Rapports d'activité mensuels et annuels du SCPRI - INSERM - Ministère de la Santé pour 1980
- GRECIA - Rapports mensuels d'activité du Laboratoire pour la Radioactivité ambiante, CEA de la Grèce
- ITALIA - Data on Environmental Radioactivity collected in Italy in 1977 e Rapporto annuale sulla radioattività ambientale in Italia - 1977 (CNEN)
- PAESI BASSI - Relazioni annuali della Coördinatie-Commissie voor de metingen van Radioactiviteit en Xenobiotische Stoffen, intitolate: "Algemene Radioactieve Bepetting van de Biosfeer. In Nederland verrichte metingen". Tali relazioni vengono pubblicate ogni anno dal "Volksgezondheid en Milieuhygiene in de serie" Verslagen, Adviezen, Rapporten.

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Nei Paesi Bassi, la presenza dello ^{90}Sr e del ^{137}Cs , ed eventualmente del ^{89}Sr e del ^{131}I , viene accertata mensilmente dal Rijks-Kwaliteitsinstituut voor Landen en Tuinbouwprodukten di Wageningen, il quale analizza a tale scopo un miscuglio di "latte ad uso industriale", normalizzato, proveniente dal Nord, dall'Ovest e dal Sud del paese, nonché 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 controllo 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 1980, i valori trimestrali e annuali del rapporto pCi $^{90}\text{Sr/g Ca}$ riscontrati in vari punti di prelievo della Comunità.

La tabella 18 riassume, per ciascun paese e per tutta la Comunità, i valori trimestrali annuali del rapporto pCi $^{90}\text{Sr/g Ca}$ per il 1980. Un sommario delle medie trimestrali ed annuali per la Comunità a partire dal 1972 figura alla tabella 19.

La media annua per il 1980 è di pCi/g Ca 3,2 rispetto a 3,4 pCi/g Ca nel 1979.

La contaminazione del latte da ^{90}Sr rappresenta attualmente 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 soltanto ad una percentuale trascurabile dei valori limite annui fissati per le incorporazioni mediante ingestione (1) da parte degli individui della popolazione.

V.3. Contaminazione da ^{137}Cs

La tabella 21 fornisce, per il 1980 i valori trimestrali ed annuali del rapporto pCi $^{137}\text{Cs/litro di latte}$, rilevati in vari punti di prelievo della Comunità.

La tabella 22 riassume, per ciascuno Stato membro e per tutta la Comunità, i valori trimestrali e annuali per l'anno 1980. La tabella 23 fornisce le medie trimestrali e annuali per la Comunità a decorrere dal 1972.

La media annua comunitaria per il 1980 è di 3,8 pCi $^{137}\text{Cs/litro}$ rispetto a 5,2 pCi $^{137}\text{Cs/litro}$ nel 1979.

La contaminazione del latte da parte del ^{137}Cs è oggi inferiore al 10% dei tassi misurati 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).

1) I valori limite annuali per le incorporazioni di radionuclidi nell'acqua potabile sono definiti dalle Norme Fondamentali dell'Euratom.

AVVERTIMENTO RELATIVO AI DATI FRANCESI

SCPRI (tabelle pagine 150, 151, 164, 198, 199, 223, 243, 256)

A decorrere dal 1° gennaio 1980, la presentazione dei risultati di misurazioni del "Service Central de Protection contre les Rayonnements Ionisants" è stata modificata per facilitarne l'interpretazione in ordine al loro significato per l'igiene pubblica, secondo le raccomandazioni della CIPR e le disposizioni adottate dalla maggior parte degli altri paesi (USA, Regno Unito, Svezia ecc...).

In particolare la menzione "A.A.S." (che significa "alcuna attività significativa") si applica ormai a qualsiasi risultato di misurazione per il quale l'analisi, spinta fino al limite menzionato alla fine della colonna, non ha consentito di rilevare alcuna attività.

Questi "livelli di registrazione" ("recording levels" della CIPR), esplicitamente indicati in ciascun caso, non sono mai superiori al centesimo dei limiti massimi consentiti o dei valori-guida corrispondenti i quali comportano di per sé un margine di sicurezza molto ampio.

Tuttavia, in parallelo con la sua missione di controllo, il "Service Central de Protection contre les Rayonnements Ionisants" esegue delle ricerche e, in questo senso, può essere indotto, ai fini dell'indagine scientifica, a spingere taluni analisi al di sotto dei livelli di registrazione definiti in precedenza. Gli eventuali risultati di tali analisi sono allora preceduti dal segno / \bar{d} .

CEA (tabelle pagine 148, 149, 196, 197)

La presentazione per il 1980 dei risultati di misurazione di radioelementi riscontrati nell'aria e nell'acqua piovana è corredata dell'indicazione di valori soglia. Tali valori, esplicitamente annunciati in ciascun caso, non sono mai superiori al centesimo dei limiti massimi ammissibili o dei valori-guida corrispondenti. Essi sono perfino spesso molto più deboli, con valori inferiori di numerose potenze di 10.

Alcuni risultati indicano valori ancora inferiori a tali soglie. In tal caso essi sono preceduti dal segno ∇ .

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

Lucht - Depositie - Water - Melk

1980

V O O R W O O R D

Dit is het twintigste rapport over de omgevingsradioactiviteit dat door het Directoraat Gezondheid en Veiligheid van de Commissie der Europese Gemeenschappen wordt gepubliceerd. Het is opgesteld aan de hand van de gegevens die in de met het toezicht op de omgevingsactiviteit belaste stations in de Lid-Staten werden verzameld. De uitkomsten zijn ontleend aan de gegevens welke, ingevolge artikel 36 van het Verdrag van Rome tot oprichting van de Europese Gemeenschap voor Atoomenergie, aan de Commissie werden verstrekt.

De in dit rapport vermelde resultaten hebben betrekking op de radioactieve besmetting van de lucht, de depositie, het oppervlaktewater en de melk in 1980 in de tien Lid-Staten van de Europese Gemeenschap: België, de Bondsrepubliek Duitsland, Denemarken, Frankrijk, Griekenland, Italië, Ierland, Luxemburg, Nederland en het Verenigd Koninkrijk.

De resultaten zijn onderverdeeld in vier hoofdrubrieken:

- kunstmatige radioactiviteit in de lucht op bodemniveau,
- kunstmatige radioactiviteit van de depositie,
- radioactieve besmetting van het water,
- radioactieve besmetting van de melk.

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

Hoewel in dit rapport vooral aandacht wordt geschonken aan de meetresultaten voor specifieke radionucliden, bevat het eveneens gegevens over de totale bèta-activiteit, zulks om de continuïteit met de vorige rapporten te waarborgen en om over vergelijkbare waarden te kunnen beschikken.

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I. INLEIDING

Tabel 1 geeft een algemeen overzicht van het meetnet waarmee de omgevingsradioactiviteit in de Gemeenschap in 1980 werd gecontroleerd en waarvan de gegevens in dit rapport zijn opgenomen.

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

Uit de analyse van de gegevens over de kunstmatige radioactiviteit in de lucht op bodemniveau en de depositie blijkt dat de totale bèta-activiteit ten opzichte van 1979 stationair is gebleven.

Op 16 oktober 1980 vond in het Verre Oosten een kernproef in de atmosfeer plaats. Dit leidde tot een algemene doch tijdelijke verhoging van de omgevingsradioactiviteit. Daarbij ontstonden splijtingsprodukten met een korte levensduur, vooral in de lucht en de neerslag; de waargenomen maximale activiteit was echter vrij gering.

Aanvullende gegevens over de na deze proef ontdekte radioactieve elementen met een korte levensduur zijn in een bijlage opgenomen.

De radioactiviteit van het water kon niet even systematisch worden onderzocht als die van de lucht daar de Lid-Staten verschillende controlesystemen (bemonstering en meting) toepassen. De resultaten van 1980 bleken echter niet veel af te wijken van die van 1979.

De radioactieve besmetting van de verschillende voedingsmiddelen wordt in de Lid-Staten van de Gemeenschap gemeten door middel van monsternemingen van de hoofdbestanddelen van het voedselpakket. Het rapport bevat alleen de meetresultaten van de hoeveelheid ^{90}Sr en ^{137}Cs in melk. Over het algemeen is de consumptie van melk de belangrijkste oorzaak van radioactieve besmetting; 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 als bijlage opgenomen nationale rapporten.

De in 1980 waargenomen activiteit van ^{90}Sr en ^{137}Cs is zeer gering en gelijk aan die welke in 1979 werd gemeten; deze heeft in de loop van het jaar geen belangrijke schommelingen te zien gegeven.

Ten slotte zij erop gewezen dat de maandgemiddelden voor de Gemeenschap als geheel werden berekend aan de hand van alle over een bepaalde maand beschikbare gegevens. Het jaargemiddelde voor de Gemeenschap werd vastgesteld door berekening van het rekenkundig gemiddelde van de maandwaarden voor de Gemeenschap.

II. KUNSTMATIGE RADIOACTIVITEIT IN DE LUCHT OP BODEMNIVEAU

De totale β -activiteit en de activiteit van de specifieke radionucliden in zwevende stofdeeltjes wordt bepaald door deze deeltjes op bodemniveau op te vangen op filterpapier waar per etmaal ongeveer 1000 m^3 lucht doorheen stroomt.

De voor de totale β -activiteit opgegeven waarden zijn de na een verval van vijf dagen verkregen meetresultaten.

In vergelijking met het voorgaande jaar is de radioactiviteit in de lucht stationair gebleven.

Kaart 1 en 2 geven de geografische spreiding weer van de meetstations voor de specifieke radionucliden en de totale β -activiteit.

De tabellen 2.1 tot en met 2.18 vermelden de per station in 1980 waargenomen maandelijkse schommelingen alsmede het jaargemiddelde van de activiteit van de specifieke radionucliden en van de totale β -activiteit om een algemeen overzicht te geven van de plaatselijke schommelingen alsmede van de maandelijks en per seizoen waargenomen verschillen, die meer dan één orde van grootte kunnen bedragen.

Voor een aantal geselecteerde stations in de Gemeenschap zijn de jaargemiddelden van 1967 tot 1980 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, welke zijn vastgelegd in de basisnormen van Euratom voor individuele leden van de bevolking.

Tabel 5 geeft een algemeen overzicht van de maand- en jaargemiddelden van de totale β -activiteit in 1980 in de afzonderlijke Lid-Staten en voor de Gemeenschap als geheel.

In 1980 bedroeg het gemiddelde van de totale β -activiteit van in de lucht zwevende deeltjes 0,03 pCi/m³, met een maximum van 0,07 pCi/m³ in november en in december.

In tabel 6 en 7 worden de maand- en jaarwaarden voor de totale β -activiteit in de lucht in alle Lid-Staten en in de Gemeenschap van 1962 tot en met 1980 vergeleken.

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

Grafiek 2a) laat de maandelijkse schommelingen zien van ^{137}Cs in Chilton (Verenigd Koninkrijk) sinds 1953 en grafiek 2b) dezelfde schommelingen in Ispra (Italië) sinds 1961 en Le Vésinet (Frankrijk) sinds 1965.

De grafieken 3a), b), c) en d), geven het verloop weer van de totale β -activiteit sinds 1963 in de Gemeenschap en in de elf 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. Opgemerkt zij dat met ingang van 1979 het station van Milford Haven in de plaats is gekomen voor dat van Chilton, dat geen metingen meer verricht van de ^{238}Pu - en ^{239}Pu -concentraties in de lucht.

Tabel 9 geeft in 1980 verkregen meetresultaten van de ^{239}Pu + ^{240}Pu -concentraties in Shrivvenham en Glasgow.

III. KUNSTMATIGE RADIOACTIVITEIT VAN DE DEPOSITIE

De op de bodem neergeslagen radioactiviteit wordt doorlopend gemeten door bemonstering van de neerslag en van de depositie in droge vorm. Afhankelijk van het station vindt de bemonstering dagelijks, wekelijks of maandelijks plaats.

De kaartjes 3 en 4 geven een beeld van de geografische spreiding van de meetstations voor de specifieke radionucliden en de totale bèta-activiteit.

De gemiddelde maandelijks schommelingen van de specifieke radionucliden, de totale bèta-activiteit en de hoeveelheid neerslag in 1980 worden, per station, weergegeven in de tabellen 10.1 tot en met 10.21.

Deze tabellen, evenals die voor de kunstmatige radioactiviteit in de lucht op bodemniveau, zijn opgenomen om een overzicht te geven van de omvang van de plaatselijke schommelingen alsmede van de maandelijks en per seizoen waargenomen verschillen.

Ten einde de op de verschillende stations gemeten waarden beter te kunnen vergelijken, geven de tabellen 11 en 12 de omvang van de jaarlijkse depositie van ^{90}Sr en ^{137}Cs van 1967 tot en met 1980.

In tabel 13 zijn voor 1980 de maandgemiddelden alsmede de totale depositie van de totale bèta-activiteit in de Lid-Staten van de Gemeenschap opgenomen.

In tabel 14 wordt per land een overzicht gegeven van de jaarlijkse depositie van de totale bèta-activiteit van 1962 tot en met 1980.

De totale bèta-activiteit van de neerslag in 1980 verschilt over het algemeen nauwelijks van de in 1979 geregistreeerde waarde. (6.9 mCi/km² in 1979 tegen 7.25 mCi/km² in 1980).

Grafiek 5 geeft 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 nieuwe depositie van ^{137}Cs gecompenseerd, maar kan een langzame en gestadige vermindering van de geaccumuleerde depositie worden geconstateerd.

Grafiek 6 geeft een overzicht van de depositie van ^{239}Pu in regenwater te Orsay (Frankrijk) gedurende de periode 1973 - 1980.

De grafieken 7a), 7b) en 7c) geven een beeld van het verloop van de jaarlijks op de bodem neergeslagen totale bèta-activiteit in negen over de Gemeenschap verspreide karakteristieke meetstations, namelijk: Mol, Le Vésinet, Ispra, Sleswijk, München, Berlijn, Chilton, Dublin en Bilthoven. In deze grafieken is tevens de hoeveelheid neerslag vermeld.

IV. RADIOACTIVITEIT VAN HET WATER

IV.1. Beschikbare 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 hoe groot het respectieve aandeel is van de natuurlijke straling en de straling van op bepaalde punten geloosde radioactieve afvalstoffen. In de Gemeenschap is het aantal stations voor het verrichten van algemene metingen in het milieu even groot als het aantal stations voor het meten van de radioactiviteit in de lucht en de depositie.

In een aantal nationale publikaties wordt een beschrijving gegeven van alle maatregelen ter zake van de controle van de radioactiviteit in het water.

BELGIE

De rapporten van het Instituut voor Hygiëne en Epidemiologie (Ministerie van Volksgezondheid) bevatten een beschrijving van de meetnetten voor de verschillende soorten water, alsmede de gegevens over de totale alfa- en bèta-activiteit, 226-Ra, bèta 40 K en HTO in oppervlaktewater, zeewater en drinkwater.

Er zijn drie uitgaven gepubliceerd:

- "Meetresultaten van radioactiviteit in de lucht, in neerslag en in water van 1958 tot en met 1968";
- "Meetresultaten van radioactiviteit in de lucht, in neerslag en in water van 1969 tot en met 1974";
- "Meetresultaten van radioactiviteit in de lucht, in neerslag en in water van 1975 tot en met 1978".

DENEMARKEN

Het onderzoeksinstituut te Risø publiceert jaarrapporten over de "radioactiviteit van het milieu in Denemarken ..." en geeft voor het hele land de meetresultaten van de concentratie ^{90}Sr in het grond-, rivier-, meer- en zeewater alsmede van het gehalte aan ^{137}Cs van het zee-water.

BONDSREPUBLICK 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 uitvoerige beschrijving van de verschillende watermeetnetten alsmede de meetresultaten van specifieke radionucliden en van de alfa- en bèta-activiteit in oppervlakte-, zee-, drink- en afvalwater.

FRANKRIJK

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

GRIEKENLAND

De meetresultaten van radioactiviteit (totale bèta-activiteit, ^{90}Sr , ^{137}Cs , ^{226}Ra ...) in oppervlaktewater, grondwater, drinkwater en zeewater zijn sinds 1961 opgenomen in de rapporten over de werkzaamheden van het Laboratorium voor Omgevingsradioactiviteit.

IERLAND

De meetresultaten van de radioactiviteit van drinkwater worden gepubliceerd in het rapport "measurements of radioactivity of precipitation, settled dust and airborne particles in Ireland" dat om de drie maanden wordt gepubliceerd door de Meteorological Service of the Department of Transport and the Nuclear Energy Board.

ITALIE

De meetresultaten van de concentraties van ^{90}Sr en ^{137}Cs in zoet water, irrigatie- en zeewater zijn opgenomen in de jaarlijkse publikaties van het Comitato Nazionale per l'Energia Nucleare (CNEN), getiteld "In Italië verzamelde gegevens over de omgevingsradioactiviteit" (Data on Environmental Radioactivity collected in Italy) en "Rapporto annuale sulla radioattività ambientale in Italia - Volume I - Reti nazionali".

NEDERLAND

De resultaten van de metingen van de verschillende soorten water zijn opgenomen in de jaarrapporten van de COORDINATIE-COMMISSIE VOOR DE METINGEN VAN RADIOACTIVITEIT EN XENOBIOTISCHE STOFFEN (C.C. R.X.), getiteld "Algemene radioactieve besmetting van de biosfeer. In Nederland verrichte metingen".

Deze rapporten bevatten ook de resultaten van de door de exploitanten van kerncentrales verrichte metingen van de bèta-restactiviteit 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 kerninstallaties worden beschreven in een reeks rapporten: "Annual Survey of Radioactive Discharges in Great Britain", waarvan het eerste in 1978 is verschenen. De belangrijkste gegevens uit de door het Ministry of Agriculture, Fisheries and Food en door de exploitanten van kerninstallaties gepubliceerde rapporten zijn in deze uitgaven gebundeld.

IV. 2. Beschrijving van de meetprogramma's

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

BELGIE

Sinds 1958 bestaat in België een meetnet dat een beeld geeft van de algemene toestand van de diverse soorten water.

Nadere bijzonderheden zijn vermeld in de onder punt IV. 1. genoemde documenten.

Aan de Maas tussen Givet en Lanaken werden 5 meetstations opgericht. Het jaarrapport "Radiologisch toezicht op de vestigingsplaatsen van kerncentrales" (van de gemengde groep SCK-Volksgezondheid) bevat nadere gegevens over dit meetnet.

DENEMARKEN

a) Grondwater

Sinds 1961 worden metingen verricht op grondwatermonsters die jaarlijks op negen over het hele land 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 volgen en de daarbij verkregen meetresultaten te vergelijken met de kenmerken van de grondlagen op deze negen punten.

b) Rivier- en meerwater

Sinds 1970 worden om het andere jaar monsters genomen van het oppervlaktewater in acht rivieren en meren die over het hele land verspreid liggen. Deze metingen hebben onder andere ten doel te bepalen hoeveel ^{90}Sr in zee wordt geloosd en na te gaan of er significante verschillen bestaan tussen de ^{90}Sr -concentraties in de verschillende wateren. Af en toe wordt het ^{137}Cs -gehalte van de rivieren en meren gemeten.

c) Drinkwater

Sinds 1965 worden in het hele 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 grotendeels uit grondwater verkregen. Sinds enkele jaren wordt evenwel steeds meer drinkwater uit oppervlaktewater gewonnen. Met ingang van 1979 zal het drinkwater om de drie jaar worden verzameld.

De meetprogramma's voor zoet water moeten worden bestudeerd in samenhang met de Deense programma's voor het onderzoek naar de hoeveelheid ^{90}Sr en ^{137}Cs in de bodem. Deze programma's hebben ten doel de in de bodem geaccumuleerde depositie te meten en te vergelijken met de aan de hand van gegevens over de neerslag en de stroming berekende theoretische waarden.

d) Zeewater

Sinds 1962 worden 's zomers en 's winters in 16 kuststations monsters van het zeewater genomen. In elk station worden monsters van 50 liter oppervlaktewater en 50 liter dieptewater genomen. De monsters worden geanalyseerd om de ^{90}Sr - en de Rc -activiteit te bepalen. De monsterneming vindt plaats in de Noordzee, het Kattegat en de Oostzee.

BONDSREPUBLIC DUITSLAND

Het meetprogramma van de Bondsrepubliek Duitsland omvat:

a) Oppervlaktewater

(verantwoordelijke dienst: Bundesanstalt für Gewässerkunde, Koblenz)

De controle op de radioactiviteit van het oppervlaktewater (totale bèta-activiteit, bèta-restactiviteit, alsook de activiteit van ^3H en andere specifieke nucliden) geschiedt momenteel door 19 onder de deelstaten ressorterende meetstations. In het kader van het meetprogramma wordt het oppervlaktewater bemonsterd op meer dan 200 plaatsen, het gesuspendeerde stof op circa 20 en het slib op circa 30 plaatsen.

b) Zeewater

(verantwoordelijke dienst: Deutsches Hydrographisches Institut, Hamburg)

Het Duitse Hydrografisch Instituut is sedert 1965 wettelijk belast met de controle op de radioactiviteit van het zeewater. Het meetnet omvat momenteel 11 stations verdeeld over de Noordzee en de Oostzee. Deze stations beschikken over apparatuur voor het continu-meten 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 aan transuranen gemeten.

c) Drinkwater en afvalwater

(verantwoordelijke dienst: Institut für Wasser-, Boden- und Luft-hygiene des Bundesgesundheitsamtes, Berlin)

Dit net omvat 18 officiële meetstations die op circa 160 punten drinkwatermonsters en op 75 punten afvalwater afkomstig van zuiveringsinstallaties, kerncentrales, centra voor kernonderzoek, radiotherapeutische klinieken en andere installaties waar radioactieve stoffen worden gebruikt, analyseren.

In het "Statutsbericht über die Überwachung der Umweltradioaktivität in der Bundesrepublik Deutschland" worden uitvoerige gegevens verstrekt over de diverse meetstations, hun taken, meetprogramma's en analysemethoden.

FRANKRIJK

De SCPRI controleert de radioactieve besmetting van het oppervlakte-water en het grondwater op 140 punten. Op 19 ervan, die stroomafwaarts ten opzichte van de belangrijkste kerncentrales of bij de monding van de grote rivieren liggen, worden door middel van automatische watervangers continu monsters genomen.

Voorts controleert de SCPRI regelmatig 40 meetpunten voor drinkwater die zich in de buurt van kerncentrales bevinden of deel uitmaken van het waterleidingnet van grote steden. Bovendien wordt door de SCPRI bij elk nieuw drinkwatervoorzieningsproject een grondig onderzoek verricht in het kader van "l'instruction sanitaire obligatoire".

Voor het zeewater beschikt de SCPRI over 21 meetstations op verspreid liggende punten langs de hele Franse kust, waar minstens eenmaal per maand monsters worden genomen. Continue bemonstering vindt plaats bij de kerncentrale van Gravelines.

De maandelijkse monsters van vloeibare effluenten van 16 kerncentrales en 6 aanverwante industrieën worden door de SCPRI uitvoerig geanalyseerd. Tevens controleert dit instituut het afvalwater van grote stedelijke agglomeraties alsmede het afvalwater uit een aantal mijnstreken.

GRIEKENLAND

De controle op de radioactiviteit van het water van het nationale net ressorteert onder het Laboratorium voor Omgevingsradioactiviteit van het Onderzoekcentrum voor Atoomenergie in Griekenland, dat sinds 1961 officieel belast is met de controle op de omgevingsradioactiviteit, en omvat:

a) Rivierwater

Het rivierwater wordt gecontroleerd door meting van de totale bèta-activiteit, ^{137}Cs , ^{40}K , ^{226}Ra en andere radionucliden van monsters van het water van de grote rivieren (de monsterneming vindt plaats aan de grenzen).

b) Zeewater

Het zeewater wordt gecontroleerd door meting van de totale bèta-activiteit, de concentratie van ^{137}Cs , ^{90}Sr en Pu in op 4 plaatsen genomen monsters: Lavrion, Rhodes, Lemnos, Kavala.

c) Putwater

Het putwater wordt gecontroleerd door meting van de totale bèta-activiteit van monsters die voor het merendeel zijn genomen uit putten die in de buurt van het onderzoekcentrum voor kernenergie liggen.

d) Meerwater (stedelijk afvalwater)

Het meerwater (stedelijk afvalwater) wordt gecontroleerd door meting van de totale bèta-activiteit en de concentratie van ^{137}Cs , ^{90}Sr , ^{226}Ra en andere radionucliden in op twee plaatsen genomen monsters.

ITALIE

De controle van het oppervlaktewater geschiedt door meting van de hoeveelheid ^{90}Sr en ^{137}Cs in op 8 punten (7 rivieren en 1 meer) genomen monsters.

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

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

NEDERLAND

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

VERENIGD KONINKRIJK

a) Toen in 1967 in het Verenigd Koninkrijk werd besloten dat uitvoering van het meetprogramma voor radioactieve neerslag in het drinkwater niet langer verantwoord was wegens de geringe straling waaraan het publiek bij consumptie van water was blootgesteld, werd een onderzoekprogramma gehandhaafd voor de bestudering van specifieke vraagstukken, zoals de beweging van ^{90}Sr van de toevoerbekkens naar de reservoirs; in 5 meetstations werd oppervlakte-, rivier- en bronwater bemonsterd en geanalyseerd ter bepaling van het gehalte aan ^{90}Sr en ^{137}Cs . Deze 5 plaatsen zijn opgenomen in tabel 15.1 onder de rubriek "drinkwater", de metingen werden verricht ter bepaling van de specifieke radionucliden en niet van de totale β -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 medio de jaren 60 verkregen maximumwaarden.

b) Daarnaast wordt sinds 1975 elk jaar het water van een grote rivier bemonsterd en grondig geanalyseerd.

In de Severn werden in de laatste tijd de meeste metingen verricht. Het hele jaar door worden dagelijks monsters genomen, verzameld en geanalyseerd. In tabel 15.1 worden de gegevens over het drinkwater vermeld. Daarbij blijkt dat de radioactiviteit zeer gering is.

c) Van bepaalde soorten drink-, oppervlakte- en rivierwater worden steekmonsters genomen. Deze worden onderzocht op totale alfa-activiteit, totale β -activiteit en tritiumgehalte. De meetresultaten worden vermeld in tabel 15.1. Wanneer het meetpunt in de buurt ligt van een plaats waar radioactieve vloeibare effluënten worden geloosd, worden tevens de daarin aanwezige, representatieve specifieke nucliden geanalyseerd. Aan de in tabel 15.1, onder de rubriek "oppervlaktewater" opgenomen bronnen, waarvan de waarden hoog zijn (meer dan 10), wordt niet rechtstreeks drinkwater onttrokken.

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Tabel 15.1 geeft voor 1980 een uittreksel van de in een aantal Lid-Staten verrichte metingen van de bèta-restactiviteit in het drinkwater, het als drinkwater geschikte oppervlaktewater, het oppervlaktewater in het algemeen en het zeewater.

Voor Denemarken zijn de meetresultaten van de hoeveelheid ^{90}Sr , ^{137}Cs en ^{134}Cs vermeld in tabel 15.2.

Hoewel het moeilijk is hieruit nauwkeurige conclusies te trekken omtrent de radioactiviteit van het water, daar de beschikbare gegevens onvolledig zijn, blijkt dat zich sinds 1972 in het algemeen geen belangrijke wijzigingen hebben voorgedaan.

V. RADIOACTIVITEIT VAN MELK

V.1. Inleiding en beschikbare nationale rapporten

Sinds enkele jaren bestaat in de Lid-Staten de neiging om hun controleprogramma's toe te spitsen op melk, welk produkt als een goede biologische indicator wordt beschouwd voor kunstmatige radionucliden, waarvan de uit bovengrondse kernproeven afkomstige ^{90}Sr en ^{137}Cs -isotopen momenteel de belangrijkste zijn.

De in 1980 gemeten activiteit is zeer gering, deze wijkt niet veel af van de in 1978 en 1979 gemeten waarden en vertoonde in de loop van het jaar geen belangrijke schommelingen.

De ervaring heeft uitgewezen dat in een zelfde land de verhouding tussen de hoeveelheid $^{90}\text{Sr/g Ca}$ in de voedselketen en de hoeveelheid $^{90}\text{Sr/g Ca}$ in melk betrekkelijk constant is (zie tabel 16).

In de meeste Lid-Staten zit bijna 80 % van de totale hoeveelheid calcium die via het voedsel wordt ingenomen in melk en melkprodukten. Voorts geven de metingen van de hoeveelheid ^{137}Cs in melk een beeld van 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:

- BELGIE - Contamination radioactive des denrées alimentaires en Belgique en 1978 et 1979 - Rapport I.H.E.
- J. Gillard-Baruh
- DENEMARKEN - Environmental Radioactivity in Denmark in 1980.
Aarkrog A., Bøtter-Jensen L., Dahlgaard H., Hansen Heinz, Lippert J., Nielsen S.P. and Nilsson K.: Risø Report nr. 447
- BONDSREPUBLIEK
DUITSLAND - Umweltradioaktivität und Strahlenbelastung.
Jahresbericht 1979 - Der Bundesminister des Innern
- FRANKRIJK - Rapports d'activité mensuels et annuels du SCPRI
- INSERM - Ministère de la Santé pour 1980
- GRIEKENLAND - Rapports mensuels d'activité du Laboratoire pour la
Radioactivité ambiante, CEA van Griekenland
- ITALIE - Data on Environmental Radioactivity collected in Italy in
1977 en Rapporto annuale sulla radioattività ambianta
le in Italia - 1977 (CNEN)
- NEDERLAND - Jaarrapporten van de Coördinatie-Commissie voor de
metingen van Radioactiviteit en Xenobiotische
Stoffen, getiteld: "Algemene Radioactieve Besmetting
van de Biosfeer. In Nederland verrichte metingen".
Deze rapporten worden jaarlijks gepubliceerd door het
Ministerie van Volksgezondheid en Milieuhygiëne in de
reeks "Verslagen, Adviezen, Rapporten".

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In Nederland wordt de aanwezigheid van ^{90}Sr , ^{137}Cs en eventueel ^{89}Sr en ^{131}I maandelijks bepaald door het Rijks-Kwaliteitsinstituut voor Land- en Tuinbouwprodukten in Wageningen. Dit instituut analyseert daartoe een gestandaardiseerd mengsel "industriemelk" uit Noord-, Oost- en Zuid-Nederland en gestandaardiseerde consumptiemelk afkomstig van toevals-steekproeven, genomen in een aantal, voornamelijk in het Westen van het land gevestigde, bedrijven.

In het Verenigd Koninkrijk berust de verantwoordelijkheid voor het programma voor controle op melk 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 1980 de op verschillende meetpunten in de Gemeenschap verkregen kwartaal- en jaarwaarden van de verhouding pCi $^{90}\text{Sr/g}$ Ca.

Tabel 18 geeft voor 1980 een samenvatting van de kwartaal- en jaarwaarden van de verhouding pCi $^{90}\text{Sr/g}$ 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 1980 bedraagt 3,2 pCi/g Ca tegen 3,4 pCi/g Ca in 1979.

De besmetting van melk door ^{90}Sr bedraagt thans slechts 10 à 20 % van de in 1963 tot 1965 gemeten waarden, in welke periode de besmetting het hoogst was (zie tabel 20).

Deze besmettingsgraad maakt slechts een gering percentage uit van de MAC-waarden voor de door de mens via het maag- en darmkanaal opgenomen hoeveelheden (1).

V.3. Besmetting door ^{137}Cs

Tabel 21 geeft voor 1980 de kwartaal- en jaarwaarden van de verhouding pCi $^{137}\text{Cs/liter}$ melk op verschillende meetpunten in de Gemeenschap.

Tabel 22 geeft voor 1980 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.

Voor 1980 komt het jaargemiddelde voor de Gemeenschap op 43,8 pCi $^{137}\text{Cs/liter}$ tegen 5,2 pCi $^{137}\text{Cs/liter}$ in 1979.

De besmettingsgraad van melk door ^{137}Cs bedraagt thans minder dan 10 % van de in 1963 tot 1965 gemeten waarden (zie tabel 24).

Dit is minder dan 1 % van de voor het gehalte aan radioactief cesium in het drinkwater vastgestelde MAC-waarden (1).

(1) De maximaal toelaatbare waarden voor het nuclidengehalte van het drinkwater zijn vastgesteld in de Basisnormen van Euratom.

TOELICHTING BIJ DE FRANSE GEGEVENS

SCPRI (tabellen bladzijden 150, 151, 164, 198, 199, 223, 243, 256)

Vanaf januari 1980 is de presentatie van de meetgegevens van de Centrale Dienst voor Bescherming tegen Ioniserende Stralen (Service Central de Protection contre les Rayonnements Ionisants) gewijzigd om de interpretatie ervan voor de volksgezondheid, overeenkomstig de aanbevelingen van de ICSP en de in de meeste andere landen (Verenigde Staten, Verenigd Koninkrijk, Zweden, enzovoorts ...) geldende bepalingen, te vergemakkelijken.

Met name zij erop gewezen dat de afkorting "A.A.S." ("aucune activité significative") voortaan is vermeld bij elk meetresultaat waarbij, na een tot de aan het eind van de kolom vermelde drempelwaarde uitgevoerde analyse, blijkt dat de radioactiviteit nihil is.

Deze "registratieniveaus" (recording levels van de ICSP) die voor elk geval duidelijk worden vermeld, liggen nooit één honderdste boven de maximaal toelaatbare waarden of de daarmee overeenkomende richtwaarden, waarbij al een zeer grote veiligheidsmarge is ingecalculeerd.

De SCPRI heeft echter niet alleen tot taak controle uit te oefenen maar ook om wetenschappelijk onderzoek te verrichten en kan uit dien hoofde bepaalde analyses tot beneden de hierboven omschreven registratieniveaus uitvoeren. Worden deze analyses uitgevoerd, dan wordt voor de resultaten ervan het teken Γ d vermeld.

CEA (tabellen bladzijden 148, 149, 196, 197).

Voor 1980 zijn naast de meetresultaten van de in de lucht en regen waargenomen radionucliden drempelwaarden vermeld. Deze drempelwaarden die voor elk geval duidelijk worden vermeld, liggen nimmer boven één honderdste van de maximaal toelaatbare waarden of de daarmee overeenkomende richtwaarden. Zij liggen zelfs veelal een aantal machten van 10 lager.

Bij sommige resultaten worden waarden bereikt die nog lager liggen dan deze drempelwaarden. In dat geval worden zij voorafgegaan door het teken ∇ .

<u>Signaturforklaring</u>		<u>Zeichenerklärung</u>	
12345	måned i året	12345	am Kopf der Spalte: Monat
a	år	a	Jahr
β^G	total β -straling	β^G	Gesamt β -Aktivität
β^R	rest β -straling	β^R	Rest β -Aktivität
ind.	person	ind.	Person
L	prøvetagningssted	L	Entnahmestelle
l	liter	l	Liter
mm, l/m ²	millimeter, regnmaengde i liter pr. kvadratmeter	mm, l/m ²	Millimeter; Regenmenge in Litern je Quadratmeter
M	middelvaerdi for Faellesskabet	M	Mittelwert für die Gemeinschaft
mCi	millicurie (10 ⁻³ Curie)	mCi	Millicurie (10 ⁻³ Curie)
N	prøveantal	N	Probenanzahl
N.M.	vaerdierne ligger under malegraendr	N.M.	Werte unterhalb der Nachweisgrenze
T	samlet arlig maengde	T	jährliche Gesamtmenge
pCi	picocurie (10 ⁻¹² Curie)	pCi	Picocurie (10 ⁻¹² Curie)
tr	spor	tr	Spuren
-	vaerdi mangler	-	Werte fehlen
\bar{x}	middlevaerdi	\bar{x}	Mittelwert
\bar{x}_m	månedsmiddelvaerdi	\bar{x}_m	Monatsmittel
\bar{x}_a	årsmiddelvaerdi	\bar{x}_a	Jahresmittel
< x	mindre end x	< x	Kleiner als x
Σ	sum	Σ	Summe
NA	ikke disponibel	NA	Nicht ermittelbar
LD	målegraense	LD	Nachweisgrenze
A.A.S.	ingen aktivitet af betydning	A.A.S.	Keine signifikante Aktivität

<u>List of Symbols</u>		<u>Liste des Symbols</u>	
12345	at the head of column: month of the year	12345	mois de l'année
a	year	a	an
β^G	total β activity	β^G	activité β globale
β^R	residual β activity	β^R	activité β résiduelle
ind.	person	ind.	individu
L	sampling site	L	lieu du prélèvement
l	litre	l	litre
mm, l/m ²	Millimetres; rainfall in litres per square metre	mm, l/m ²	millimètres; hauteur de pluie en litre par mètre carré
M	Community mean	M	moyenne pour la Communauté
mCi	millicurie (10 ⁻³ curie)	mCi	millicurie (10 ⁻³ curie)
N	number of samples	N	nombre d'échantillons
N.M.	values lie below the detection limit	N.M.	valeurs inférieures à la limite de détection
T	annual total	T	total annuel
pCi	picocurie (10 ⁻¹² curie)	pCi	picocurie (10 ⁻¹² curie)
tr	traces	tr	traces
-	no values available	-	valeur manquante
\bar{x}	mean	\bar{x}	valeur moyenne
\bar{x}_m	monthly mean	\bar{x}_m	valeur moyenne mensuelle
\bar{x}_a	annual mean	\bar{x}_a	valeur moyenne annuelle
< x	less than x	< x	plus petit que x
Σ	overall total	Σ	somme
NA	not available	NA	non disponible
LD	limit detection	LD	limite détection
A.A.S.	no significant activity	A.A.S.	aucune activité significative

<u>Elenco dei Simboli</u>		<u>Lijst van Afkortingen</u>	
12345	in testa alle colonne: tali cifre indicano i mesi dell'anno	12345	bovenaan de kolom: maand van het jaar
a	anno	a	jaar
β^G	attività β globale	β^G	totale β -activiteit
β^R	attività β residua	β^R	β -restactiviteit
ind.	individuo	ind.	persoon
L	luogo di prelievo	L	monsternemingplaats
l	litro	l	liter
mm, l/m ²	millimetri; altezza delle precipitazioni espressa in litri per metro quadrato	mm, l/m ²	millimeter; regenval in liter per vierkante meter
M	media per la Comunità	M	gemiddelde voor de Gemeenschap
mCi	millicurie (10 ⁻³ curie)	mCi	millicurie (10 ⁻³ curie)
N	numero di campioni	N	aantal monsters
N.M.	valori inferiori al limite di rilevabilità	N.M.	waarden beneden het meetbare minimum
T	totale annuale	T	totaal per jaar
pCi	picocurie (10 ⁻¹² curie)	pCi	picocurie (10 ⁻¹² curie)
tr	tracce	tr	sporen
-	dato mancante	-	waarden ontbreken
\bar{x}	valore medio	\bar{x}	gemiddelde waarde
\bar{x}_m	valore medio mensile	\bar{x}_m	maandgemiddelde
\bar{x}_a	valore medio annuale	\bar{x}_a	jaargemiddelde
< x	inferiore a x	< x	kleiner dan x
Σ	somma	Σ	som
NA	non disponibile	NA	niet beschikbaar
LD	limite di rilevabilità	LD	detectiegrens
A.A.S.	alcuna attività signifi- cativa	A.A.S.	geen significante activiteit

AMBIANT RADIOACTIVITY MONITORING SITUATION IN THE COMMUNITY

Table 1

1980

	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	-	11	-	~50 sampling points	7 sampling points
DEUTSCHLAND (BR)	3	12	3	19	c.a. 9200 samples c.a. 620 sampling points	435 samples 40 sampling points
FRANCE (SCPRI)	26	34	13	31	4972 samples	867 samples
FRANCE (CEA)	14	21	6	6	- samples	180 samples
GREECE	-	10	2	6	132 samples 11 sampling points	20 samples 8 sampling points
IRELAND	-	2	-	7	104 samples 2 sampling points	-
ITALIA	2	20	5	2	8 sampling points	11 sampling points
LUXEMBOURG	-	-	-	-	-	-
NEDERLAND	-	5	1	1	about 300 samples 9 sampling points	66 samples
UNITED KINGDOM	7	7	6	6	36 sampling points	73 sampling points
COMMUNITY	60	120	54	85		

ARTIFICIAL RADIOACTIVITY
IN THE AIR AT GROUND LEVEL

AMBIANT ATMOSPHERIC RADIOACTIVITY
Sampling points and measuring stations for specific radionuclides



Map 1

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.1

BELGIQUE/BELGIË

10^{-3} pCi/m³

	Brasschaat		Florennes		Kleine Brogel		Koksidje		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	0.31	0.02	0.15	0.02	0.17	0.02	0.33	0.02	0.30
February	0.02	0.43	0.02	0.35	0.02	0.41	0.02	0.32	0.02	0.37
March	0.02	0.37	0.02	0.28	0.02	0.26	0.02	0.39	0.02	0.31
April	0.01	0.34	0.02	0.52	0.02	0.28	0.02	0.67	0.02	0.34
May	0.02	0.64	0.02	0.63	0.02	0.62	0.02	0.63	0.02	0.70
June	0.01	0.44	0.01	0.51	0.01	0.46	0.01	0.41	0.01	0.53
July	0.01	0.36	0.01	0.43	0.01	0.28	0.01	0.26	0.01	0.30
August	0.01	0.29	0.01	0.24	0.02	0.32	0.01	0.27	0.02	0.30
September	0.02	2.1	0.02	3.2	0.02	1.9	0.02	1.7	0.02	1.8
October	0.01	0.15	0.01	0.18	0.01	0.18	0.01	0.18	0.01	0.11
November	0.04	0.18	0.04	0.27	0.04	0.31	0.04	0.29	0.05	0.24
December	0.05	0.14	0.04	0.23	0.05	0.24	0.05	0.17	0.05	0.15
M	0.02	0.48	0.02	0.58	0.02	0.45	0.02	0.47	0.02	0.43

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.2

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

10^{-3} pCi/m³

	total beta pCi/m ³	⁷ Be	⁹⁰ Sr	⁹⁵ Nb	⁹⁵ Zr	¹⁰³ Ru	¹⁰⁶ Ru	¹³⁷ Cs	¹⁴¹ Ce	¹⁴⁴ Ce
January	0.02	35,861	0.15	< 0.075	< 0.122	< 0.074	< 0.566	< 0.070	< 0.102	< 0.360
February	0.02	54,814	0.29	< 0.097	< 0.140	< 0.094	< 0.593	< 0.074	< 0.134	< 0.384
March	0.02	60,276	0.27	< 0.104	< 0.139	< 0.098	< 0.558	0.286	< 0.143	< 0.367
April	0.02	58,845	0.31	< 0.098	< 0.143	< 0.098	< 0.597	0.343	< 0.140	< 0.380
May	0.02	97,638	0.66	< 0.102	< 0.147	< 0.097	< 0.633	0.485	< 0.139	< 0.407
June	0.01	51,746	0.49	< 0.372	< 0.408	< 0.306	< 1.473	< 0.174	< 0.479	< 0.825
July	0.01	31,037	0.26	< 0.078	< 0.112	< 0.069	< 0.477	< 0.058	< 0.199	< 0.534
August	0.01	37,192	0.33	< 0.142	< 0.198	< 0.120	< 0.813	< 0.099	< 0.173	< 0.472
September	0.01	35,575	1.50	< 0.080	< 0.118	< 0.071	< 0.485	< 0.059	< 0.101	< 0.283
October	0.01	24,949	0.15	< 0.159	< 0.210	< 0.137	< 0.795	< 0.094	< 0.201	< 0.462
November	0.03	26,182	0.26	1.766	1.190	2.276	< 0.346	< 0.043	2.431	< 0.246
December	0.04	24,094	0.17	5.047	3.145	3.938	< 0.437	< 0.051	3.734	1.607
M	0.02	44,851	0.40	< 0.733	< 0.506	< 0.615	< 0.648	< 0.153	< 0.665	< 0.528

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.3

MOL - BELGIQUE

	10 ⁻³ pCi/m ³												
	total beta pCi/m ³	⁷ Be	⁹⁰ Sr	⁶⁰ Co	⁹⁵ Nb	⁹⁵ Zr	¹⁰³ Ru	¹³⁷ Cs	¹⁴⁰ Ba	¹⁴¹ Ce	¹⁴⁴ Ce	¹⁴⁷ Nd	²³⁷ U
January	0.02	31.8	0.27					0.80					
February	0.02	43.8	0.54					0.77					
March	0.03	47.3	0.23					0.64					
April	0.02	30.8	0.67					0.85					
May	0.02	57.6	0.70					0.56					
June	0.01	45.3	0.47					1.08					
July	0.01	33.2	0.40					1.03					
August	0.02	36.6	0.36					0.34					
September	0.02	39.3	3.5					0.25					
October	0.02	30.4	0.18				0.34	0.28	0.88				4.90
November	0.05	45.3	0.33		2.87	3.40	4.87	-	4.43	4.43	1.20	1.90	6.67
December	0.06	35.2	0.31	0.87	7.34	5.74	6.40	-	1.94	5.66			
M	0.03	39.7	0.66					0.66					

Chinese text explosion in the air the 16-10-1980

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

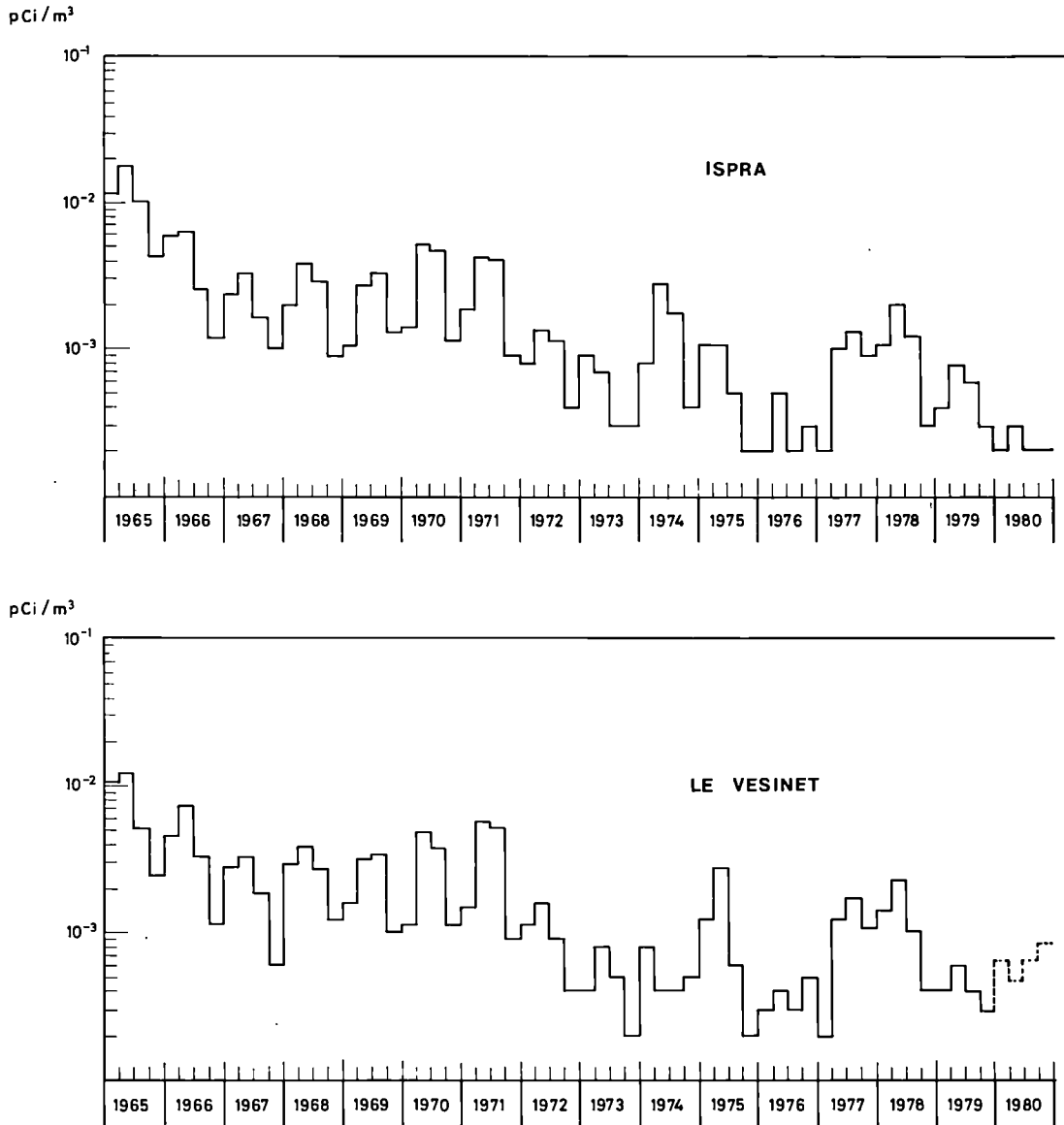
Table 2.4

RISØ - DENMARK

10^{-3} pCi/m³

	⁹⁰ Sr	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Ru	¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba	¹⁴⁰ La	¹⁴¹ Ce	¹⁴⁴ Ce
January	0.17					0.16					
February	0.20					0.14					
March	0.31					0.30					
April	0.27					0.31					
May	0.46					0.42					
June	0.42					0.44					
July	0.37					0.35					
August	0.26					0.26					
September	0.15					0.13					
October	0.26	0.015	0	0.02	0	0.07	0.07	0.04	0.03	0.02	0
November	0.16	1.59	1.09	1.97	0.17	0.53	0.08	2.0	2.0	1.88	0.34
December	0.17	7.3	8.9	5.7	0.65	0.28	0.15	2.0	2.2	5.3	1.94
M	0.27	-	-	-	-	-	0.24	-	-	-	-

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



Graph 1

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

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	²¹⁰ Pb
January	45.09	0.002	N.M.	N.M.	N.M.	0.240	0.069	0.120	N.M.	0.230	0.023	14.99
February	41.85	0.002	N.M.	N.M.	N.M.	0.281	0.048	0.120	N.M.	0.230	0.023	8.80
March	71.82	0.004	N.M.	N.M.	N.M.	0.451	0.086	0.230	N.M.	0.370	0.037	17.50
April	65.88	0.007	N.M.	N.M.	N.M.	0.451	0.110	0.281	N.M.	0.389	0.038	8.80
May	109.89	0.011	N.M.	N.M.	N.M.	0.751	0.210	0.540	N.M.	0.740	0.068	8.51
June	61.83	0.006	N.M.	N.M.	N.M.	0.500	0.150	0.370	N.M.	0.500	0.047	6.51
July	52.92	0.002	N.M.	N.M.	N.M.	0.340	0.110	0.250	N.M.	0.319	0.033	5.51
August	59.94	0.002	N.M.	N.M.	N.M.	0.240	0.078	0.200	N.M.	0.230	0.027	8.40
September	52.92	0.001	N.M.	N.M.	N.M.	0.130	0.046	0.088	N.M.	0.130	0.021	10.69
October	49.95	N.M.	0.072	0.015	0.100	0.110	0.054	0.077	0.120	0.098	0.010	5.81
November	45.09	N.M.	2.889	1.798	3.186	0.319	0.160	0.089	3.807	0.859	N.M.	8.88
December	42.93	0.068	8.100	7.398	6.291	1.000	0.110	0.170	7.695	2.697	N.M.	6.18
M	58.34	0.009	0.922	0.768	0.798	0.401	0.103	0.211	0.968	0.566	0.027	9.22

N.M. = values lie below the detection limit

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.6

JÜLICH - DEUTSCHLAND		10^{-3} pCi/m^3							
	total beta ₃ pCi/m ³	⁷ Be	⁵⁴ Mn	⁶⁰ Co	⁶⁵ Zn	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Rh
January	0.170	37.00	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
February	0.130	56.25	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
March	0.120	30.50	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
April	0.080	46.00	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	3.50
May	0.170	73.00	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
June	0.160	42.20	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
July	0.120	59.00	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
August	0.160	42.70	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
September	0.250	59.80	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
October	0.240	48.25	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
November	0.260	44.75	N.M.	N.M.	N.M.	4.70	3.10	5.80	N.M.
December	0.190	46.75	N.M.	N.M.	N.M.	7.13	7.28	7.55	N.M.
M	0.170	48.85	N.M.	(0.32)	N.M.	(5.92)	(5.19)	(6.68)	(3.50)

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SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.6a)
continued

JÜLICH - DEUTSCHLAND

	10 ⁻³ pCi/m ³								
	¹²⁵ Sb	¹³¹ J	¹³⁷ Cs	¹⁴⁰ Ba	¹⁴⁰ La	¹⁴¹ Ce	¹⁴⁴ Ce	²⁰³ Hg	
January	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	
February	N.M.	N.M.	0.60	N.M.	N.M.	N.M.	N.M.	N.M.	
March	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	
April	N.M.	N.M.	0.55	N.M.	N.M.	N.M.	N.M.	N.M.	
May	N.M.	N.M.	0.70	N.M.	N.M.	N.M.	N.M.	N.M.	
June	N.M.	N.M.	0.50	N.M.	N.M.	N.M.	N.M.	N.M.	
July	N.M.	N.M.	0.58	N.M.	N.M.	N.M.	N.M.	N.M.	
August	N.M.	N.M.	0.40	N.M.	N.M.	N.M.	N.M.	N.M.	
September	N.M.	N.M.	0.41	N.M.	N.M.	N.M.	N.M.	N.M.	
October	N.M.	N.M.	0.50	N.M.	N.M.	N.M.	N.M.	N.M.	
November	N.M.	N.M.	0.20	4.95	4.97	7.77	N.M.	N.M.	
December	N.M.	0.60	0.30	2.95	2.85	9.23	3.53	N.M.	
M	N.M.	(0.60)	(0.47)	(3.95)	(3.91)	(8.50)	(3.53)	N.M.	

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.7

KARLSRUHE (MESSORT FORSTHAUS) - DEUTSCHLAND

10^{-3} pCi/m³

	⁷ Be	⁵¹ Cr	⁵⁴ Mn	⁵⁷ Co	⁵⁸ Co	⁵⁹ Fe	⁶⁰ Co	⁶⁵ Zn	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Ru
January	50.7	< 3.5	< 0.3	< 0.1	< 0.4	< 1.1	< 0.4	< 0.9	< 0.8	< 0.6	< 0.5	< 2.5
February	64.2	< 2.6	< 0.2	< 0.1	< 0.3	< 0.7	< 0.2	< 0.5	< 0.5	< 0.4	< 0.3	< 1.7
March	43.3	< 3.5	< 0.3	< 0.2	< 0.4	< 0.9	< 0.3	< 0.7	< 0.7	< 0.5	< 0.4	< 2.6
April	76.2	< 6.2	< 0.4	< 0.1	< 0.6	< 0.1	< 0.4	< 1.1	< 0.6	< 0.8	< 0.6	< 3.6
May	95.8	< 2.7	< 0.2	< 0.1	< 0.3	< 0.7	< 0.2	< 0.5	< 0.5	< 0.4	< 0.3	< 2.0
June	57.5	< 4.4	< 0.3	< 0.1	< 0.4	< 0.9	< 0.3	< 0.7	< 0.7	< 0.5	< 0.4	< 2.3
July	62.8	< 4.1	< 0.3	< 0.2	< 0.4	< 0.9	< 0.3	< 0.7	< 0.7	< 0.5	< 0.4	< 2.4
August	54.9	< 5.0	< 0.4	< 0.2	< 0.4	< 1.1	< 0.4	< 0.8	< 0.8	< 0.6	< 0.7	< 2.7
September	57.0	< 3.7	< 0.3	< 0.2	< 0.4	< 0.9	< 0.4	< 0.8	< 0.7	< 0.5	< 0.6	< 2.6
October	46.5	< 4.6	< 0.4	< 0.2	< 0.4	< 1.1	< 0.4	< 0.9	< 0.8	< 0.6	< 0.6	< 2.7
November	55.2	< 4.2	< 0.4	< 0.2	< 0.5	< 1.3	< 0.5	< 1.0	4.5	6.0	5.5	< 3.2
December	37.8	< 5.1	< 0.3	< 0.2	< 0.4	< 1.1	< 0.3	< 0.8	4.6	7.4	5.4	< 2.5
M	58.49	< 4.13	< 0.32	< 0.16	< 0.41	< 0.90	< 0.34	< 0.78	< 1.33	< 1.57	< 1.31	< 2.57

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SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.7a)
continued

KARLSRUHE (MESSORT FORTSHAUS) - DEUTSCHLAND

10^{-3} pCi/m³

	^{110m} Ag	¹²⁴ Sb	¹²⁵ Sb	¹³¹ I	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁰ Ba/La	¹⁴¹ Ce	¹⁴⁴ Ce
January	< 0.5	< 0.9	< 0.6	< 4.5	< 0.3	< 0.2	< 4.3	< 0.4	< 1.0
February	< 0.3	< 0.5	< 0.5	< 2.2	< 0.2	0.9	< 2.5	< 0.4	< 0.9
March	< 0.4	< 0.7	< 0.7	< 2.9	< 0.3	0.5	< 3.0	< 0.5	< 1.3
April	< 0.6	< 1.2	< 0.9	< 7.5	< 0.5	< 0.4	< 7.1	< 0.6	< 1.5
May	< 0.3	< 0.6	< 0.5	< 2.3	< 0.2	0.7	< 2.4	< 0.4	< 1.0
June	< 0.5	< 0.7	< 0.7	< 3.6	< 0.2	0.4	< 3.6	< 0.4	< 1.3
July	< 0.4	< 0.7	< 0.7	< 2.7	< 0.3	1.3	< 3.2	< 0.5	< 1.3
August	< 0.5	< 1.0	< 0.8	< 3.7	< 0.3	0.5	< 4.4	< 0.6	< 1.6
September	< 0.5	< 0.9	< 0.8	< 2.6	< 0.3	< 0.3	< 3.1	< 0.5	< 1.3
October	< 0.5	< 0.8	< 0.8	< 3.7	< 0.4	< 0.3	< 4.0	< 0.6	< 1.4
November	< 0.6	< 1.1	< 0.9	< 5.3	< 0.5	0.4	7.3	6.6	< 1.7
December	< 0.5	< 0.8	< 0.7	< 5.1	< 0.3	< 0.3	< 4.8	5.1	1.6
M	< 0.47	< 0.83	< 0.72	< 3.84	< 0.32	< 0.52	< 4.14	< 1.39	< 1.33

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.8

LE BARP - BORDEAUX (CEA) - FRANCE		10^{-3} pCi/m ³										
	total beta pCi/m ³	⁷ Be	⁸⁹ Sr	⁹⁰ Sr	⁹⁵ Zr	⁹⁵ Nb	⁹⁹ Mo	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³¹ I	¹³² I
January	∇0.018	59.9	A.A.S.	∇ 0.2	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.
February	∇0.014	66.8	"	∇ 0.3	"	"	"	"	"	"	"	"
March	∇0.010	55.2	"	∇ 0.1	"	"	"	"	"	"	"	"
April	∇0.009	56.0	"	∇ 0.1	"	"	"	"	"	"	"	"
May	∇0.009	46.1	"	∇ 0.2	"	"	"	"	"	"	"	"
June	∇0.005	68.1	"	∇ 0.2	"	"	"	"	"	∇ 0.1	"	"
July	∇0.006	59.0	"	∇ 0.2	"	"	"	"	"	A.A.S.	"	"
August	∇0.008	45.7	"	∇ 0.1	"	"	"	"	"	"	"	"
September	∇0.013	55.2	"	∇ 0.1	"	"	"	"	"	"	"	"
October	∇0.009	49.1	"	∇ 0.1	"	"	"	"	"	"	∇ 0.1	"
November	0.041	47.0	"	∇ 0.4	∇ 4.0	∇ 2.7	0.2	∇ 3.8	"	"	∇ 1.2	0.2
December	0.039	29.7	2.5	∇ 0.1	∇ 8.5	∇ 8.8	A.A.S.	5.9	"	"	∇ 0.2	A.A.S.
Seuil	0.027	-	-	1.1	27	27	-	5.4	27	5.4	5.4	-
M	∇ 0.015	53.2	A.A.S.	∇ 0.2	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.

Notice concerning data for France : pages 29DA, 49DE, 69EN, 89FR, 109IT, 120 NL

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SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.8a)
continued

LE BARP - BORDEAUX (CEA) - FRANCE		10 ⁻³ pCi/m ³								
	¹³² Te	¹³³ Xe	¹³⁷ Cs	¹⁴⁰ Ba	¹⁴⁰ La	¹⁴¹ Ce	¹⁴⁴ Ce	¹⁴⁷ Nd	²³⁷ U	
January	A.A.S.	A.A.S.	∇ 0.1	A.A.S.	A.A.S.	A.A.S.	∇ 0.3	A.A.S.	A.A.S.	
February	"	"	∇ 0.1	"	"	"	∇ 0.3	"	"	
March	"	"	∇ 0.2	"	"	"	∇ 0.3	"	"	
April	"	"	A.A.S.	"	"	"	∇ 0.3	"	"	
May	"	"	"	"	"	"	∇ 0.4	"	"	
June	"	"	∇ 0.3	"	"	"	∇ 0.5	"	"	
July	"	"	∇ 0.2	"	"	"	∇ 0.4	"	"	
August	"	"	∇ 0.2	"	"	"	A.A.S.	"	"	
September	"	"	∇ 0.1	"	"	"	"	"	"	
October	"	"	∇ 0.3	∇ 0.2	∇ 0.2	∇ 0.1	"	"	"	
November	0.2	0.2	A.A.S.	∇ 7.3	∇ 7.3	∇ 6.5	∇ 1.0	1.6	4.8	
December	A.A.S.	A.A.S.	"	∇ 3.4	∇ 3.9	∇ 9.1	∇ 2.3	0.9	0.8	
Seuil	-	-	5.4	27	27	27	27	-	-	
Total	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	

Notice concerning data for France : pages 29DA, 49DE, 69EN, 89FR, 109IT, 129 NL

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.9

LE VESINET - SCPRI - FRANCE

10⁻³ pCi/m³

	total beta pCi/m ³	⁷ Be	⁵⁴ Mn	⁹⁰ Sr	⁹⁵ Zr/Nb	¹⁰³ Ru	¹⁰⁶ Ru/Rh	¹²⁵ Sb	¹³¹ I	¹³⁷ Cs
January	A.A.S.	60	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.
February	"	98	"	0.44	"	"	"	"	"	"
March	"	69	"	< 0.39	"	"	"	"	"	"
April	"	91	"	< 0.38	"	"	"	"	"	"
May	"	140	"	0.59	"	"	"	"	"	"
June	"	81	"	< 0.44	"	"	"	"	"	"
July	"	77	"	< 0.45	"	"	"	"	"	"
August	"	82	"	< 0.37	"	"	"	"	"	"
September	"	83	"	A.A.S.	"	"	"	"	"	"
October	"	61	"	"	"	"	"	"	"	"
November	0.043	62	"	0.36	8.9	< 5.1	"	"	"	"
December	0.042	52	"	A.A.S.	< 18	8.0	"	"	"	"
M	< 0.020	80	A.A.S.	< 0.39	< 4.4	< 2.0	A.A.S.	A.A.S.	A.A.S.	A.A.S.
Measurement threshold	0.027		5.4	1.1	27	5.4	27	5.4	5.4	5.4

The mean results preceded by a sign < have been computed taking into account the real values
 Notice concerning data for France : pages 29DA, 49DE, 69EN, 89FR, 109IT, 129NL

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SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1980

Table 2.9a)
continued

LE VESINET - SCPRI - FRANCE	10^{-3} pCi/m ³									
	¹⁴⁰ Be/Le	¹⁴¹ Ce	¹⁴⁴ Ce/Pr							
January	A.A.S.	A.A.S.	A.A.S.							
February	"	"	"							
March	"	"	"							
April	"	"	"							
May	"	"	"							
June	"	"	"							
July	"	"	"							
August	"	"	"							
September	"	"	"							
October	"	"	"							
November	"	< 8.4	"							
December	"	< 9.6	"							
M	A.A.S.	< 3.2	A.A.S.							
Measurement threshold	27	27	27							

The mean results preceded by the sign < have been completed taking into account the real values.
Notice concerning data for France : pages 29DA, 49DE, 69EN, 89FR, 109IT, 129NL

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.10

CCR - EURATOM - ISPRA - ITALIA		10^{-3} pCi/m^3									
	total beta pCi/m^3	^7Be	^{89}Sr	^{90}Sr	^{95}Nb	^{95}Zr	^{103}Ru	^{106}Ru	^{137}Cs	^{141}Ce	^{144}Ce
January	0.03	67	(+)	0.2	-	-	-	-	≤ 1.0	-	-
February	0.04	77	≤ 0.1	0.2	-	-	-	-	≤ 1.0	-	-
March	0.02	50	≤ 0.1	0.2	-	-	-	-	≤ 1.0	-	-
April	0.02	46	≤ 0.1	0.2	-	-	-	-	≤ 1.0	-	-
May	0.02	57	≤ 0.1	0.3	-	-	-	-	≤ 1.0	-	-
June	0.02	53	≤ 0.1	0.4	-	-	-	-	≤ 1.0	-	-
July	0.02	56	≤ 0.1	0.3	-	-	-	15	≤ 1.0	-	-
August	0.03	85	≤ 0.1	0.2	-	-	-	12	≤ 1.0	-	-
September	0.04	65	≤ 0.1	0.2	-	-	-	10	≤ 1.0	-	-
October	0.04	59	≤ 0.1	0.2	-	-	-	-	≤ 1.0	-	-
November	0.11	44	3.0	0.2	-	-	4	-	≤ 1.0	6	4
December	0.18	68	7.0	0.3	11	15	10	8	≤ 1.0	8	8
M	0.05	61	≤ 1.0	0.2	-	-	-	-	≤ 1.0	-	-

(+) misura non effettuata

- N.M. (attività non rilevabile)

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.11

SEGRATE - ITALIA	10^{-3} pCi/m^3											
	^7Be	^{54}Mn	^{95}Zr	^{103}Ru	^{106}Ru	^{125}Sb	^{131}I	^{137}Cs	^{140}Ba	^{141}Ce	^{144}Ce	^{155}Eu
January	13	< 0.04	< 0.1	< 0.07	< 0.4	< 0.11	< 0.17	0.03	< 0.09	< 0.08	< 0.4	< 0.2
February	-	-	-	-	-	-	-	-	-	-	-	-
March	-	-	-	-	-	-	-	-	-	-	-	-
April	43	< 0.04	< 0.1	< 0.07	< 0.6	0.09	< 0.10	0.24	< 0.08	< 0.07	0.3	< 0.1
May	52	< 0.04	< 0.1	< 0.08	< 0.5	0.11	< 0.16	0.36	< 0.19	< 0.06	0.5	< 0.1
June	42	< 0.04	< 0.1	< 0.05	0.22	0.07	< 0.11	0.48	< 0.07	< 0.06	0.4	0.08
July	45	< 0.06	< 0.1	< 0.05	0.22	< 0.19	< 0.15	0.29	< 0.09	< 0.06	0.17	0.10
August	62	< 0.05	< 0.1	< 0.05	0.5	0.11	< 0.14	0.30	< 0.09	< 0.07	0.21	< 0.15
September	48	< 0.06	< 0.1	< 0.06	< 0.6	0.08	< 0.09	0.13	< 0.09	< 0.07	0.3	< 0.15
October	16	< 0.04	< 0.06	0.03	< 0.4	< 0.11	0.04	0.07	0.07	0.03	< 0.3	< 0.1
November	47	< 0.16	2.5	2.9	< 1.8	< 0.6	0.35	< 0.16	< 2.4	< 0.9	0.8	< 0.5
December	13	< 0.05	1.7	1.5	< 0.2	< 0.2	< 0.06	0.06	0.35	< 0.05	0.3	< 0.1
M	(38)	(0.06)	(0.50)	(0.49)	(0.54)	(0.17)	(0.14)	(0.21)	(0.35)	(0.15)	(0.37)	(0.16)

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL
1980

Table 2.12

CHILTON - UNITED KINGDOM

10^{-3} pCi/m³

	total beta	⁵⁴ Mn	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³¹ I(*)	¹³⁷ Cs	¹⁴⁰ Ba	¹⁴¹ Ce	¹⁴⁴ Ce
January	19	< 0.06	< 0.06	< 0.12	< 0.06	0.44	0.07	< 0.06	0.11	< 0.06	< 0.06	0.10
February	7	< 0.06	< 0.06	< 0.12	< 0.06	~ 0.6	< 0.07	< 0.06	0.19	< 0.06	< 0.06	< 0.12
March	11	< 0.06	< 0.06	< 0.12	< 0.06	~ 0.3	< 0.06	< 0.06	0.30	< 0.06	< 0.06	< 0.12
April	17	< 0.06	< 0.06	< 0.12	< 0.06	~ 0.5	0.12	< 0.06	0.30	< 0.06	< 0.06	~ 0.16
May	22	< 0.06	< 0.06	< 0.12	< 0.06	~ 0.6	~ 0.3	< 0.06	0.53	< 0.12	< 0.06	~ 0.3
June	18	< 0.06	< 0.06	< 0.12	< 0.06	1.0	0.18	< 0.06	0.41	< 0.12	< 0.06	0.45
July	11	< 0.06	< 0.06	< 0.12	< 0.06	0.50	< 0.06	< 0.06	0.28	< 0.12	< 0.06	0.18
August	13	< 0.06	< 0.06	< 0.12	< 0.06	< 0.12	< 0.06	< 0.06	0.21	< 0.12	< 0.06	< 0.12
September	17	< 0.06	< 0.06	< 0.12	< 0.06	0.47	< 0.05	< 0.06	0.14	< 0.12	0.06	< 0.12
October	9	< 0.06	~ 0.06	~ 0.05	0.21	0.49	< 0.05	0.52	0.10	0.53	0.07	< 0.06
November	220	< 0.06	2.2	1.6	4.6	2.3	0.05	1.05	0.13	4.3	2.9	1.05
December	97	< 0.06	6.0	7.0	8.3	1.1	0.15	0.19	0.15	2.6	4.9	4.9
M	39	< 0.06	< 0.73	< 0.81	< 1.15	0.70	< 0.10	< 0.38	0.24	< 0.69	< 0.70	< 0.96

(*) Particulate component only

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2 .13

ESKDALEMUIR - UNITED KINGDOM

10^{-3} pCi/m³

	total beta	⁵⁴ Mn	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³¹ I(*)	¹³⁷ Cs	¹⁴⁰ Ba	¹⁴¹ Ce	¹⁴⁴ Ce
January	4.9	<0.06	< 0.12	<0.12	<0.06	0.56	0.12	<0.06	0.18	< 0.12	<0.06	0.32
February	9.5	<0.06	< 0.12	<0.12	<0.06	0.85	0.24	< 0.06	0.29	<0.12	<0.06	0.24
March	6.2	<0.06	< 0.12	<0.12	<0.06	0.8	0.18	<0.06	0.46	< 0.12	<0.06	0.3
April	6.1	<0.06	< 0.12	<0.12	<0.06	<0.24	0.30	<0.06	0.61	< 0.12	<0.06	0.4
May	7.3	<0.06	< 0.12	<0.12	<0.06	1.2	0.27	<0.06	0.64	< 0.12	<0.06	0.52
June	4.9	<0.06	< 0.12	<0.12	<0.06	<0.24	<0.07	<0.06	0.67	< 0.12	<0.06	0.12
July	4.9	<0.06	< 0.12	<0.12	<0.06	<0.24	<0.07	<0.06	0.50	< 0.12	<0.06	0.53
August	3.6	<0.06	< 0.12	<0.12	<0.06	0.74	<0.07	<0.06	0.50	< 0.12	<0.06	0.35
September	4.9	<0.06	< 0.12	<0.12	<0.06	< 0.12	<0.07	<0.06	0.68	< 0.12	<0.06	< 0.06
October	2.4	<0.06	0.17	<0.12	0.22	1.3	0.11	0.33	0.33	0.38	0.13	0.29
November	120	<0.05	2.3	2.7	5.7	0.52	0.10	1.2	0.13	5.1	3.2	0.80
December	110	<0.05	6.9	9.7	8.1	1.3	0.17	< 0.12	0.18	2.6	5.3	2.2
M	24	<0.06	< 0.87	<1.1	<1.2	<0.68	<0.15	<0.18	0.43	<0.76	<0.76	0.51

(*) Particulate component only

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.14

GLASGOW - UNITED KINGDOM

	10^{-3} pCi/m^3										
	total beta	^7Be	^{95}Zr	^{95}Nb	^{103}Ru	$^{106}\text{Ru/Rh}$	^{125}Sb	^{131}Cs	$^{140}\text{Ba/La}$	^{141}Ce	^{144}Ce
January	16	35	-	-	-	-	-	0.24	-	-	0.22
February	9	46	-	-	-	-	0.24	0.24	-	-	0.16
March	17	49	-	-	-	0.24	-	0.16	-	-	0.14
April	17	86	-	-	-	-	-	0.51	-	-	0.32
May	17	72	-	-	-	0.16	0.41	0.49	-	-	0.38
June	11	47	-	-	-	0.30	-	0.27	-	-	0.32
July	7	40	-	-	-	0.24	-	0.19	-	-	0.27
August	8	48	-	-	-	-	-	0.22	-	-	0.05
September	8	29	-	-	-	-	-	0.14	-	-	-
October	8	33	-	-	-	-	-	0.05	-	-	0.46
November	30	33	2.2	1.1	3.5	-	-	0.19	4.0	3.1	0.46
December	36	50	8.4	8.2	7.9	1.1	-	0.19	2.8	7.0	2.3
M	15	47	0.88	0.78	0.95	0.17	0.05	0.24	0.56	0.84	0.42

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.15

LERWICK - UNITED KINGDOM

10^{-3} pCi/m³

	total beta	⁵⁴ Mn	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹²⁵ Ru	¹²⁵ Sb	¹³¹ I(*)	¹³⁷ Cs	¹⁴⁰ Ba	¹⁴¹ Ce	¹⁴⁴ Ce
January	6.7	< 0.06	< 0.12	< 0.12	< 0.06	0.42	0.16	< 0.06	0.07	< 0.12	< 0.06	< 0.12
February	5.3	< 0.06	< 0.12	< 0.12	< 0.06	~ 0.5	< 0.04	< 0.06	0.10	< 0.12	< 0.06	~ 0.14
March	4.9	< 0.06	< 0.12	< 0.12	< 0.06	~ 0.5	< 0.06	< 0.06	0.12	< 0.12	< 0.06	< 0.24
April	3.6	< 0.06	< 0.12	< 0.12	< 0.06	< 0.24	< 0.05	< 0.06	0.21	< 0.12	< 0.06	< 0.12
May	3.6	< 0.06	< 0.12	< 0.12	< 0.06	~ 0.15	< 0.06	< 0.06	0.22	< 0.12	< 0.06	~ 0.3
June	3.6	< 0.06	< 0.12	< 0.12	< 0.06	1.05	< 0.06	< 0.06	0.21	< 0.12	< 0.06	< 0.12
July	3.6	< 0.06	< 0.12	< 0.12	< 0.06	< 0.24	< 0.06	< 0.06	0.18	< 0.12	< 0.06	0.32
August	2.4	< 0.06	< 0.12	< 0.12	< 0.06	< 0.12	< 0.06	< 0.06	0.06	< 0.12	< 0.06	< 0.12
September	2.4	< 0.06	< 0.12	< 0.12	< 0.06	< 0.12	< 0.06	< 0.06	0.08	< 0.12	< 0.06	< 0.12
October	2.4	< 0.06	< 0.12	< 0.12	< 0.06	0.15	< 0.06	< 0.06	0.08	< 0.12	< 0.06	< 0.12
November	140	0.05	2.1	1.7	4.1	1.0	0.08	1.3	0.08	4.6	2.0	0.86
December	120	0.05	6.8	10.0	6.3	0.76	0.08	< 0.12	0.24	1.8	4.5	2.3
M	22	< 0.06	< 0.84	< 1.1	< 0.92	< 0.44	< 0.07	0.22	0.14	< 0.63	< 0.59	0.41

(*) Particulate component only

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SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.16

MILFORD HAVEN - UNITED KINGDOM

10^{-3} pCi/m³

	total beta	⁵⁴ Mn	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³¹ I (*)	¹³⁷ Cs	¹⁴⁰ Cs	¹⁴¹ Ce	¹⁴⁴ Ce
January	10.0	< 0.06	< 0.12	< 0.12	< 0.06	1.5	0.12	< 0.06	0.15	< 0.12	< 0.06	~ 0.4
February	4.9	< 0.06	< 0.12	< 0.12	< 0.06	~ 0.3	0.24	< 0.06	0.16	< 0.12	< 0.06	< 0.12
March	6.1	< 0.06	< 0.12	< 0.12	< 0.06	~ 0.4	~ 0.1	< 0.06	0.21	< 0.12	< 0.06	~ 0.3
April	7.3	< 0.06	< 0.12	< 0.12	< 0.06	< 0.24	~ 0.2	< 0.06	0.29	< 0.12	< 0.06	~ 0.2
May	6.1	< 0.06	< 0.12	< 0.12	< 0.06	0.92	< 0.12	< 0.06	0.49	< 0.12	< 0.06	0.36
June	3.6	< 0.06	< 0.12	< 0.12	< 0.06	< 0.24	< 0.05	< 0.06	0.24	< 0.12	< 0.06	< 0.12
July	3.6	< 0.06	< 0.12	< 0.12	< 0.06	< 0.12	< 0.05	< 0.06	0.27	< 0.12	< 0.06	< 0.12
August	4.9	< 0.06	< 0.12	< 0.12	< 0.06	< 0.12	< 0.05	< 0.06	0.10	< 0.12	< 0.06	< 0.12
September	2.4	< 0.06	< 0.12	< 0.12	< 0.06	< 0.12	< 0.05	< 0.06	0.04	< 0.12	< 0.06	< 0.12
October	3.6	< 0.06	< 0.06	< 0.06	0.11	0.35	< 0.04	0.06	0.06	0.17	0.11	0.19
November	120	< 0.06	2.4	2.0	4.7	1.2	0.21	1.0	0.19	5.2	3.0	1.0
December	130	< 0.05	4.4	8.4	8.1	0.32	< 0.1	0.07	0.21	2.8	4.6	0.81
M	25	< 0.06	< 0.66	< 0.87	1.1	< 0.49	< 0.08	< 0.14	0.20	< 0.77	< 0.69	< 0.32

(*) Particulate component only

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.17

ORFORDNESS - UNITED KINGDOM		10^{-3} pCi/m ³										
	total beta	⁵⁴ Mn	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³¹ I (*)	¹³⁷ Cs	¹⁴⁰ Ba	¹⁴¹ Ce	¹⁴⁴ Ce
January	7.3	< 0.06	< 0.12	< 0.12	< 0.06	1.1	< 0.06	< 0.06	0.07	< 0.12	< 0.06	< 0.12
February	7.3	< 0.06	< 0.12	< 0.12	< 0.06	0.97	0.21	< 0.06	0.21	< 0.12	< 0.06	0.30
March	8.5	< 0.06	< 0.12	< 0.12	< 0.06	~ 0.4	0.18	< 0.06	0.12	< 0.12	< 0.06	~ 0.3
April	8.5	< 0.06	< 0.12	< 0.12	< 0.06	< 0.24	< 0.06	< 0.06	0.23	< 0.12	< 0.06	< 0.12
May	7.3	< 0.06	< 0.12	< 0.12	< 0.06	1.2	0.30	< 0.06	0.49	< 0.12	< 0.06	0.45
June	2.4	< 0.06	< 0.12	< 0.12	< 0.06	< 0.24	< 0.08	< 0.06	0.22	< 0.12	< 0.06	< 0.12
July	3.6	< 0.06	< 0.12	< 0.12	< 0.06	< 0.24	< 0.08	< 0.06	0.30	< 0.12	< 0.06	< 0.12
August	4.9	< 0.06	< 0.12	< 0.12	< 0.06	< 0.24	< 0.06	< 0.06	0.16	< 0.12	< 0.06	~ 0.2
September	7.3	< 0.06	< 0.12	< 0.12	< 0.06	< 0.12	< 0.06	< 0.06	0.06	< 0.12	< 0.06	< 0.12
October	4.9	< 0.06	< 0.06	< 0.06	0.15	0.80	< 0.11	0.35	0.07	0.24	0.07	0.27
November	390	0.06	4.4	3.0	3.6	1.1	0.11	3.88	0.19	12.0	4.9	1.35
December	300	< 0.04	8.5	10.5	10.0	0.64	0.13	< 0.12	0.28	1.9	5.7	1.5
M	63	< 0.06	< 1.2	< 1.2	< 1.2	< 0.61	< 0.12	< 0.41	0.20	< 1.3	< 0.93	~ 0.4

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(*) Particulate component only

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN AIR NEAR GROUND LEVEL

1980

Table 2.18

SHRIVENHAM - UNITED KINGDOM		10^{-3} pCi/m ³										
	total beta	⁷ Be	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Ru/Rh	¹²⁵ Sb	¹³¹ I(*)	¹³⁷ Cs	¹⁴⁰ Ba/La	¹⁴¹ Ce	¹⁴⁴ Ce
January	15	54	-	-	-	0.59	-	-	0.24	-	-	0.24
February	11	73	-	-	-	0.22	0.43	-	0.22	-	-	0.16
March	12	105	-	-	-	-	-	-	0.27	-	-	0.54
April	13	116	-	-	-	0.41	1.41	-	0.84	-	-	0.35
May	NM	143	-	-	-	0.57	0.23	-	0.73	-	-	0.92
June	10	54	-	-	-	0.24	0.34	-	0.24	-	-	0.30
July	6	108	-	-	-	-	-	-	0.68	-	-	-
August	7	68	-	-	-	0.32	-	-	0.43	-	-	-
September	8	135	-	-	-	-	-	-	0.30	-	-	0.19
October	7	37	-	-	-	0.26	-	-	0.05	-	-	0.14
November	14	44	2.0	1.4	3.8	0.57	-	0.8	0.11	6.0	2.6	0.28
December	53	54	8.4	7.7	8.8	0.49	-	-	0.16	1.5	7.4	2.4
M	14	83	0.87	0.76	1.1	0.31	0.20	0.07	0.36	0.62	0.83	0.46

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(*)= particulate component only
 NM = not measured

⁹⁰Sr IN AIR NEAR GROUND LEVEL

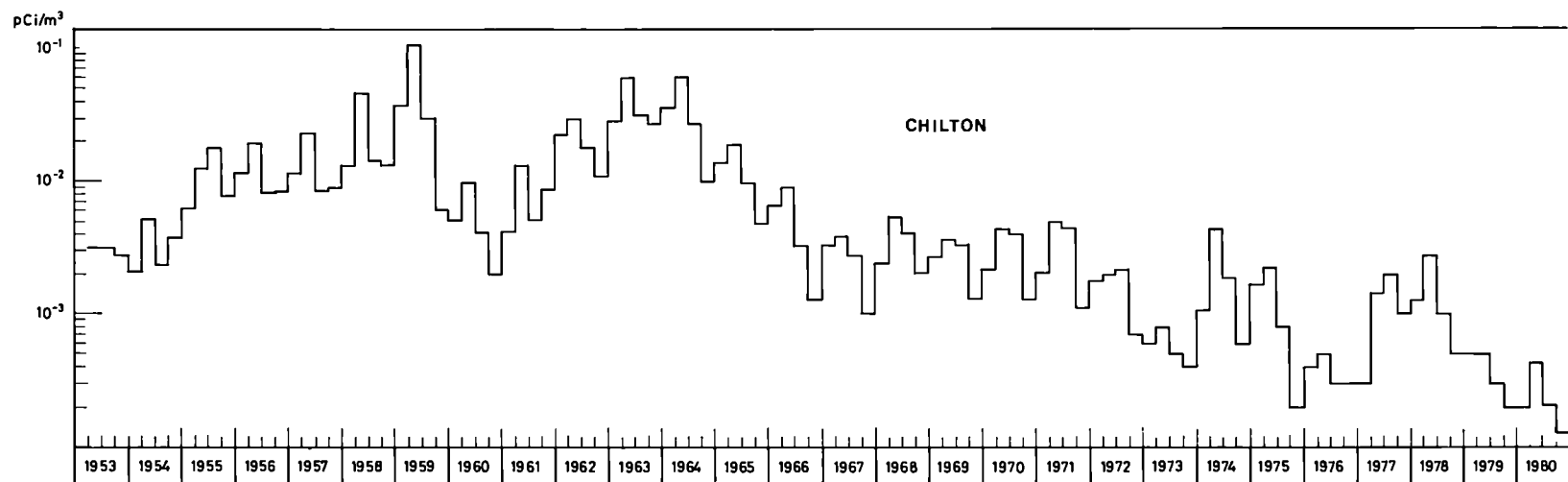
Table 3

1967 - 1980

10^{-3} pCi/m³ \bar{x}_a

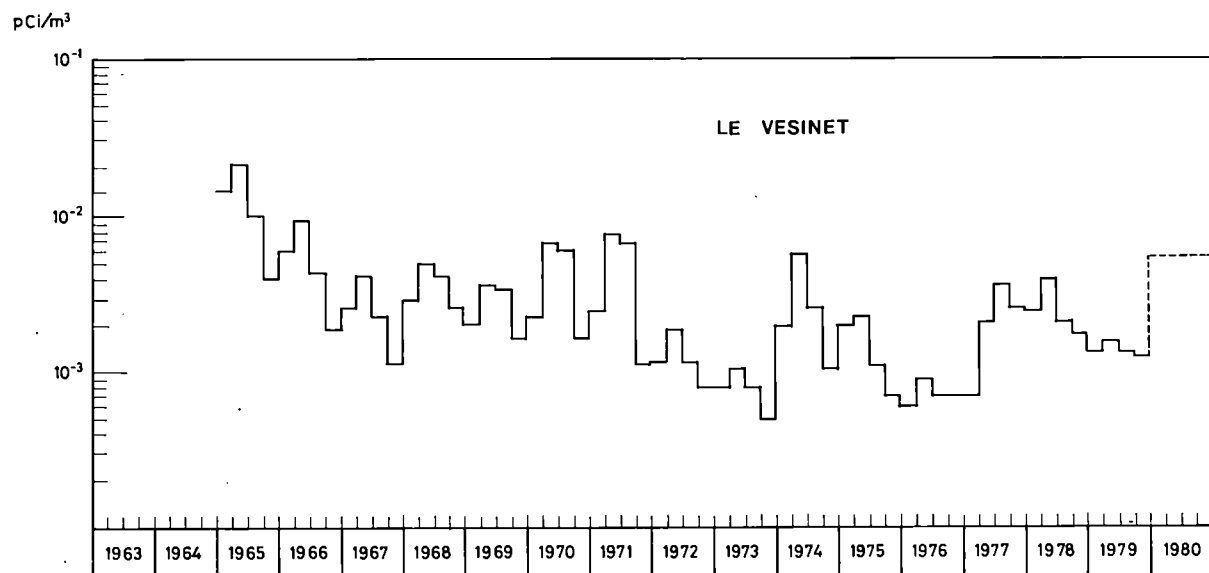
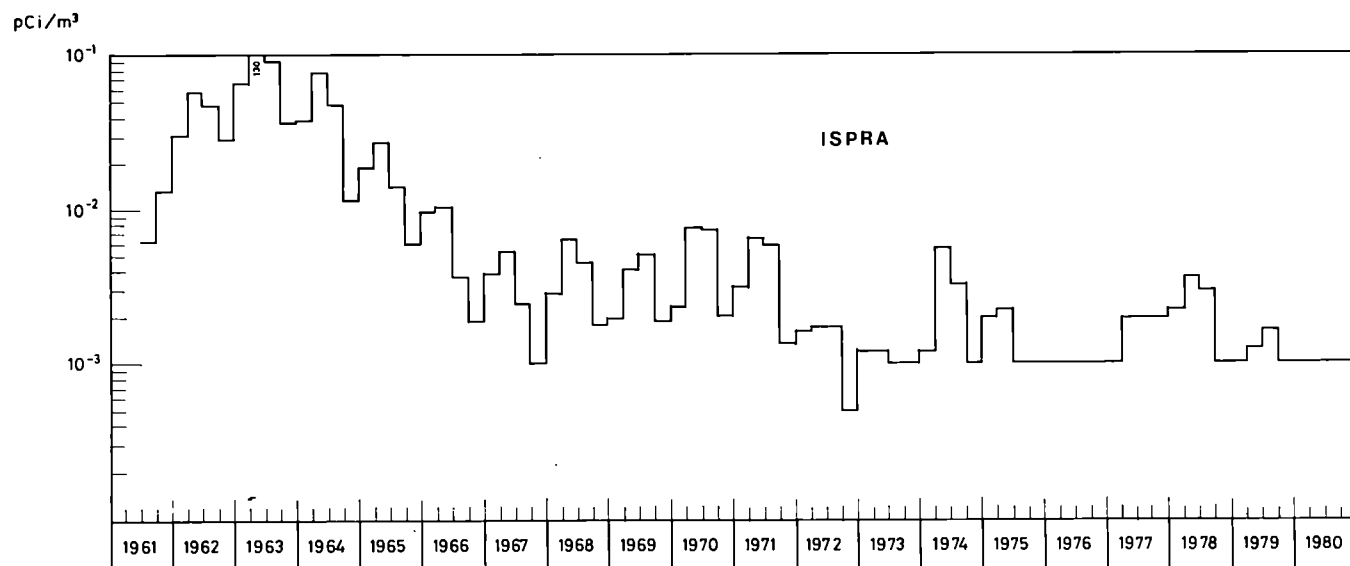
	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
<u>BELGIQUE/BELGIË</u>														
Mol.....	1.55	2.01	2.03	2.61	2.77	1.07	0.40	1.34	0.83	0.35	1.09	1.26	1.28	0.66
Brasschaat	1.58	2.13	2.02	2.55	2.78	0.97	0.44	1.23	0.83	0.28	0.84	1.19	1.17	0.48
Florennes	1.72	2.29	2.09	2.62	2.91	1.10	0.51	1.44	0.86	0.33	0.91	1.23	1.00	0.58
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	0.45
Koksijde	-	-	-	-	-	-	-	-	-	0.30	0.78	1.16	1.07	0.47
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	0.43
Bruxelles,IHE	-	-	-	-	-	-	0.30	0.91	0.52	0.26	0.72	0.75	0.85	0.40
<u>DENMARK</u>														
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	0.27
<u>DEUTSCHLAND</u>														
Heidelberg	1.34	1.40	0.95	-	-	-	-	-	-	-	-	-	-	-
<u>EURATOM</u> : 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	0.2
<u>FRANCE</u>														
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	0.39
Orsay (CEA)	-	-	-	1.89	1.90	0.98	0.40	1.24	0.75	0.27	0.89	0.89	0.28	0.16
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	0.17
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	0.14
<u>UNITED KINGDOM</u>														
Chilton	1.56	2.07	1.22	1.80	1.86	-	-	-	-	-	-	-	-	-

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)

^{137}Cs IN AIR NEAR GROUND LEVEL
1967 - 1980

10^{-3} pCi/m³ \bar{x}_a Table 4

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
<u>BELGIQUE/BELGIË</u>														
Mol	-	-	-	5.0	6.0	3.6	2.8	4.4	2.3	1.6	2.53	2.1	1.14	0.66
Bruxelles IHE	-	-	-	-	-	-	0.63	3.3	<1.1	<0.4	<1.5	<1.6	<0.4	<0.2
<u>DENMARK</u>														
Risø	2.1	2.4	2.4	3.4	2.7	1.37	0.47	1.96	1.30	0.42	1.62	1.70	0.62	0.24
<u>DEUTSCHLAND</u>														
Karlsruhe	-	-	-	-	-	-	-	-	-	-	-	-	<0.95	<0.52
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	0.211
Jülich	-	-	-	-	-	-	-	-	-	-	(1.84)	2.015	<0.6	(0.47)
<u>EURATOM</u>														
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	≤1.0
<u>FRANCE</u>														
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	A.A.S. (**)
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	0.21
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	1.11
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	0.19
<u>UNITED KINGDOM</u>														
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	0.24
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	0.20
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	0.43
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	0.20
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	0.14
Chilton (NRPB) ...	-	-	-	-	-	-	-	-	-	0.44	1.4	(*)	(*)	(*)
Glasgow	-	-	-	-	-	-	-	-	-	0.26	1.0	1.6	0.46	0.24
Shrivenham	-	-	-	-	-	-	-	-	-	0.33	1.3	2.1	0.54	0.36

(*) no longer sampled

(**) measurement threshold : $5,4 \times 10^{-3}$ pCi/m³

TOTAL BETA IN AIR

Table 5

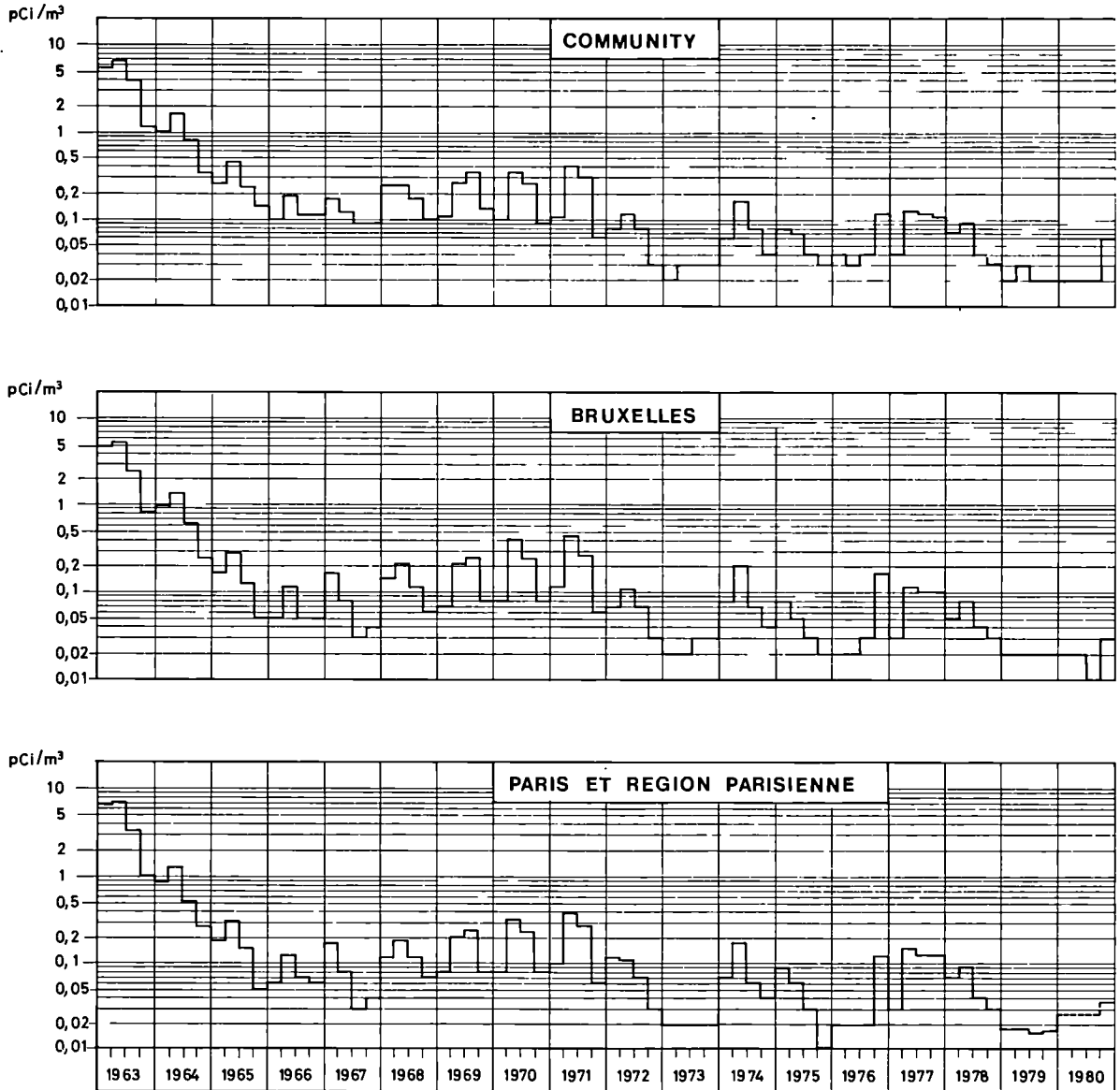
1980

pCi/m³

	1		2		3		4		5		6		7		8		9		10		11		12		$\bar{x}_a = \frac{\sum \bar{x}_m}{12}$
	\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	
Belgique/België	0.02	9	0.02	9	0.02	9	0.02	9	0.02	9	0.01	9	0.01	9	0.01	9	0.02	9	0.01	9	0.04	9	0.05	9	0.02
Denmark (*)	-		-		-		-		-		-		-		-		-		-		-		-		-
Deutschland (BR)	<0.03	12	<0.03	12	<0.03	12	<0.03	12	<0.03	12	<0.03	12	<0.03	12	<0.03	12	<0.03	12	<0.03	12	<0.04	12	<0.04	12	<0.031
France (SCPRI)	<0.021	29	0.017	30	0.017	30	0.016	30	0.017	30	0.014	30	0.013	31	0.015	31	0.021	31	0.021	32	0.058	32	0.061	32	<0.024
France (CEA)	0.025	21	0.021	21	0.020	21	0.021	21	0.023	21	0.03	21	0.018	21	0.022	21	0.026	21	0.026	21	0.052	21	0.065	21	<0.029
Greece	0.02	6	0.02	6	0.02	6	0.02	6	0.02	7	0.03	7	0.03	7	0.03	6	0.03	6	0.03	7	0.10	7	0.08	9	0.04
Ireland	0.03	1	0.01	1	0.02	1	0.02	1	0.03	1	0.01	1	0.04	2	0.03	2	0.04	2	0.03	2	0.05	2	0.05	2	0.03
Italia	<0.04	18	<0.05	18	<0.04	17	<0.04	18	<0.04	18	<0.04	17	<0.04	18	<0.05	18	<0.05	18	<0.05	18	<0.10	18	<0.10	18	<0.05
Luxembourg	-		-		-		-		-		-		-		-		-		-		-		-		-
Nederland	0.03	5	0.03	5	0.03	5	0.02	5	0.03	5	0.02	5	0.02	5	0.02	5	0.03	5	0.02	5	0.04	5	0.05	5	0.03
United Kingdom	0.012	7	0.008	7	0.01	7	0.011	7	0.011	7	0.008	6	0.006	7	0.007	7	0.008	7	0.006	7	0.156	7	0.129	7	0.03
M	<0.03	108	<0.02	109	<0.02	108	<0.02	109	<0.03	110	<0.02	108	<0.02	112	<0.02	111	<0.03	111	<0.03	113	<0.07	113	<0.07	115	<0.03

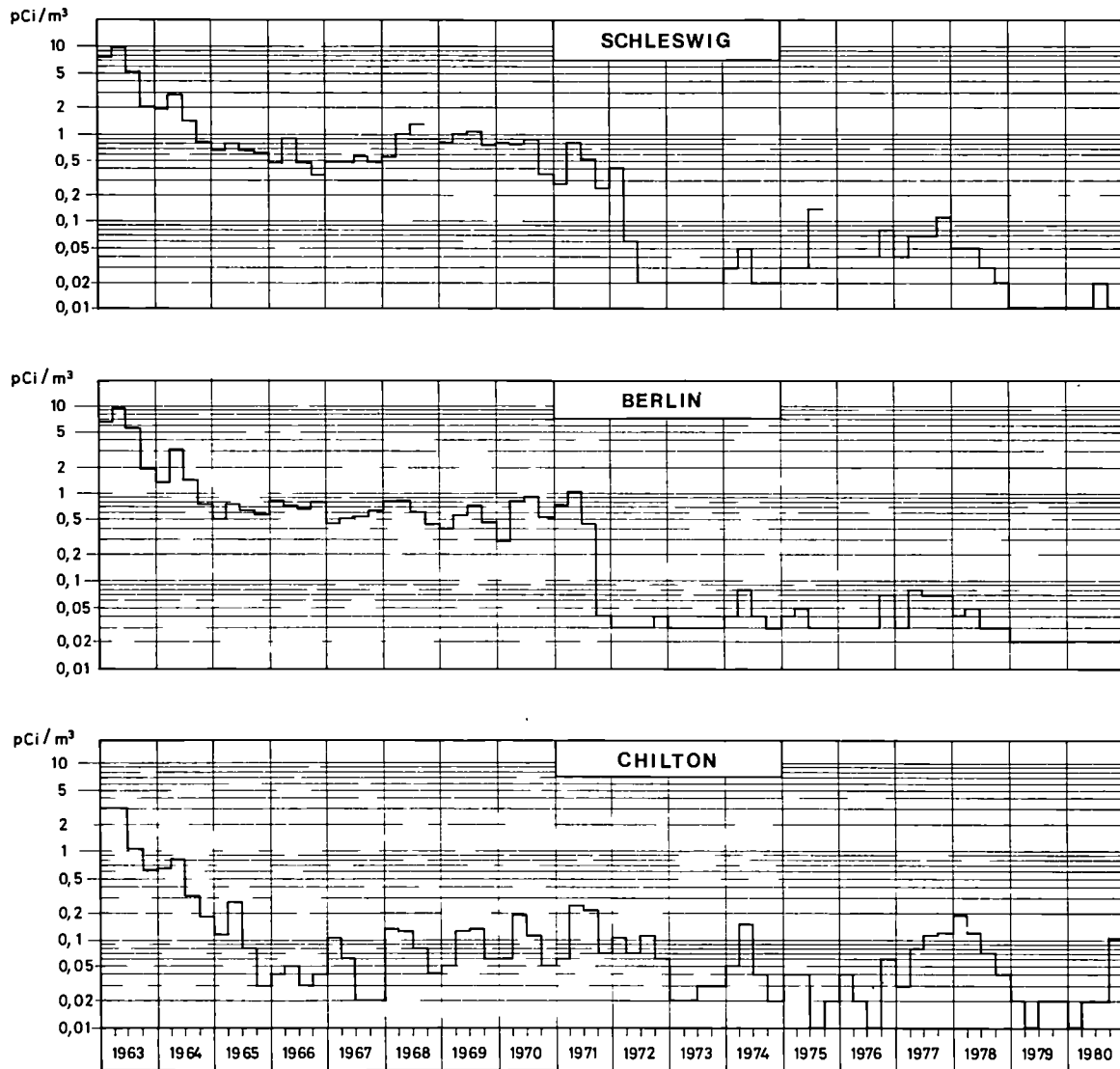
(*) Total beta measurements have been discontinued in 1980

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



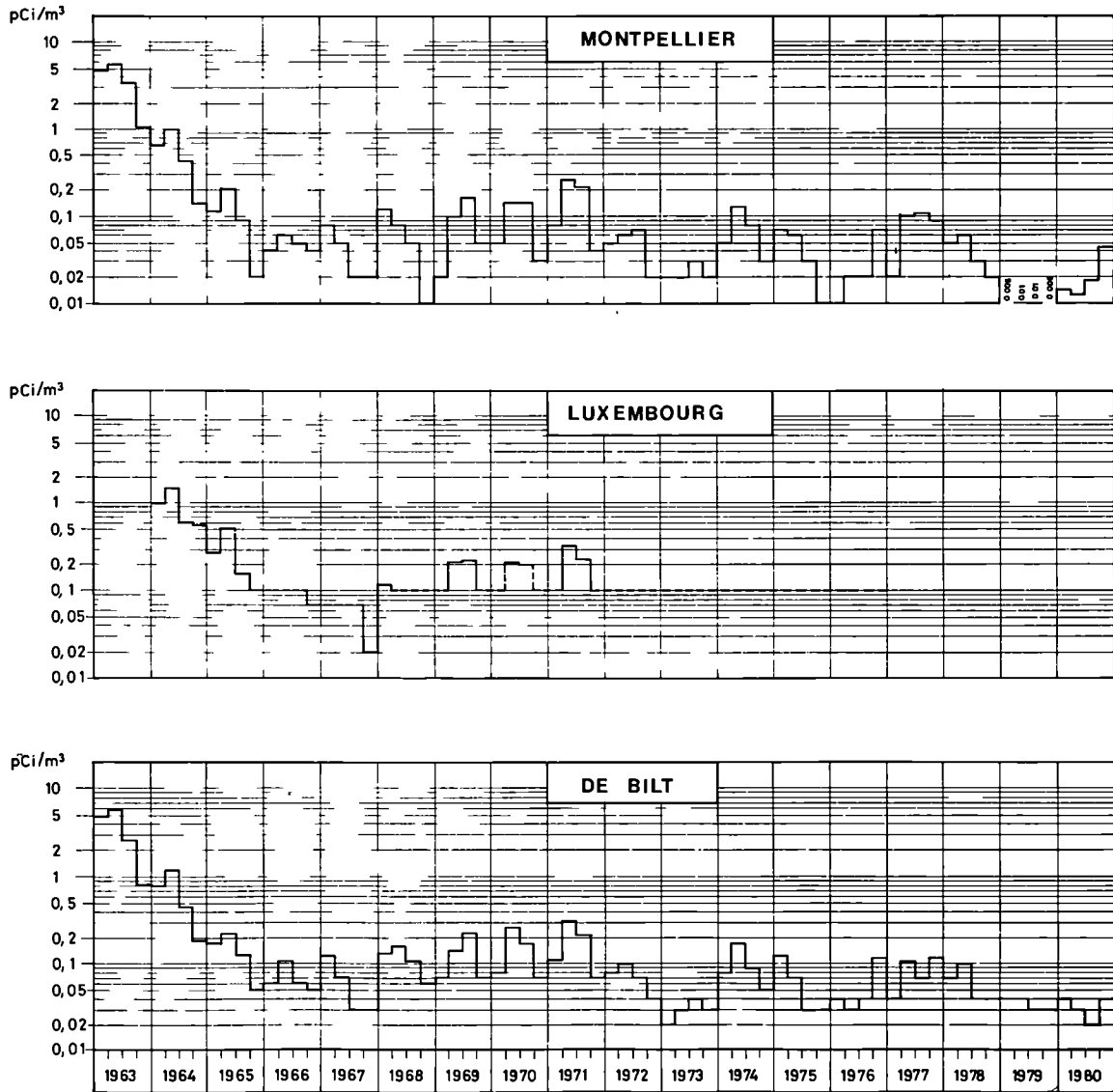
Graph 3a)

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



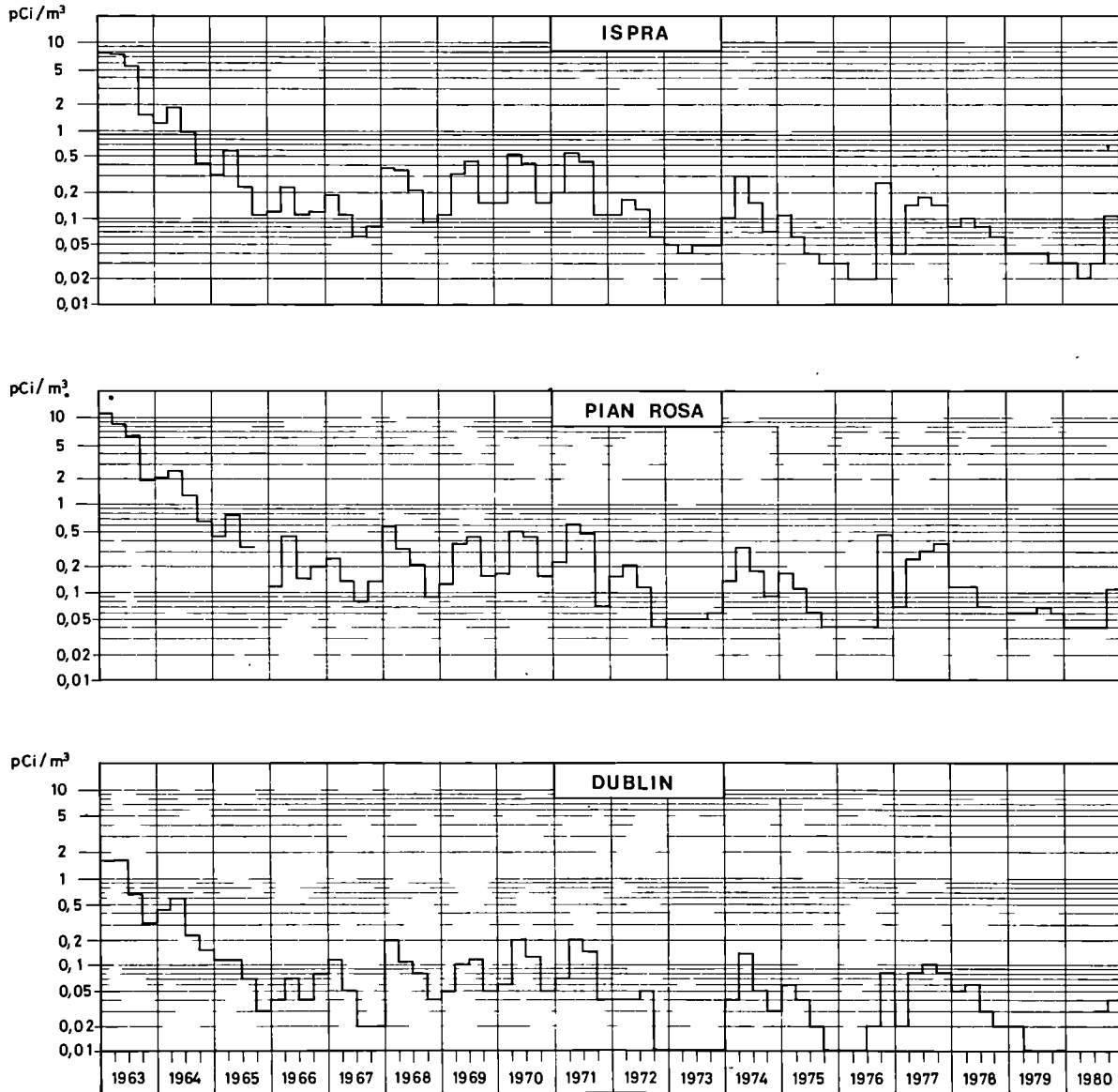
Graph 3b)

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
1962 - 1980

\bar{x}_m

pCi/m³

Table 6.1

	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
1980	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.04	0.05

TOTAL BETA IN AIR \bar{x}_m
1962 - 1980

Table 6.2

	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 measurements have been discontinued in 1980

TOTAL BETA IN AIR $\frac{-}{x_m}$
1962 - 1980

Table 6.3

	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
1980	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	< 0.03	<0.04	< 0.04

TOTAL BETA IN AIR
1962 - 1980

Table 6.4

	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
1980 (SCPRI)	<0.021	<0.017	<0.017	<0.016	<0.017	<0.014	<0.013	<0.015	<0.021	<0.021	0.058	0.061
1980 (CEA)	0.025	0.021	<0.020	<0.021	0.023	0.03	0.018	0.022	0.026	0.026	0.052	0.065

TOTAL BETA IN AIR

Table 6.5

1962 - 1980

 \bar{x}_m pCi/m³

	1	2	3	4	5	6	7	8	9	10	11	12
GREECE												
1962	3.63	2.71	3.48	3.30	3.34	2.95	2.03	1.60	2.65	2.85	3.98	3.87
1963	5.33	3.49	4.23	5.71	5.68	5.26	5.80	4.26	2.72	1.45	1.40	1.00
1964	1.33	1.09	1.15	1.46	1.72	1.75	1.32	0.79	0.45	0.56	0.69	0.59
1965	0.50	0.44	0.63	0.38	0.52	0.58	0.26	0.16	0.22	0.19	0.17	0.17
1966	0.19	0.18	0.12	0.13	0.16	0.26	0.21	0.14	0.17	0.13	0.25	0.13
1967	0.20	0.25	0.18	0.19	0.23	0.22	0.26	0.14	0.13	0.10	0.10	0.17
1968	0.28	0.30	0.30	0.47	0.41	0.35	0.28	0.40	0.30	0.20	0.13	0.17
1969	0.18	0.10	0.18	0.27	0.36	0.44	0.54	0.44	0.32	0.27	0.16	0.15
1970	0.13	0.13	0.22	0.30	0.38	0.59	0.53	0.39	0.23	0.12	0.14	0.08
1971	0.08	0.09	0.23	0.43	0.64	0.63	0.58	0.38	0.17	0.09	0.06	0.05
1972	0.07	0.09	0.08	0.13	0.16	0.22	0.19	0.11	0.07	0.03	0.03	0.03
1973	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04
1974	0.05	0.08	0.14	0.22	0.28	0.23	0.16	0.11	0.08	0.06	0.06	0.06
1975	0.09	0.09	0.14	0.16	0.09	0.02	0.06	0.04	0.05	0.03	0.03	0.02
1976	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.03	0.28	0.14	0.03
1977	0.03	0.03	0.07	0.12	0.23	0.23	0.25	0.02	0.14	0.27	0.09	0.07
1978	0.06	0.08	0.18	0.13	0.13	0.12	0.09	0.08	0.05	0.03	0.03	0.02
1979	0.03	0.02	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03
1980	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.10	0.08

TOTAL BETA IN AIR $\times 10^3$
1962 - 1980

Table 6.6

	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
1980	0.03	0.01	0.02	0.02	0.03	0.01	0.04	0.03	0.04	0.03	0.05	0.05

TABLE BETA IN AIR \bar{x}_m
1962 - 1980

Table 6.7

		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
	1980	< 0.04	< 0.05	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.05	< 0.05	< 0.05	< 0.10	0.10

TOTAL BETA IN AIR
1962 - 1980

Table 6.8

\bar{x}_m pCi/m³

	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	-	-	-	-	-	-	-	-	-	-	-	-
1980	-	-	-	-	-	-	-	-	-	-	-	-

TOTAL BETA IN AIR \bar{x}_m
1962 - 1980

Table 6.9

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
1980	0.03	0.03	0.03	0.02	0.03	0.02	0.02	0.02	0.03	0.02	0.04	0.05

TOTAL BETA IN AIR
1962 - 1980

$\times 10^{-3}$

pCi/m³

Table 6.10

	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
1980	0.012	0.008	0.010	0.011	0.011	0.008	0.006	0.007	0.008	0.006	0.156	0.129

TOTAL BETA IN AIR \bar{x}_m
1962 - 1980

Table 6.11

	pCi/m ³											
	1	2	3	4	5	6	7	8	9	10	11	12
COMMUNITY												
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
1980	< 0.03	< 0.02	< 0.02	< 0.02	< 0.03	< 0.02	< 0.02	< 0.02	< 0.03	< 0.03	< 0.07	< 0.07

TOTAL BETA IN AIR
1962 - 1980

\bar{x}_a

pCi/m³

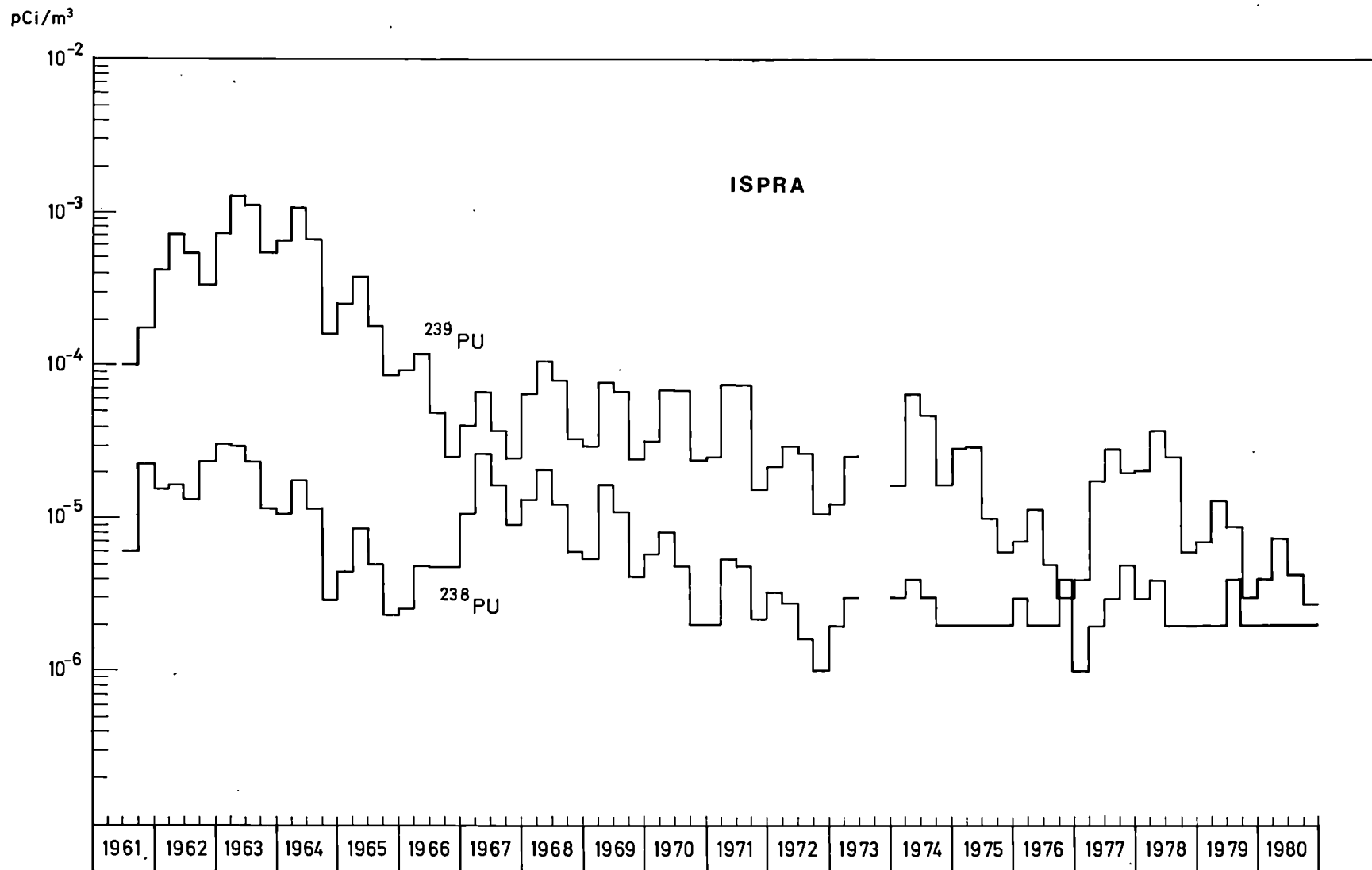
Table 7

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
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	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	<0.031
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	<0.024
FRANCE (CEA)	-	-	-	-	-	-	-	-	-	-	-	0.023	0.094	0.045	0.05	0.098	0.057	0.020	<0.029
GREECE (++)	3.03	3.86	1.08	0.35	0.17	0.18	0.30	0.28	0.27	0.29	0.10	0.03	0.13	0.07	0.06	0.14	0.08	0.03	0.04
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	0.03
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	<0.05
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	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	0.03
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	<0.03

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

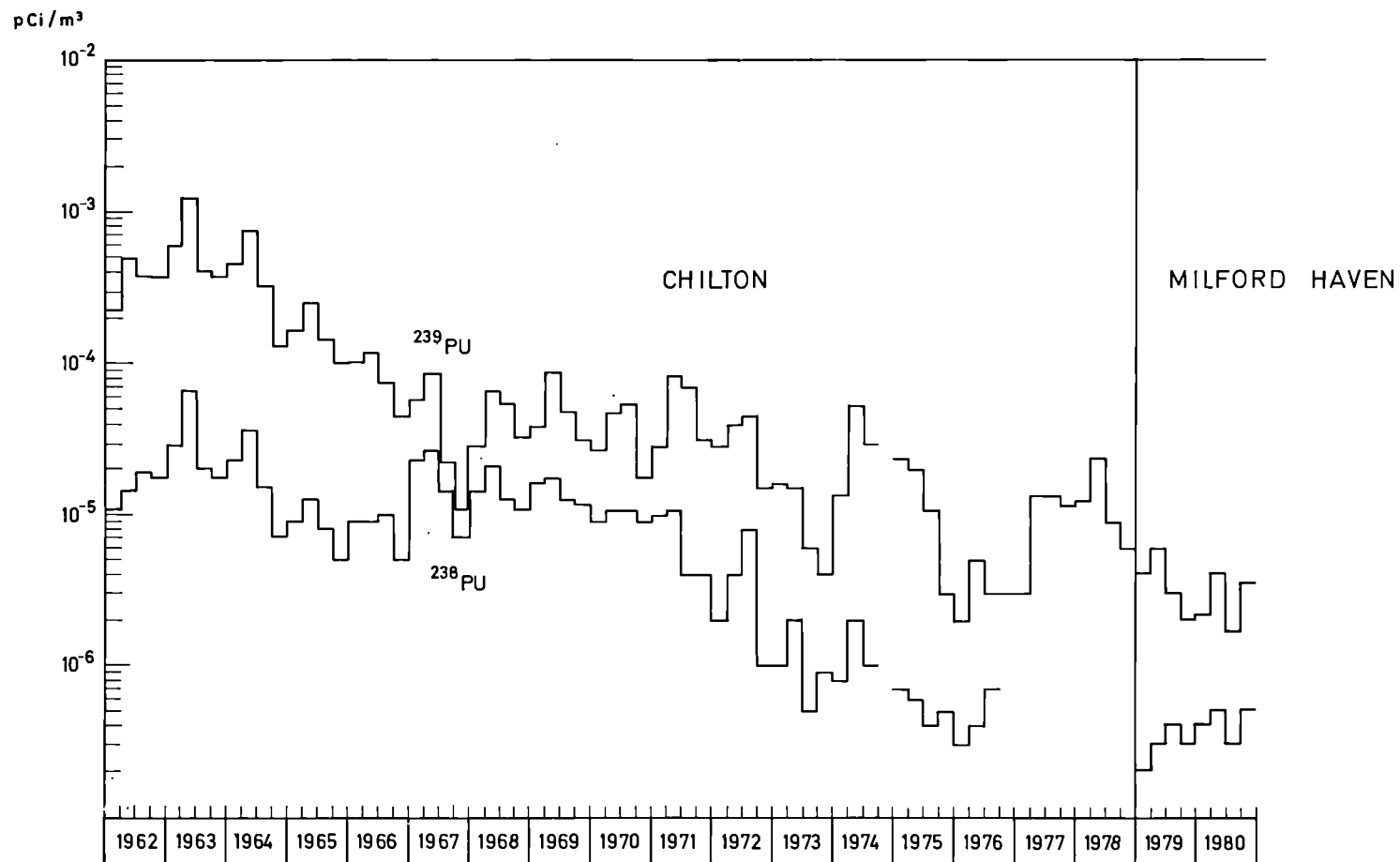
(++) the values of Greece are calculated in the average only since 1980.

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.) 1979-1980



Graph 4b)

Table 8

$^{238}\text{Pu} - ^{239}\text{Pu}$ IN AIR

1980

10^{-6} pCi/m³

	MILDFORD HAVEN (U.K.)		ISPRA (Italy)	
	^{238}Pu	^{239}Pu	^{238}Pu	^{239}Pu
January	< 0.3	1.1	≤ 2	4
February	~ 0.5	3.4	≤ 2	5
March	~ 0.3	2.1	≤ 2	3
April	~ 0.3	3.7	≤ 2	6
May	~ 0.6	5.8	≤ 2	8
June	~ 0.6	2.6	≤ 2	8
July	~ 0.4	2.7	≤ 2	8
August	< 0.3	1.1	≤ 2	3
September	< 0.3	1.2	≤ 2	2
October	< 0.2	0.7	≤ 2	≤ 2
November	~ 1.0	7.4	≤ 2	≤ 2
December	< 0.4	2.5	≤ 2	4
M	< 0.4	2.9	≤ 2	< 5

Table 9

$^{239}\text{Pu} + ^{240}\text{Pu}$ IN AIR

1980

UNITED KINGDOM (NRPB results)

10^{-6} pCi/m³

	SHRIVENHAM	GLASGOW
	January	} 2.4
February		
March	} 7.6	} 5.7
April		
May		
June	} 3.2	} 1.9
July		
August	} 4.6	} 12
September		
October		
November		
December		
M	4.5	5.6

ARTIFICIAL RADIOACTIVITY
OF DEPOSITION

RADIOACTIVE FALLOUT
Sampling points and measuring stations for specific radionuclides



Map 3

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN

1980

mCi/km²

Table 10.1

BELGIQUE/BELGIË

	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	36.3	0.21	0.0147	52.5	0.32	0.0093	44.3	0.25	0.0046	47.9	0.27	0.0160
February	44.3	0.23	0.0112	58.8	0.24	0.0162	61.1	0.28	0.0167	68.6	0.28	0.0181
March	68.7	0.41	0.0118	72.9	0.31	0.0109	66.6	0.36	0.0155	86.1	0.35	0.0142
April	26.0	0.23	0.0113	31.5	0.27	0.0119	26.4	0.24	0.0143	34.4	0.24	0.0109
May	32.6	0.31	0.0207	36.7	0.35	0.0135	59.2	0.40	0.0186	27.9	0.34	0.0136
June	83.7	0.46	0.0327	77.4	0.50	0.0270	94.0	0.59	0.0301	89.4	0.54	0.0174
July	144.4	0.75	0.0258	162.4	0.66	0.0159	193.1	0.60	0.0186	136.8	0.53	0.0187
August	34.7	0.18	0.0108	56.6	0.30	0.0115	71.8	0.39	0.0132	52.9	0.33	0.0150
September	17.9	0.17	0.0101	31.8	0.26	0.0117	26.6	0.13	0.0102	37.7	0.29	0.0054
October	93.0	0.64	0.0097	78.0	0.75	0.0084	98.1	0.89	0.0058	66.8	0.78	0.0044
November	37.5	1.61	0.0068	49.7	1.49	0.0056	67.8	2.23	0.0065	37.5	2.16	0.0096
December	49.0	1.83	0.0143	85.5	2.54	0.0090	83.4	2.51	0.0118	58.5	2.24	0.0094
Total	668	7.04	0.180	793	7.99	0.151	892.4	8.87	0.166	744.5	8.35	0.153

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN

1980

Table 10.2

BELGIQUE/BELGIË

mCi/km²

	Kleine Brogel			Schaffen			Uccle Bruxelles		
	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	50.0	0.25	0.0096	31.9	0.22	0.0105	51.5	0.18	-
February	56.8	0.25	0.0191	42.2	0.16	0.0158	55.8	0.15	0.008
March	60.2	0.25	0.0100	65.2	0.31	0.0076	104.9	0.27	0.005
April	34.2	0.24	0.0119	25.9	0.23	0.0095	43.6	0.16	0.016
May	25.7	0.24	0.0120	33.8	0.29	0.0136	67.2	0.15	0.019
June	77.3	0.52	0.0177	75.9	0.78	0.0244	101.4	0.46	0.029
July	180.9	0.98	0.0303	102.8	0.41	0.0256	177.3	0.43	0.024
August	64.3	0.37	0.0164	42.2	0.20	0.0135	69.7	0.35	0.015
September	38.7	0.23	0.0076	32.9	0.25	0.0079	15.6	0.10	0.005
October	77.9	0.58	0.0052	51.4	0.56	0.0031	91.3	0.39	0.0073
November	42.9	1.51	0.0072	22.0	1.07	0.0089	48.9	0.75	0.0062
December	74.8	2.01	0.0196	43.9	1.42	0.0107	85.9	1.56	0.0116
Total	783.7	7.43	0.167	570.1	5.90	0.151	913.1	4.95	0.146

SPECIFIC RADIONUCLIDES MEASUREMENTS IN RAIN

1980

Table 10.3

RISØ - DENMARK		mCi/km ²									
	rain l/m ²	⁹⁰ Sr	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba	¹⁴⁰ La	¹⁴¹ Ce	¹⁴⁴ Ce
January	24	0.003					0.003				
February	20	0.002					0.003				
March	16	0.003					0.004				
April	28	0.005					0.008				
May	10	0.004					0.004				
June	76	0.019					0.020				
July	83	0.013					0.018				
August	41	0.006					0.007				
September	72	0.004					0.006				
October	76	0.004	0.019	0.006	0.038	0.078	{0.004 0.001}	0.078	0.064	0.026	-
November	61	0.004	0.122	0.108	0.26	0.108	0.006	0.30	0.31	0.122	0.035
December	38	0.004	0.118	0.129	0.178	0.015	0.004	0.10	0.090	0.085	0.032
Total	545	0.07	-	-	-	-	0.09	-	-	-	-

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN

1980

Table 10.4

JÜLICH - DEUTSCHLAND

	mCi/km ²												
	rain l/m ²	total beta	³ H	⁷ Be	⁵⁴ Mn	⁵⁹ Fe	⁶⁰ Co	⁸⁹ Sr	⁹⁰ Sr	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	
January	30.9	<0.20	N.M.	0.800	N.M.	N.M.	N.M.	}0.008	}0.020	N.M.	N.M.	N.M.	
February	18.8	<0.20	N.M.	1.198	N.M.	N.M.	N.M.			N.M.	N.M.	N.M.	N.M.
March	64.8	1.0	N.M.	1.750	N.M.	N.M.	N.M.			N.M.	N.M.	N.M.	N.M.
April	59.1	<0.25	N.M.	2.830	N.M.	N.M.	N.M.	}0.033	}0.017	N.M.	N.M.	N.M.	
May	18.4	<0.32	N.M.	0.210	N.M.	N.M.	N.M.			N.M.	N.M.	N.M.	N.M.
June	62.2	0.34	N.M.	3.090	N.M.	N.M.	N.M.			N.M.	N.M.	N.M.	N.M.
July	172.6	<0.32	N.M.	6.450	N.M.	N.M.	N.M.	}0.026	}0.020	N.M.	N.M.	N.M.	
August	51.9	<0.42	N.M.	1.940	N.M.	N.M.	N.M.			N.M.	N.M.	N.M.	N.M.
September	31.5	<0.22	N.M.	1.955	N.M.	N.M.	N.M.			N.M.	N.M.	N.M.	N.M.
October	46.9	<0.33	N.M.	0.810	N.M.	N.M.	N.M.	}0.260	}0.027	N.M.	N.M.	N.M.	
November	51.4	<0.50	N.M.	2.350	N.M.	N.M.	N.M.			N.M.	0.128	0.102	0.164
December	59.7	0.70	N.M.	1.800	N.M.	N.M.	N.M.			N.M.	0.147	0.172	0.213
Total	668.2	<4.80	N.M.	25.183	N.M.	N.M.	N.M.	<0.327	0.084	0.275	0.274	0.377	

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SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN

1980

Table 10.4 a)
continued

JÜLICH - DEUTSCHLAND

mCi/km²

	¹⁰⁶ Rh	¹²⁴ Sb	¹²⁵ Sb	¹³¹ J	¹³⁷ Cs	¹⁴⁰ Ba	¹⁴⁰ La	¹⁴¹ Ce	¹⁴⁴ Ce	¹⁴⁴ Pr	¹⁴⁷ Nd
January	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
February	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
March	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
April	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
May	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
June	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
July	N.M.	N.M.	N.M.	N.M.	0.039	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
August	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
September	N.M.	N.M.	N.M.	N.M.	0.023	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
October	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
November	N.M.	N.M.	N.M.	N.M.	N.M.	0.019	0.088	0.057	0.092	N.M.	N.M.
December	N.M.	N.M.	N.M.	N.M.	0.004	N.M.	0.054	0.115	N.M.	N.M.	N.M.
Total	N.M.	N.M.	N.M.	N.M.	0.066	0.019	0.142	0.172	0.092	N.M.	N.M.

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN

1980

Table 10.5

OFFENBACH - DEUTSCHLAND

	mCi/km ²									
	rain l/m ²	total beta	⁷ Be	⁵¹ Cr	⁵⁴ Mn	⁵⁷ Co	⁵⁸ Co	⁵⁹ Fe	⁶⁰ Co	⁶⁵ Zn
January	44.7	0.286	2.778	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
February	60.5	0.086	1.857	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
March	42.6	0.263	1.393	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
April	30.4	0.122	1.283	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
May	50.2	0.196	2.038	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
June	87.0	0.632	4.710	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
July	109.1	0.410	3.585	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
August	48.7	0.227	4.144	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
September	34.1	0.335	3.029	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
October	39.6	0.795	2.652	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
November	34.6	0.412	1.298	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
December	46.5	0.566	1.079	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
Total	628.0	4.330	29.846	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.

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SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1980

Table 10.5 a)
continued

OFFENBACH - DEUTSCHLAND

	^{89}Sr	^{90}Sr	^{91}Y	^{95}Zr	^{95}Nb	^{103}Ru	^{106}Ru	$^{110\text{m}}\text{Ag}$	^{124}Sb	^{125}Sb
January	N.M.	0.007	0.008	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	0.006
February	N.M.	0.007	0.009	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	0.008
March	N.M.	0.008	0.004	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	0.008
April	N.M.	0.011	0.003	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	0.005
May	N.M.	0.009	0.006	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	0.014
June	N.M.	0.031	0.010	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	0.017
July	N.M.	0.019	0.008	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	0.016
August	N.M.	0.006	0.006	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	0.011
September	N.M.	0.005	0.004	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	0.006
October	0.007	0.006	0.004	0.014	0.009	0.044	N.M.	N.M.	N.M.	0.004
November	0.109	0.005	0.006	0.153	0.205	0.274	N.M.	N.M.	N.M.	0.015
December	0.140	0.005	0.005	0.163	0.278	0.284	0.019	N.M.	N.M.	0.035
Total	0.256	0.119	0.073	0.330	0.492	0.602	0.019	N.M.	N.M.	0.145

mCi/km²

% continued in next page

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1980

Table 10.5 b)
continued

OFFENBACH - DEUTSCHLAND	mCi/km ²												
	¹³¹ J	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁰ Ba	¹⁴⁰ La	¹⁴¹ Ce	¹⁴⁴ Ce						
January	N.M.	N.M.	0.009	N.M.	N.M.	N.M.	0.005						
February	N.M.	N.M.	0.009	N.M.	N.M.	N.M.	0.014						
March	N.M.	N.M.	0.008	N.M.	N.M.	N.M.	0.011						
April	N.M.	N.M.	0.008	N.M.	N.M.	N.M.	0.011						
May	N.M.	N.M.	0.014	N.M.	N.M.	0.020	N.M.						
June	N.M.	N.M.	0.031	N.M.	N.M.	N.M.	0.030						
July	N.M.	N.M.	0.021	N.M.	N.M.	N.M.	0.036						
August	N.M.	N.M.	0.011	N.M.	N.M.	N.M.	0.020						
September	N.M.	N.M.	0.005	N.M.	N.M.	N.M.	0.007						
October	0.087	N.M.	0.005	0.029	N.M.	0.015	0.006						
November	0.076	N.M.	0.004	0.013	N.M.	0.081	0.021						
December	0.012	N.M.	0.005	0.059	N.M.	0.079	0.029						
Total	0.175	N.M.	0.130	0.101	N.M.	0.195	0.190						

SPECIFIC RADIONUCLIDES IN RAIN

1980

Table 10.6

LE BARP BORDEAUX (CEA) - FRANCE

mCi/km²

	rain l/m ²	⁷ Be	⁸⁹ Sr	⁹⁰ Sr	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³⁷ Cs
January	121	3.146	-	0.006	-	-	-	-	-	0.013
February	26	1.846	-	0.005	-	-	-	-	-	0.009
March	97	2.328	-	0.005	-	-	-	< 0.007	< 0.005	< 0.002
April	26	1.248	-	-	-	-	-	< 0.003	-	0.026
May	121	6.050	-	0.017	-	-	-	0.033	0.007	0.046
June	102	5.304	-	0.012	-	-	-	0.032	0.009	0.032
July	72	3.312	-	0.004	-	-	-	0.003	0.007	0.029
August	27	1.890	-	0.004	-	-	-	< 0.002	< 0.002	0.006
September	47	2.209	-	0.006	-	-	-	< 0.003	< 0.004	0.004
October	160	4.320	-	0.008	0.058	0.046	0.176	< 0.003	< 0.005	0.013
November	43	1.591	0.022	0.005	0.098	0.099	0.198	< 0.017	< 0.005	< 0.003
December	76	1.900	0.167	0.002	0.182	0.243	0.357	< 0.010	< 0.004	< 0.002
Seuil pCi/l		41	-	0.41	6.8		6.8	41	6.8	6.8
Total	918	35.144	0.189	0.074	0.338	0.388	0.731	< 0.113	< 0.048	< 0.185

Notice concerning data for France : pages 29DA, 49DE, 69EN, 89FR, 109IT, 129NL

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SPECIFIC RADIONUCLIDES IN RAIN

1980

Table 10.6 a)
continued

LE BARP BORDEAUX (CEA) - FRANCE

mCi/km²

	¹⁴⁰ Ba	¹⁴⁰ La	¹⁴¹ Ce	¹⁴⁴ Ce					
January	-	-	-	0.022					
February	-	-	-	0.013					
March	-	-	-	< 0.002					
April	-	-	-	0.018					
May	-	-	-	0.048					
June	-	-	-	< 0.024					
July	-	-	-	0.017					
August	-	-	-	0.008					
September	-	-	-	< 0.003					
October	1.120	0.864	0.091	0.013					
November	-	-	0.168	0.022					
December	-	-	0.160	0.046					
Seuil	41		41	41					
Total	1.120	0.864	0.419	<0.236					

Notice concerning data for France : pages 29DA, 49DE, 69EN, 89FR, 109IT, 129NL

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN

1980

Table 10.7

LE VESINET - SCPRI - FRANCE

mCi/km²

	rain l/m ²	total beta	⁷ Be	⁵⁴ Mn	⁹⁰ Sr	⁹⁵ Zr/Nb	¹⁰³ Ru	¹⁰⁶ Ru/Rh	¹²⁵ Sb	¹³⁷ Cs
January	27.3	A.A.S.	0.73	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.
February	47.7	"	1.3	"	0.0041	"	"	"	"	"
March	86.6	0.38	2.9	"	0.013	"	"	"	"	"
April	8.1	A.A.S.	0.48	"	0.0024	"	"	"	"	"
May	48.4	0.36	3.2	"	0.014	"	"	"	"	0.021
June	59.9	A.A.S.	1.3	"	0.0095	"	"	"	"	A.A.S.
July	106.5	"	3.3	"	0.012	"	"	"	"	"
August	24.3	"	1.0	"	0.0025	"	"	"	"	"
September	29.6	"	1.2	"	0.0024	"	"	"	"	"
October	55.2	0.27	1.2	"	A.A.S.	"	"	"	"	"
November	51.0	0.69	2.1	"	0.0062	0.21	0.29	"	"	"
December	80.4	1.0	2.5	"	0.0085	0.36	0.41	"	"	"
Total	625.0	< 3.8	23	A.A.S.	0.078	< 0.85	0.75 ⁽¹⁾	A.A.S.	A.A.S.	< 0.24
Measurement threshold pCi/l	/	6.8	/	6.8	0.41	6.8	6.8	41	6.8	6.8

The totals have been computed taking into account the real values instead of the measurement threshold

(1) In this case total not preceded by < ; partially due to the contribution of the last 2 months.

Notice concerning data for France : pages 29DA, 49DE, 69EN, 89FR, 109IT, 129NL ./.continued in next page

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN

1980

Table 10.7a)
continued

LE VESINET - SCPRI - FRANCE				mCi/km ²			
	¹⁴⁰ Ba/La	¹⁴¹ Ce	¹⁴⁴ Ce/Pr				
January	A.A.S.	A.A.S.	A.A.S.				
February	"	"	"				
March	"	"	"				
April	"	"	"				
May	"	"	"				
June	"	"	"				
July	"	"	"				
August	"	"	"				
September	"	"	"				
October	"	"	"				
November	0.74	0.13	"				
December	A.A.S.	A.A.S.	"				
Total	< 2.4	< 0.45	A.A.S.				
Measurement threshold pCi/l	41	41	41				

The totals have been computed taking into account the real values instead of the measurement threshold.
Notice concerning data for France pages 29DA, 49DE, 69EN, 89FR, 109IT, 129NL

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN DEPOSITION

1980

Table 10.8

ATHENS - GREECE

mCi/km²

	total beta	⁷ Be	⁵⁴ Mn	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Ru	¹³⁷ Cs		
January	0.32							0.020		
February	0.14							0.010		
March	0.38							0.020		
April	0.61							0.040		
May	0.79							0.020		
June	0.15							0.010		
July	0.10							0.010		
August	0.23							0.010		
September	0.17							-		
October	4.30	0.95	0.01	0.51	0.43	0.65	0.020	0.030		
November	1.42	0.28	0.01	0.19	0.97	0.40	0.001	0.020		
December	3.56	0.70	0.01	0.94	6.38	1.62	0.040	0.040		
Total	12.17	-	-	-	-	-	-	0.230		

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN DEPOSITION

1980

Table 10.9

N.R.C. "DEMOCRITOS" - GREECE

mCi/km²

	total beta	⁷ Be	⁵⁴ Mn	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Ru	¹³⁷ Cs		
January	0.33							0.010		
February	0.13							0.010		
March	0.37							0.030		
April	0.61							0.050		
May	0.62							0.030		
June	0.25							0.040		
July	0.09							0.010		
August	0.14							0.010		
September	0.13	0.07	0.009	0.04	0.10	0.03	-	0.001		
October	4.11	0.88	0.006	0.38	0.35	0.64	0.012	0.030		
November	1.63	0.23	0.020	0.17	0.19	0.79	-	0.010		
December	7.82	1.53	0.260	3.17	9.49	2.62	0.14	0.160		
Total	16.23	-	-	-	-	-	-	0.391		

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1980

Table 10.10

CCR - EURATOM - ISPRA - ITALIA

mCi/km²

	rain l/m ²	total beta	⁷ Be	⁸⁹ Sr	⁹⁰ Sr	⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Ru	¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba	¹⁴⁰ La	¹⁴¹ Ce
January	77.0	0.26	0.65	(*)	0.005	-	-	0.60	-	≤0.01	-	-	-
February	1.0	0.10	0.44	0.005	0.005	-	-	0.18	-	0.01	-	-	-
March	211.8	0.51	1.27	0.005	0.007	-	-	0.53	-	0.02	-	-	-
April	4.4	0.18	0.05	0.005	0.005	-	-	0.56	-	≤0.01	-	-	-
May	217.6	0.65	4.21	0.012	0.027	-	-	0.50	-	0.05	-	-	-
June	285.4	0.60	4.87	0.005	0.036	-	-	0.50	-	0.06	-	-	-
July	94.0	0.42	1.53	0.005	0.012	-	-	0.42	-	0.03	-	-	-
August	133.0	0.55	3.66	0.005	0.012	-	-	0.43	-	0.02	-	-	-
September	65.4	0.52	1.96	0.005	0.005	-	-	0.44	-	0.02	-	-	-
October	172.4	0.40	2.23	0.024	0.006	-	0.01	0.40	0.03	≤0.01	-	0.02	-
November	47.8	0.33	0.74	0.108	0.005	0.01	0.07	0.05	0.01	≤0.01	0.01	0.04	0.07
December	3.4	0.17	0.15	0.027	0.005	0.03	0.03	0.40	-	≤0.01	-	-	0.01
Total	1313.2	4.69	21.76	0.206	0.130	0.04	0.11	5.01	0.04	≤0.26	0.01	0.06	0.08

(*) misura non effettuata
- Inferiore alla sensibilità

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN

1980

Table 10.11

CASACCIA - ITALIA		mCi/km ²									
	rain l/m ²	⁷ Be	⁵⁴ Mn	⁹⁰ Sr	⁹⁵ Zr	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³⁷ Cs	¹⁴¹ Cs	¹⁴⁴ Ce
January	156	5.60	(*)	0.017	(*)	(*)	0.020	0.071	0.028	(*)	0.030
February	21	1.80	(*)	0.008	(*)	(*)	0.005	0.020	0.009	(*)	0.013
March	62	4.20	(*)	0.017	(*)	(*)	0.002	0.008	0.020	(*)	0.032
April	31	4.10	(*)	0.014	(*)	(*)	0.002	0.006	0.017	(*)	0.023
May	108	4.70	(*)	0.022	(*)	(*)	0.021	0.010	0.030	(*)	0.036
June	10	0.70	(*)	0.007	(*)	(*)	0.011	0.003	0.011	(*)	0.009
July	1	0.70	(*)	0.005	(*)	(*)	(*)	(*)	0.008	(*)	0.009
August	58	3.00	(*)	0.011	(*)	(*)	(*)	0.007	0.014	(*)	0.010
September	1	0.15	(*)	0.003	(*)	(*)	(*)	(*)	0.002	(*)	(*)
October	124	5.35	(*)	0.010	0.020	0.07	(*)	0.012	0.002	(*)	(*)
November	193	8.75	0.004	0.018	0.650	1.00	0.060	(*)	0.025	1.07	0.271
December	66	3.30	0.005	0.015	0.760	0.70	0.064	(*)	0.013	0.64	0.315
Total	831	42.35	0.009	0.147	1.430	1.77	0.185	0.137	0.179	1.71	0.748

(*) N.M. = not measured

SPECIFIC RADIONUCLIDES MEASUREMENTS IN RAIN

1980

Table 10.12

FIASCHERINO (La Spezia) - ITALIA

mCi/km²

	rain l/m ²	⁷ Be	⁹⁵ Zr	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³⁷ Cs	¹⁶¹ Ce	¹⁶⁶ Ce
January	92	5.45	< 0.003	< 0.003	< 0.014	0.009	0.019	< 0.004	0.025
February	62	3.44	< 0.003	< 0.002	0.009	0.006	0.014	< 0.003	0.020
March	165	6.29	< 0.004	< 0.004	0.025	0.013	0.034	< 0.006	0.029
April	60	8.99	< 0.003	< 0.002	0.032	0.015	0.050	< 0.004	0.045
May	74	4.90	< 0.004	< 0.003	0.013	0.007	0.026	< 0.004	0.025
June	51	5.23	< 0.003	< 0.002	0.031	0.013	0.037	< 0.004	0.026
July	19	3.20	< 0.003	< 0.002	< 0.014	0.004	0.020	< 0.003	0.012
August	54	5.84	< 0.003	< 0.002	< 0.011	0.009	0.017	< 0.002	0.018
September	14	1.30	< 0.005	< 0.003	< 0.018	< 0.005	0.006	< 0.004	< 0.009
October	265	19.32	0.107	0.189	0.034	0.014	0.044	0.204	0.078
November	156	8.24	0.672	1.086	0.062	< 0.016	0.015	0.681	0.219
December	43	6.71	1.348	1.625	0.173	0.036	0.032	1.063	0.411
Total	1055	78.91	< 2.158	< 2.923	< 0.436	< 0.147	0.314	< 1.982	< 0.917

SPECIFIC RADIONUCLIDES MEASUREMENTS IN RAIN

1980

Table 10.13

PARMA - ITALIA

mCi/km²

	rain l/m ²	⁷ Be	⁹⁵ Nb	⁹⁵ Zr	¹⁰³ Ru	¹⁰⁶ Ru	¹³⁷ Cs	¹⁴¹ Ce	¹⁴⁴ Ce
January	68	1.46	< 0.003	< 0.005	<0.003	0.138	0.008	0.003	0.024
February	7	0.30	< 0.003	< 0.005	<0.003	0.080	0.003	0.003	0.025
March	149	2.85	0.003	< 0.006	<0.003	0.082	0.022	0.004	0.019
April	23	2.14	0.003	< 0.006	<0.003	0.093	0.018	0.004	0.013
May	110	4.29	0.003	< 0.006	<0.003	0.138	0.032	0.004	0.030
June	43	1.78	0.003	< 0.006	<0.003	0.057	0.011	0.004	0.027
July	14	1.19	0.003	< 0.006	<0.003	0.055	0.011	0.004	0.025
August	27	1.46	0.003	< 0.006	<0.003	0.062	0.006	0.004	0.013
September	15	0.99	0.003	< 0.006	<0.003	0.060	0.006	0.004	0.012
October	185	5.74	0.012	0.023	0.036	0.032	0.013	0.042	0.009
November	136	2.51	0.534	0.347	0.385	0.050	0.003	0.456	0.045
December	53	0.92	0.715	0.445	0.247	0.049	0.005	0.252	0.127
Total	830	25.63	1.278	0.867	0.695	0.896	0.138	0.784	0.369

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1980

Table 10.14

SEGRATE - ITALIA		mCi/km ²								
	rain l/m ²	total beta	⁷ Be	⁵⁴ Mn	⁹⁵ Zr	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³¹ I	¹³⁷ Cs
January	94	0.40	1.68	< 0.006	< 0.014	0.005	< 0.07	< 0.02	<0.03	0.007
February	3	0.17	0.33	< 0.003	< 0.006	<0.005	< 0.05	< 0.01	<0.01	0.0025
March	138	0.28	1.79	< 0.006	< 0.009	<0.006	< 0.05	< 0.01	<0.03	0.011
April	5	0.33	0.14	< 0.002	< 0.003	<0.002	< 0.01	< 0.004	<0.01	0.004
May	134	0.22	1.56	< 0.001	< 0.003	<0.002	< 0.03	< 0.01	<0.02	0.009
June	107	0.59	0.93	< 0.002	< 0.003	<0.002	< 0.01	< 0.005	<0.006	0.011
July	53	0.36	0.65	< 0.001	< 0.002	<0.001	< 0.01	< 0.003	<0.006	0.005
August	45	0.51	0.98	< 0.001	< 0.002	<0.001	< 0.005	< 0.002	<0.005	0.005
September	7	0.11	0.15	< 0.001	< 0.002	<0.001	< 0.01	< 0.003	<0.002	0.001
October	153	0.83	1.23	< 0.001	0.010	0.026	< 0.01	< 0.003	<0.005	0.003
November	87	0.97	0.45	< 0.001	0.038	0.066	< 0.01	< 0.003	<0.005	0.002
December	13	0.56	0.20	< 0.001	0.032	0.040	< 0.01	< 0.002	<0.002	0.003
Total	839	5.33	10.09	< 0.026	< 0.124	<0.157	< 0.275	< 0.075	<0.131	0.0635

% continued in next page

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN

1980

Table 10.14 a)
continued

SEGRATE - ITALIA

mCi/km²

	¹⁴⁰ Ba	¹⁴¹ Ce	¹⁴⁴ Ce	¹⁵⁵ Eu					
January	< 0,02	< 0,009	< 0,02	< 0,007					
February	< 0,01	< 0,004	< 0,02	< 0,005					
March	< 0,02	< 0,009	< 0,02	< 0,006					
April	< 0,01	< 0,002	< 0,01	< 0,002					
May	< 0,02	< 0,002	< 0,001	< 0,008					
June	< 0,01	< 0,002	< 0,008	< 0,002					
July	< 0,003	< 0,001	< 0,003	< 0,001					
August	< 0,003	< 0,001	0,004	< 0,002					
September	< 0,002	< 0,001	< 0,003	< 0,001					
October	0,044	0,020	< 0,035	< 0,002					
November	0,034	0,043	0,010	< 0,002					
December	0,005	< 0,002	0,087	< 0,002					
Total	< 0,181	< 0,096	< 0,221	< 0,040					

SPECIFIC RADIONUCLIDES MEASUREMENTS IN RAIN
1980

Table 10.15

BILTHOVEN - NEDERLAND

mCi/km²

	rain l/m ²	³ H	⁷ Be	⁸⁹ Sr	⁹⁰ Sr	¹³⁷ Cs	¹⁴⁴ Ce			
January	58	11	1.6	-	0.01	< 0.01	0.02			
February	49	6.5	1.2	< 0.01	< 0.01	< 0.01	< 0.01			
March	68	8.1	2.2	< 0.01	0.03	< 0.02	0.03			
April	45	2.7	1.2	< 0.01	0.08	< 0.02	0.03			
May	12	4.0	1.9	< 0.01	0.02	0.02	< 0.02			
June	86	16	4.1	< 0.01	0.02	0.03	0.03			
July	127	19	3.5	< 0.01	0.02	0.03	0.03			
August	69	6.9	2.2	< 0.01	0.03	< 0.02	0.04			
September	37	3.3	2.9	< 0.01	0.05	< 0.02	< 0.02			
October	72	3.6	2.5	< 0.01	0.06	< 0.04	< 0.02			
November	72	9.8	3.3	0.12	0.02	< 0.01	0.05			
December	81	4.1	1.9	0.24	0.01	< 0.02	0.05			
Total	776	96	31	0.36	0.36	< 0.25	0.35			

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1980

Table 10.16

BELFAST - UNITED KINGDOM

mCi/km²

	rain l/m ²	total beta	⁷ Be	⁹⁰ Sr	¹⁰³ Ru	¹³⁷ Cs	¹⁴¹ Ce	¹⁴⁴ Ce
January	118	0.165	2.5		-	0.022	-	-
February	97	0.086	1.6	} 0.024	-	0.021	-	0.078
March	117	0.057	2.3		-	0.022	-	-
April	10	0.010	N.M.		N.M.	N.M.	N.M.	N.M.
May	37	0.029	N.M.	} 0.043	N.M.	N.M.	N.M.	N.M.
June	146	0.135	N.M.		-	N.M.	N.M.	N.M.
July	59	0.045	3.2		-	0.032	-	-
August	77	0.084	2.8	} 0.025	-	0.029	-	-
September	95	0.082	2.0		-	0.026	-	-
October	136	0.081	5.7		-	0.026	-	-
November	77	0.168	3.5	} 0.012	0.25	0.006	0.17	-
December	93	0.263	2.9		0.40	0.010	0.08	-
Total	1062	1.21	34 (1)	0.10	0.65	0.29 (2)	0.25	0.078

(1) estimated

(2) missing values-estimated from ⁹⁰Sr concentration

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1980

Table 10.17

BRIDGEND - UNITED KINGDOM							mCi/km ²			
	rain l/m ²	total beta	⁷ Be	⁹⁰ Sr	¹⁰³ Ru	¹³¹ Cs				
January	93	0.065	1.8		-	0.011				
February	121	0.068	3.1	0.016	-	0.016				
March	147	0.147	3.3		-	0.016				
April	15	0.031	-		-	0.018				
May	33	0.028	N.M.	0.054	N.M.	N.M.				
June	134	0.112	N.M.		N.M.	N.M.				
July	80	0.080	N.M.		N.M.	N.M.				
August	127	0.103	3.1	0.025	-	0.034				
September	118	0.118	4.5		-	0.022				
October	147	0.147	5.6	0.056	-	0.020				
November	129	0.339	5.7		0.47	0.035				
December	122	← sample missing →								
Total	1266	1.24	38 ⁽¹⁾	0.15	0.47	0.29				

(1) estimated
N.M. - non measured

SPECIFIC RADIONUCLIDES AND TOTAL MEASUREMENTS IN RAIN

1980

Table 10.18

GLASGOW - UNITED KINGDOM

mCi/km²

	rain l/m ²	total beta	⁷ Be	⁹⁰ Sr	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Ru/Rh	¹³⁷ Cs	¹⁴¹ Ce
January	83	0.063	1.6	0.020	-	-	-	0.12	0.018	-
February	74	0.044	1.3		-	-	-	-	0.010	-
March	62	0.072	1.7		-	-	-	-	0.014	-
April	5	0.072	-	0.051	-	-	-	-	-	-
May	19	0.027	N.M.		N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
June	93	0.113	N.M.		N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
July	167	0.207	N.M.	0.022	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
August	150	0.199	3.3		-	-	-	-	0.041	-
September	160	0.186	3.3		-	-	-	-	0.026	-
October	131	0.096	3.5	0.036	-	-	-	-	0.014	-
November	137	0.270	3.9		-	-	0.44	-	0.030	0.36
December	150	0.776	6.0		0.09	0.06	0.98	-	-	0.45
Total	1231	2.13	31 (1)	0.13	0.09	0.06	1.4	0.12	0.36 (2)	0.81

(1) estimated

(2) missing values-estimated from ⁹⁰Sr concentration

N.M. = not measured

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1980

Table 10.19

CHILTON - UNITED KINGDOM		mCi/km ²								
	rain l/m ²	total beta	⁵⁴ Mn	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³¹ I	¹³⁷ Cs
January	39.1	0.31	<0.0020	< 0.0039	< 0.0039	< 0.0039	< 0.0078	< 0.0031	< 0.0027	0.0074
February	37.1	0.22	<0.0019	< 0.0037	< 0.0037	< 0.0022	< 0.0074	< 0.0037	< 0.0026	0.0037
March	87.4	0.26	<0.0044	< 0.0087	< 0.0087	< 0.0044	0.017	< 0.0087	< 0.0070	0.010
April	18.8	0.13	<0.0009	< 0.0019	< 0.0019	< 0.0009	< 0.0019	< 0.0009	< 0.0009	0.0071
May	37.6	0.23	<0.0019	< 0.0038	< 0.0038	< 0.0019	< 0.0075	< 0.0019	< 0.0019	0.0098
June	70.9	0.28	<0.0035	< 0.0071	< 0.0071	< 0.0035	0.10	0.018	< 0.0035	0.026
July	56.9	0.18	<0.0028	< 0.0057	< 0.0057	< 0.0028	0.035	0.014	< 0.0028	0.011
August	52.9	0.10	<0.0026	< 0.0053	< 0.0053	< 0.0026	< 0.0053	< 0.0026	< 0.0026	0.020
September	47.6	0.05	<0.0024	< 0.0048	< 0.0048	< 0.0024	< 0.0048	< 0.0024	< 0.0024	0.0095
October	86.7	0.43	<0.0043	< 0.0043	< 0.0043	0.016	0.037	0.0052	0.071	0.0087
November	41.4	2.9	<0.0021	0.041	0.032	0.014	0.0083	< 0.0025	0.11	0.0046
December	38.7	2.1	<0.0019	0.15	0.017	0.22	0.17	< 0.0039	0.0074	0.0058
Total	615.1	7.2	< 0.031	< 0.24	< 0.098	< 0.40	< 0.40	< 0.067	< 0.21	0.124

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN
1980

Table 10.19 a)
continued

CHILTON - UNITED KINGDOM			mCi/km ²						
	¹⁴⁰ Ba	¹⁴¹ Ce	¹⁴⁴ Ce						
January	<0.0039	<0.0020	< 0.0039						
February	<0.0037	<0.0019	< 0.0037						
March	<0.0087	<0.0044	< 0.0087						
April	<0.0019	<0.0094	< 0.0037						
May	<0.0038	<0.0019	< 0.0037						
June	<0.0071	<0.0035	< 0.030						
July	<0.0057	<0.0028	< 0.011						
August	<0.0053	<0.0026	< 0.0053						
September	<0.0048	<0.0024	< 0.0048						
October	0.055	0.0078	0.0087						
November	0.42	0.082	0.0083						
December	0.14	0.11	0.19						
Total	<0.66	< 0.23	< 0.28						

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN

1980

Table 10.20

MILFORD HAVEN - UNITED KINGDOM

mCi/km²

	rain l/m ²	total beta	⁵⁴ Mn	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³⁷ Cs	¹⁴⁰ Ba	¹⁴¹ Ce	¹⁴⁴ Ce
January	70.1	0.63	<0.0035	< 0.0070	< 0.0070	< 0.0035	0.028	< 0.014	0.018	< 0.0070	< 0.0035	< 0.0070
February	152.5	1.4	<0.0076	< 0.015	< 0.015	< 0.0076	~ 0.15	< 0.046	0.031	< 0.015	< 0.0076	~ 0.061
March	132.3	0.26	<0.0066	< 0.013	< 0.013	< 0.0066	~ 0.040	< 0.013	0.025	< 0.013	< 0.0066	~ 0.026
April	6.0	0.09	<0.0006	< 0.0006	< 0.0006	< 0.0003	< 0.0012	< 0.0006	0.003	< 0.0006	< 0.0003	< 0.0012
May	32.2	0.10	<0.0016	< 0.0032	< 0.0032	< 0.0016	~0.016	< 0.0064	0.012	< 0.0032	< 0.0016	~ 0.016
June	81.4	0.65	<0.0040	< 0.0081	< 0.0081	< 0.0041	0.15	< 0.019	0.027	< 0.0081	< 0.0041	< 0.0081
July	44.4	0.31	<0.0022	< 0.0044	< 0.0044	< 0.0022	0.039	< 0.012	0.011	< 0.0044	< 0.0022	< 0.018
August	66.8	0.27	<0.0033	< 0.0067	< 0.0067	< 0.0033	< 0.020	< 0.0067	0.011	< 0.0067	< 0.0033	< 0.020
September	147.8	1.5	<0.0074	< 0.015	< 0.015	< 0.0074	< 0.044	< 0.0074	0.024	< 0.015	< 0.0074	< 0.015
October	198.2	0.80	<0.0099	0.042	0.030	0.055	0.073	0.020	0.032	1.05	0.050	0.12
November	61.9	2.3	<0.003	0.053	0.074	0.28	0.073	< 0.0062	0.017	0.39	0.20	0.077
December	64.3	2.8	<0.0064	0.25	0.37	0.80	0.24	0.019	0.012	0.32	0.54	0.12
Total	1057.9	11.1	<0.056	< 0.42	< 0.55	< 1.17	< 0.87	< 0.17	0.22	< 1.83	< 0.83	< 0.49

SPECIFIC RADIONUCLIDES AND TOTAL BETA MEASUREMENTS IN RAIN

1980

Table 10.21

SHRIVENHAM - UNITED KINGDOM

mCi/km²

	rain l/m ²	total beta	⁷ Be	⁹⁰ Sr	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹³⁷ Cs	¹⁴¹ Ce	⁵⁴ Mn	¹⁴⁰ Ba/La	¹⁴⁴ Ce
January	43	0.022	0.98	0.016	-	-	-	0.007	-	-	-	-
February	35	0.026	0.83		-	-	-	0.004	-	-	-	-
March	65	0.039	1.3		-	-	-	0.015	-	-	-	-
April	14	0.016	-	0.012	-	-	-	0.008	-	-	-	-
May	55	0.191	N.M.		N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
June	82	0.062	N.M.		N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
July	64	0.098	N.M.	0.022	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.	N.M.
August	62	0.055	1.3		-	-	-	0.020	-	-	-	-
September	67	0.054	1.6		-	-	-	0.018	-	-	-	-
October	65	0.049	1.6	0.011	-	-	-	0.018	-	-	-	-
November	31	0.054	0.74		0.034	0.021	0.16	0.007	0.08	-	-	-
December	30	0.173	0.86		-	-	0.18	0.008	0.12	-	-	-
Total	613	0.84	1.6 ⁽¹⁾	0.061	0.034	0.021	0.34	0.14 ⁽²⁾	0.20	-	-	-

(1) estimated

(2) missing values estimated from ⁹⁰Sr deposition

N.M. = not measured

⁹⁰Sr DEPOSITION
1967 - 1980

$\Sigma \bar{x}_m$

mCi/km²

Table 11.1

	1967		1968		1969		1970		1971		1972		1973	
	⁹⁰ Sr	1/m ² (1)	⁹⁰ Sr	1/m ² (1)	⁹⁰ Sr	1/m ² (1)	⁹⁰ Sr	1/m ² (1)	⁹⁰ Sr	1/m ² (1)	⁹⁰ Sr	1/m ² (1)	⁹⁰ Sr	1/m ² (1)
<u>Belgique/België</u>														
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	0.208	610.9
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	0.220	627.9
Florennes	0.833	854.1	1.0886	743.4	0.8739	718.8	1.5282	833.5	-	711.4	0.5261	779.9	0.203	631.6
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	0.203	666.7
Schaffen	0.677	584.5	0.8760	574.5	0.7911	584.3	-	541.6	0.9507	474.8	0.5232	587.6	0.178	620.7
Bruxelles IHE	-	-	-	-	-	-	-	-	-	-	-	-	0.017	689.8
<u>Denmark</u>														
Tylstrup	1.010	742	1.610	644	1.584	521	1.660	595	1.720	557	0.434	577	0.203	653
Studsgaard (Borris) ..	1.060	851	1.700	913	1.206	621	1.920	873	2.210	672	0.449	742	0.213	763
Ødum	0.950	814	1.310	668	0.938	413	1.500	472	1.190	481	0.410	507	0.180	546
Askov	1.440	946	1.640	870	1.312	608	2.590	918	1.860	682	0.475	670	0.222	723
St. Jynde vad	1.440	879	1.580	702	1.163	551	2.300	890	1.650	668	0.542	758	0.257	847
Blangstedgård	1.320	752	1.300	633	0.701	475	0.860	632	1.050	592	0.434	701	0.127	532
Tystofte	0.770	661	1.330	482	0.853	341	1.640	547	1.640	457	0.433	577	0.159	411
Virumgård (Ledreborg).	0.770	747	1.030	554	0.906	443	1.280	684	1.120	513	0.410	434	0.229	715
Abed	0.840	651	0.960	575	0.634	458	0.900	578	1.170	409	0.397	600	0.152	495
Åkirkeby	0.890	523	1.560	628	1.053	388	1.820	586	1.450	397	0.412	536	0.175	496
<u>Deutschland (BR)</u>														
Jülich	0.503	704	0.550	734	0.754	690	0.587	814.4	0.041	491.9	0.3461	592.2	0.070	564
Königstein	0.966	934	0.685	975	0.767	826	0.745	924.8	0.535	637.2	0.169	689.9	0.035	446.9

(1) height of precipitations 1/m²

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^{90}Sr DEPOSITION $\Sigma \bar{x}_m$
1967 - 1980

Table 11.1 a)
continued

mCi/km^2

	1974		1975		1976		1977		1978		1979		1980	
	^{90}Sr	$1/\text{m}^2$ (1)	^{90}Sr	$1/\text{m}^2$ (1)	^{90}Sr	$1/\text{m}^2$ (1)	^{90}Sr	$1/\text{m}^2$ (1)	^{90}Sr	$1/\text{m}^2$ (1)	^{90}Sr	$1/\text{m}^2$ (1)	^{90}Sr	$1/\text{m}^2$ (1)
<u>Belgique/België</u>														
Mol	0.708	908.9	0.365	602.3	0.104	448.8	0.424	786.9	0.431	634.8	0.186	757	0.153	744.5
Brasschaat	0.571	943.8	0.364	649.6	0.133	419.0	0.407	815.1	0.509	677.4	0.183	836	0.151	793.0
Florennes	0.799	975.6	0.375	651.5	0.119	504.2	0.480	801.6	0.638	712.7	0.214	863	0.166	892.4
Kleine-Brogel	0.638	918.6	0.364	567.1	0.101	462.8	0.531	759.8	0.493	648.7	0.174	691	0.167	783.7
Schaffen	0.644	813.3	0.349	476.6	0.103	377.0	0.448	635.3	0.398	553.5	0.167	620	0.151	570.1
Bruxelles IHE	0.649	1039.6	0.306	734.3	0.098	540.9	0.446	855.9	0.427	767.7	0.205	838	0.146	913.1
Koksijde	-	-	-	-	0.091	395.8	0.371	637.5	0.387	547.7	0.190	645	0.180	668
<u>Denmark</u>														
Tylstrup	0.721	628	0.448	520	0.110	489	0.403	633	0.491	608	0.151	662	0.114	666
Studsgaard (Borris).	0.809	914	0.439	624	0.095	503	0.489	818	0.570	648	0.183	751	0.162	1010
Ødum	0.516	621	0.384	440	0.075	374	0.260	500	0.372	400	0.143	619	0.114	758
Askov	0.991	979	0.508	649	0.152	556	0.472	773	0.581	792	0.181	688	0.157	1174
St. Jynde vad	0.858	920	0.481	569	0.147	579	0.402	709	0.675	792	0.213	785	0.154	1069
Blangstedgård	0.706	707	0.311	496	0.094	381	0.300	569	0.371	526	0.163	613	0.086	651
Tystofte	0.654	554	0.373	413	0.091	320	0.337	411	0.421	474	0.174	532	0.086	583
Virumgård (Ledreborg)	0.545	577	0.647	430	0.076	369	0.272	511	0.306	428	0.155	485	0.097	510
Abed	0.597	631	0.336	487	0.101	376	0.349	580	0.421	490	0.150	574	0.081	684
Åkirkeby	0.711	725	0.484	445	0.091	368	0.552	627	0.419	424	0.136	464	0.124	613
Risø	-	-	-	-	-	-	0.297	454	0.268	526	-	-	0.07	545
<u>Deutschland (BR)</u>														
Jülich	0.187	770.0	0.2118	533.2	0.054	444	0.332	579.3	0.319	591.9	0.11	746.3	0.084	668.2
Königstein	0.350	701.1	-	-	-	-	-	-	-	-	-	-	-	-
Offenbach	-	-	0.145	587.8	0.052	379	0.251	749.6	0.322	565.0	0.119	701.3	0.119	628.0

(1) height of precipitations $1/\text{m}^2$

⁹⁰Sr DEPOSITION $\Sigma \bar{x}_m$

Table 11.2

1967 - 1980

mCi/km²

	1967		1968		1969		1970		1971		1972		1973	
	⁹⁰ Sr	1/m ² (1)	⁹⁰ Sr	1/m ² (1)	⁹⁰ Sr	1/m ² (1)	⁹⁰ Sr	1/m ² (1)	⁹⁰ Sr	1/m ² (1)	⁹⁰ Sr	1/m ² (1)	⁹⁰ Sr	1/m ² (1)
<u>France (SCPRI)</u>														
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	0.19	936.7
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	0.27	758.8
Bussy-le-Grand...	-	-	-	-	0.83	656.1	1.5	913.6	-	-	-	-	0.16	644.0
Cléville.....	0.83	790.4	0.66	524.8	-	-	-	-	0.90	506.1	0.29	607.3	0.12	667.2
Le Vésinet.....	0.76	604.8	1.0	747.6	0.90	581.1	1.1	687.2	1.1	567.6	0.54	778.6	0.14	591.8
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	0.13	534.7
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	0.21	898.0
<u>France (CEA)</u>														
Orsay.....	0.40	590	0.30	633	0.26	618	0.73	631	0.70	508	0.29	740	0.13	576
Le Barp(Bordeaux)	-	-	0.90	998	0.58	1139	1.00	802	0.95	330	0.52	790	0.28	797
Verdun.....	-	-	-	-	-	-	1.16	1062	0.40	662	0.40	806	0.29	764
<u>Ireland</u>														
Dublin City.....	0.93	711.8	0.86	665.9	0.79	688.1	0.76	652.5	(2)	(3)	0.47	655.0	0.36	656.7

(1) height of precipitations 1/m²

(2) for 11 months (October 1971 sampling failed)

(3) Fall-out for 12 months (excluding October - 536.9)

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

Table 11.2 a)
continued

1967 - 1980

mCi/km²

	1974		1975		1976		1977		1978		1979		1980	
	^{90}Sr	1/m ² (1)	^{90}Sr	1/m ² (1)	^{90}Sr	1/m ² (1)	^{90}Sr	1/m ² (1)	^{90}Sr	1/m ² (1)	^{90}Sr	1/m ² (1)	^{90}Sr	1/m ² (1)
<u>France (SCPRI)</u>														
Anglade	0.68	939.2	0.26	705.0	0.17	879.7	0.48	1006.8	0.54	674.8	<0.20	939.0	< 0.13	901.7
Bellenaves	-	-	0.28	636.8	< 0.14	779.5	0.54	877.7	0.52	626.8	<0.22	791.5	< 0.10	630.7
Bordeaux	-	-	0.33	803.5	0.16	970.9	0.57	946.0	0.89	938.1	<0.27	1205.9	0.15	955.0
Briançon	0.53	557.4	0.32	598.4	< 0.16	642.3	0.79	1005.4	0.58	784.9	<0.23	857.8	< 0.13	561.9
Bussy-le-Grand..	-	-	0.34	909.0	0.081	497.8	0.46	824.0	0.47	719.8	0.18	946.7	< 0.13	804.4
Cléville	0.45	750.9	0.28	673.2	< 0.18	423.7	0.31	600.2	0.48	741.7	<0.13	712.0	< 0.12	732.2
Le Vésinet	0.41	760.0	0.34	647.4	0.087	408.4	0.34	693.0	0.52	756.6	0.13	711.2	0.078	625.0
Lille	-	-	0.27	751.1	< 0.13	446.6	0.45	737.5	0.50	614.2	<0.18	810.2	< 0.11	765.0
Méaudre	-	-	0.47	1535.5	0.16	1098.1	0.99	1537.4	1.2	1423.0	0.28	1486.8	0.25	1529.8
Nancy	0.51	707.0	0.24	546.9	< 0.11	500.3	-	-	-	-	-	-	-	-
Nainville-les-R.	-	-	0.28	718.1	< 0.11	400.7	0.42	698.7	0.45(3)	648.4	<0.17	794.5	< 0.12	695.3
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	< 0.096	623.5
Montfacon	-	-	-	-	-	-	0.71	799.3	0.65	543.9	0.19	703.0	< 0.095	449.5
Vioménil	0.66	1040.0	0.39	890.3	< 0.15	706.6	0.63	1194.5	0.74	1004.0	0.24	1088.4	0.13	1052.0
<u>France (CEA)</u>														
Orsay	0.29	668	0.17	659	0.056	410	0.225	700	0.222	789	0.094	853	0.131	649
Le Barp(Brodeaux)	0.44	819	0.18	745	0.110	785	0.293	960	0.570	1085	0.112	1200	0.074	918
Verdun	0.40	979	0.29	769	0.046	571	0.282	840	0.352	1013	0.099	1203	0.114	1031
<u>Ireland</u>														
Dublin City	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 precipitation 1/m²

(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

(5) national overage

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

Table 11.3

1967 - 1980

mCi/km²

	1967		1968		1969		1970		1971		1972		1973	
	^{90}Sr	1/m ² (1)	^{90}Sr	1/m ² (1)	^{90}Sr	1/m ² (1)	^{90}Sr	1/m ² (1)	^{90}Sr	1/m ² (1)	^{90}Sr	1/m ² (1)	^{90}Sr	1/m ² (1)
<u>Italia</u>														
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	0.28	596.2
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	0.310	1276.2
<u>Nederland</u>														
Bilthoven	0.89	812	1.31	853	0.92	729	1.10	808.0	1.18	547.0	0.43	596.0	0.31	778
<u>United Kingdom</u>														
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 1/m²

./. continued in next page

^{90}Sr DEPOSITION $\sum \bar{x}_m$
1967 - 1980

Table 11.3 a)
continued

mCi/km^2

	1974		1975		1976		1977		1978		1979		1980	
	^{90}Sr	$1/\text{m}^2$ (1)	^{90}Sr	$1/\text{m}^2$ (1)	^{90}Sr	$1/\text{m}^2$ (1)	^{90}Sr	$1/\text{m}^2$ (1)	^{90}Sr	$1/\text{m}^2$ (1)	^{90}Sr	$1/\text{m}^2$ (1)	^{90}Sr	$1/\text{m}^2$ (1)
<u>Italia</u>														
Udine	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Segrate(Milano)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Casaccia(Roma)	0.675	818.6	<0.48	947	<0.25	844	-	-	1.101	826	-	-	0.147	831
Caltagirone..	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ispra (CCR)..	0.806	1326.6	<0.708	1923.4	<0.219	1809.8	1.232	2444	1.243	1859.4	< 0.322	1776.3	<0.130	1313
<u>Nederland</u>														
Bilthoven ...	0.83	980	0.5	642	0.49	648	0.55	897	0.61	669	< 0.32	922	0.36	776
<u>United Kingdom</u>														
Abington	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Milford-Haven	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chilton(NRPB)	-	-	-	-	-	-	0.22	769	(2)	(2)	(2)	(2)	(2)	(2)
Belfast.....	-	-	-	-	-	-	0.36	847	0.32	1124	0.19	921	0.10	1062
Bridgend	-	-	-	-	-	-	0.42	1094	0.33	1090	0.41	1220	0.15	1266
Glasgow	-	-	-	-	-	-	0.38	971	0.54	788	0.18	1048	0.13	1231
Leeds	-	-	-	-	-	-	0.36	766	(2)	(2)	(2)	(2)	(2)	(2)
Shrivenham...	-	-	-	-	-	-	0.63	763	0.35	595	0.15	656	0.06	613

(1) height for precipitations $1/\text{m}^2$

(2) no longer sampled

^{137}Cs DEPOSITION $\Sigma \bar{x}_m$

Table 12.1

1967 - 1980

mCi/km²

	1967		1968		1969		1970		1971		1972		1973	
	^{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)	^{137}Cs	1/m ² (1)
<u>Denmark</u>														
Risø	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Deutschland (BR)</u>														
Braunschweig	-	-	-	-	-	-	1.960	694.9	1.902	400.7	0.948	465.0	0.586	410.2
Jülich	1.499	704	1.729	734	2.189	690	1.625	814.4	0.882	491.9	0.116	592.2	0.070	564.0
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	0.146	446.9
Königsutter	-	-	-	-	-	-	2.730	780.0	4.293	472.8	2.970	622.0	1.861	546.1
<u>France (SCPRI)</u>														
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	<0.45	936.7
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	<0.36	758.8
Bussi-le-Grand	-	-	-	-	1.1	656.1	1.8	913.6	-	-	-	-	<0.31	644.0
Cléville	<1.1	790.4	<1.4	524.8	-	-	-	-	0.97	506.1	<0.42	607.3	<0.27	667.2
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	<0.18	591.8
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	<0.30	534.7
Nainville-les-R	<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	<0.36	898.0

(1) height of precipitations 1/m²

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^{137}Cs DEPOSITION $\Sigma \bar{x}_m$
1967 - 1980

Table 12.1 a)
continued

mCi/km²

	1974		1975		1976		1977		1978		1979		1980	
	^{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)	^{137}Cs	1/m ² (1)
<u>Denmark</u>														
Risø	-	-	-	-	-	-	-	-	-	-	0.098	450	0.09	545
<u>Deutschland (BR)</u>														
Braunschweig	1.423	488.0	0.912	388.9	0.642	374.8	0.216	412.7	0.325	333.4	0.134	338.6	0.052	379.5
Jülich	0.383	740.2	0.297	539.3	(3.838)	444.0	0.574	579.3	0.801	567.4	0.301	746.3	0.066	668.2
Karlsruhe	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Königstein	0.908	701.1	-	-	-	-	-	-	-	-	-	-	-	-
Königsutter	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	0.130	628.0
<u>France (SCPRI)</u>														
Anglade	<1.2	939.2	<0.53	705.0	<0.38	879.7	<0.73	1006.8	<1.0	674.8	<0.48	939.0	A.A.S.	901.7
Bellenaves	-	-	<0.66	636.8	<0.25	779.5	<0.76	877.7	<0.94	626.8	<0.53	791.5	"	630.7
Bordeaux	-	-	<0.57	803.5	<0.34	970.9	<0.80	946.0	1.4	938.1	<0.60	1205.9	"	955.0
Briançon	<0.69	557.4	<0.54	598.4	<0.31	642.3	<0.89	1005.4	<1.1	784.9	<0.56	857.8	"	561.9
Bussy-le-Grand ...	-	-	<0.67	909.0	<0.21	497.8	<0.91	824.0	<0.91	719.8	<0.49	946.7	"	804.4
Cléville	<0.88	750.9	<0.62	673.2	<0.25	423.7	<0.72	600.2	<1.1	741.7	<0.48	712.0	"	732.2
Le Vésinet	0.87	760.0	<0.45	647.4	<0.15	408.4	<0.47	693.0	0.77	756.6	<0.20	711.2	<0.24	625.0
Lille	-	-	<0.68	751.1	<0.27	446.6	<0.82	737.5	<0.93	614.2	<0.52	810.2	A.A.S.	765.0
Méaudre	-	-	<0.82	1535.5	<0.36	1098.1	<1.2	1537.4	1.5	1423.0	<0.79	1486.8	"	1529.8
Nancy	<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)	648.4(2)	<0.47	794.5	A.A.S.	695.3
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	"	623.5
Montfaucon	-	-	-	-	-	-	<0.68	799.3	<0.92	543.9	<0.45	703.0	"	449.5
Vioménil	<0.99	1040.0	<0.77	890.3	<0.40	706.6	<0.99	1194.5	0.98	1004.0	<0.58	1088.4	"	1052.0

(1) height of precipitations 1/m²

(2) for 11 months (June 1978 sampling failed)

(3) measurement threshold for monthly samples : 6.8 pCi/l

^{137}Cs DEPOSITION $\Sigma \bar{x}_m$
1967 - 1980

Table 12.2

mCi/km²

	1967		1968		1969		1970		1971		1972		1973	
	^{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)	^{137}Cs	1/m ² (1)
<u>France (CEA)</u>														
Orsay	0.81	590	1.06	633	0.82	618	1.06	631	1.48	508	0.86	740	0.30	576
Le Barp (Bordeaux)	-	-	2.55	998	1.76	1139	2.21	802	3.17	930	1.33	790	0.50	797
Verdun	-	-	-	-	-	-	2.68	1062	2.38	662	1.38	806	0.89	764
<u>Grèce</u>														
Athens	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Democritos - NRC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Italia</u>														
Segrate (Milano) ..	-	-	-	-	1.98	566.9	-	896.0	-	768.1	-	1043.1	0.470	658.8
Casaccia (Roma) ..	-	-	-	-	2.56	863.4	1.90	630.5	2.024	901.0	1.651	987.8	0.304	596.2
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	0.504	1276.2
<u>Nederland</u>														
Bilthoven	1.51	812	2.16	853	1.69	729	2.05	808	2.17	547	0.69	596	0.40	778
<u>United Kingdom</u>														
Chilton (AERE) ...	1.15	752.1	1.38	716.3	1.04	557.4	1.17	726.0	1.09	695.3	0.69	616.5	0.33	552.6
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	0.48	838.9

(1) height of precipitations 1/m²

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^{137}Cs DEPOSITION $\Sigma \bar{x}_m$

1967 - 1980

Table 12.2 a)

continued

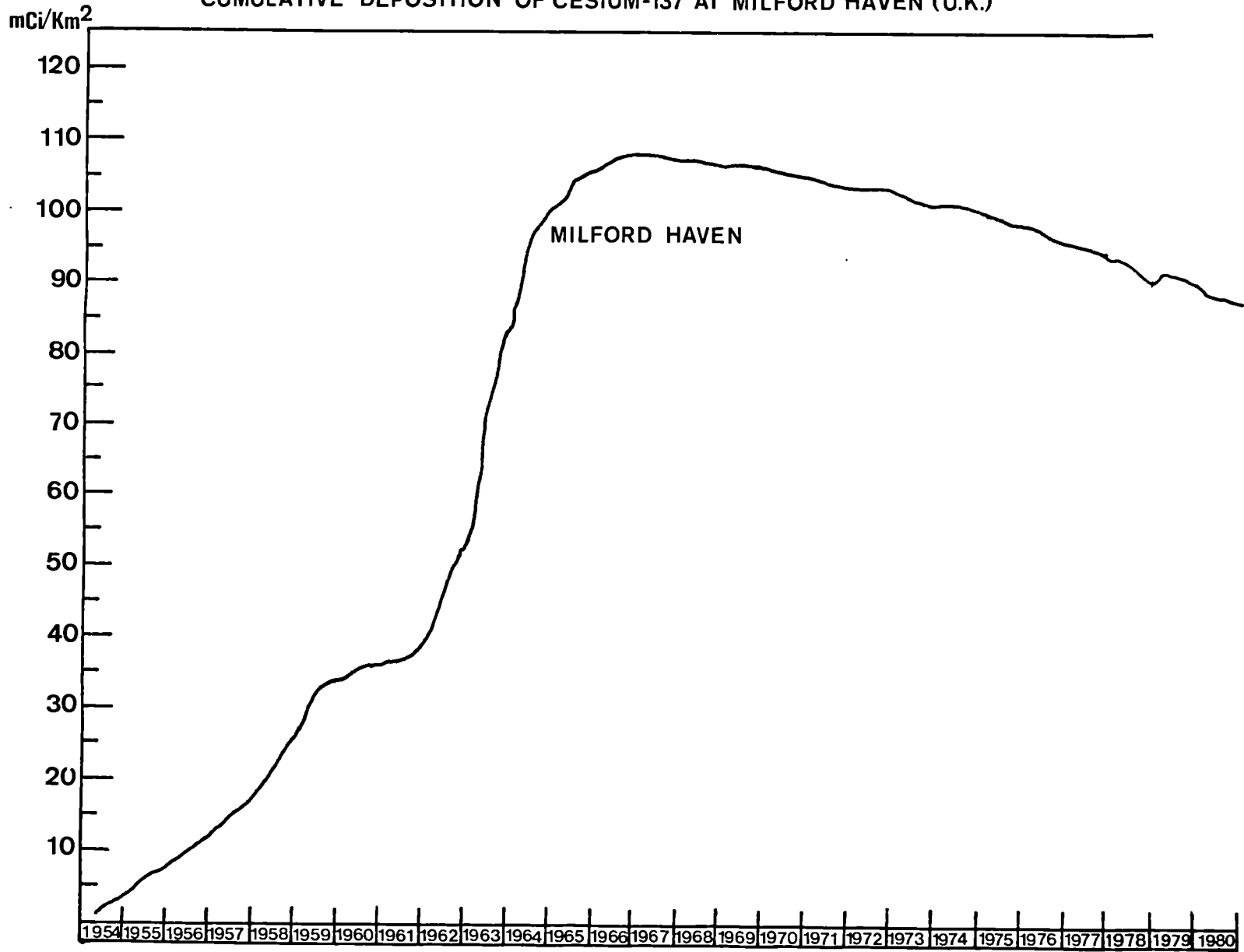
mCi/km²

	1974		1975		1976		1977		1978		1979		1980	
	^{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)	^{137}Cs	1/m ² (1)
<u>France (CEA)</u>														
Orsay	1.09	668	0.28	659	0.028	410	0.357	700	0.926	789	0.158	853	0.107	649
Le Barp (Bordeaux)	1.49	817	0.44	745	0.080	785	0.697	960	1.261	1085	0.394	1200	0.185	918
Verdun	1.08	979	0.67	769	0.107	571	0.413	840	0.878	1013	0.361	1203	0.188	1031
<u>Grèce</u>														
Athens	-	-	-	-	-	-	-	-	-	-	-	-	0.23	-
Democritos NRC ...	-	-	-	-	-	-	-	-	-	-	-	-	0.39	-
<u>Italia</u>														
Segrate (Milano)..	1.074	784.2	0.77	1303.6	0.32	1235	1.26	1306	1.59	1205	0.379	1281	0.064	839
Casaccia (Roma)...	0.771	818.6	0.62	947	0.31	844	0.96	667	1.73	826	0.539	1236	0.179	831
Ispra (CCR).....	1.65	1326.6	1.5	1923.4	0.38	1809.8	2.23	2444	2.33	1859.4	0.500	1776.3	0.26	1313
Fiascherino	-	-	-	-	-	-	-	-	-	-	-	-	0.314	1055
Parma	-	-	-	-	-	-	-	-	-	-	-	-	0.138	830
<u>Nederland</u>														
Bilthoven	0.97	969	0.36	642	0.32	648	0.95	897	0.70	669	0.43	922	0.25	776
<u>United Kingdom</u>														
Chilton (AERE)...	0.53	800.7	0.45	568.6	0.28	521.7	0.57	819.8	0.61	665.2	0.23	757.8	0.124	615.1
Milford Haven	1.15	1164.9	0.55	873.4	0.45	1189.2	0.87	1118.2	0.98	924.3	0.35	1136.3	0.22	1057.9
Chilton (NPR)	-	-	-	-	0.14	475	0.73	769	(2)	(2)	(2)	(2)	(2)	(2)
Belfast	-	-	-	-	0.20	991	0.52	847	0.75	1124	0.33	921	0.29	1062
Bridgend	-	-	-	-	0.32	1049	0.68	1094	1.00	1090	0.42	1220	0.29	1266
Glasgow	-	-	-	-	0.19	908	0.80	971	0.75	788	0.30	1048	0.36	1231
Leeds	-	-	-	-	0.22	807	0.50	766	(2)	(2)	(2)	(2)	(2)	(2)
Shrivenham	-	-	-	-	0.12	515	0.63	763	0.60	595	0.21	656	0.14	613

(1) height of precipitations 1/m²

(2) no longer sampled

CUMULATIVE DEPOSITION OF CESIUM-137 AT MILFORD HAVEN (U.K.)



Graph 5

TOTAL BETA DEPOSITION

Table 13

1980

mCi/km²

	1		2		3		4		5		6		7		8		9		10		11		12		Σ \bar{x}_m	
	\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		
Belgique/België	(1)	0.24	7	0.23	7	0.32	7	0.23	7	0.30	7	0.55	7	0.62	7	0.30	7	0.20	7	0.66	7	1.55	7	2.02	7	7.22
	(2)	44.9	7	55.4	7	74.9	7	31.7	7	40.4	7	85.6	7	156.8	7	56.0	7	28.7	7	79.5	7	43.8	7	68.7	7	766.4
Denmark (3)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	(2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Deutschland (BR)	(1)	0.402	19	0.326	19	0.370	19	0.382	19	0.328	19	0.708	19	0.693	19	0.472	19	0.238	19	0.680	19	1.047	19	1.144	19	6.79
	(2)	61.8	19	58.9	19	55.0	19	77.6	19	44.0	19	130.1	19	156.6	19	84.1	19	55.3	19	97.5	19	64.6	19	78.7	19	964.2
France (SCPRI)	(1)	<0.28	13	<0.24	13	<0.39	13	<0.22	13	0.52	13	<0.36	13	<0.38	13	<0.23	13	<0.32	13	0.73	13	0.75	13	0.89	13	<5.3
	(2)	70.8	13	62.6	13	92.0	13	25.2	13	69.5	13	80.0	13	79.6	13	42.6	13	41.7	13	112.5	13	47.0	13	70.9	13	794.4
France (CEA)	(1)	<0.59	6	<0.55	6	<0.91	6	<0.25	6	<0.56	6	<0.76	6	<0.87	6	<0.48	6	<0.48	5	<1.52	6	<1.46	6	<1.06	6	<9.49
	(2)	47.6	6	56.8	6	95.0	6	20.0	6	58.3	6	74.6	6	87.6	6	53.5	6	47.1	5	101.2	6	69.0	6	65.0	6	775.7
Greece	(1)	0.25	3	0.11	3	0.29	3	0.54	3	0.60	3	0.19	3	0.13	3	0.25	3	0.39	4	4.77	3	2.77	5	3.90	4	14.19
	(2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ireland	(1)	-	0.28	8	0.32	8	0.22	8	0.17	8	0.24	8	0.28	8	0.32	8	0.33	8	0.49	8	-	-	-	-	2.65	(4)
	(2)	-	-	97.8	8	19.8	8	37.9	8	75.2	8	93.4	8	102.3	8	137.2	8	142.2	8	-	-	-	-	-	705.8	(5)
Italia	(1)	0.33	2	0.14	2	0.40	2	0.26	2	0.44	2	0.60	2	0.39	2	0.53	2	0.32	2	0.62	2	0.65	2	0.37	2	5.05
	(2)	86	2	2	2	175	2	5	2	176	2	196	2	74	2	89	2	36	2	163	2	68	2	8	2	1078
Nederland	(1)	0.41	1	0.21	1	0.19	1	0.43	1	0.27	1	0.57	1	0.53	1	0.21	1	0.37	1	1.00	1	1.4	1	1.7	1	7.3
	(2)	110	1	48	1	55	1	59	1	1.9	1	70	1	150	1	38	1	59	1	69	1	65	1	88	1	813
United Kingdom	(1)	0.21	6	0.30	6	0.14	6	0.06	6	0.10	6	0.23	6	0.15	6	0.14	6	0.33	6	0.27	6	1.00	6	1.21	5	4.14
	(2)	74	6	86	6	102	6	11	6	36	6	101	6	78	6	90	6	106	6	127	6	79	6	75	5	965
M	(1)	0.34	57	0.26	65	0.37	65	0.29	65	0.36	65	0.47	65	0.45	65	0.33	65	0.33	65	1.19	65	1.33	59	1.53	57	7.25
	(2)	70.7	54	52.8	54	93.3	62	31.2	62	58	62	101.6	62	109.5	62	69.4	62	63.9	61	111.5	62	62.3	54	64.9	53	889

(1) β G-mCi/km²

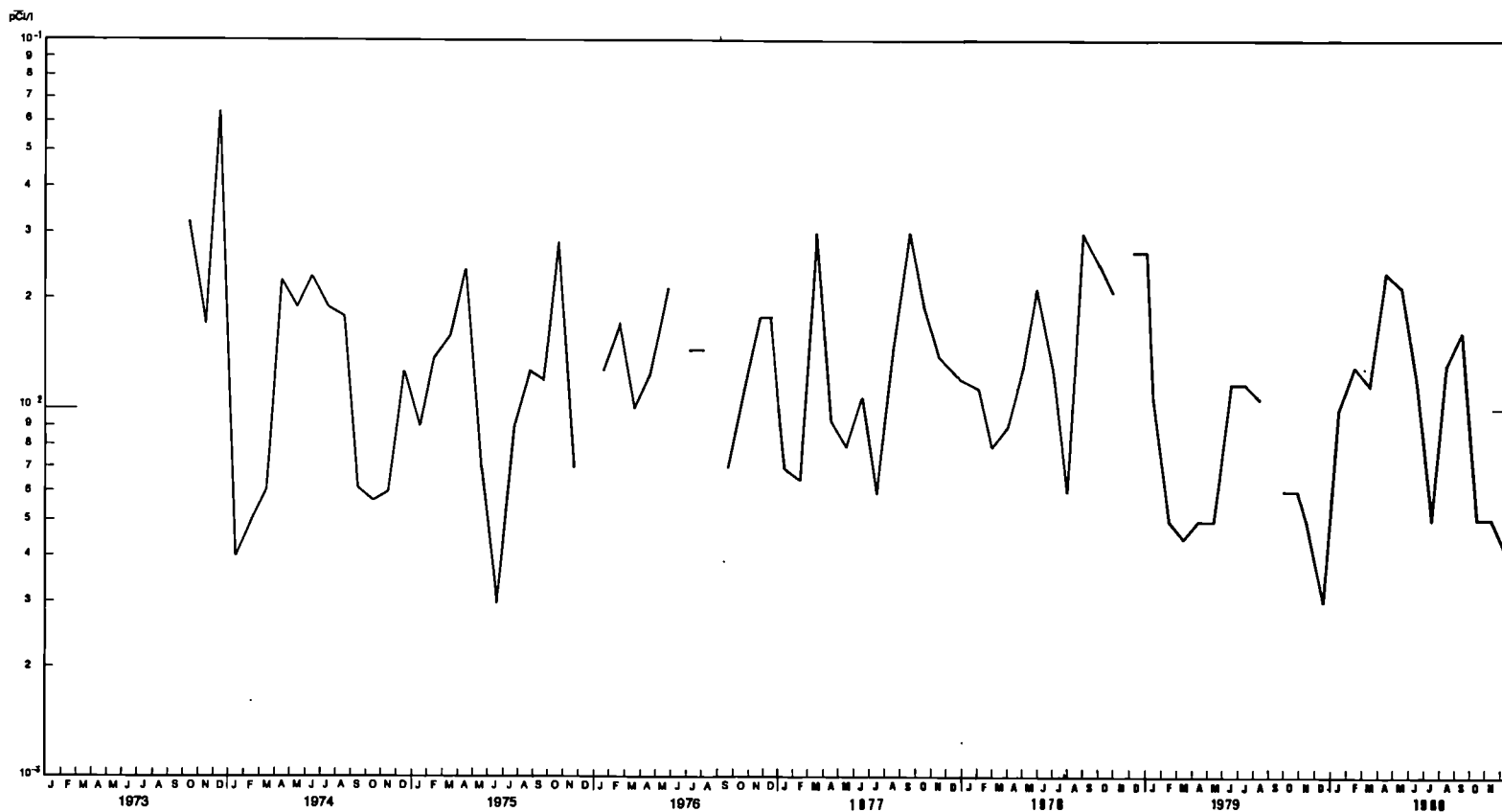
(2) Height of precipitations 1/m²

(3) Total beta measurements was discontinued in 1980

(4) Total for nine months

(5) Total for eight months

^{239}Pu MEASUREMENTS IN RAIN AT ORSAY (France)



Graph 6

TOTAL BETA DEPOSITION $\sum \bar{x}_m$
1962 - 1980

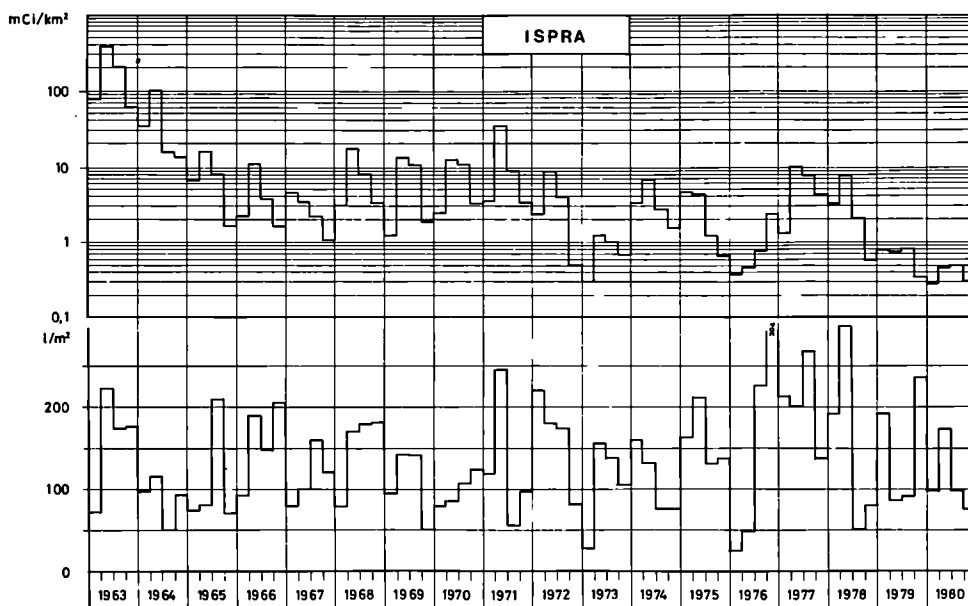
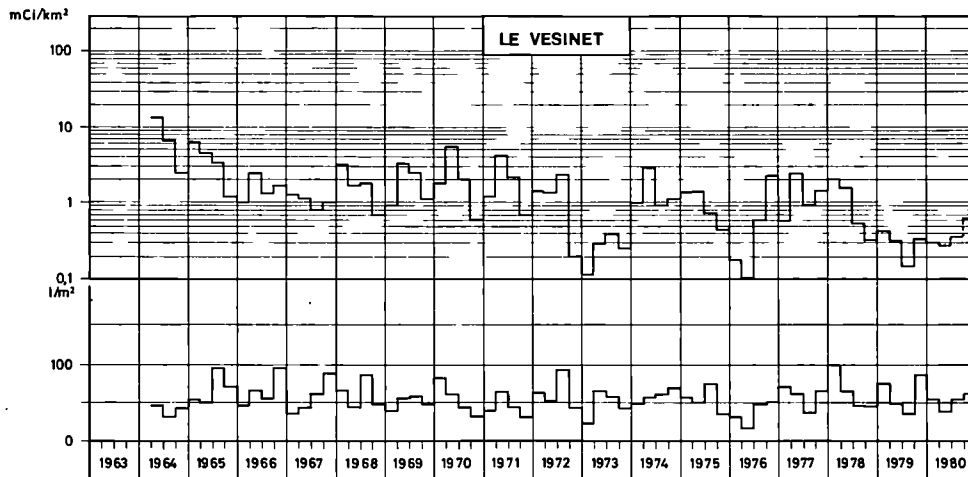
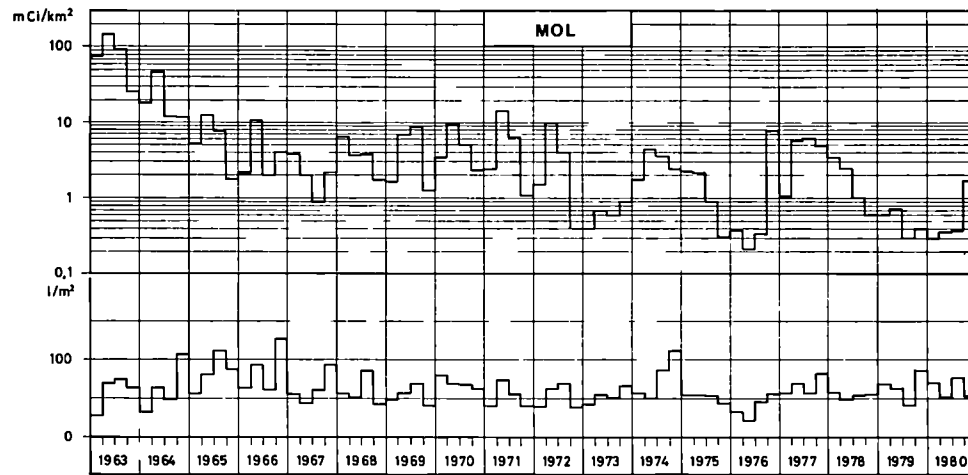
mCi/km²

Table 14

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
BELGIQUE/BELGIE	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	7.22
DENMARK	260	360	126	23	13	9	11	12	9	23	14	7.4	13	-	13.2	13.9	9.62	4.42	-
DEUTSCHLAND	605	579	153	55	28	17	28	24	36	32	16	6.3	20	10.4	15.5	25.35	16.24	6.49	6.79
FRANCE (SCPRI)	760	1100	310	64	21	<13	25	29	33	33	12	<4.5	18	<8.8	11.2	29	15	<5.3	<5.3
FRANCE (CEA)	-	-	-	-	30	28	41	42	53	56	24	6.2	22.5	-	-	43.09	21.45	11.9	<9.49
GREECE	1158	913	224	51	24	10	20	30	38	72	32	7.7	38.8	16.4	25.3	19.58	17.45	5.21	14.19
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	2.65
ITALIA	834	924	251	50	25	16	83	87	93	151	47	11	35	26.3	14.3	56.38	37.29	9.31	5.05
NEDERLAND	1623	1950	397	110	65	30	65	117	51	55	28	6.1	43	21.9	23.6	60.6	26	9.6	7.3
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	4.14
\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	7.25

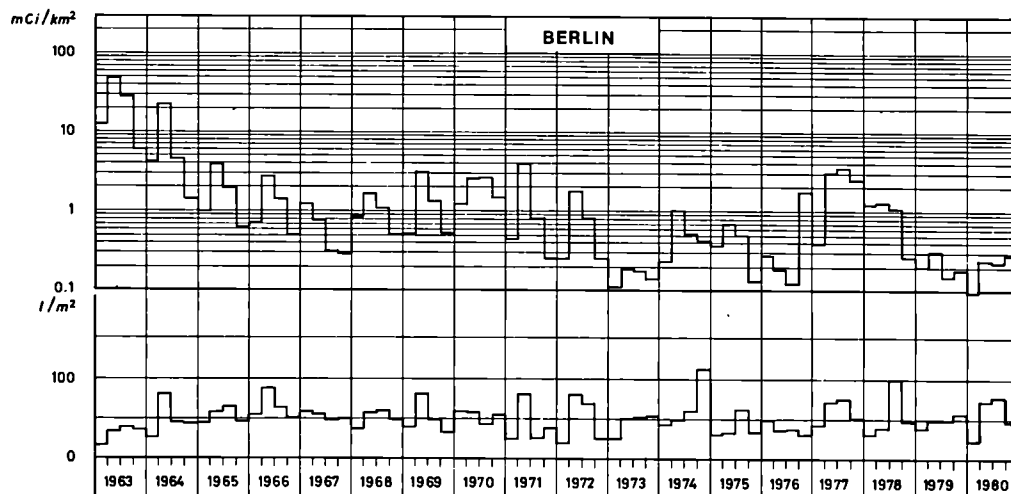
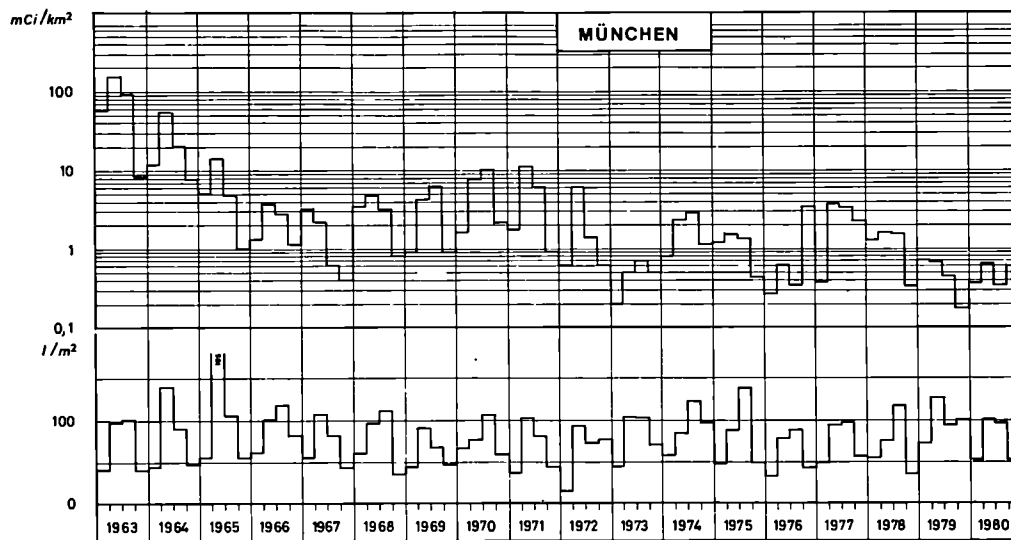
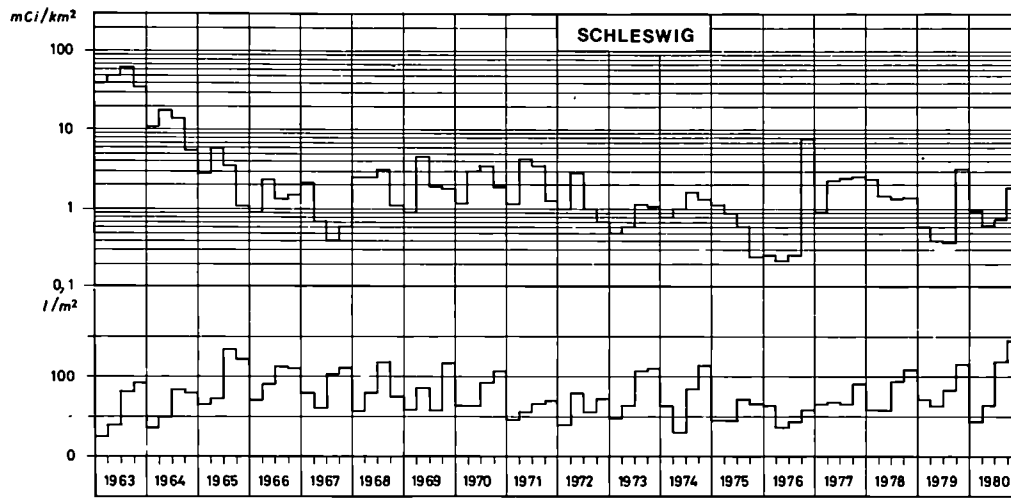
(*) The values of Greece are calculated in the average only since 1980

VARIATION OF THE TOTAL BETA ACTIVITY ON THE FALL-OUT AT SEVERAL STATIONS OF THE NETWORK ESTABLISHED ON THE TERRITORY OF THE EUROPEAN COMMUNITY



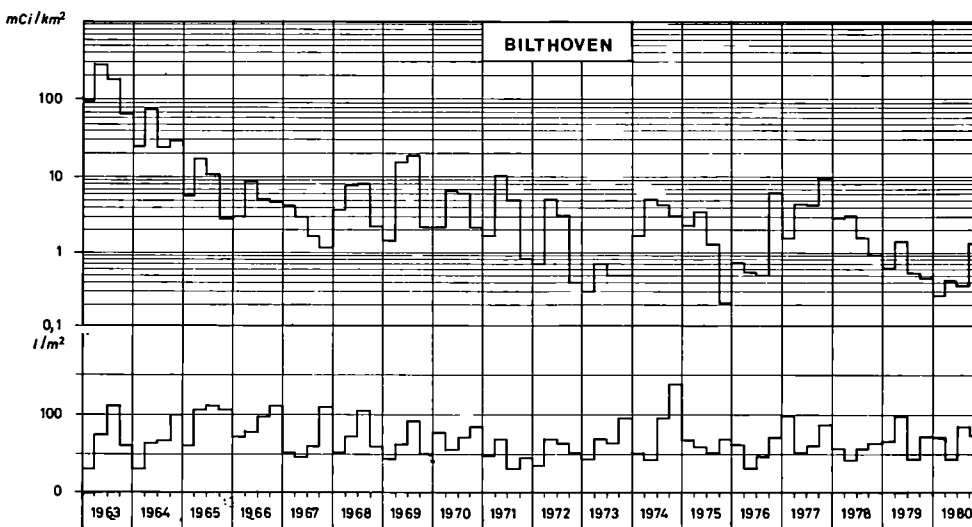
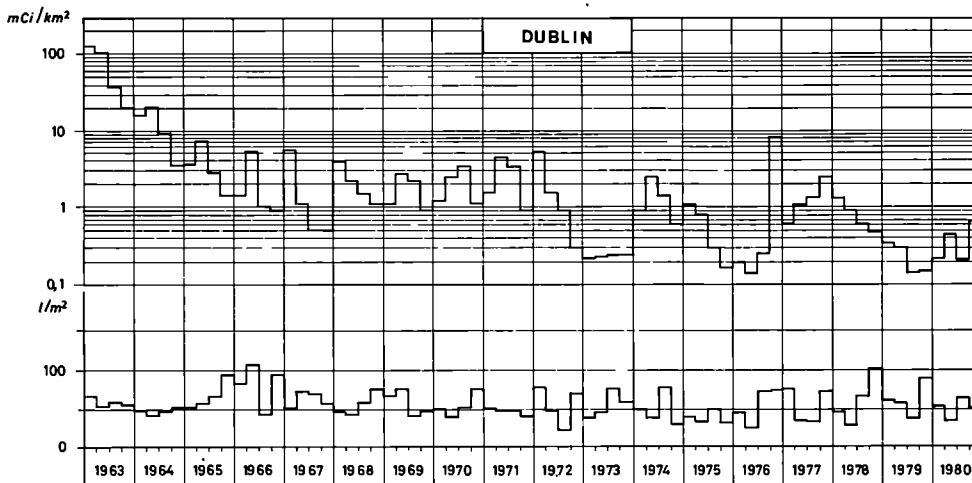
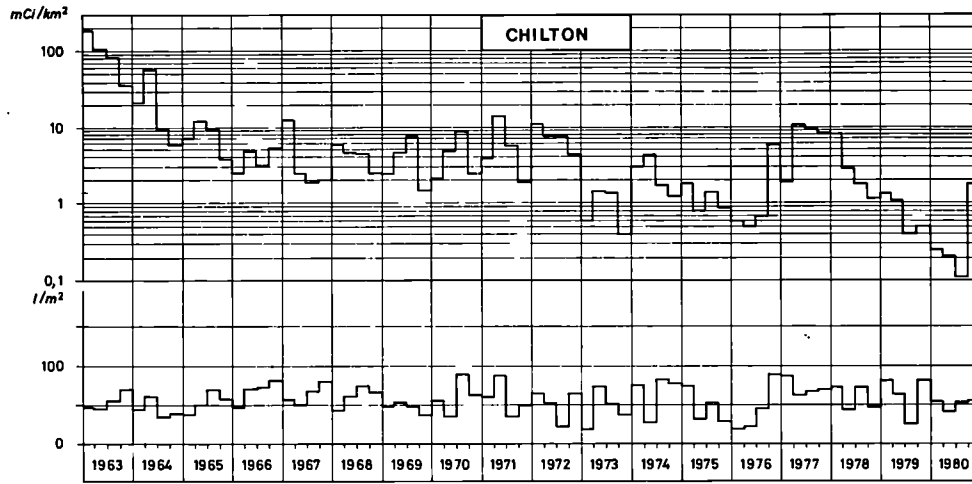
Graph 7a)

VARIATION 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)

VARIATION 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

1980

Table 15.1
 β_R -pCi/l

		Minim.	0 <10	≤ 10 <30	≤ 30 <50	> 50	Maxim.	N.
Drinking water	Belgique	< 5	83 %	15 %	2 %	-	28	59
	Deutschland	1	97 %	2 %	-	1 %	110	ca 2000
	France (SCPRI)	< 1	98 %	-	2 %	-	37	429
	Ireland	0.5	100 %	-	-	-	9	104
	United Kingdom (++)	< 4	93 %	7 %	-	-	< 11	14
Surface water suitable for drinking water supply	Belgique	< 5	93 %	7 %	-	-	29	30
	Greece	4.80	100 %	-	-	-	8.34	12
	Nederland	0	100 %	-	-	-	7	4
	United Kingdom	< 7	100 %	-	-	-	< 8.6	2
Surface water	Belgique	< 5	93 %	6 %	1 %	-	50	72
	Deutschland (+)	1	91 %	8.3 %	0.35 %	0.35 %	140.4	3092
	France (SCPRI)	< 1	93 %	2 %	1 %	4 %	84	4078
	Greece	1.88	70 %	30 %	-	-	10.44	39
	Nederland	0.7	98 %	2 %	-	-	11.5	48
	United Kingdom	< 4	60 %	-	-	40 %	12.00	20
Sea water	Belgique	10	12.5 %	12.5 %	25 %	50 %	185	8
	France (SCPRI)	-	100 %	-	-	-	10	367
	Greece	< 2	100 %	-	-	-	< 3	12

(+) β_R and total beta

(++) Measured only for specific nuclides

RADIOACTIVITY OF WATER - DENMARK

Table 15.2

1980

		pCi/l ⁻¹			
		Min.	Ma.	Geometric mean	N.
⁹⁰ Sr	Drinking water	-	-	-	-
	Lakes water	-	-	-	-
	Streames water	-	-	-	-
	Sea water surface	0.33	1.19	0.62	27
	Sea water bottom	0.41	2.73	0.69	21
} no samples in 1980					
¹³⁷ Cs	Sea water surface	0.46	6.75	1.21	46
	Sea water bottom	0.49	3.08	1.88	28
¹³⁴ Cs	Sea water surface	~ 0	0.31	0.071 (*)	31
	Sea water bottom	~ 0	0.15	0.11 (*)	22

(*) The mean is biased, because zero values were not included.

RADIOACTIVITY
OF MILK

$\text{pCi } ^{90}\text{Sr/g Ca DIET TO MILK RATIO}$
1961 - 1980

Table 16

$\text{pCi } ^{90}\text{Sr/g Ca}$ Diet Milk	Belgique/ België	Denmark (c)	Deutsch- land (BR)	France		Italia	Nederland	United Kingdom (a)	M
				SCPRI	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)	-
1980	2.32	1.38	3.1	2.0	-	-	(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

1980

⁹⁰Sr - pCi/gCa in milk

	1st quarter	2nd quarter	3rd quarter	4th quarter	\bar{x}_a
BELGIQUE/BELGIË	5.277	3.3	4.13	4.495	4.306
DENMARK					
Hjørring	3.3	3.3	3.6	3.2	3.4
Aarhus	3.1	2.8	2.8	3.3	3.0
Videabaek	3.4	3.9	3.3	3.8	3.6
Åbenrå	3.3	3.7	3.5	4.1	3.7
Odense	2.1	2.1	3.0	2.8	2.5
Ringsted	2.3	2.2	1.9	2.3	2.2
Lolland-Falster Møn	1.8	2.0	1.8	2.2	2.0
DEUTSCHLAND (BR)					
Schleswig-Holstein.	2.0	2.25	2.0	2.7	2.2
Baden-Württemberg	4.75	5.2	4.1	3.8	4.5
Bayern	2.25	3.2	3.6	2.7	2.9
Berlin-West	-	-	-	-	-
Hamburg	1.6	1.3	1.3	1.2	1.35
Hessen	2.5	2.5	2.5	3.4	2.7
Niedersachsen	2.7	2.25	2.7	3.2	2.7
Nordrhein-Westfalen	2.25	2.0	2.25	3.2	2.4
Rheinland-Pfalz ...	2.7	3.4	2.9	3.2	3.05
FRANCE (SCPRI)					
Vioménil	8.1	7.1	5.8	6.8	6.9
Méaudre	7.2	5.8	5.7	10	7.2
Montfaucon	< 2.0	< 2.9	< 2.6	< 2.3	< 2.4
Nainville	2.7	2.5	3.2	2.3	2.7
Cléville	1.4	1.7	1.7	< 1.2	< 1.5
Bellenaves	2.8	2.7	3.0	2.6	2.8
Anglade	8.0	8.2	9.0	8.0	8.3
Bussy	3.1	2.5	2.7	3.0	2.8
Le Vésinet	1.6	< 1.8	1.8	< 1.7	< 1.7
90 départements : moyennes générales (1)	3.8	4.1	3.8	3.8	4.0

(1) Mean weighted on the basis of the production of each department distributed as milk for consumption.

./. continued in next page

Table 17 a)
continued

Quarterly and annual means for all the sampling areas and points in the
Community
1980

⁹⁰Sr - pCi/gCa in milk

	1st quarter	2nd quarter	3rd quarter	4th quarter	\bar{x}_a
FRANCE (CEA)					
Alsace	2.2	2.3	-	-	2.2
Anjou-Vendee	4.4	3.7	-	-	4.0
Auvergne	-	-	-	-	-
Bresse-Lyonnais	5.0	4.8	-	-	4.9
Bretagne	4.1	4.6	4.4	4.4	4.4
Charente	2.9	4.1	-	-	3.5
Garonne	5.8	4.8	-	-	5.3
Ile-de-France	3.5	3.7	4.1	4.1	3.8
Jura	3.8	4.6	-	-	4.2
Landes	5.2	5.3	3.8	3.8	4.5
Lorraine	5.4	4.6	6.3	6.3	5.6
Nord	2.3	2.4	-	-	2.3
Normandie	3.7	3.3	-	-	3.5
Savoie-Dauphine	4.2	4.0	-	-	4.1
ITALIA					
Alessandria	< 2	< 1.4	-	-	1.7
Ancona	2.6	2.6	-	-	2.6
Bari	-	-	2.4	1.8	2.1
Catania	-	-	-	-	-
Firenze	-	-	-	-	-
Genova	6.3	6.1	7.3	7.1	6.7
Milano	-	-	-	-	-
Roma	3.7	< 1.4	4.5	5.6	3.8
Torino	< 1.5	3.7	7.2	3.0	3.9
Varese	-	-	-	-	-
Verona	< 1.6	5.2	3.7	2.9	3.4
NEDERLAND					
	1.1	1.2	1.7	1.6	1.6
UNITED KINGDOM					
England	1.9	1.4	1.9	1.9	1.8
Wales	2.7	3.8	4.1	3.0	3.4
Scotland	2.4	3.2	3.0	2.4	2.8
Nothern Ireland	2.2	2.2	2.7	2.4	2.4

Table 18

CALCULATED QUARTERLY MEANS BY MEMBER STATES AND FOR THE COMMUNITY
1980

⁹⁰Sr pCi/g Ca in milk

	1st quarter	2nd quarter	3rd quarter	4th quarter	\bar{x}_a
Belgique/België	5.277	3.323	4.13	4.495	4.305
Denmark	2.8	2.9	2.8	3.1	2.9
Deutschland (BR)	2.6	2.8	2.7	2.9	2.7
France (SCPRI)	3.8	4.1	3.8	3.8	4.0
France (CEA)	3.8	3.8	4.6(**)	4.6(**)	4.2
Italia	2.9	3.4	5.0	4.1	3.8
Nederland	1.1	1.2	1.7	1.6	1.6
United Kingdom (*)	2.0	1.8	2.3	2.1	2.1
\bar{x} Community	3.0	2.9	3.4	3.3	3.2

(*) Weited for protection in each country of U.K.

(**) Mean value of semestrial analyses for four regions only

Table 19

CALCULATED QUARTERLY MEANS FOR THE COMMUNITY
1972 - 1980

⁹⁰Sr pCi/g Ca in milk

year	1st quarter	2nd quarter	3rd quarter	4th quarter	\bar{x}_a
1972	6.8	7.2	5.7	5.3	6.3
1973	5.4	5.6	5.4	4.9	5.3
1974	5.0	5.4	4.9	5.2	5.1
1975	4.2	4.5	3.8	3.8	4.1
1976	3.7	3.7	3.1	3.2	3.4
1977	3.4	3.8	4	3.9	3.8
1978	3.8	4.2	4	3.5	3.9
1979	3.5	3.4	3.3	3.3	3.4
1980	3.0	2.9	3.4	3.3	3.2

ANNUAL MEAN RATIOS OF STRONTIUM-90 TO CALCIUM IN MILK

Table 20

1958 - 1980

pCi ⁹⁰Sr/g Ca

	Belgique/ België	Denmark	Deutschland (BR)	France		Greece	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)	3.54 (3)	8.14	7	6.8
1970	6.16	7.3	8	8.4	12 (4)	15.28 (3)	7.06	6	6.1
1971	6.45	7.2	8	8.6	11 (4)	13.13 (3)	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)	44.41 (3)	6.01	4	4.1
1974	4.70	4.5	6	5.9	6 (4)	51.32 (3)	-	4	3.3
1975	4.48	4.1	5	5.4	6 (4)	20.00 (3)	3.03	3	2.8
1976	3.33	3.4	3	4.5	5.3(4)	32.49 (3)	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)	5.70 (3)	5.9	3	2.2
1979	3.49	2.9	3	4.3	4.2(4)	NA	5.0	1	2.6
1980	4.23	2.9	3	4.0	4.2(4)	NA	3.8	2	2.1

(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 sampling areas and point in the Community

1980

¹³⁷Cs - pCi/l in milk

	1st quarter	2nd quarter	3rd quarter	4th quarter	\bar{x}_a
BELGIQUE/BELGIE	5.38	6.37	3.03	2.06	4.35
DENMARK					
Hjørring	4.0	4.5	4.6	2.8	4.0
Århus	4.1	3.7	5.1	2.8	3.9
Videbaek	4.0	4.3	5.5	3.3	4.3
Åbenrå	3.0	3.4	5.5	2.8	3.7
Odense	2.4	2.1	2.3	1.4	2.0
Ringsted	1.8	1.7	1.6	1.2	1.6
Lolland-Falster Møn	1.6	2.0	1.6	1.2	1.6
DEUTSCHLAND					
Schleswig-Holstein	3.0	2.4	1.6	1.9	2.2
Baden-Württemberg	10.0	8.7	4.3	< 4.1	6.8
Bayern	3.5	4.1	5.4	2.7	3.9
Berlin-West	-	-	-	-	-
Hamburg	6.5	6.2	7.6	6.7	6.75
Hessen	3.0	2.7	1.9	2.7	2.6
Niedersachsen	6.7	6.7	10.8	8.4	8.15
Nordrhein-Westfalen	<2.7	<3.0	<3.2	< 2.7	< 2.9
Rheinland-Pfalz ..	5.7	3.2	2.2	2.2	3.3
FRANCE (SCPRI)					
Vioménil	<6.4	A.A.S.	A.A.S.	A.A.S.	< 4.8
Méaudre	6.7	"	"	10	< 7.4
Montfaucon	<4.3	< 5.4	"	A.A.S.	< 4.3
Nainville	A.A.S.	A.A.S.	"	"	A.A.S.
Cléville	"	"	"	"	"
Bellenaves	<6.1	< 5.5	"	"	< 4.5
Anglade	8.4	< 7.2	7.6	< 6.8	< 7.5
Bussy	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.
Le Vésinet	"	"	"	"	"
90 départements :					
Moyennes générales (1)	<6.1	<4.1	< 5.4	< 3.9	< 5.0
Measurement threshold	6.8	6.8	6.8	6.8	6.8

(1) Mean weighted on the basis of the production of each department distributed as milk for consumption.

Notice concerning data for France pages 29DA, 49DE, 69EN, 89FR, 109IT, 129NL.

Table 21 a)
continued

Quarterly and annual means for all the sampling areas and points in the
Community

1980

¹³⁷Cs - pCi/l in milk

	1st quarter	2nd quarter	3rd quarter	4th quarter	\bar{x}_a
FRANCE (CEA)					
Alsace	3.3	< LD	< LD	< LD	< 1.2
Anjou-Vendee ...	2.1	< LD	< LD	< LD	< 0.9
Auvergne	-	-	-	-	-
Bresse-Lyonnais	-	1.9	< LD	< LD	1.0
Bretagne	4.4	6.4	6.1	4.4	5.3
Charente	2.7	13.2	< LD	< LD	< 4.2
Garonne	2.4	< LD	< LD	< LD	< 1.0
Ile-de-France ..	-	< LD	< LD	4.8	< 1.9
Jura	2.0	3.6	6.0	< LD	< 3.0
Landes	3.0	3.4	4.8	5.6	4.2
Lorraine	28.4	21.6	29.7	23.8	25.9
Nord	0.7	< LD	< LD	< LD	< LD
Normandie	1.9	< LD	< LD	< LD	< 0.8
Savoie-Dauphiné.	3.5	< LD	4.6	3.5	< 3.0
ITALIA					
Alessandria	< 2	< 2	-	-	< 2
Ancona	4.1	< 2	-	-	3
Bari	-	-	3.9	2.5	3.2
Catania	-	-	-	-	-
Firenze	-	-	-	-	-
Genova	4.9	5.3	7.3	5.5	5.8
Milano	-	-	-	-	-
Roma	< 2	5.6	< 2.9	< 2.9	< 3.4
Torino	< 2	< 2	6.2	< 2.9	< 3.3
Varese	-	-	-	-	-
Verona	< 2	< 2	< 2.9	< 2.5	< 2.4
NEDERLAND					
	4.1	3.7	3.5	2.8	3.5
UNITED KINGDOM					
England	3.0	1.9	1.9	2.7	2.4
Wales	3.5	3.2	3.8	2.2	3.2
Scotland	3.2	6.8	4.6	3.2	4.5
Nothern Ireland.	3.2	5.7	5.1	5.1	4.8

LD = 0.5 pCi/l

Table 22

CALCULATED QUARTERLY MEANS BY MEMBER STATES AND FOR THE COMMUNITY
1980

^{137}Cs pCi/l milk

	1st quarter	2nd quarter	3rd quarter	4th quarter	\bar{x}_a
Belgique/België	5.38	6.37	3.03	2.60	4.35
Denmark	3.0	3.1	3.7	2.2	3.0
Deutschland (BR)	5.4	4.6	4.6	3.9	4.6
France (SCPRI)	< 6.1	< 4.1	< 5.4	< 3.9	< 5.0
France (CEA)	3.7	3.6	3.9	2.9	3.5
Italia	2.8	< 3.2	4.6	< 3.3	3.4
Nederland	4.1	3.7	3.5	2.8	3.5
United Kingdom(*)	3.1	2.7	2.6	2.9	2.8
\bar{x} Community	< 4.2	< 3.9	< 3.9	< 3.1	< 3.8

(*) Weighted for production in each country of U.K.

Table 23

CALCULATED QUATERLY MEANS FOR THE COMMUNITY
1972 - 1980

^{137}Cs pCi/l in milk

year	1st quarter	2nd quarter	3rd quarter	4th quarter	\bar{x}_a
1972	19.4	15.6	14.2	11.6	15.2
1973	11.1	9.1	10.0	9.4	9.9
1974	8.5	11	12.7	10.7	10.7
1975	< 11.5	< 10.6	< 10.5	< 9.2	< 10.4
1976	< 8.2	5.5	5.2	5.2	< 6.0
1977	4	4.6	7.9	8.1	6.1
1978	6.9	7.7	8.7	7	7.6
1979	6.3	5.6	5.0	3.9	5.2
1980	4.2	< 3.9	< 3.9	< 3.1	< 3.8

ANNUAL MEAN CONCENTRATION OF CAESIUM-137 IN MILK
1958 - 1980

Table 24

¹³⁷Cs - pCi/l

	Belgique/ België	Denmark	Deutschland (BR)	France		Grèce	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)	4.47 (3)	36.3	23	14
1970	13.6	13.9	31	21	26 (4)	8.69 (3)	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)	10.68 (3)	7.5	6	7
1979	4.6	4.8	< 6	6.5	3.5 (4)	NA	6.2	6	5
1980	4.4	3.0	< 5	< 5.0	3.5 (4)	NA	3.4	4	3

(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)

SUPPLEMENTARY DATA
ON AMBIENT RADIOACTIVITY AND
ON SHORT-LIVED RADIOELEMENTS

DETECTED DURING 1980
(from the Chinese test explosion of 16.10.1980)

DEUTSCHLAND (Bundesrepublik)

Measurement results in the Federal Republic of Germany after the nuclear bomb test in the People's Republic of China on 16 October 1980

According to the German Meteorological Service in Offenbach most of the fission products of the Chinese nuclear bomb test of 16 October 1980 remained in the stratosphere. A relatively small proportion remained in the troposphere. Thus, during the last ten days of October, only traces of short-lived fission isotopes could be detected by the Physikalisch-Technische Bundesanstalt in Braunschweig and the Gesellschaft für Strahlen- und Umweltforschung (Society for Radiation and Environmental Research) in Munich. An increase in radionuclides such as Ru 103, Zr 95, Nb 95 and Cer 941 was recorded towards the end of the year.

The following tables show measurements of iodine 131 in precipitation in Offenbach and Emden and iodine 131 measurements in milk in Baden-Württemberg, North Rhine-Westphalia and Schleswig-Holstein. Measurements by the Bundesforschungsanstalt für Ernährung (Federal Research Institute for Nutrition) in Karlsruhe have indicated the presence of short-lived fission products in green kale. The results of these measurements are summarized in a table.

FEDERAL REPUBLIC OF GERMANY

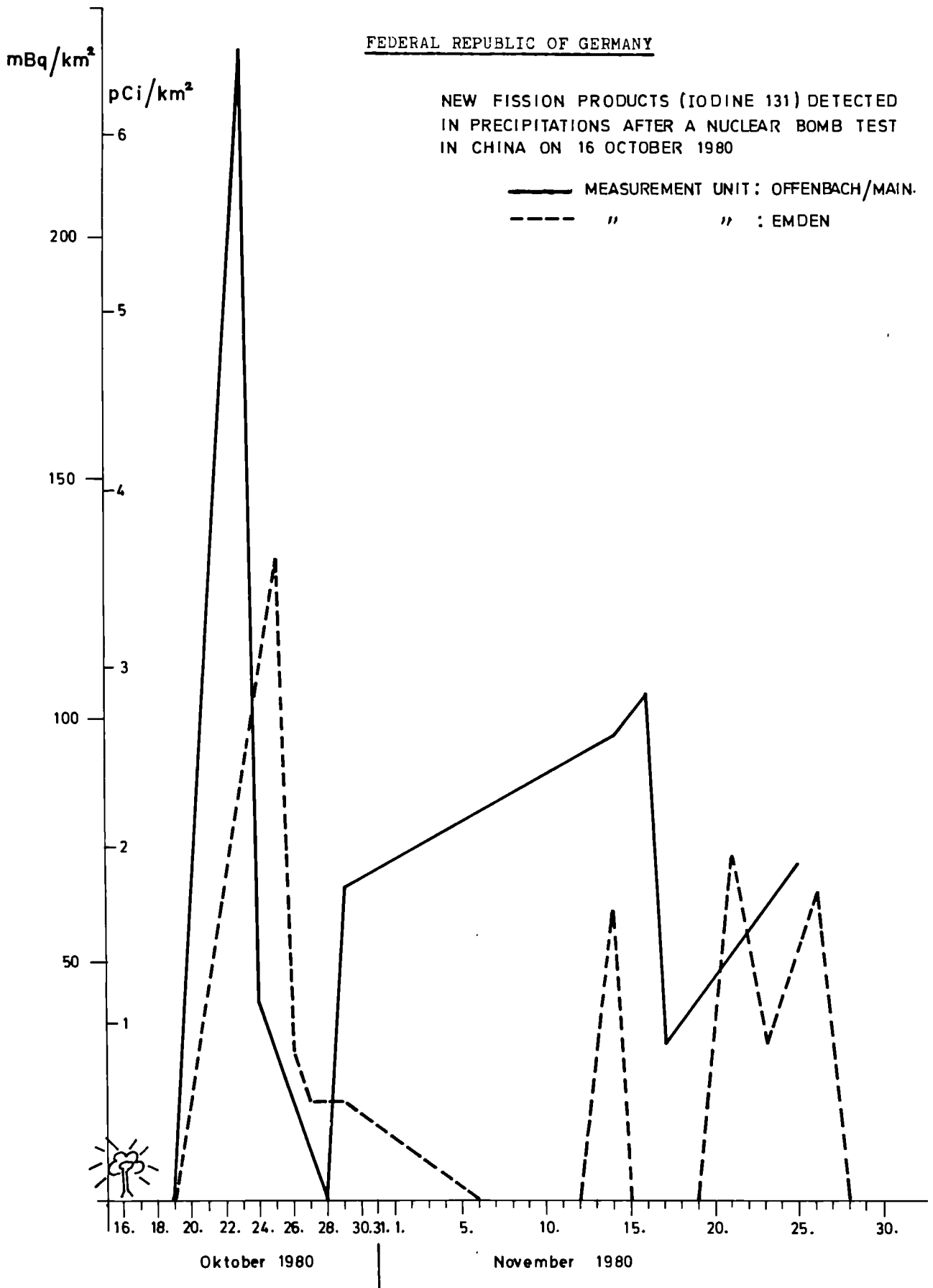
Iodine 131 levels in milk

Federal Land (measurement unit place of sampling)	Date of sampling	Iodine 131 mBq/l	pCi/l
<u>Baden</u>			
<u>Württemberg</u>			
(32)			
Crailsheim	11.11.80	< 19	< 0.5
Freiburg	31.10.80	81	2.2
	24.11.80	96	2.6
Heilbronn	25.11.80	< 19	< 0.5
Karlsruhe	11.11.80	< 19	< 0.5
Langenau	04.11.80	< 19	< 0.5
Ludwigsburg	03.11.80	< 37	< 1
Mannheim	21.11.80	< 19	< 0.5
Mosbach	26.11.80	< 19	< 0.5
Öhringen	27.11.80	100	2.7
	29.11.80	63	1.7
	30.10.80	74	2
Radolfzell	13.11.80	< 19	< 0.5
Ravensburg	27.10.80	118	3.2
	29.10.80	52	1.4
	05.11.80	< 37	< 1
Rottweil	27.10.80	< 37	< 1
	29.10.80	< 37	< 1
	31.10.80	48	1.3
	20.11.80	< 19	< 0.5

./. continued in next page

FEDERAL REPUBLIC OF GERMANY

Federal Land (measurement unit place of sampling)	Date of sampling	J 131	
		mBq/l	pCi/l
		(continued)	
St. Georgen	06.11.80	< 19	< 0.5
	09.12.80	< 19	< 0.5
<u>Nordrhein</u>			
<u>Westfalen</u>			
(56)			
Borken I	30.10.80	19	0.5
Borken II	30.10.80	< 19	< 0.5
Coesfeld I	28.10.80	48	1.3
Coesfeld II	28.10.80	< 19	< 0.5
Iserlohn	26.11.80	< 19	< 0.5
Jülich	24.11.80	< 19	< 0.5
Münster I	27.10.80	11	0.3
Münster II	27.10.80	< 19	< 0.5
Münster III	27.10.80	< 41	1.1
Münster IV	27.10.80	19	0.5
Rimbek	23.11.80	< 19	< 0.5
Steinfurt I	05.11.80	< 19	< 0.5
Steinfurt II	05.11.80	< 19	< 0.5
<u>Schleswig-</u>			
<u>Holstein</u>			
(30)			
Kiel	24.10.80	< 6	< 0.2
	28.10.80	< 6	< 0.2
	29.10.80	< 6	< 0.2
Schaedtbeek	25.10.80	< 6	< 0.2
	26.10.80	< 6	< 0.2
	27.10.80	< 6	< 0.2
	29.10.80	< 6	< 0.2
	31.10.80	< 6	< 0.2



MONITORING OF RADIONUCLIDE LEVELS IN GREEN KALE - FEDERAL REPUBLIC OF GERMANY

The measurements were made by measurement unit 29 (Federal Research Institute for Nutrition)
 Measurement values in mBq and pCi/kg fresh material - Place of sampling : open countryside,
 Karlsruhe-Neureut; distance from the Nuclear Research Centre : approx. 6 km sw. After freeze-
 drying no iodine 131 was detected in any of the samples examined (detection limit: 110 mBq/kg).

Date of harvesting 1980	^7Be		^{137}Cs		^{141}Ce		^{95}Zr		^{95}Nb		^{103}Ru		^{140}La	
	mBq/kg	pCi/kg	mBq/kg	pCi/kg	mBq/kg	pCi/kg	mBq/kg	pCi/kg	mBq/kg	pCi/kg	mBq/kg	pCi/kg	mBq/kg	pCi/kg
20.10	1000	27	120	3.2	< 180	< 5	< 110	< 3	< 110	< 3	< 110	< 3	< 180	< 5
21.10.	6500	175,5	< 37	< 1	< 180	< 5	< 110	< 3	< 110	< 3	< 110	< 3	< 180	< 5
22.10	9100	246	< 37	< 1	< 180	< 5	< 110	< 3	< 110	< 3	< 110	< 3	< 180	< 5
23.10.	6700	181	< 37	< 1	< 180	< 5	< 110	< 3	< 110	< 3	< 110	< 3	< 180	< 5
24.10.	6500	175,5	< 37	< 1	< 180	< 5	< 110	< 3	< 110	< 3	< 110	< 3	< 180	< 5
25.10.	4370	< 10	< 37	< 1	< 180	< 5	< 110	< 3	< 110	< 3	< 110	< 3	< 180	< 5
26.10.	2700	73	< 37	< 1	< 180	< 5	< 110	< 3	< 110	< 3	< 110	< 3	< 180	< 5
27.10.	4800	130	< 37	< 1	< 180	< 5	< 110	< 3	< 110	< 3	< 110	< 3	< 180	< 5
28.10.	8500	230	< 37	< 1	< 180	< 5	< 110	< 3	< 110	< 3	< 110	< 3	< 180	< 5
29.10.	6300	170	< 37	< 1	< 180	< 5	< 110	< 3	< 110	< 3	< 110	< 3	< 180	< 5
30.10.	4370	< 10	< 37	< 1	< 180	< 5	< 110	< 3	< 110	< 3	< 110	< 3	< 180	< 5
4.11.	6500	175,5	< 37	< 1	< 180	< 5	< 110	< 3	< 110	< 3	< 110	< 3	< 180	< 5
5.11.	7200	194	< 37	< 1	< 180	< 5	< 110	< 3	< 110	< 3	< 110	< 3	< 180	< 5
6.11.	7700	208	< 37	< 1	< 180	< 5	< 110	< 3	< 110	< 3	< 110	< 3	< 180	< 5
7.11.	7400	200	< 37	< 1	< 180	< 5	< 110	< 3	< 110	< 3	< 110	< 3	< 180	< 5

(continued)

Date of harvesting 1980	^7Be	^{137}Cs	^{141}Ce	^{95}Zr	^{95}Nb	^{103}Ru	^{140}La
	mBq/kg pCi/kg	mBq/kg pCi/kg	mBq/kg pCi/kg	mBq/kg pCi/kg	mBq/kg pCi/kg	mBq/kg pCi/kg	mBq/kg pCi/kg
8.11.	13000 351	< 37 < 1	< 180 < 5	< 110 < 3	< 110 < 3	< 110 < 3	< 180 < 5
9.11.	2400 65	< 37 < 1	< 180 < 5	< 110 < 3	< 110 < 3	< 110 < 3	< 180 < 5
10.11.	4370 < 10	< 37 < 1	< 180 < 5	< 110 < 3	< 110 < 3	< 110 < 3	< 180 < 5
14.11.	5400 146	< 37 < 1	< 180 < 5	< 110 < 3	< 110 < 3	< 110 < 3	< 180 < 5
17.11. (1)	8100 219	< 37 < 1	2400 65	< 110 < 3	< 110 < 3	1000 27	1800 49
20.11.	11000 297	< 37 < 1	2000 54	1400 38	920 25	1200 32	1400 38
25.11.	11000 297	< 37 < 1	2000 54	890 24	1100 30	1100 30	1000 27
26.11.	9400 254	< 37 < 1	2500 68	3100 84	2300 62	920 25	440 12
27.11.	11000 297	< 37 < 1	2600 70	1800 49	1800 49	1300 35	960 26
1.12.	5900 159	< 37 < 1	1600 43	1200 32	1500 41	810 22	260 7
3.12.	5600 151	240 6.5	1700 46	2100 57	1700 46	920 25	< 180 < 5
5.12.	8500 230	< 37 < 1	1800 49	1800 49	1300 35	1000 27	< 180 < 5
8.12.	13000 351	200 5.4	1900 51	1400 38	1500 41	1200 32	520 14
11.12.	11000 297	< 37 < 1	2300 62	2700 73	2200 59	1100 30	< 180 < 5
17.12.	12000 324	170 4.6	4400 119	8000 216	8400 227	1300 35	< 180 < 5
17.12. (2)	13000 351	44 1.2	3900 105	3200 86	3000 81	1800 49	740 20

(1) Heavy rainfall 14 to 17 November

(2) Control sample from Karlsruhe-Durlach; distance from Nuclear Research Centre : approximately 12 km SSE.

FRANCE - SCPRI

A la suite de l'essai nucléaire d'Extrême Orient du 16 Octobre 1980 de faibles hausses d'activité ont été observées par le SCPRI sur tout le territoire pendant le 4ème trimestre 1980. Cette augmentation générale de la radioactivité de l'environnement est toutefois restée sans conséquences sur le plan sanitaire.

I - AIR HAUTE ALTITUDE

Présence de radioéléments à vie courte sur divers prélèvements.

Valeurs maximales (picocurie par centimètre carré de surface externe) :

- Vol Paris-New York-Paris du 30/10/80 : Iode 131 : 2,2 pCi/cm²
Baryum 140 : 12 pCi/cm²
- Vol Nice-Paris du 15/11/80 : Zirconium 95 + Niobium 95 : 5,2 pCi/cm²
Baryum 140 : 3,9 pCi/cm²
- Vol Paris-Johannesbourg et retour du 26/12/80 : Zirconium 95 + Niobium 95 :
25 pCi/cm²
Cérium 141 : 20 pCi/cm²

II - AIR AU SOL

1 - Augmentation de l'activité β totale à dater du 27 octobre.

Valeurs maximales (picocurie par mètre cube) :

- 0,095 pCi/m³ à Bellenaves le 27/10/80
- 0,61 pCi/m³ à Ajaccio le 21/11/80
- 6,1 pCi/m³ à Anglade le 31/12/80 (poussière isolée par autoradiographie Zirconium 95 : 390 picocuries, Niobium 95 : 460 picocuries). Valeur maximale en décembre pour le reste des stations : 0,41 pCi/m³

2 - Mesure des radioéléments spécifiques : présence de radioéléments à vie courte : voir sur le tableau I les résultats obtenus pour les prélèvements hebdomadaires de la station du Vésinet.

III - EAUX DE PLUIE

1 - Echantillons hebdomadaires

Augmentation de l'activité β totale dès la 4ème semaine d'octobre

Valeurs maximales (eau brute) :

- 320 pCi/l du 22/10 au 1/11/80 dans le département de l'Isère
- 81 pCi/l du 15 au 22/11/80 dans le département de la Drôme
- 73 pCi/l du 1er au 8/12/80 dans la région Parisienne

2 - Analyses détaillées sur les échantillons mensuels

Présence de radioéléments à vie courte sur les prélèvements de novembre et de décembre :

Valeurs maximales :

- Zirconium 85 + Niobium 95 : 10 pCi/l à Méandre en décembre
- Ruthénium 103 : 8,1 pCi/l à Vioménil en novembre.

IV - THYROIDES DE BOVINS

Présence d'Iode 131 à dater du 28 octobre sur 23 échantillons
(voir les résultats sur le tableau II).

Valeur maximale : 10 picocuries par gramme d'organe frais (provenance
Nancy) le 19 novembre.

V - LAIT

Traces d'Iode 131 décelées seulement à la fin d'octobre :

- 2,4 pCi/l à Cléville le 28/10/80
- 3,8 pCi/l à Vioménil le 29/10/80

VI - VEGETAUX

Présence de radioéléments à vie courte

Valeurs maximales (picocurie par gramme de cendres) :

- Baryum 140 + Lanthane 140 : 22 pCi/g à Anglade le 4/11/80
- Zirconium 95 + Niobium 95 : 7,4 pCi/g et Baryum 140 + Lanthane 140 :
14 pCi/g à Vioménil le 2/12/80.

TABLEAU I - MEASURE DE RADIOELEMENTS SPECIFIQUES DANS L'AIR AU SOL A LA STATION DU VESINET (FRANCE)

A LA SUITE DE L'ESSAI NUCLEAIRE DU 16 OCTOBRE 1980

LE VESINET - SCPRI (France)

pCi/m³

Dates de prélèvement	⁷ Be	⁵⁴ Mn	⁹⁰ Sr	⁹⁵ Zr+ ⁹⁵ Nb	¹⁰³ Ru	¹⁰⁶ Ru+ ¹⁰⁶ Rh	¹²⁵ Sb	¹³¹ I	¹³² Te+ ¹³² I
15/10-22/10/80	0,052	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.	A.A.S.
22/10- 1/11/80	0,057	"	"	"	"	"	"	"	-
1/11-15/11/80	0,061	"	"	"	"	"	"	"	-
8/11-15/11/80	0,048	"	"	"	"	"	"	"	-
15/11-22/11/80	0,081	"	0,00043	0,017	0,010	"	"	"	-
22/11- 1/12/80	0,056	"	0,00045	0,012	0,0052	"	"	"	-
1/12- 8/12/80	0,048	"	A.A.S.	A.A.S.	0,0051	"	"	"	-
8/12-15/12/80	0,059	"	"	0,024	0,011	"	"	"	-
15/12-22/12/80	0,059	"	"	0,019	0,0088	"	"	"	-
22/12- 1/ 1/81	0,040	"	"	0,015	0,0070	"	"	"	A.A.S.
Seuil de mesure	-	0,0054	0,0011	0,027	0,0054	0,027	0,0054	0,0054	0,027
Dates de prélèvement	¹³⁷ Cs	¹⁴⁰ Ba+ ¹⁴⁰ La	¹⁴¹ Ce	¹⁴⁴ Ce+ ¹⁴⁴ Pr	(Notice concerning data for France pages 29DA, 49DE, 69EN, 89FR, 109IT, 129NL).				
15/10-22/10/80	A.A.S.	A.A.S.	A.A.S.	A.A.S.					
22/10- 1/11/80	"	"	"	"					
1/11- 8/11/80	"	"	"	"					
8/11-15/11/80	"	"	"	"					
15/11-22/11/80	"	"	0,012	"					
22/11- 1/12/80	"	"	A.A.S.	"					
1/12- 8/12/80	"	"	"	"					
8/12-15/12/80	"	"	0,011	"					
15/12-22/12/80	"	"	A.A.S.	"					
22/12- 1/ 1/81	"	"	0,0099	"					
Seuil de mesure	0,0054	0,027	0,027	0,027					

TABLEAU II - IODE 131 DANS LES THYROIDES DE BOVINS

SCPRI - (France)

Lieu de prélèvement	Date de prélèvement	Région d'élevage	Iode 131 pCi/g organe frais
Avignon	28/10/80	Saône et Loire	1,7
Nancy	29/10/80	Meurthe et Moselle	3,8
Vioménil	3/11/80	Vosges	6,8
Avignon	4/11/80	Saône et Loire	2,9
Bordeaux	4/11/80	Sud-Ouest	7,3
Mantes	4/11/80	Normandie	2,1
Nancy	5/11/80	Meurthe et Moselle	5,3
Nancy	12/11/80	Meurthe et Moselle	4,6
Avignon	12/11/80	Allier	3,1
Bordeaux	12/11/80	Sud-Ouest	6,9
Vioménil	17/11/80	Vosges	9,1
Mantes	17/11/80	Eure	2,3
Avignon	18/11/80	Allier	9,1
Bordeaux	18/11/80	Sud-Ouest	3,2
Nancy	19/11/80	Meurthe et Moselle	10
Nancy	25/11/80	Meurthe et Moselle	5,3
Bordeaux	25/11/80	Sud-Ouest	2,0
Vioménil	1/12/80	Vosges	6,7
Bordeaux	2/12/80	Sud-Ouest	2,1
Nancy	3/12/80	Meurthe et Moselle	5,5
Bordeaux	9/12/80	Sud-Ouest	1,8
Nancy	10/12/80	Meurthe et Moselle	3,3
Bordeaux	16/12/80	Sud-Ouest	2,6

FRANCE - CEA

DOSAGE D'IODE-131 DANS LES THYROÏDES DE BOVINS

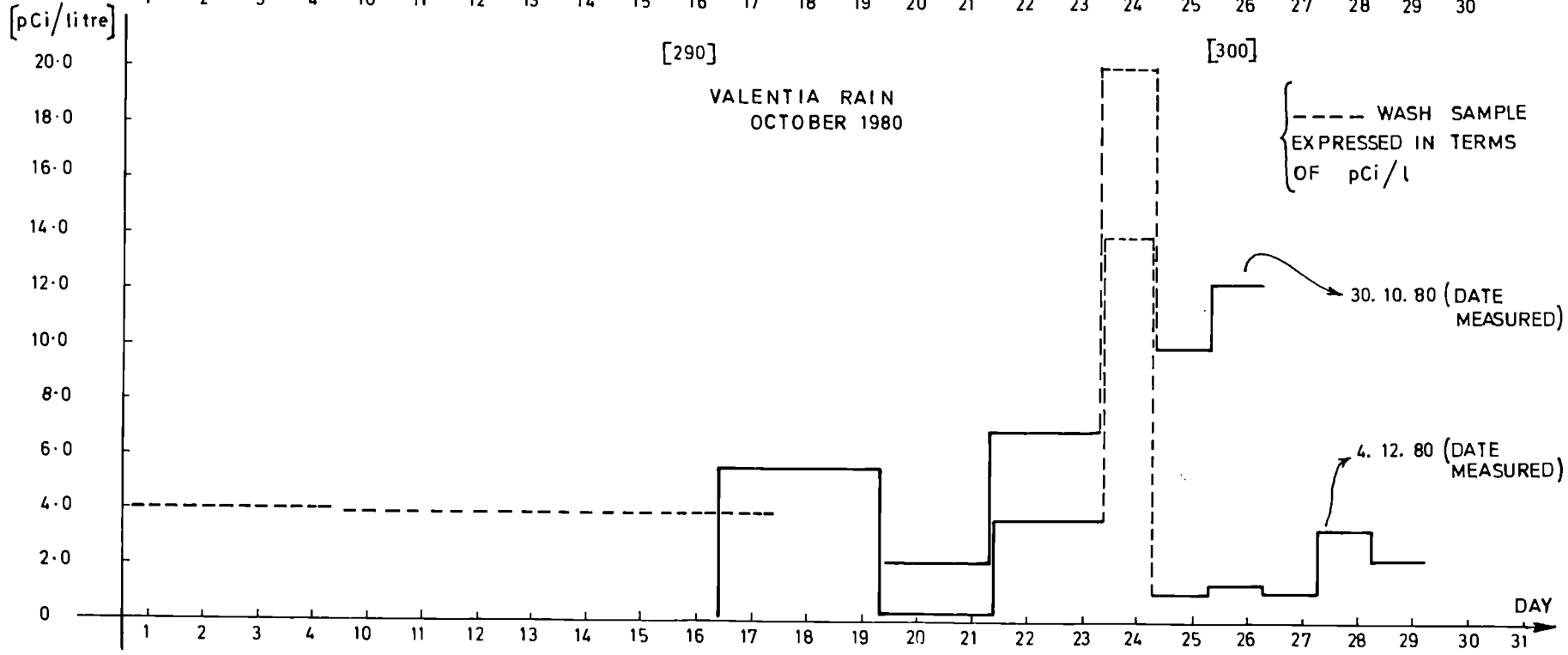
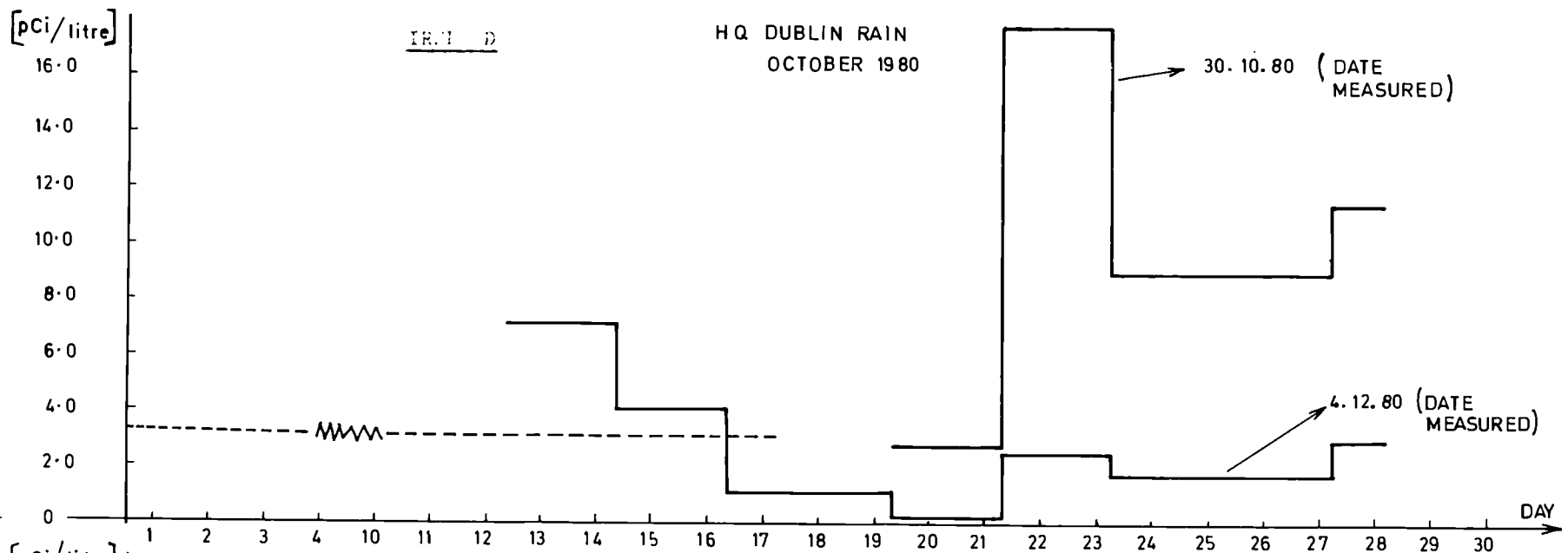
<u>Date d'abattage</u>	<u>Origine</u>	<u>pCi/g</u>
24.11.80	Yvelines	1,6
24.11.80	"	10,4
24.11.80	"	13,8
24.11.80	"	1,2
24.11.80	"	1,4
?	Manche	6,6
26.11.80	"	3,4
26.11.80	"	5,5
26.11.80	"	5,6
26.11.80	"	5,2
26.11.80	"	5,8
26.11.80	"	0,9
26.11.80	"	9,6
26.11.80	"	2,9
1.12.80	Yvelines	10,3
1.12.80	"	9,7
1.12.80	"	9,3
1.12.80	"	10,6
2.12.80	"	15,2
8.12.80	"	7,2
8.12.80	"	6,0
8.12.80	"	7,9
8.12.80	"	10,7
8.12.80	"	0,1
15.12.80	"	néant
15.12.80	"	7,4
15.12.80	"	5,2
15.12.80	"	0,9
15.12.80	"	3,4
22.12.80	"	0,5
22.12.80	"	0,9
22.12.80	"	8,9
22.12.80	"	néant
22.12.80	"	1,8

IRELAND

SUPPLEMENTARY DATA

As result of the Chinese test explosion of 16th October 1980, the frequency of precipitation sampling was increased to daily sampling over a two-week period beginning 20th October. The measurements indicated a slight increase in sample activity which was after attributed to fall-out resulting from the Chinese test explosion.

This increase is amply demonstrated in the accompanying histograms which contain the daily measurements for the period 20th to 28th October 1980, for both Dublin City and Valentia. These samples were measured on 30th October 1980. The histograms of the same and earlier samples, back to the middle of October are inset. These samples were measured on 4th December 1980, almost five weeks later, and the lower sample activities are due to the radioactive decay of the shorter-lived radionuclides resulting from the Chinese fallout. The mean activities of the Dublin City and Valentia rain samples up to the 17th October are also inset on the graphs as horizontal dashed lines.



UNITED KINGDOM

NRPB - Supplementary data on ambient radioactivity and on
short-lived radionuclides detected during 1980

Table 1 : Atmospheric concentrations of short-lived radionuclides detected
at Chilton, U.K. November and December, 1980 (fCi m³)

Collection period of sample	Atmospheric concentrations (fCi m ³)					
	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹³¹ I	¹⁴⁰ Ba/ ¹⁴⁰ La	¹⁴¹ Ce
27/10/80- 3/11/80	.46	.41	.54	.22	.56	.43
3/11/80-10/11/80	-	-	.43	.22	.30	.14
10/11/80-17/11/80	2.6	2.0	3.9	1.1	4.2	3.6
17/11/80-24/11/80	6.1	3.8	8.7	1.2	6.6	7.1
24/11/80- 1/12/80	23	17	4.8	.22	3.2	4.9
1/12/80- 8/12/80	7.1	6.9	5.9	.46	2.7	5.1
8/12/80-15/12/80	13	12	15	.68	5.5	12
15/12/80-22/12/80	8.4	8.3	8.4	-	2.5	6.9
22/12/80-29/12/80	8.4	8.6	8.4	-	1.9	6.2
29/12/80- 5/ 1/81	15	18	8.9	-	1.8	7.1

Table 2 : Deposition of ¹³¹I at Chilton, U.K.

Collection period of sample	Activity concentration pCi/l ⁻¹	Deposition mCi/km ²
11/11/80-24/11/80	3.2	0.8

Daily milk samples were collected from a local farm, where the cattle were still grazing open pasture, during October and November 1980. No iodine-131 was detected; the detection limit, at the 95 % confidence level, was approximately 0.3 pCi/l⁻¹.

SHORT-LIVED FISSION PRODUCT ACTIVITY IN AIR NEAR GROUND LEVEL

from table 29 AERE - R 10088

U.K. STATIONS (femtocuries/Cu. Metre of air)

1980		CHILTON						MILDFORD HAVEN					
MONTH	WEEK	Ba-140	Zr-95	Nb-95	Ce-141	Ru-103	I-131*	R-140	Zr-95	Nb-95	Ce-141	Ru-103	L-131*
Oct	6-13	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12
Oct	13-20	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12
Oct	20-27	0.33	~ 0.12	~ 0.14	0.97	0.21	0.13	< 0.12	< 0.12	~ 0.12	< 0.12	< 0.12	< 0.12
Oct	27- 3	0.95	0.11	0.15	0.29	0.84	0.64	~ 0.3	0.16	< 0.12	0.42	0.53	0.12
Nov	3-10	0.47	0.07	0.12	0.23	0.46	0.40	< 0.24	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12
Nov	10-17	4.49	2.19	1.36	2.79	4.73	1.04	3.64	1.86	2.19	2.43	3.40	0.66
Nov	17-24	5.59	3.52	2.79	5.22	8.38	1.02	7.65	5.46	4.49	6.80	9.83	1.12
Nov	24- 1	2.55	2.43	2.02	3.16	4.98	0.52	3.88	2.14	2.31	3.04	5.83	0.61
Dec	1- 8	2.14	2.91	2.91	3.52	4.98	0.36	3.04	5.95	6.19	4.37	5.46	0.80
Dec	8-15	4.12	10.63	11.78	8.13	12.02	~ 0.3	1.01	4.98	7.77	5.10	8.86	< 0.12
Dec	15-22	1.93	5.22	6.07	4.01	8.01	~ 0.2	1.02	6.92	9.23	3.88	8.62	< 0.12
Dec	22-29	1.59	4.98	6.68	4.25	8.13	0.08	4.37	5.58	9.71	5.10	8.98	< 0.12
1981													
Dec	29- 5	1.21	6.68	7.41	4.61	9.10	< 0.12	3.16	5.22	5.46	4.40	8.13	< 0.12
Jan	5-12	0.90	7.65	8.26	4.13	8.74	< 0.12	< 0.24	8.62	13.84	6.92	15.42	< 0.12
Jan	12-19	0.80	10.56	12.99	4.01	5.71	< 0.12	2.10	16.02	21.97	10.32	17.85	< 0.12
Jan	19-26	0.62	7.65	9.59	4.25	9.35	< 0.12	< 0.12	11.17	15.90	3.40	6.80	< 0.12
Jan	26- 2	0.23	7.28	9.23	1.94	3.88	< 0.12	1.46	13.84	17.24	7.65	14.81	< 0.12
Feb	2- 9	0.96	17.85	24.28	9.23	19.30	< 0.12	< 0.24	22.46	32.78	8.13	17.24	< 0.12
Feb	9-16	0.27	8.38	14.93	3.40	7.04	< 0.12	< 0.12	11.41	15.90	4.25	8.62	< 0.12
Feb	16-23	~ 0.4	13.60	23.92	5.95	11.90	< 0.12	< 0.12	14.33	23.70	48.56	6.07	< 0.12
Feb	23- 2	0.11	18.82	32.78	7.89	12.63	< 0.12	< 0.36	18.21	37.63	5.95	9.83	< 0.12

Individual activities corrected for decay to mid-week
 * Particulate component only

1 femtocurie = 10^{-15} Ci = 37 microbecquerels

SHORT-LIVED PRODUCT ACTIVITY IN AIR NEAR GROUND LEVEL

U.K. STATIONS (femtocuries/Cu. Metre of air)

1980 MONTH	WEEK	ESKDALEMUIR						ORFORDNESS						
		Ba-140	Zr-95	Nb-95	Ce-141	Ru-103	I-131*	Pa-140	Zr-95	Nb-95	Ce-141	Ru-103	I-131*	
Oct	6-13	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12
Oct	13-20	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12
Oct	20-27	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12
Oct	27- 3	0.83	0.18	0.27	0.49	0.85	0.45	0.55	< 0.12	< 0.12	0.27	0.73	0.49	
Nov	3-10	0.49	0.19	< 0.12	0.80	1.17	1.82	1.13	0.51	0.32	0.36	0.80	0.97	
Nov	10-17	0.89	2.19	2.67	1.87	2.55	< 0.36	22.58	3.04	1.55	4.73	12.02	8.74	
Nov	17-24	8.62	4.86	5.58	6.80	12.99	2.55	13.72	8.01	7.16	9.35	14.81	3.64	
Nov	24- 1	4.13	2.04	2.21	3.16	6.19	< 0.36	5.10	6.07	2.91	4.86	8.38	1.09	
Dec	1- 8	2.38	6.92	4.37	4.01	4.37	< 0.85	1.94	5.22	4.61	3.04	3.40	< 0.24	
Dec	8-15	3.52	6.43	9.71	5.95	11.29	< 0.12	4.25	< 0.12	17.12	9.47	16.63	< 0.12	
Dec	15-22	1.01	7.77	12.26	6.31	10.08	< 0.12	1.85	10.20	11.17	5.71	9.95	< 0.12	
Dec	22-29	2.79	6.31	11.53	5.34	6.07	< 0.12	1.51	6.31	9.95	4.73	9.47	< 0.12	
1981														
Dec	29- 5	0.78	5.34	4.37	1.40	1.94	< 0.12	1.03	5.83	8.74	4.01	8.38	< 0.12	
Jan	5-12	< 0.12	10.56	11.90	4.37	8.98	< 0.12	3.16	9.71	15.78	4.25	9.95	< 0.12	
Jan	12-19	< 0.12	4.49	5.58	2.38	4.37	< 0.12	1.46	15.42	15.90	5.34	10.20	< 0.12	
Jan	19-26	< 0.36	15.30	21.12	5.34	10.93	< 0.12	< 0.24	14.45	19.91	4.98	9.71	< 0.12	
Jan	26- 2	< 0.12	16.39	25.49	6.19	10.08	< 0.12	< 0.12	19.30	23.55	4.73	7.80	< 0.12	
Feb	2- 9	< 0.12	14.81	25.49	7.89	17.12	< 0.12	< 0.12	25.49	41.28	10.20	20.52	< 0.12	
Feb	9-16	< 0.12	10.44	22.70	5.22	11.78	< 0.12	< 0.12	9.10	14.69	4.01	11.05	< 0.12	
Feb	16-23	< 0.24	24.28	40.06	4.61	8.38	< 0.12	< 0.12	25.49	38.85	6.68	10.80	< 0.12	
Feb	23- 2	< 0.24	21.85	43.70	17.36	22.09	< 0.12	< 0.12	41.28	72.84	11.53	19.67	< 0.12	

Individual activities corrected for decay to mid-week

* Particular component only

1 femtocurie = 10^{-15} Ci = 37 microbecquerels

SHORT-LIVED FISSION PRODUCT ACTIVITY IN AIR NEAR GROUND LEVEL
 U.K. STATIONS (femtocuries/Cu. Metre of air)

1980		LERWICK					
MONTH	WEEK	Ba-140	Zr-95	Nb-95	Ce-141	Ru-103	I-131*
Oct	6-13	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12
Oct	13-20	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12
Oct	20-27	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12
Oct	27- 3	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12
Nov	3-10	2.12	1.91	0.75	1.17	2.67	2.08
Nov	10-17	2.16	1.25	1.03	1.25	2.38	0.61
Nov	17-24	5.71	2.27	2.22	3.04	5.83	1.21
Nov	24- 1	4.01	2.67	2.91	2.91	5.83	0.61
Dec	1- 8	1.46	3.52	2.55	4.86	2.91	< 0.24
Dec	8-15	1.60	2.79	4.73	3.52	4.86	< 0.12
Dec	15-22	3.28	10.20	13.72	6.80	11.05	< 0.12
Dec	22-29	0.68	10.44	16.75	3.40	5.83	< 0.12
1981							
Dec	29- 5	0.42	6.92	6.19	1.86	3.16	< 0.12
Jan	5-12	1.59	17.85	20.76	7.89	9.10	< 0.12
Jan	12-19	0.85	4.73	7.16	3.16	5.58	< 0.12
Jan	19-26	< 0.12	9.71	13.48	2.91	5.58	< 0.12
Jan	26- 2	< 0.12	14.69	19.67	8.01	13.84	< 0.12
Feb	2- 9	< 0.12	6.07	12.14	3.40	7.53	< 0.12
Feb	9-16	< 0.12	16.63	29.14	5.58	11.53	< 0.12
Feb	16-23	< 0.12	23.79	40.06	7.16	9.95	< 0.12
Feb	23- 2	< 0.12	35.21	65.56	24.16	25.49	< 0.12

Individual activities corrected for decay to mid-week
 * Particulate component only

1 femtocurie = 10^{-15} Ci = 37 microbecquerels

SHORT-LIVED RADIONUCLIDES
 Deposition mCi/km² Chilton, U.K.

1980

MONTH	WEEK	1/m ²	⁹⁵ Zr	⁹⁵ Nb	¹⁰³ Ru	¹³¹ I	¹⁴⁰ Ba	¹⁴¹ Ce
Oct	6-13	30.8	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Oct	13-20	39.8	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Oct	20-27	8.1	< 0.0005	< 0.008	0.0038	0.0050	0.0065	0.0012
Oct	27- 3	7.4	0.00015	0.0074	0.0034	0.0045	0.011	0.0020
Nov	3-10	4.9	< 0.0005	< 0.0005	0.0071	< 0.0005	0.022	0.0041
Nov	10-17	14.8	0.037	0.024	0.055	0.095	0.037	0.031
Nov	17-24	19.5	0.018	0.017	0.105	0.27	0.150	0.057
Nov	24- 1	2.2	0.0014	0.0014	0.0044	0.0066	0.029	0.0044
Dec	1- 8	2.4	0.0014	0.0014	0.0084	~ 0.0012	0.0072	0.0040
Dec	8-15	11.7	0.130	0.155	0.135	~ 0.006	0.046	0.064
Dec	15-22	21.8	0.057	0.057	0.096	~ 0.0037	0.083	0.055
Dec	22-29	2.8	0.0020	0.0018	0.010	< 0.0003	0.0092	0.0047

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 - Instituut voor Hygiène 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

GREECE

GAEC/ERL : Greek Atomic Energy Commission - Environmental Radioactivity Laboratory

IRELAND

- IMS : Meteorological Service, Department of Transport, Dublin
- NEB : Nuclear Energy Board, 20 Lr. Hatch Street, 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)
- UNIVERSITA' DI PARMA - Istituto di Zoologia

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

UNITED KINGDOM

AERE : Atomic Energy Research Establishment, Harwell
NRPB : National Radiological Protection, Chilton

COMMISSION OF THE EUROPEAN COMMUNITIES - Euratom, Ispra

CCR : Gemeinsame Kernforschungsstelle - Joint Research Centre -
Centre commun de recherche - Centro comune di ricerca -
Gemeenschappelijk Centrum voor Onderzoek

Sampling stations	Latitude	Longitude	Measuring Laboratories			
			Air	Depo- sition	Specific radionuclides	Milk
<u>BELGIQUE/BELGIË</u>						
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	
<u>DENMARK</u>						
Risø	55°40'N	12°08'E	Risø	Risø	Risø	
Tylstrup	57°12'N	9°58'E		Risø		
Studgård (Borris)	~ 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 (Ledreborg).....	~ 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	Depo- sition	Specific radionuclides	Milk
<u>DEUTSCHLAND (BRD)</u>						
Aachen	50°46'N	6°06'E	DWD	DWD	DWD	
Berlin	52°32'N	13°25'E	DWD	DWD		
Cuxhaven	53°52'N	8°42'E		DWD		
Deuselbach	49°46'N	7°03'E		DWD		
Emden	53°23'N	7°13'E	DWD	DWD		
Essen	51°30'N	7°05'E	DWD	DWD		
Freiburg	48°00'N	7°52'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		
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				
Braunschweig	52°15'N	10°30'E				
Königslutter	52°15'N	10°49'E				
Karlsruhe	49°00'N	8°24'E				
					Kerforschungs- anlage Phys. Techn. Bundesanstalt Phys. Techn. Bundesanstalt Kerforschungs- zentrum	

Sampling stations	Latitude	Longitude	Measuring Laboratories			
			Air	Depo- sition	Specific radionuclides	Milk
<u>DEUTSCHLAND (continued)</u>						
<u>M I L C H</u>						
<u>Baden-Württemberg</u>						
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				
Karlsruhe	49°00'N	8°24'E				
Offenburg	49°29'N	7°57'E				
Radolfzell	47°44'N	8°59'E				
Triberg	48°07'N	8°14'E				
Crailsheim	49°09'N	10°06'E				
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				
St. Georgen	48°07'N	8°20'E				
Mosbach	49°21'N	9°09'E				
<u>Nordsrhein-Westfalen</u>						
Münsterland	51°53'N	7°30'E				
Ost-Westfalen	51°42'N	8°50'E				
Sauerland	50°50'N	7°45'E				
Rheinland	50°18'N	7°35'E				
						Chem. Landes- unter- suchungs- anstalt Stuttgart
						Chem. Landes- untersu- chungsamt Nordrhein- Westfalen Münster

Sampling stations	Latitude	Longitude	Measuring Laboratories			
			Air	Deposition	Specific radionuclides	Milk
<u>DEUTSCHLAND (continued)</u>						
<u>Rheinland-Pfalz</u>						
Speyer	49°18'N	8°26'E				Chemisches Untersuchungsamt - 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				
<u>Schleswig-Holstein</u>						
Kiel	54°20'N	10°08'E				Bundesantalt für Milchwissenschaft - Kiel
St. Peter	54°20'N	8°30'E				
Lentföhrden	53°30'N	9°55'E				
<u>Bayern</u>						
Schwaben	48°10'N	11°53'E				Landesuntersuchungsamt für das Gesundheitswesen 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				

Sampling stations	Latitude	Longitude	Measuring Laboratories			
			Air	Deposition	Specific radionuclides	Milk
<u>DEUTSCHLAND (continued)</u>						
<u>Berlin</u>						
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				
<u>Hamburg</u>						
Hamburg	53°33'N	10°00'E				Hyg. Institut der Freien und Hansestadt Hamburg Messstelle für Radioaktivität in Lebensmitteln der Chem. und Lebensmitteluntersuchungsanstalt - Hamburg
<u>Hessen</u>						
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				
<u>Niedersachsen</u>						
Rodenkirchen	53°24'N	8°27'E				Staatl. Chem. 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				

Sampling stations	Latitude	Longitude	Measuring Laboratories			
			Air	Depo- sition	Specific radionuclides	Milk
<u>FRANCE</u>						
<u>Pays Armoricaains</u>						
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			
<u>Bassin Parisien</u>						
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
Dampierre-en-Burly	47°43'N	2°31'E	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			

Sampling stations	Latitude	Longitude	Measuring Laboratories			
			Air	Depo- sition	Specific radionuclides	Milk
<u>FRANCE (continued)</u>						
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
<u>Pays de l'Est</u>						
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	
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
<u>Bassin Aquitain</u>						
Anglade	45°58'N	0°29'E	SCPRI	SCPRI	SCPRI	SCPRI
Biarritz	43°28'N	1°32'E			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			

Sampling stations	Latitude	Longitude	Measuring Laboratories			
			Air	Deposition	Specific radionuclides	Milk
<u>FRANCE (continued)</u>						
<u>Massif Central</u>						
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			
<u>Région des Alpes</u>						
Briaçon	44°53'N	6°38'E		SCPRI	SCPRI	
Grenoble (CEN)	45°12'N	5°42'E	SCPRI - CEA	SCPRI		
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		
<u>Région Méditerranéenne</u>						
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			
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	SCPRI		
Le Tricastin	44°20'N	4°44'E	SCPRI	SCPRI		

Sampling stations	Latitude	Longitude	Measuring Laboratories			
			Air	Depo- sition	Specific radionuclides	Milk
<u>GREECE</u>						
Alexandroupolis	40°50'N	25°25'E	GAEC/ERL	-	-	GAEC/ERL
Aliveri	38°00'N	23°50'E	GAEC/ERL	GAEC/ERL	GAEC/ERL	-
Athens (Philadelphia)	38°00'N	23°45'E	GAEC/ERL	GAEC/ERL	GAEC/ERL	GAEC/ERL
Cefalonia	38°11'N	20°29'E	GAEC/ERL	-	-	-
Corfu	39°37'N	19°55'E	GAEC/ERL	-	-	-
Democritos NCR	38°00'N	23°45'E	GAEC/ERL	GAEC/ERL	GAEC/ERL	-
Heracleon	35°20'N	25°11'E	GAEC/ERL	-	-	GAEC/ERL
Kavala	41°55'N	24°30'E	-	-	-	GAEC/ERL
Kilkis	40°55'N	24°30'E	-	-	-	GAEC/ERL
Kythira	36°20'N	23°10'E	GAEC/ERL	-	-	-
Layrio	38°00'N	23°45'E	GAEC/ERL	GAEC/ERL	GAEC/ERL	GAEC/ERL
Lemnos	39°53'N	26°04'E	GAEC/ERL	-	-	GAEC/ERL
Megalopolis	37°41'N	22°30'E	GAEC/ERL	GAEC/ERL	GAEC/ERL	-
Mytilini	39°04'N	26°35'E	-	-	-	GAEC/ERL
Orestias	41°30'N	26°20'E	-	-	-	GAEC/ERL
Ptolemais	40°40'N	22°56'E	GAEC/ERL	GAEC/ERL	GAEC/ERL	-
Rhodos	36°22'N	28°07'E	GAEC/ERL	-	GAEC/ERL	-
Serres	41°10'N	23°30'E	-	-	-	GAEC/ERL
Soufli	41°00'N	26°18'E	-	-	-	GAEC/ERL
Thessaloniki	40°40'N	22°56'E	GAEC/ERL	GAEC/ERL	-	-
Tripolis	37°41'N	22°30'E	-	-	-	GAEC/ERL

Sampling stations	Latitude	Longitude	Measuring Laboratories			
			Air	Deposition	Specific radionuclides	Milk
<u>IRELAND</u>						
Dublin City	53°21'N	6°16'W	IMS/NEB	IMS/NEB		
Valentia Observatory ...	51°56'N	10°16'W	IMS/NEB	IMS/NEB		
Meteorological Station :						
- Dublin Airport	53°26'N	6°14'W		IMS/NEB		
- Belmullet	54°14'N	10°00'W		IMS/NEB		
- Mullingar	53°32'N	7°22'W		IMS/NEB		
- Rosslare	52°15'N	6°20'W		IMS/NEB		
- Roche's Pt	51°48'N	8°15'W		IMS/NEB		
<u>ITALIA</u>						
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)			
Parma	44°48'N	10°19'E		(7)		
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)			
Monte Scuro	39°19'37"N	16°24'04"E	(6)			

Sampling stations	Latitude	Longitude	Measuring Laboratories			
			Air	Deposition	Specific radionuclides	Milk
<u>ITALIA (continued)</u>						
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	
Fiascherino	44°04'N	9°55'E		CNEN		
Euratom-CCR - Ispra	45°48'11"N	8°37'35"E	CCR	CCR	CCR	CCR
<u>GRAND-DUCHE DE LUXEMBOURG</u>						
Luxembourg-Ville	49°37'N	6°08'E	Service de radio protection			
<u>NEDERLAND</u>						
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	Deposition	Specific radionuclides	Milk
<u>UNITED KINGDOM</u>						
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 Sécurité Civile
- (2) En coopération avec le Département de Radioprotection d'Electricité de France
- (3) En coopération avec la 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.
- (7) Università di Parma - Istituto di Zoologia

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Ministère de la Santé Publique - Bruxelles
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Dette dokument er den tyvende rapport om radioaktivitet i omgivelserne udgivet af Direktoratet for sundhed og sikkerhed under Kommissionen for De europæiske Fællesskaber.

Rapporten er udarbejdet på grundlag af data indsamlet af de observationsstationer, som overvåger radioaktiviteten i omgivelserne i medlemsstaterne. Resultaterne er udtaget af de data, som indsendes til Kommissionen for De europæiske Fællesskaber i henhold til artikel 36 i Rom-traktaten om oprettelse Det europæiske Atomenergifællesskab.

Denne rapport indeholder resultaterne af målinger af strålekontamineringen i luft, nedfald, overfladevand og mælk foretaget i løbet af året 1980 i de ti EØF-medlemsstater: Belgien, Forbundsrepublikken Tyskland, Danmark, Frankrig, Grækenland, Italien, Irland, Luxembourg, Nederlandene og Det forenede Kongerige.

Bei dem vorliegenden Dokument handelt es sich um den 20. Bericht über die Umweltradioaktivität, den die Direktion Gesundheit und Sicherheit der Kommission der Europäischen Gemeinschaften veröffentlicht hat.

Dem Bericht liegen die Daten zugrunde, die in den mit der Überwachung der Umgebungsradioaktivität in den Mitgliedstaaten beauftragten Meßstationen gesammelt worden sind. Die Ergebnisse sind den der Kommission der Europäischen Gemeinschaften gemäß Artikel 36 des Vertrags zur Gründung der Europäischen Atomgemeinschaft übermittelten Daten entnommen.

Die in diesem Bericht dargestellten Ergebnisse betreffen die radioaktive Kontamination der Luft, der Ablagerungen, der Oberflächengewässer und der Milch im Jahre 1980 in den 10 Mitgliedstaaten der Europäischen Gemeinschaft, d. h. in Belgien, der Bundesrepublik Deutschland, Dänemark, Frankreich, Griechenland, Italien, Irland, Luxemburg, den Niederlanden und dem Vereinigten Königreich.

This document is the 20th report on environmental radioactivity published by the Health and Safety Directorate of the Commission of the European Communities.

It has been prepared from data gathered at the stations which monitor environmental radioactivity in the Member States. The results are taken from the data communicated to the Commission of the European Communities in accordance with Article 36 of the Treaty of Rome establishing the European Atomic Energy Community.

The results contained in the report refer to radioactivity measurements for air, deposition, surface water and milk during 1980 in the ten Member States of the European Community (Belgium, Denmark, Federal Republic of Germany, France, Greece, Ireland, Italy, Luxembourg, the Netherlands and United Kingdom).

Le présent document est le vingtième 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 États membres. Les résultats sont extraits des données envoyées à la Commission des Communautés européennes 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 1980 dans les dix États membres de la Communauté européenne, c'est-à-dire: Belgique, république fédérale d'Allemagne, Danemark, France, Grèce, Italie, Irlande, Luxembourg, Pays-Bas et Royaume-Uni.

Il presente documento costituisce la ventesima relazione sulla radioattività ambientale pubblicata dalla Direzione sanità e sicurezza della Commissione delle Comunità europee.

L'elaborazione si è basata su dati raccolti nelle stazioni cui è affidato il controllo della radioattività ambientale negli Stati membri. I risultati sono ricavati dai dati inviati alla Commissione delle Comunità europee in applicazione dell'articolo 36 del Trattato di Roma che istituisce la Comunità europea dell'energia atomica.

I risultati presentati in questa relazione riguardano la contaminazione radioattiva dell'aria, delle ricadute, delle acque di superficie e del latte nell'arco del 1980 nei dieci Stati membri della Comunità europea, ossia: Belgio, Repubblica federale di Germania, Danimarca, Francia, Grecia, Italia, Irlanda, Lussemburgo, Paesi Bassi e Regno Unito.

Dit document is het twintigste verslag over radioactiviteit in de omgeving dat door het Directoraat Gezondheid en Veiligheid van de Commissie van de Europese Gemeenschappen wordt gepubliceerd.

Het werd opgesteld aan de hand van gegevens van de met het toezicht op de radioactiviteit van het milieu belaste stations in de Lid-Staten. De resultaten zijn verkregen uit gegevens die aan de Commissie van de Europese Gemeenschappen worden toegezonden overeenkomstig artikel 36 van het Verdrag van Rome tot oprichting van de Europese Gemeenschap voor Atoomenergie.

De in dit verslag gepubliceerde resultaten betreffen de radiologische besmetting van de lucht, de neerslag, het oppervlaktewater en de melk gedurende het jaar 1980 in de tien Lid-Staten van de Europese Gemeenschap, met name: België, de Bondsrepubliek Duitsland, Denemarken, Frankrijk, Griekenland, Ierland, Italië, Luxemburg, Nederland en het Verenigd Koninkrijk.

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