Analyse, inform and activate



Stichting Laka: Documentatie- en onderzoekscentrum kernenergie

De Laka-bibliotheek

Dit is een pdf van één van de publicaties in de bibliotheek van Stichting Laka, het in Amsterdam gevestigde documentatie- en onderzoekscentrum kernenergie.

Laka heeft een bibliotheek met ongeveer 8000 boeken (waarvan een gedeelte dus ook als pdf), duizenden kranten- en tijdschriftenartikelen, honderden tijdschriftentitels, posters, video's en ander beeldmateriaal. Laka digitaliseert (oude) tijdschriften en boeken uit de internationale antikernenergiebeweging.

De <u>catalogus</u> van de Laka-bibliotheek staat op onze site. De collectie bevat een grote verzameling gedigitaliseerde <u>tijdschriften</u> uit de Nederlandse antikernenergie-beweging en een verzameling <u>video's</u>.

Laka speelt met oa. haar informatievoorziening een belangrijke rol in de Nederlandse anti-kernenergiebeweging.

The Laka-library

This is a PDF from one of the publications from the library of the Laka Foundation; the Amsterdam-based documentation and research centre on nuclear energy.

The Laka library consists of about 8,000 books (of which a part is available as PDF), thousands of newspaper clippings, hundreds of magazines, posters, video's and other material.

Laka digitizes books and magazines from the international movement against nuclear power.

The <u>catalogue</u> of the Laka-library can be found at our website. The collection also contains a large number of digitized <u>magazines</u> from the Dutch anti-nuclear power movement and a video-section.

Laka plays with, amongst others things, its information services, an important role in the Dutch anti-nuclear movement.

Appreciate our work? Feel free to make a small donation. Thank you.



www.laka.org | info@laka.org | Ketelhuisplein 43, 1054 RD Amsterdam | 020-6168294

AAP ALARMGROEP ATOOMPLANNEN

Naar aanleiding van het in handen krijgen van het rapport "Geologic Waste Disposal Program to be carried out in the Netherlands" bieden wij deze brochure aan.

Inhoud

- 1) Brief van Drs. H.M.Harsveldt aan de commissie van europese gemeenschappen (fotocopie)
- 2) Geologic Waste Disposal Program to be carried out in the Netherlands; Present state of Affairs (fotocopie)
- 3) Dutch Geologic Waste Disposal Programme; Additional programme items (fotocopie)
- 4) Vertaling van de onderdelen 2en 3 .(stencil)
- 5) Kommentaar.
- 6) Conclusies.

Groningen, 24 maart 1976 教育FS GEOLOGISCHE DIENST

SPACED D - POSTECS 157 - BARLLEM RELEGION (023) 31/93/CC - POSTREETEING 24931

Correspondentie to richten sen de Directeur, 70 nodig t.a.v.

Commissie van de Europese Gemeenschappen

Wetstraat 200

1049 Brussel - Belgie

t.a.v. Dr. P. Venet

pw kenmerk

Onderwerp

uw brief

ons kenmerk

bijlage(n)

Haarlem.

D 96376.

2.

21 december 1976

Weledelzeergeleerdo Heer,

Hierbij zend ik V ten behoeve van de besprekingen die moeten leiden naar het opstellen van een research contract een exemplaar toe van het zojuist geroed gekomen "Geologic Vaste Disposal Program to be carried out in the Netherlands - Present State of Affairs".

Aan het rapport is een door het ECN opgesteld aanvullend programma toegevoegd dat nog niet door de hiervoor in Nederland aangewezen comissies is bestudeerd, maar waarvan opname in het Waste Disposal Program zeker wordt overwogen.

Hoogachtend,

Drs. Harsveldt

Bijlage: 1) Geologic Waste disposal Program Collectie Stickt

2) Additional items ECM

www.laka.org Gedigitaliseerd 2021

Geologic Vaste Disposal Program to be carried out in the Netherlands.

Present state of Affairs

Table of Contents

- 1) Origin of the Program
- 2) Objectives
- 3) Description of Objectives
 - 3-1: Disposal possibilities in different rock types
 - 3-2: Solutionmined Cavities
 - 3-3: Borchole disposal
 - 3-4: Rocksaltmine.

4) Major Tanks

- 4-1: Work done up to the present
- 4-2: Future tasks
 - 4-2-1: Permissions
 - 4-2-2: Geological and Geohydrological examinations
 - 4-2-3: Drilling activities and borehole examinations
 - 4-2-4: Request for concession
 - 4-2-5: Construction rocksaltmine
 - 4-2-6: Borehole disposal
 - 4-2-7: Hazard Assesment study

5) Expenditures

- 5-1: Theoretical Studies and Exploratory work
- 5-2: Administration costs
- 5-3: Constructioncost estimates
- 5-4: Personel over 10 years
- 5-5: Pro Memoria
- 6) Allocation of budget over successive years

教育FS GEOLOGISCHE DIENST

SPACED D - POSTECS 157 - BARLLEM RELEGION (023) 31/93/CC - POSTREETEING 24931

Correspondentie to richten sen de Directeur, 70 nodig t.a.v.

Commissie van de Europese Gemeenschappen

Wetstraat 200

1049 Brussel - Belgie

t.a.v. Dr. P. Venet

pw kenmerk

Onderwerp

uw brief

ons kenmerk

bijlage(n)

Haarlem.

D 96376.

2.

21 december 1976

Weledelzeergeleerdo Heer,

Hierbij zend ik V ten behoeve van de besprekingen die moeten leiden naar het opstellen van een research contract een exemplaar toe van het zojuist geroed gekomen "Geologic Vaste Disposal Program to be carried out in the Netherlands - Present State of Affairs".

Aan het rapport is een door het ECN opgesteld aanvullend programma toegevoegd dat nog niet door de hiervoor in Nederland aangewezen comissies is bestudeerd, maar waarvan opname in het Waste Disposal Program zeker wordt overwogen.

Hoogachtend,

Drs. Harsveldt

Bijlage: 1) Geologic Waste disposal Program Collectie Stickt

2) Additional items ECM

www.laka.org Gedigitaliseerd 2021

1) Origin of the Program

The original program was drafted by R.C.N. (now E.C.N.) in 1972. This program has been subjected to government control by the for this purpose founded "Technische Werkgroep Radioactieve Afvalstoffen". This workinggroup was part of the "Subcommissie Radioactieve Afvalstoffen" which in its turn formed a branch of the "Interdepartementale Commissie voor Kernenergie".

With some slight changes the workingprogram of E.C.N. was adopted. In May 1974 the "Technische Werkgroep Radioactieve Afvalstoffen" reported their conclusions with regard to the disposal of LAVA and MAVA in rocksalt to the "Subcommissie Radioactieve Afvalstoffen". This subcommission reworked the advice of the "Technische Werkgroep Radioactieve Afvalstoffen" and reported in August 1975 to the "Interdepartementale Commissie voor Kernenergie" with the report "Radioactieve Afvalstoffen in Nederland bij een vermogen aan Kernenergie-centrales van 3500 MWe". As an annex to the report the General Hazard Analysis prepared by E.C.N. was added. With this report as a guiding principle it was decided to begin the investigation into the properties of rocksalt as a storagefacility and the possible consequences for the environment from that.

With this in mind four workinggroups have been installed in 1976 by the "Subcommissie Radioactieve Afvalstoffen" i.c.

- a: Workinggroup for legal financial and organisation matters
- b: Workinggroup to test the selected saltdomes by means of geohydrological, geological and seismic methods.
- c: Workinggroup for mining aspects in rocksalt
- d: Workinggroup for further evaluation of the Hazard Analysis

2) Objectives

To evaluate the possibilities in the Netherlands for disposal of solid radioactive waste of various categories in different rocktypes.

Design and construction of a solution mined cavity for lowand medium level wastes.

Evaluation of deep borehole disposal concept.

Design and construction of a rocksaltmine for high level waste and K.S.A..

3) Description of Objectives

3-1: Disposal possibilities in different rock types

An evaluation has been made of the geologic formations within the Netherlands that could possibly be suited for disposal of radioactive waste. To the disposal in the formation three conditions are set namely:

- a) there must be a natural barrier between the waste in the formation and the biosphere
- b) the geologic formation has to be reasonably stable
- c) the geologic formation must lie at attainable depth

With regard to the geologic formations occuring in the Notherlands at attainable depth, as clay-shale-limestone and dolomitic limestone layers, must be stated that they are not suited for definite disposal of radicactive waste.

The claylayers present are too thin (less than 50 m thickness) for the construction of cavities. The shale deposits are very fissile and interlaminated with marl- and limestone layers as a consequence whereof the homogeneity is disturbed which makes the formation unsuitable to the purpose. Also here the thickness does not exceed 50 m. The limestone and dolomitic limestone layers are likewise not suited for reason of their schistosity, cleavage planes and porosity.

Finally the possibility of injection of fluidized radioactive waste into exhausted oil- and gasfields in the W part of the Netherlands has been examined, also to no avail.

An enumeration of possible sites for disposal of solid radioactive waste of various categories has been made from the saltoccurences present in the N.E. Netherlands basin. This study was made by the State Geological Survey in 1973.

3-2: Solutionmined Cavities

General theoretical discussions about the construction of dry and wet solutionmined cavities for disposal of low and medium level wastes have taken place in deliberation with the industry.

Also discussions about the stability of solutionmined cavities at greater depth (below 1000 m) were evaluated. To gain experience with the several phases of solution mining a number of tests is contemplated. To test against leaks behind the casing, G.F. Donat published a very accurate method (preprint SPE 3723) that was applied to two large gas storage solution cavities at Tersanne, 60 km south of Lyons. It involves the use of a small amount of short-life radioactive tracer dissolved in the last injected water directly undermeath the oil blanket and checking on possible upward movement with a radioactivity log. The method seems well worth testing out for ourselves. Other, cheaper methods, will also be tested. Provided that the holes are in a suitable condition more tests could be carried out, in the first place the controlled solutionmining itself, be it on a small scale. Depending on depth and mechanical behaviour the required pressure on the system may or may not involve excess pressure at the well head. Apart from the collection of information, this would provide an opportunity to train some field staff in the manoevres with tubing depth, oil blanket, the oil- and brine-administration, the observations of temperature and cavity shape. Both in straight holes and in small solution cavities, filling techniques should be tested with dummy material.

Upon conclusion of dummy filling a scaling of the hole should be tested by leaving behind with the last dummy material some tracer, either a chemical one or a short-life radioactive one.

3-3: Borehole disposal

The deep borehole concept as a contrast to horizontal burial-zones aims at the drilling of several boreholes from a mine-gallery in a saltdome to depths of maximum 2600 m.

It is the intention to lower into these boreholes high level waste and K.S.A. in canisters. The use of 30 cm diameter

waste and K.S.A. in canisters. The use of 30 cm diameter canisters will be studied. Boreholes like this can likewise serve to study the behaviour of rocksalt under higher temperature and pressure (Creep and Conversion problems).

A theoretical study on this subject has been set up but not yet put to the test.

3-4: Rocksaltmine

Designs for arranging a rocksaltmine are in progress. Excavation of a rocksaltmine is seriously considered as being the safest, be it the most expensive solution of the HAVA/ K.S.A. problem.

The mine concept originated from the wish to be able to control and repair the connection between solution cavity and surface on leaks and damages.

This implied the construction of a manway shaft as a connection between the cavity and the surface. In fact this meant the construction of a mine which opened at the same time the possibility for storage of high level waste and K.S.A.. Whether the mine will be designed with one or two shafts is still under discussion.

4) Major Tasks

4-1: Work done up to the present

In 1973 the State Geological Survey made a preliminary investigation of the saltoccurrences within the Netherlands that

possibly could be suited for disposal of radioactive waste. Rocksalt occurs in the Triassic (Upper Bunter) and Zechstein formation.

The saltdeposits of the Triassic occur in the form of saltlayers.

In the Hengelo area (Middle East of the Netherlands) exploitation of these layers has been undertaken since 1918 by Royal Dutch Saltworks. The upper side of the salt lies between 300 and 500 m below ground.

The saltlayer dips in SSW direction and has a thickness that increases from about 30 m in the NE to locally 100 m in the SW. The saltlayer is not suited for the purpose of disposal of low and medium level radioactive waste because it is subdivided by shale and anhydrite layers into four thin units. Leaching of a cavity in the layer will result in an unstable repository.

Moreover, the saltlayer is in exploitation.

The usable saltdeposits of the Zechstein occur in the form of saltpillows and saltdomes. In the middle East and in the Northern provinces saltpillows and saltdomes are present. Some saltpillows are in concession for the exploitation of salt. The thickness of the salt in the pillows lies between 100 and 400 m.

The depth of the salt below ground lies in between 500 and 700 m.

From borehole data it is known that the salt is covered by a caprock of dolomite. The best developed saltpillow lies just south of the town of Groenlo. Its dimensions as far as can be judged from the scarce seismic information are $2\frac{1}{2} \times 2\frac{1}{2} \text{ km}$. Geologically spoken this pillow is suited for storage of low and medium level radioactive waste, but the presence of exploitable coallayers below the salt forbids the excavation of a saltmine hereabove.

For this reason leaching of the rocksalt is not permitted in this area.

The other saltpillows are less well developed. No boreholes have been drilled into these pillows. Seismic information reveals that the top of the rockselt may be expected here between 400 and 500 m below ground.

The thickness of the salt is estimated at 200 - 300 m. Further exploration is needed here. The saltpillows in the Northern provinces lie at depths of 1500 m and more, reason wherefore they are less favourable for the purpose of burying waste.

Saltdomes. With regard to the saltdomes in the Northern and Eastern Netherlands the situation is geologically spoken not difficult.

However all these saltdomes lie within concession area's of oil- or saltcompanies, which means that they are not directly available for this purpose.

Rocksalt is exploited by the Royal Dutch Saltworks from the saltdomes of Winschoten and Zuidwending. In the Winschoten saltdome the top of the rocksalt has been found at approximately 400 m depth below ground.

The basis of the salt lies according to seismic information between 2500 and 3000 m. Caprock is present with a thickness of up to 40 m.

The Zuidwending saltdome has its rocksalttop at ± 200 m below ground.

In the Weerselo saltdome, also in concession by Royal Dutch Saltworks, the top of the rocksalt lies at ± 450 m depth. Not in exploitation but situated within the concession area of an oilcompany, is the saltdome of Schoonlo. The top of the rocksalt here lies at approximately 250 m below ground, the basis at 2500 m.

The ideal saltdome suited for the disposal of radioactive waste should come up to the following requirements:

1) the top of the rocksalt should be situated below the level of groundwater circulation

- 2) the thickness of the saltdeposits should be sufficient
- 3) the saltdome should have a caprock of impervious material
- 4) above the caprock a claylayer or sandy-claylayer should be present
- 5) preferable an impervious claylayer or sandy-claylayer should be present below the waterbearing system that participates in the hydrological circulation
- 6) the salt should be reasonably stable (little creep)
- 7) the salt should be as pure as possible and be of good quality
- 8) no potash- anhydrite-limestone or claylayer should be present in the immediate surroundings of the cavity in the salt
- 9) one should be alert for gas or brine inclusions in the salt
- 10) no bitumina prospects should be present in or around the saltdone
- 11) no concession or drilling permit should exist for the selected saltdone
- 12 the saltdome should be free from other destinations as for instance the storing of oil- gas or chemical waste

On top of this, one should take into acount other not technical/geological factors as damage to environments- town and country planning etc, etc.

The saltpillows and saltdomes present in the Northern and Eastern Netherlands will be examined according to the directives set here above.

A geological selection based on seismic information of 5 saltdomes has been made. In geological order of preference these are the saltdomes of Gasselte (Province of Drenthe), Schoonlo (Province of Drenthe), Pieterburen (Province of Groningen), Onstwedde (Province of Groningen) and Anlo (Province of Drenthe).

Feasibility study and general hazard analysis with the aim to obtain public and governmental acceptance.

Theoretical studies on vertical disposal by means of the deep boreholeconcept.

Theoretical framework for a thermal analysis.

4-2: Future tasks

In order of succession the following steps have to be taken:

4-2-1: Permissions

Before any activity can take place in the field, the necessary permissions will have to be obtained from all provincial and municipal authorities concerned. Questions raised by these authorities may lead to as yet unforeseen preliminary studies.

4-2-2: Geological and Geolydrological examinations

Geological and Geohydrological examination of the subsurface around and above the saltdone down to a maximum depth of about 300 m will be carried out in order to investigate the suitability of the saltdome.

This means verification of the aquifers, determination of porosity and permeability of the different layers, tracing the groundwatermovement and determine the chemical qualities of the groundwater, ir order to investigate if the presence of the saltdome has had influence on the composition of the groundwater.

Also the examination will be directed to detect possible faults in the layers above or adjacent to the saltbody.

Isopachmaps will be prepared from special horizons with the purpose to learn about the geotectonic history of the saltbody. The data mentioned above will be obtained from the study of surface seismic work, geoelectrical examinations (only in fresh water areas) and boreholes down to a depth of about 300 m. Ultimately a geologic-hydrologic model will be prepared with the help of these data.

4-2-3: Drilling activities and borehole examinations

Provided good results are obtained with the examinations done in 4-2-2 a drilling permit will be asked from the Government.

After drilling locations have been determined the saltdone will be put to the test by two or three boreholes. Two of the borcholes will be drilled up to a depth of 1000 m each, in order to investigate the exact top of the rocksalt, the continuity of the salt down to total depth of the borchole, the presence of a caprock, the presence of a claylayer above the caprock, the stability of the saltdome, the composition of the rocksalt, the presence of impurities (claylayers potashlayers - limestonelayers - anhydritelayers), the presence of brine- or gasinclusions. One of the borcholes will be cored from top to bottom. Coresamples of sufficient diameter for several uses (rockmechanics- temperaturelithology etc.) will be drawn. On top of this, geophysical boreholomeasurements will be run such as: Gammaray log-Caliperlog- temperature log- Sonic log- laterolog- neutronlog- density log and dipmeter survey in order to obtain correlation between the geological and geophysical data in the boreholes.

It is considered that a third borehole drilled and cored to great depths into the salt (± 3000 m) could give useful information about the behaviour of the salt at great depths. For each boring as total depth has been reached, repeated temperature logs will be run. From the temperature build up analysis by extrapolation the equilibrium temperatures will be determined, and through the rates of temperature adjustment the in situ values of the heat conduction coefficient.

With the information obtained from the several borehole measurements and the visual inspection of the cores, series of cores will be sent to a laboratory to be investigated on their three dimensional mechanic properties, and elastic and plastic behaviour as functions of temperature.

In some cases where it is evident from lithological examination that composition and habitus of the rocksalt are identical over a longer distance, a second laboratory will be asked to do the same determinations somewhat higher or lower in that identical interval for reasons of comparison. The duration of these laboratory tests, however, has always been fairly short, a few months at the most, and considerable uncertainty exists about the longer term behaviour. As the latter is of major importance to our project it is proposed to devote our main effort to a clarification of that aspect. Other tests regarding the mechanical behaviour, directly related to natural sealing properties in situ, should be carried out in the third borehole. The pressure in the hole will be reduced by steps and repeated caliper surveys will reveal under what conditions a hole will close itself.

In order to prevent caving in and leaching out of the boreholes, drilling and coring through the salt will be carried out with a specially prepared mud.

Directly above the caprock over the saltdome it is possible that additional information regarding the geohydrological situation is obtained. If watersands are encountered in addition to those already investigated during the geohydrological survey (4-2-2) it is considered to install one or more waterfilters before abandoning the borehole in order to be able to observe pressures and collect watersamples. Should the need rise to determine the exact position of the borehole with regard to the flank of the saltdome, it is advisable to carry out a seismic saltflank determination. This enables us to cope with the requirements of the State Supervision of the Mines who prescribe a distance of 200 m untouched rocksalt between the borehole and the flank of the saltdome.

4-2-4: Request for concession

Before the construction of a saltmine can take place, a concession over the area where the saltmine will be located must be obtained.

4-2-5: Construction rocksaltmine

Design and construction of a rocksaltmine for diposal of LAVA,

MAVA, HAVA and K.S.A. wastes.

So far no decisions about how exactly the mine will be designed have been made. It is considered that, as contrasted with former views regarding this subject, the designing of a cavity in rocksalt by means of solution will not be carried out. For the construction of a mine-shaft and the disposal of HAVA and K.S.A. from a gallery into a for this purpose excavated. room in the saltbody the following rock mechanic properties are of importance i.c.:

Modulus of clasticity
Poisson-ratio
Octahedral shearing strength
Viscosity
Heat conductivity coefficient
Coefficient of expansion
Specific heat capacity

All these properties will be determined from saltcores in a laboratory, except the octahedral shearing strength that must be determined in the mine.

In addition to this in situ measurements will be done in the borchole on convergence- temperature- and pressure (see also 4-2-3).

The modulus of elasticity is an important indicator for the pressurerange between which salt behaves as an elastic rock. It depends on the mineralogical and petrographical composition of the salt and the stress to which the salt is imposed.

The same goes for the other geomechanical parameters. Reliable. determinations of the Poisson ratio and the octahedral shearing strength can only be obtained with a triaxial compaction cell.

Factors that influence the structural stability analysis are the dependance of the shearing strength from the mineralogical and petrographical composition of the salt and the relation between shearing strength and temperature. Besides the determination of octahedral shearing strength in the mine, this parameter can also be determined, if one has possession of several caliper and temperature logs taken with regular intervals in the borehole.

The results of these in situ measurements are more representative than the laboratory experiments.

Also the viscosity of salt depends on its mineralogical and petrographical composition, its leading and its temperature. The heat conductivity coefficient and the specific heat capacity are necessary for calculation with regard to the behaviour of the salt under the influence of the increase in temperature caused by K.S.A. and HAVA disposal.

4-2-6: Borchole disposal

No decision so far has been taken about the drilling of a deep borehole from a gallery in a saltmine, to put to the test the feasibility of the ultimate disposal of solidified highlevel reprecessing waste (K.S.A.).

4-2-7: Hazard Assesment study

The Hazard Assessment study so far prepared by E.C.R. and published by I.C.K. will be reconsidered in some respects and completed with a permissible doses calculation.

5) Expenditures

The following should be considered as a preliminary estimate of the costs. All figures given are in million Netherlands guilders.

5-1: Theoretical	Studies an	d Exploratory	work	
				10 ⁶ N.Fl.
	ere reason as	estable to make		a
Site Selection re	port			0.025
Hazard Assesment	report			0.025 ?
Seismic lines	riokat be			0.3 - 1.5
Reprocessing seis	mic lines	Dibodoi		0.05

Velocity and Well data	1.00
Cored 6" borehole to 1000 m	2.00
Drilled borehole to 1000 m	0.75
Drilled and cored borchole to ± 3000 m	4.5
Boreholemeasurements 2 holes	0.20
Rocksaltmechanics	1.6 - 2.3
Wellsitter examination	0.80
6 boreholes geohydr. to 300 m	0.24
Geoelectrical exam.	0.18
Analysis Watersamples	0.06
Goohydrological model of area	0.02 ?
Geohydrological reporting	0.05
5-2: Administration costs	
Licences etc.	0.10
Drilling Permit- Concession- other duties	1.00
5-3: Constructioncost estimates	W 04152
Designwork for conventional mine .	2.00
Buildings- Equipment	3.00
Construction of mine and belongings	50.00 - 100.00
5-4: Personel over 10 years	E DITTO
Very rough estimate	5.00

5-5: Pro Memoria

Not included, because still under consideration are the expenses for a deepboring up to maximum 2600 m. If this project will be approved by the workinggroups b and c, the expenses should amount to 1.2 million guilders at least. Instrumentcosts for measurement of creep (conversion) and temperature are not included.

1.20

6) Allocation of budget over successive years

No sound prediction can be given.

If according to the steps taken in 4-2-4 the work can start the following schedule could be maintained:

4-2-1:	1976 - 1977	Expenditures:	1.14	million	guilders	
4-2-2:	1977 - 1978		0.55	n	u —	
4-2-3:	1979		9.05	11	n .	
4-2-4:	1980		1.0	11	и.	
4-2-5:	1981 - 1990	50-	-100.0	O u	tt .	

Total time estimated for this program 14 years.

P.M.: 1981 deepboring for waste disposal 1.2 "

H.M. Harsveldt

10 december 1976

Dutch Geologic Waste Disposal Programme

Additional programme.items

At present various additional studies to the direct geologic and hydrogeologic investigations are being considered. Some of these studies have
been planned to some extent already, others are still in an early stage
of formulation and budgetting. However to our opinion all of this work
must appear in the technical annex of a contract with the European Commission. In order to start detailed negotiations the following programs
descriptions can be given, of necessity some of them only in preliminary
form.

1. Work by ECN

Three

Four main items can be distinguished:

(i)	Design of facilities	and	ecuipmen	it is it
(流流)/	Thermal calculations	1	(1.1)	tores d
(i.i.i.)	/Safety studies	1	(1.2)	asanau
(idiai.)/Radionuclide mobility	i.a	soils.	/ (1.3

Work planned will be presented below.

1.1. Design work

In the Government working groups, studying the various aspects of the waste disposal programme, ideas develop concerning the general design and layout of the underground and above ground facilities. These ideas will be worked out and detailed when relevant by ECN.

ial work and literature results, as we

For instance a system for lowering containers through a narrow shaft has been studied already to some extent. Recently the original plans for a solution mined cavity have been amended in such a way that a wide shaft with human access is now adopted. This of course changes the facilities and equipment needed to a large extent and much new design work is foreseen. It is however premature to try a detailed description of the work because the whole matter is still under consideration in the relative yorking group.

1.1

1.2. Thermal calculations

A number of preliminary calculations has been made on the 3 dimensional thermal effects of high level waste placement in a salt done, as a function of waste quantity and placement geometry. Some of these calculations have to be refined and furthermore should be repeated when experimental values for heat conductivity of the salt from the relevant formation have been determined. These measurements themselves are indicated in another chapter of the programme.

In the thermal calculations emphasis is placed on the deep-borehole configuration, since it has been shown already in the work done, that a much better utilisation of the formation and more homogeneous thermal load on it can be achieved with this concept.

1.2

7>3. Safety studies

Our safety studies on geologic disposal sofar have been of general nature and should be refined on the basis of the various relevant parameters measured on the salt dome ultimately choosen for the disposal facilities. In this respect some weight is placed on results of nuclide migration measurements described in 1.4.

In the original risk assessments attention was mainly directed to indicate the possible consequences of a large incident with the repository, either caused by natural catastrophic events or by human influences. Sofar only limited attention was given to the dose consequences for future generations when by accident some of the waste nuclides would return to man. Our initial work and literature results, as well as preliminary calculations of Ispra all indicate that dose commitments predicted with given accident and pathway models are very moderate. Nevertheless we feel that for public acceptance of the whole geologic disposal concept the possible consequences for our progeny should be investigated in sufficient detail. ECN will perform part of this work, mainly on the basis of the United States model.

Complimentary it is foreseen that ITAL, Wageningen, will also perform these calculations, based on the ISPRA model and possibly a model modified for the specific Dutch circumstances. This programme appears in chapter 2.

1.3

134 Radionuclide mobility in soils

The work done sofar in this field by ECN was on soil samples taken from

currings warious=drillings on top of or nearby existing salt domes, so the results should already be valid for nuclide migration calculations. However new measurements, expected to take about one man-year of effort, will be performed on new samples taken from the actual exploratory drillings of this programme.

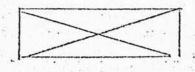
Sofar distribution coefficients for various nuclides between 90% saturated saline solutions and clay and other soil samples have been measured by simple equilibration in stirred mixtures of soil and saline nuclide solutions. In order to simulate conditions of nature better we will also perform equilibration tests in small high pressure vessels.

Further column experiments, also under pressure, will be done for the faster moving elements such as Tc, Cs and possibly Np. Special attention will be given to the behaviour of Np since this can be present depending on its valency state as an anion or a cation. By careful adjustment of the valency, using for instance redox-buffers we hope to obtain a better insight in Np mobility in soils.

The group of elements to be used in the experiments include the following: Cs, Sr, Tc, Np, Pu, Am, Cm, Ra and Ba.

2. Work proposed by ITAL, Wageningen

The Instituut voor Toepassing van Atoemenergie in de Landbouw recently proposed to contribute to the waste disposal programme by calculations of the possible dose commitments to man resulting from disposal in a geologic formation. They consider the Institute competent for this work because of their extensive experience on migration of radionuclides in soil and transfer to plants. They can certainly produce the relevant imput data for the calculations based on the Dutch situation, but for the initial steps of the geosphere transport from a disposal site to which a breach of containment occurred they will have to rely upon models developed elsewhere, and specifically at Ispra, or to define a geosphere-biosphere transport model themselves. At present the proposed programme is still under discussion so that no more details can be presented as yet.



== geschrapt voor Brussellectie Stichting

www.laka.org

Gedigitaliseerd 202