

# Teknisk notat



Til: **Store Norske Spitsbergen Kullkompani AS**  
v/: **Ester Knudsen**  
Fra: **Norges Geotekniske Institutt**  
Dato: **2000-10-11**  
Prosjekt: **994070 Supplerende undersøkelser deponier Svalbard**  
Utarbeidet av: Anja Sivertsen *Anja Sivertsen*  
Kontrollert av: Jan Erik Sørli *JES*

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Tittel: **Prøvetaking av grunnvann på lokalitet nr. 211032,  
gammel fylling, Longyearbyen**

## INNLEDNING

På bakgrunn av konklusjon i NGI-rapport 994070-1 og telefonsamtale i august 2000 med adm. sjef Ester Knudsen, ble det avtalt å utføre prøvetaking sommeren 2000 av overvåkingsbrønnene som ble installert i 1999 i den gamle fyllingen i Longyearbyen.

For nærmere opplysninger om fyllingen, bakgrunn for undersøkelsen, kart, figurer etc., henvises det til NGI-rapport 994070-1.

## PRØVETAKING OG ANALYSER

Overvåkingsbrønnene i den gamle fyllingen ble prøvetatt i august 2000 med en Bailer-prøvetaker. Sigevann (punkt 6) er ikke prøvetatt. Oksygeninnhold i vannet ble ikke målt i noen av prøvene.

Vannprøvene ble sendt til analyse ved ALControl Biochem Laboratoria i Nederland for innhold av uorganiske og organiske miljøgifter, samt nitrat og ammonium.

Fullstendige analyseresultater er gitt i vedlegg 1.

## RESULTATER

Observasjoner gjort ved prøvetaking av brønnene er angitt i tabell 1.

*Tabell 1 Observasjoner ved prøvetaking av brønnene*

Brønn nr.	Farge på vannet	Kommentarer
1	Grumset, gulig	Lite vann, frosset i bunnen
2	Grumset, brunt	Lukter råttent
3	Grumset, brunt	Lukter litt råttent
4	Klart på toppen (1 L), svart;brunt resten	Lukter veldig råttent
5	Grumset, brunt/rødt	Lite vann

Innhold av næringsstoffer og miljøgifter i vannprøvene er gitt i tabell 2. Drikkevannsnormene til Helse- og sosialdepartementet, og verdier for sigevann fra kommunale fyllinger er også gitt i tabellen for sammenligning. Verdiene som overskridet maksimalt tillatt konsentrasjon for drikkevann, er uthevet i tabellen.

Tabell 2 Sammendrag av analyseresultatene fra grunnvannsprøvene tatt i brønner, 1999 og 2000 ( $\mu\text{g/l}$  hvis ikke annet er angitt)

Parameter	Brønn 1		Brønn 2		Brønn 3		Brønn 4		Brønn 5		Sigevann		Drikkevann		Sigevann fra komm. fyllinger
	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000	Veil.	Max tillatt	
pH	6,75	7,59	6,67	7,53	6,81	7,62	5,85	6,97	7,25	7,56	7,40	i.a.	****	****	****
EC ( $\mu\text{S/cm}$ )	4320	1864	3040	1521	3900	1863	2760	1298	2880	1842	1088	i.a.	****	****	****
O <sub>2</sub> (mg/l)	5,2	i.a.	9,7	i.a.	6,7	i.a.	1,9	i.a.	7,0	i.a.	i.a.	i.a.	****	****	****
Temperatur (°C)	3,1	5,9	2,9	2,4	2,2	2,4	3,8	2,8	2,9	3,0	i.a.	i.a.	****	****	****
Krom	<1,0	55	8,4	4,4	3,4	8,8	5,1	<1	11,0	6,7	<1,0	i.a.	****	50	50-1000
Nikel	27	<10	7,8	38	5,7	<10	115	28	<5,0	<10	<5,0	i.a.	****	50	50-1700
Kobber	<5,0	6,1	<5,0	28	<5,0	<5	12,5	<5	<5,0	6,3	<5,0	i.a.	100	300	10-150
Sink	<10	89	<10	160	<10	68	280	71	<10	<20	<10	i.a.	100	300	50-130 000
Arsen	<5,0	<5	<5,0	<5	<5,0	<5	5,9	<5	<5,0	<5	8,5	i.a.	****	10	****
Kadmium	<0,4	<0,4	<0,4	<0,4	<0,4	<0,4	0,6	<0,4	<0,4	<0,4	<0,4	i.a.	****	5	5-10
Bly	<5,0	<10	<5,0	<10	<5,0	<10	<5,0	<10	<5,0	<10	<5,0	i.a.	****	20	50-600
Kvikksølv	<0,01	<0,05	<0,05	<0,05	<0,05	<0,05	<0,01	<0,05	<0,05	<0,05	<0,05	i.a.	****	0,5	****
Ammonium (mg/l)	0,4	<0,5	0,3	<0,5	<0,1	<0,5	6,3	2,2	0,5	<0,5	3,5	i.a.	****	0,5	****
Nitrat (mg/l)	<0,5	<0,2	59	66	3,9	<0,2	0,8	<0,2	1,6	<0,2	0,6	i.a.	****	10	****
BTEX	<1,2	***	<1,2	***	<1,2	***	<1,2	1,9	<1,2	***	<1,2	i.a.	****	****	****
VOC	0,5	i.a.	<1,8	2,2	<1,8	1,6	<1,8	***	0,4*	1,2	<1,8	i.a.	1	***	****
Mineralolje	<50	i.a.	<50	<50	<50	<50	<50	450	<50	80	<50	i.a.	****	10	****
Klorfenoler	i.a.	i.a.	i.a.	***	i.a.	0,05**	i.a.	0,60**	i.a.	***	i.a.	i.a.	****	****	****
PAH	i.a.	***	i.a.	***	<0,6	***	i.a.	<0,6	***	i.a.	<0,6	i.a.	****	0,2	0-3000

i.a. Ikke analysert

\* Trikloretan er påvist i angitt konsentrasjon

\*\* Pentaklorfenol er påvist i angitt konsentrasjon

\*\*\* Alle enkeltkomponentene hadde konsentrasjon lavere enn deteksjonsgrensen

\*\*\*\* Ikke utarbeidet verdier for disse

Drikkevann: Sosial- og helsedepartementet, 1996. Forskrift om vannforsyning og drikkevann m.m.

Sigevann fra kommunale fyllinger: Banks, D. og Misund, A., 1993. Viktige kriterier ved avfallsdeponering i løsmasser. Vann, Vol. 3, s. 322-342.

## VURDERING AV RESULTATER

Det er ingen markante endringer i resultatene sammenlignet med prøvetakingen i 1999. Det ser imidlertid ut til å være noe lavere innhold av næringsstoffer. Når det gjelder miljøgifter, ble det ikke observert særlig høyere konsentrasjoner under denne prøvetakingen, men det ble funnet spor av miljøgifter i flere av brønnene enn i 1999.

Det er ingen direkte krav til maksimalt tillatte utslipp fra kommunale fyllinger. For å vise hvor lave konsentrasjonene av miljøgiftene som har lekket ut fra fyllingen er, er resultatene i tabell 2 sammenlignet med maksimalt tillatte krav til drikkevann (Helse- og sosialdepartementet, 1996). Av miljøgifter var det i 1999 kun nikkel i brønn 4 som overskred drikkevannsnormene. I 2000 ble det funnet krom i brønn 1 og mineralolje i brønn 4 og 5 som overskridet drikkevannskravene. Overskridelsen for krom er svært lav. Funn av mineralolje er sannsynligvis et resultat av mye ukontrollert spill på overflaten.

Analyseresultatene tyder på at det har blitt deponert spesialavfall i fyllingen, men at miljøgiftene kun i liten grad transporteres med sigevannet. Den viktigste årsaken til dette er antagelig at størstedelen av fyllingen er frosset. For å sikre at fyllingen holder seg stabil (frosset) fremover, bør det sørges for at fylmmassene er tilstrekkelig overdekket. Ved eventuell fremtidig endring i arealbruken, som for eksempel bebyggelse, bør det i tillegg tas hensyn til isolasjonskrav for å hindre økt opptining av fylmmassene.

## KONKLUSJON OG ANBEFALINGER

Resultatene fra prøvetakingen av overvåkingsbrønnene sommeren 2000 bekrefter antagelsen om at fyllingen er stabil, og at miljøgifter kun i liten grad transporteres med sigevannet. Basert på resultatene fra denne prøvetakingen, samt tidligere utførte undersøkelser i forbindelse med den gamle fyllingen, anses det ikke å være behov for årlig prøvetaking av brønnene.

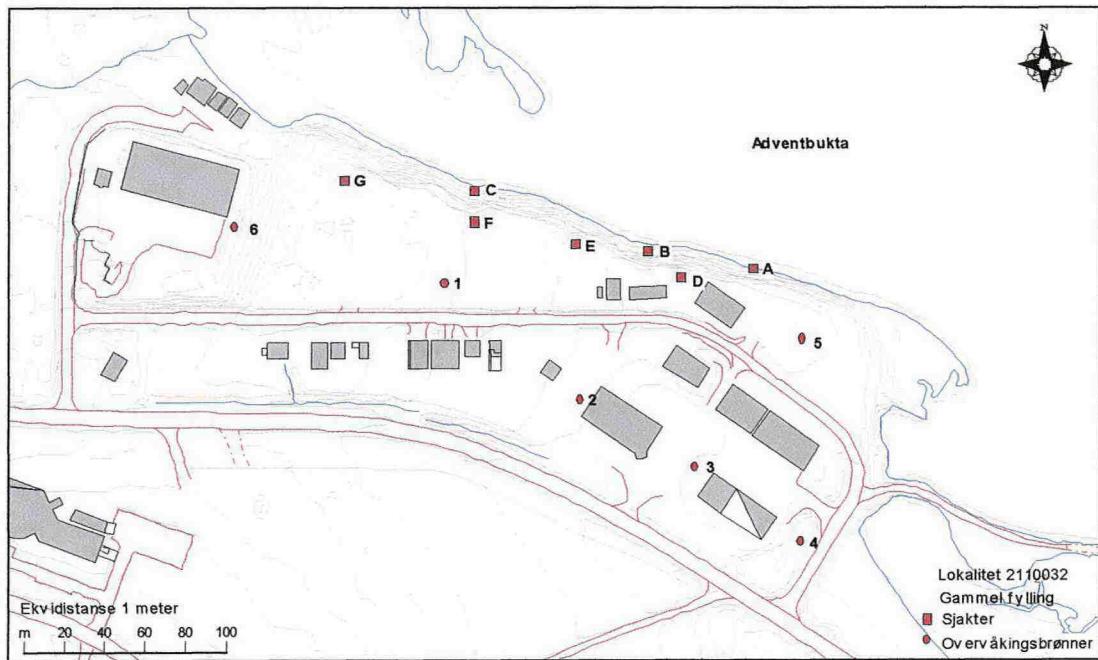
Ved varmere somre må man imidlertid regne med at mer av fyllingen vil tine opp, og at det derfor er sannsynlig at utelekkingen av miljøgifter til fjorden vil øke. På bakgrunn av dette anbefales det at brønnene prøvetas når det observeres en sommer (juni, juli og august måned) med høyere middeltemperatur enn for sommeren 1999 og 2000.

### Vedlegg

1. Kartskisse over gammel fylling
2. Analyseresultater

## Vedlegg 1

### Kartskisse over gammel fylling, Longyearbyen



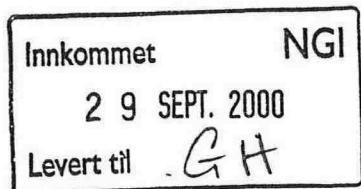


ALcontrol B.V.

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Norges Geotekniske Inst.  
 Grete Haug  
 PO Box 3930  
 N-0806 OSLO, NORWAY



Hoogvliet, 20-09-2000

Dear Grete Haug,

Herewith we send you the results of the analysis of the samples, as specified in the sample description  
 These results concern:

Your project description : SNSK  
 Your project number : 994070-7

ALcontrol report number : 0036498

This certificate consists of : 11 pages 10 of which are the appendix.  
 If you have any questions or remarks on the results, please feel free to contact the department of  
 Marketing & Sales.  
 It is only allowed to reproduce the full report, no parts of it.

Yours sincerely,

dr. J.H.F. van de Mart  
 Director Operations

signed by:





## Certificate of analysis

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Norges Geotekniske Inst.  
Grete Haug

## Appendix 1 of 10

Project : SNSK  
Projectnumber : 994070-7  
Receive date : 08-09-2000  
Starting date : 12-09-2000

Report number : 0036498  
Report date : 20-09-2000

Analysis	Unit	X01	X02	X03	X04	X05
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## METALS

## filtering metals

arsenic	ug/l	<5	<5	<5	<5	1
barium	ug/l		20	25	40	35
cadmium	ug/l	<0.4	<0.4	<0.4	<0.4	<0.4
chromium	ug/l	55	4.4	8.8	<1	6.7
cobalt	ug/l		<5	<5	25	<5
copper	ug/l	6.1	28	<5	<5	6.3
mercury	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05
lead	ug/l	<10	<10	<10	<10	<10
molybden	ug/l		<5	<5	<5	<5
nickel	ug/l	<10	38	<10	28	<10
tin	ug/l		25	35	20	<10
vanadium	ug/l		<5	<5	<5	<5
zinc	ug/l	89	160	68	71	<20

## ANORGANIC CONNECTIONS

ammonia	mgN/l	<0.5	<0.5	<0.5	2.2	<0.5
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## VOLATILE AROMATICS

benzene	ug/l		<0.2	<0.2	0.6	<0.2
toluene	ug/l		<0.2	<0.2	0.2	<0.2
ethyl benzene	ug/l		<0.2	<0.2	<0.2	<0.2
xylenes	ug/l		<0.5	<0.5	<0.5	<0.5
aromatics total	ug/l		<1	<1	1.1	<1
cumene	ug/l		<0.2	<0.2	<0.2	<0.2
styrene	ug/l		<0.2	<0.2	<0.2	<0.2

Code	Sample type	Sample description
X01	Groundwater	Br 1
X02	Groundwater	Br 2
X03	Groundwater	Br 3
X04	Groundwater	Br 4
X05	Groundwater	Br 5





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## Appendix 2 of 10

Report number : 0036498  
Report date : 20-09-2000

Analysis	Unit	X01	X02	X03	X04	X05
<b>POLYCYCLIC AROMATIC HYDROCARBON</b>						
naphthalene						
naphthalene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1
anthracene	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02
phenanthrene	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02
fluoranthene	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02
benzo(a)anthracene	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02
chrysene	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02
benzo(a)pyrene	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
benzo(ghi)perylene	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02
benzo(k)fluoranthene	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
indeno(1,2,3-cd)pyrene	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02
acenaphthelene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1
acenaphthene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1
fluorene	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05
pyrene	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02
benzo(b)fluoranthene	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02
dibenzo(ah)anthracene	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02
<b>CHLORINATED HYDROCARBONS</b>						
1,2-dichloroethane	ug/l	<1	<1	<1	<1	<1
dichloromethane	ug/l	<1	<1	<1	<1	<1
1,2-dichloropropane	ug/l	<1	<1	<1	<1	<1
tetrachloroethylene	ug/l	0.4	1.4	<0.2	<0.2	<0.2
tetrachloromethane	ug/l	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,1-trichloroethane	ug/l	<1	<1	<1	<1	1.2
1,1,2-trichloroethane	ug/l	<1	<1	<1	<1	<1
trichloroethylene	ug/l	1.8	0.2	<0.2	<0.2	<0.2
chloroform	ug/l	<0.2	<0.2	<0.2	<0.2	<0.2
	ug/l	<1	<1	<1	<1	<1
<b>CHLORBENZEN</b>						
monochlorobenzene	ug/l	<0.2	<0.2	<0.2	<0.2	<0.2
dichlorobenzene	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5
trichlorobenzenes	ug/l	<0.03	<0.03	<0.03	<0.03	<0.03
tetrachlorobenzene	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
pentachlorobenzene	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
hexachlorobenzene	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01

Code	Sample type	Sample description
X01	Groundwater	Br 1
X02	Groundwater	Br 2
X03	Groundwater	Br 3
X04	Groundwater	Br 4
X05	Groundwater	Br 5





## Certificate of analysis

Norges Geotekniske Inst.  
Grete Haug

Project : SNSK  
Projectnumber : 994070-7  
Receive date : 08-09-2000  
Starting date : 12-09-2000

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## Appendix 3 of 10

Report number : 0036498  
Report date : 20-09-2000

Analysis	Unit	X01	X02	X03	X04	X05
<b>CHLOR FENOL</b>						
2-chlorophenol	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05
4-chlorophenol	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05
3-chlorophenol	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05
2,3-dichlorophenol	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05
2,4-dichlorophenol	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05
2,5-dichlorophenol	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05
2,6-dichlorophenol	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05
3,4-dichlorophenol	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05
3,5-dichlorophenol	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05
2,3,4-trichlorophenol	ug/l	<0.03	<0.03	<0.03	<0.03	<0.03
2,3,5-trichlorophenol	ug/l	<0.03	<0.03	<0.03	<0.03	<0.03
2,3,6-trichlorophenol	ug/l	<0.03	<0.03	<0.03	<0.03	<0.03
2,4,5-trichlorophenol	ug/l	<0.03	<0.03	<0.03	<0.03	<0.03
2,4,6-trichlorophenol	ug/l	<0.03	<0.03	<0.03	<0.03	<0.03
3,4,5-trichlorophenol	ug/l	<0.03	<0.03	<0.03	<0.03	<0.03
2,3,4,5-tetrachlorophenol	ug/l	<0.02	<0.02	!0.0606	<0.02	
2,3,4,6-tetrachlorophenol	ug/l	<0.02	<0.02	!0.0606	<0.02	
2,3,5,6-tetrachlorophenol	ug/l	<0.02	<0.02	<0.02	<0.02	
pentachlorophenol	ug/l	<0.02	0.05	0.60	<0.02	
4-chloro-2-methyl phenol	ug/l	<0.05	<0.05	<0.05	<0.05	
<b>POLYCHLOR BI FENYL (pcb)</b>						
PCB 28	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 52	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 101	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 118	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 138	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 153	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 180	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
totaal PCB (7)	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05

Code	Sample type	Sample description
X01	Groundwater	Br 1
X02	Groundwater	Br 2
X03	Groundwater	Br 3
X04	Groundwater	Br 4
X05	Groundwater	Br 5





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## Appendix 4 of 10

Report number : 0036498  
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Analysis	Unit	X01	X02	X03	X04	X05
<b>CHLOR PESTICIDES</b>						
DDT (totaal)	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02
o,p-DDT	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
p,p-DDT	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
DDD (totaal)	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02
o,p-DDD	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
p,p-DDD	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
DDE (totaal)	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02
o,p-DDE	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
p,p-DDE	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
aldrin	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
dieldrin	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
totaal aldrin/dieldrin	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02
endrin	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
telodrin	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
isodrin	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
totaal 5 drins	ug/l	<0.05	<0.05	<0.05	<0.05	<0.05
alfa-HCH	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
beta-HCH	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
gamma-HCH	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
delta-HCH	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
heptachloor	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
alfa-endosulfan	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
hexachloorbutadien	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
beta-endosulfan	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
trans-chloordaan	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
cis-chloordaan	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
cis-heptachloorepoxyde	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
trans-heptachloorepoxyde	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
heptachloorepoxyde	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02
quintozeen	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
<b>PHOSPHOR PESTICIDES</b>						
dichlorvos	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
E-mevinphos	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
dimethoate	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
diazinon	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
disulfoton	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
parathion-methyl	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
parathion-ethyl	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
malathion	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01
fenthion	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01

Code	Sample type	Sample description
X01	Groundwater	Br 1
X02	Groundwater	Br 2
X03	Groundwater	Br 3
X04	Groundwater	Br 4
X05	Groundwater	Br 5





# ALcontrol Biochem Laboratoria

## Certificate of analysis

Norges Geotekniske Inst.  
Grete Haug

Project : SNSK  
Projectnumber : 994070-7  
Receive date : 08-09-2000  
Starting date : 12-09-2000

ALcontrol B.V.  
Steenhouwerstraat 15 · 3194 AG Hoogvliet  
Tel.: (010) 2314700 · Fax: (010) 4163034

### Appendix 5 of 10

Report number : 0036498  
Report date : 20-09-2000

Analysis	Unit	X01	X02	X03	X04	X05
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#### PHOSPHOR PESTICIDES

chlorpyriphos-ethyl	ug/l	<0.02	<0.02	<0.02	<0.02
bromophos-methyl	ug/l	<0.01	<0.01	<0.01	<0.01
bromophos-ethyl	ug/l	<0.01	<0.01	<0.01	<0.01

Code	Sample type	Sample description
X01	Groundwater	Br 1
X02	Groundwater	Br 2
X03	Groundwater	Br 3
X04	Groundwater	Br 4
X05	Groundwater	Br 5





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## Appendix 6 of 10

Report number : 0036498  
Report date : 20-09-2000

Analysis	Unit	X01	X02	X03	X04	X05
----------	------	-----	-----	-----	-----	-----

### N - PESTICIDES

atrazine	ug/L	<0.01	<0.01	<0.01	<0.01
propazine	ug/L	<0.01	<0.01	<0.01	<0.01
simazine	ug/L	<0.01	<0.01	<0.01	<0.01
terbutryn	ug/L	<0.01	<0.01	<0.01	<0.01

### MINERAL OIL

fraction C10 - C12	ug/L	<10	<10	65	<10
fraction C12 - C22	ug/L	<10	<10	300	65
fraction C22 - C30	ug/L	<10	<10	85	15
fraction C30 - C40	ug/L	<10	<10	<10	<10
total oil C10 - C40	ug/L	<50	<50	450	80
nitrate	mg/L	<0.2	66	<0.2	<0.2

Code	Sample type	Sample description
X01	Groundwater	Br 1
X02	Groundwater	Br 2
X03	Groundwater	Br 3
X04	Groundwater	Br 4
X05	Groundwater	Br 5



QUALIFIED BY STERLAB. ALCONTROL IS INGESCHREVEN IN HET STERLABREGISTER VOOR LABORATORIA ONDER NO. 28 VOOR GEBIEDEN ZOALS NADER BESCHREVEN IN DE ERKENNING AL ONZE WERKZAAMHEDEN WORDEN UITGEVOERD ONDER DE ALGEMENE VOORWAARDEN GEDEPOSEERD BIJ DE KAMER VAN KOOPHANDEL EN FABRIEKEN TE ROTTERDAM. INSCHRIJVING HANDELSREGISTER KVKG ROTTERDAM 24265286.



# ALcontrol Biochem Laboratoria

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## Appendix 7 of 10

Report number : 0036498  
Report date : 20-09-2000

### Remarks

! = Som der componenten.

Analysis	Sample type	Relation to standard
arsenic	Groundwater	Own method, analysis based on NEN 6426
barium	Groundwater	Own method, analysis based on NEN 6426
cadmium	Groundwater	Own method, analysis based on NEN 6426
chromium	Groundwater	Own method, analysis based on NEN 6426
cobalt	Groundwater	Own method, analysis based on NEN 6426
copper	Groundwater	Own method, analysis based on NEN 6426
mercury	Groundwater	Disclosure gathered from NEN-EN 1483, analysis us cold vapor-technique
lead	Groundwater	Own method, analysis based on NEN 6426
molybdenum	Groundwater	Own method, analysis based on NEN 6426
nickel	Groundwater	Own method, analysis based on NEN 6426
tin	Groundwater	Own method, analysis based on NEN 6426
vanadium	Groundwater	Own method, analysis based on NEN 6426
zinc	Groundwater	Own method, analysis based on NEN 6426
ammonia	Groundwater	Own method, segmented instead of continuous flow, NEN 6472
benzene	Groundwater	VPR C85-12
toluene	Groundwater	VPR C85-12
ethyl benzene	Groundwater	VPR C85-12
xylanes	Groundwater	VPR C85-12
cumene	Groundwater	VPR C85-12
styrene	Groundwater	VPR C85-12
naphthalene	Groundwater	Compatible with NEN 6524
anthracene	Groundwater	Compatible with NEN 6524
phenanthrene	Groundwater	Compatible with NEN 6524
fluoranthene	Groundwater	Compatible with NEN 6524
benzo(a)anthracene	Groundwater	Compatible with NEN 6524
chrysene	Groundwater	Compatible with NEN 6524
benzo(a)pyrene	Groundwater	Compatible with NEN 6524
benzo(ghi)perylene	Groundwater	Compatible with NEN 6524
benzo(k)fluoranthene	Groundwater	Compatible with NEN 6524
indeno(1,2,3-cd)pyrene	Groundwater	Compatible with NEN 6524
acenaphthelene	Groundwater	Compatible with NEN 6524
acenaphthene	Groundwater	Compatible with NEN 6524
fluorene	Groundwater	Compatible with NEN 6524
pyrene	Groundwater	Compatible with NEN 6524
benzo(b)fluoranthene	Groundwater	Compatible with NEN 6524
dibenzo(ah)anthracene	Groundwater	Compatible with NEN 6524
1,2-dichloroethane	Groundwater	VPR C85-12
dichloromethane	Groundwater	VPR C85-12
1,2-dichloropropane	Groundwater	VPR C85-12
tetrachloroethylene	Groundwater	VPR C85-12
tetrachloromethane	Groundwater	VPR C85-12
1,1,1-trichloroethane	Groundwater	VPR C85-12
1,1,2-trichloroethane	Groundwater	VPR C85-12
trichloroethylene	Groundwater	VPR C85-12
chloroform	Groundwater	VPR C85-12
monochlorobenzene	Groundwater	VPR C85-12
dichlorobenzene	Groundwater	VPR C85-12
trichlorobenzenes	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
tetrachlorobenzene	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)





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## Appendix 8 of 10

Report number : 0036498  
Report date : 20-09-2000

Analysis	Sample type	Relation to standard
pentachlorobenzene	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
hexachlorobenzene	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
2-chlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
4-chlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
3-chlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
2,3-dichlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
2,4-dichlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
2,5-dichlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
2,6-dichlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
3,4-dichlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
3,5-dichlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
2,3,4-trichlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
2,3,5-trichlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
2,3,6-trichlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
2,4,5-trichlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
2,4,6-trichlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
3,4,5-trichlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
2,3,4,5-tetrachlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
2,3,4,6-tetrachlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
2,3,5,6-tetrachlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
pentachlorophenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
4-chloro-2-methyl phenol	Groundwater	Extraction own methodd, based upon ISO/DIS 10695-1.
PCB 28	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
PCB 52	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
PCB 101	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
PCB 118	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
PCB 138	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
PCB 153	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
PCB 180	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
o,p-DDT	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
p,p-DDT	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
o,p-DDD	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
p,p-DDD	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
o,p-DDE	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
p,p-DDE	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
aldrin	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
dieldrin	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
endrin	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
telodrin	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
isodrin	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
alfa-HCH	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to





# ALcontrol Biochem Laboratoria

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## Appendix 9 of 10

Report number : 0036498  
Report date : 20-09-2000

Analysis	Sample type	Relation to standard
beta-HCH	Groundwater	EPA 8270 Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
gamma-HCH	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
delta-HCH	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
heptachloor	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
alfa-endosulfan	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
hexachloorbutadieen	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
beta-endosulfan	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
trans-chloordaan	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
cis-chloordaan	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
cis-heptachloorepoxyde	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
trans-heptachloorepoxyde	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
quintozeen	Groundwater	Extraction based on NEN 5718 and NEN 5734, analysis according to EPA 8270
dichlorvos	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
E-mevinphos	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
dimethoate	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
diazinon	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
disulfoton	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
parathion-methyl	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
parathion-ethyl	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
malathion	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
fenthion	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
chlorpyriphos-ethyl	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
bromophos-methyl	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
bromophos-ethyl	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
atrazine	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
propazine	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
simazine	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
terbutryn	Groundwater	Gathered from ISO/DIS 10695-1 (GC-MS)
nitrate	Groundwater	Gathered from NEN-ISO 10304-1 after extraction using water
oil(GC)	Groundwater	Gathered from NEN 6678

Analysis marked with \* are not accredited by STERLAB.



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AL ONZE WERKZAAMHEDEN WORDEN UITGEVOERD ONDER ALGEMENE VOORWAARDEN GEDEPOSEERD BIJ DE KAMER VAN KOOPHANDEL EN FABRIEKEN TE ROTTERDAM.  
INSCHRIJVING HANDELSREGISTER KVK ROTTERDAM 24265286.



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Grete Haug

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ALcontrol B.V.  
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## Appendix 10 of 10

Report number : 0036498  
Report date : 20-09-2000

### Sample information:

X001	d0310527
X002	a0750996, a0750997, d0310779
X003	a0750998, a0751002, d0310777
X004	a0750999, a0751000, d0310762
X005	a0751001



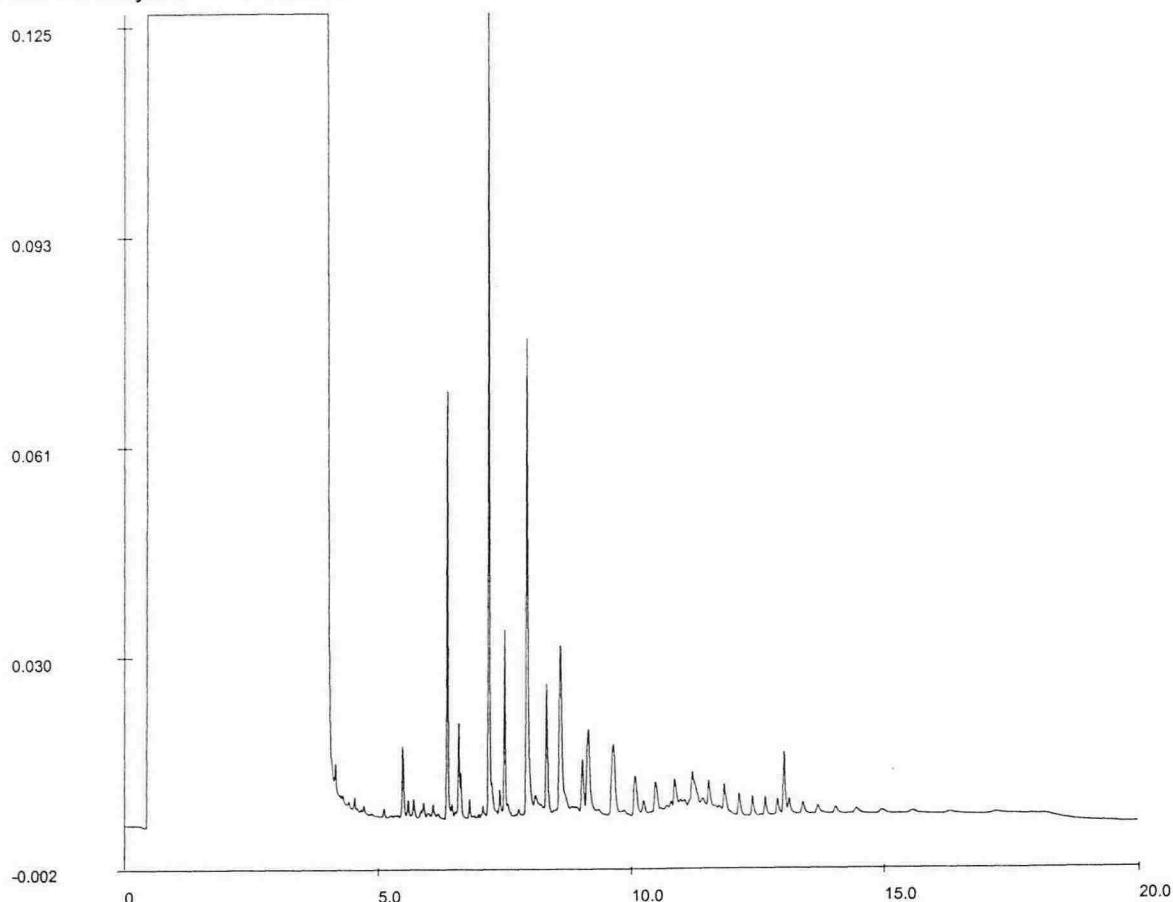
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INSCHRIJVING HANDELSREGISTER KVK ROTTERDAM 24265286.



Norges Geotekniske Inst.  
Grete Haug  
PO Box 3930  
N-0806 OSLO, NORWAY

Monsternummer: 0036498 X004  
Datum analyse: 14/09/00

### Olie GC - chromatogram



Voor analyseresultaten: zie rapport

#### Karakterisering naar alkaantraject

benzine	C9-C14
kerosine en petroleum	C10-C16
diesel en gasolie	C10-C28
motorolie	C20-C36
stookolie	C10-C36
humus	C28-C40

#### Retentietijden van de even alkanen in minuten:

C10	5.0
C12	6.0
C22	9.5
C30	11.5
C40	13.0

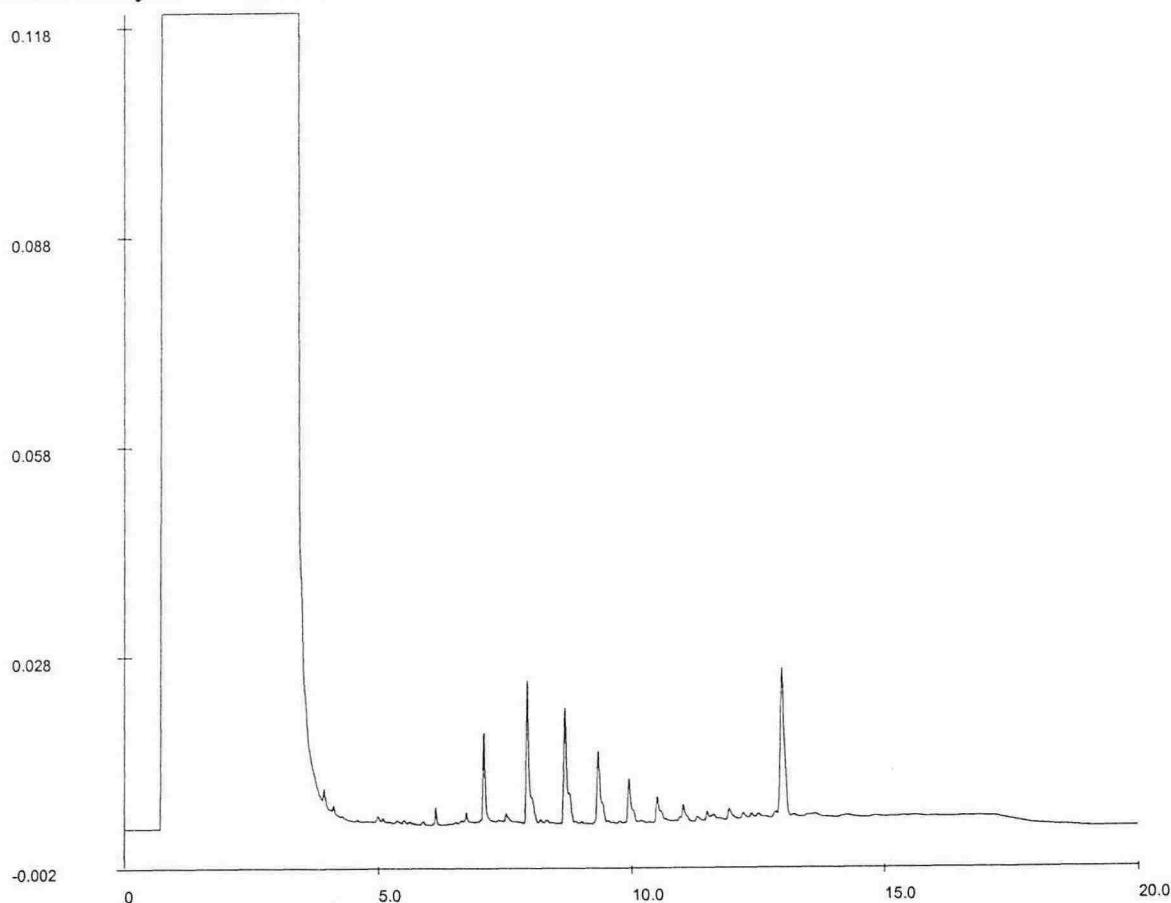




Norges Geotekniske Inst.  
Grete Haug  
PO Box 3930  
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Monsternummer: 0036498 X005  
Datum analyse: 15/09/00

### Olie GC - chromatogram



**Voor analyseresultaten: zie rapport**

#### Karakterisering naar alkaantraject

benzine	C9-C14
kerosine en petroleum	C10-C16
diesel en gasolie	C10-C28
motorolie	C20-C36
stookolie	C10-C36
humus	C28-C40

#### Retentietijden van de even alkanen in minuten:

C10	5.0
C12	6.0
C22	9.5
C30	11.5
C40	13.0

