Grontmij

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DEUTSCHLAND

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Betreft
Rapport Yali-bims

Divisie Advies & Techniek
Handelsregister
Utrecht nr. 30129769

Geachte heer Nagel,

Conform uw verzoek doen wij u hierbij in vijfvoud de Engelse vertaling toekomen van het u eerder toegezonden rapport inzake Yali-bims.

Meerdere exemplaren zijn uiteraard, na uw bericht, te produceren en toe toezenden.

Wij vertrouwen erop u hiermede van dienst te zijn geweest.

Hoogachtend,
Grontmij Advies & Techniek bv
Vestiging Zuid-Holland

Ha J. Vetl

I.B. de Groote
Rayonleider Rijnmond

Bijlage: Rapport in vijfvoud.

Sample inspection Building Materials

Examination of a depot Yali-pumice in conformity with the Bouwstoffenbesluit (Building Materials Decree)

Nagel G.mbH&Co. Schiffahrts & Handelsgesellschaft Manheim
Talstrabe 74
68259 Mannheim-Feudenheim

Grontmij Advies & Techniek bv
Vestiging Zuid-Holland
Waddinxveen, 5 September 2000

Grontmij

Contents

1 Introduction

Grontmij Verkeer & Infrastructuur (Grontmij Traffic and Infrastructure Dept.) has received the order from Nagel G.mbH & Co. Schiffahrts & Handelsgesellschaft Mannheim to sample and to analyse a depot of pumice (Yali-pumice 0/16) in conformity with the Bouwstoffenbesluit (Building Materials Decree). The depot is also sampled and analysed as "clean soil". The Yali-pumices are originating from Greece where they are extracted on the island Yali by the mining company Mining and Quarrying Co. In order of Nagel G.mbH & Co. Schiffahrts & Handelsgesellschaft Mannheim the pumices are transported to Rotterdam by ship. During the extracting and the transport the pumices are turned over a number of times. For this reason it is assumed that the pumices in the depot are relatively homogeneous. In this report the sampling, the analysing results and the testing with regards to the Building Materials Decree are described.

2 Sampling

2.1 Location of the depot

The depot is situated on the ground of E.P.Shipping & Trading B.V. at the Quebecstreet at Rotterdam. At the time of the sampling the depot contained appr. 7000 tons of building material and had a size of appr. 42 x 21 x 7 and 13 x 21 x 3.5 meters.

2.2 Sampling

The sampling is executed on Monday 8 May 2000. The sampling is based on the user's protocol as described in the execution regulation of the Building Materials Decree, and the VKB-protocol "Sampling of non-shaped building materials from static batches on behalf of batch tests". On basis of this protocol 12 sampling points are determined at random and set out in a x-, y- and z- coordinate. On the sampling points that were within reach with the shovel, the pumice was, preceding to the sampling, excavated up to the calculated depth. On the places that were not able to reach with the shovel, the z-coordinate is eventually adjusted to the depth that was able to sample by hand. Because the pumices are relatively homogeneous (see introduction) this has no consequences for the result of the examination.

After the sampling the 12 picks are joined, by way of random numbers, up to 2 mixed samples. The mixed samples are packed in synthetic bags and transported to the road construction laboratory of Grontmij at Zeist.

Besides of the sampling for building materials, a "soil" sampling is executed. At this 50 picks of appr. 200 grams are taken, spread over the depot area. The sampling depth was here maximum 10 centimeters. The 50 picks are divided at random over an A- and a B-mixed sample and packed in synthetic and transported to the laboratory.

3 Laboratory examination

3.1 Methods of examination

The samples for the building materials examination are offered for analysing to the analytical laboratory (Iwaco). The samples are analysed according to the full analysis package as described in appendix 2 of the Building Materials Decree. The analyses are performed under AP04-accrediting. The standards used hereto are mentioned in appendix 4.

The samples taken in behalf of the analyses as being soil, are also offered to the analytical laboratory (Alcontrol). As analysis package the standard package for the analysis of clean soil is selected here. Hereto chloride testing is added because from previous examination it appeared that this is a critical material in Yali-pumices.

3.2 Results and testing on leaching

In table 3.1 the results of the leaching examination is presented. In this the average results of both samples are presented. The results of the individual samples are included in appendix 4.
As a first testing stage the results of both analyses are compared with each other. The difference in result between both mixed samples should not be more than a factor of 2.1. Because this was not the case, the testing is continued.

In order to be able to test the result, this is converted to immission during 100 years as is described in the Building Materials Decree. At this there is started from category 1 building material and an application height of maximum 0.5 meter. At parameters at which the analysis result is under the detection limit, the detection limit is kept. At the conversion a surety factor of 1.37 is used in accordance with the user's protocol and based on 6 picks and 2 analysis samples.

In table 3.1, at the immission to be tested, for a large number of parameters "nil" is indicated. At the related parameters the analysis result is lower than the "standard value" that is deducted at the calculation, from the analysis result. From the table it only appears that chloride is significantly leaching and a testable value can be calculated. For chloride, in the Building Materials Decree a leaching standard of 30,000 mg/m3 is entered. For an application like category 1 building material however a standard of 87,000 mg/m2 is applying. For this reason the batch Yali-pumices is also complying on basis of this examination for chloride as category 1 building material, at an application height of maximum 0.5 meter.

Table 3.1 ***Results and testing for leaching***

Parameter	Analysis result average (mg/kg d.s.)	Calculated immission at an application height of 0.5 m (mg/m2 in 100 years)	Testing value immission (mg/m2 in 100 years)
antimony	< 0,009	nil	39
arsenic	< 0,2	nil	435
barium	< 0,1	nil	6300
cadmium	< 0,001	nil	12
chromium	0,022	nil	1500
cobalt	< 0,03	nil	300
copper	< 0,02	nil	540
mercury	< 0,0003	nil	4,5
lead	< 0,05	nil	1275
molybdenum	< 0,03	nil	150
nickel	< 0,05	nil	525
selenium	< 0,009	nil	15
tin	< 0,03	nil	300
vanadium	< 0,02	nil	2400
zinc	< 0,05	nil	2100
fluoride	0,845	nil	14.000 1)
bromide	0,76	nil	300
chloride	262	32.486	87.000 2)
sulphate	30	nil	100.000 2)

1) leaching in 1 year
2) leaching in 1 year as category 1 building material

3.3 Results and testing regarding composition

In the table as below the results of the composition examination are given. Also at the testing of the composition, as a first step the difference in result between both mixed samples is compared. At this it appears that the difference is not more than a factor of 2.1

Table 3.2 ***Results and testing of composition***

Parameter	Analysis result average (mg/kg d.s.)	Testing value (mg/kg d.s.)
benzene	< 0,05	1,25
ethyl benzene	< 0,05	1,25
toluene	< 0,05	1,25
xylenes 1)	< 0,05	1,25
phenol	0,081	1,25
naphtalene	< 0,01	5
anthracene	< 0,01	20
fenantrene	0,03	10
fluoranthene	0,05	35
benzo(a)anthtracene	0,03	10
chrysene	0,03	50
benzo(a)pyrene	0,02	10
benzo(ghi)perylene	0,02	50
benzo(k)fluorantene	0,02	50
indeno(1,2,3-cd)pyrene	< 0,1	50
PAK (polycyclic aromatic hydrocarbon) (10-VROM) 1)	0,19	75
PCB's (polychlorobiphenyl) 1)	< 0,009	0,5
EOCl	< 0,1	3
chlorine containing pesticides 1)	< 0,024	0,5
non chlorine containing pesticides 1)	< 0,01	0,5
mineral oil	< 20	500

1) summation

At a number of materials in table 3.2 only the result of the "summation" is mentioned because this is tested. In the table the average results are included, multiplied with a surety factor of 1.37. The results of both mixed samples are mentioned in appendix 4.

From table 3.2 it appears that the contents of examined materials in the sample are below or near the detection limit. By this the contents of the examined materials are widely complying with the testing values of the Building Materials Decree and application of the batch Yali-pumices is allowed.

3.4 Results of analysis as being soil

In the table below the results are mentioned of the examination of Yali-pumices as being soil. The results of the 2 mixed samples are averaged. The testing value for clean soil from the Building Materials Decree (appendix 1) is corrected for the examined materials for the content of organic material and lutum.

Table 3.3 Results and testing as "soil"

Parameter	Analysis result average (mg/kg d.s.)	Testing value appendix 1 BMD after correction lutum and organic material (mg/kg d.s.)
arsenic	< 4	18,2
cadmium	<0,4	0,5
chromium	< 0,15	57,8
copper	6,0	19,8
mercury	< 0,05	0,2
lead	13	58,0
nickel	6,0	13,9
zinc	8,7	67,9
PAK (polycyclic aromatic hydrocarbon)	0,1	1,0
EOX	0,11	0,12
mineral oil	< 20	20,5
chloride	560	200
organic material (% mm)	4,1	not applying
lutum (% mm)	3,9	not applying

From table 3.3 it appears that the Yali-pumices do comply with the requirements for clean soil with exception of the content of chloride. The content of chloride exceeds the standard by which this batch of Yali-pumices should not be considered as clean soil.

4 Discussion and recommendation

4.1 Difference in chlorides content

A notable difference between the sampling and analysis of the Yali-pumices as building material or as soil is the content of chloride (see table 4.1).
One might assume that the leaching test and the content determination for chloride give an identical result. If no analysing mistake is made, so the difference is to be traced back to the sampling. Besides of the difference in size and number of the random picks between both methods, there is a difference in maximum depth at which the picks are taken. The sampling of the Yali-pumices as building material is taken at maximum 40 centimeters from the surface. This with the exception of 2 samples at which the above-laying pumices are removed with a shovel. These samples are taken at a depth of 1.5 meters. The picks for the sampling as soil are taken at a depth of maximum 10 centimeters.

Table 4.1 Difference in chlorides content

Sampling	Analysis	Average content (mg/kg d.s.)
As building material	Leaching test	262
As soil	Content determination	560

The most obvious explanation for the difference in chlorides content is the depth at which the sampling has taken place. Possibly the chloride was especially present on the surface of the Yali-pumice. If this is true, this applies for periods in which it is raining little, and at which the batch of Yali-pumice lays in the depot for a longer time (chloride leaches fast).

4.2 Critical materials

After this round of sampling it is clear to the Grontmij that only chloride is a critical material. For this also see the preceding testing report of February 2000 (doc.nr. V&I-99013106.doc/sb/bms). In both examinations all examined materials of the whole series as mentioned in appendix 2 of the Building Materials Decree are below or near the detection limit. Only chloride is leaching in a significant value by which the Yali-pumice is not to be classified for the time being in a same quality as "clean soil". Both examined batches do comply with the requirements as set for category 1 building material (the cleanest building material).

4.3 Batch tests

It is recommended that the Yali-pumice is to be sampled directly after the unloading from the ship, by a certified institute according to the Building Materials Decree and to examine only for the critical material chloride. Because of the homogeneous composition and the clean producing area, the risk that a batch of Yali-pumices is approved wrongfully, is small. As an extra security it is recommended to execute a complete examination annually, as described in this report.

5 Conclusion

The examined depot of Yali-pumices is, on basis of the sampling and analysis in conformity with AP04, complying as a non-shaped category 1 building material at an application height of maximum 0.5 meters.

The sample Yali-pumices is examined for the standard series of materials as mentioned in the Building Materials Decree. With exception of chloride all contents and leaching values have values below or near the detection limit (lowest value that can be determined with the applied analysing methods). For this reason only chloride is considered as a critical material.

Justification

Title	:	Sample inspection Yali pumices Examination of a depot Yali-pumices in conformity with the Building Materials Decree (bouwstoffenbesluit)
Clients	:	Nagel G.mbH & Co. Schiffahrts & Handelsgesellschaft Mannheim
Issued by	:	Grontmij Verkeer & Infrastructuur
Place and date	:	Waddinxveen, 5 september 2000
P.N.	:	22.8862.1
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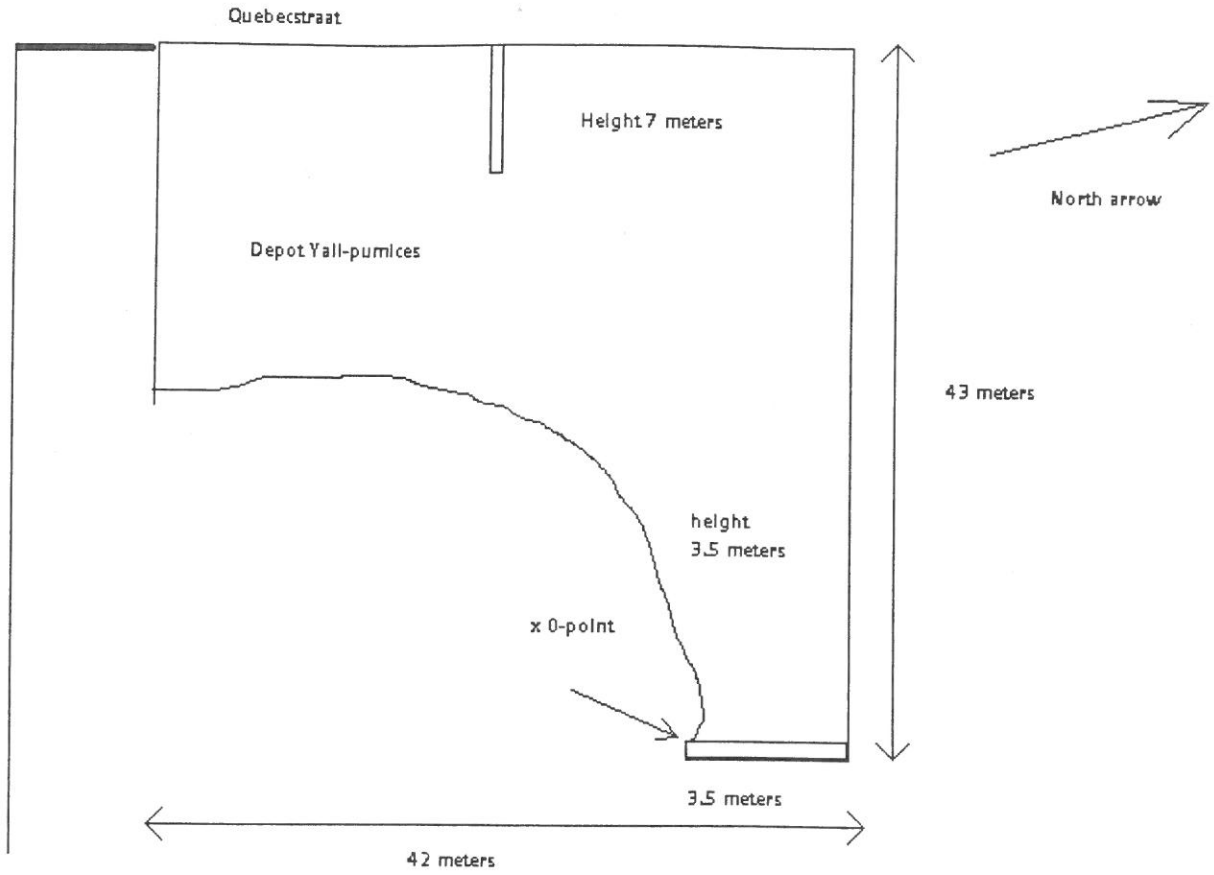
Author	:	S. van den Berg
Checked		J. van der Goes
Approved	:	S. van den Berg
Information	:	(+31) 30 22 07 809

Appendix 1: Location of the de depot



Appendix 2: Sampling forms

Sampling of non-shaped building materials from static batches in behalf of batch testing **VKB-A-201**

Sampling schedule

General

Project	Examination Yali-pumices
Number	
Project leader	
Phone	.. 31 (0)30 220 78 09
Sampler	
Client	
Contact	
Contact on location	
Competent authority	n.a.
Contact	n.a.
Building material	pumices
Producer	Nagel G.mbH&Co
Purpose of sampling	Batch testing
Date of sampling	

Method

Users or maintenance	Users
Way in which building material is available	In depot on the grounds of E.P. Shipping & Trading B.V., at left behind the gate Quebecstraat no. 5 at Rotterdam
Equipment	Shovel, coal scoop, measuring bucket, measuring tape, photo, etc.
Quantity	4000 tons
Picks to be taken	12
Samples to compose	2
Grain size	0/16
Pick size	3 kg
Sample size	18 kg
Safety	n.a.

Execution

Sample coding	Sample A and B
Sample packing	Plastic bags
Transport	Automobile
Delivery	Directly to Iwaco laboratory (not sampling as soil)

Remark

Also sampling of Yali pumice as being clean soil, therefor 100 picks (50 per sample) pick size 0.14 to join, sampling with "edelman" brace if possible.

Approval

Initials project leader	
Initials sampler	

Sampling of non-shaped building materials from static batches in behalf of batch testing VKB-A-202

Sampling schedule

General

Project	Examination Yali-pumices
Number	
Project leader	
Phone	.. 31 (0)30 220 78 09
Sampler	
Client	
Contact	
Contact on location	
Competent authority	n.a.
Contact	n.a.
Building material	pumices
Producer	Nagel G.mbH&Co
Purpose of sampling	Batch testing
Date of sampling	

Execution

Size depot L - W - H (m)	42 x 21 x 7,0 en 13 x 22 x 3,5 continuous
Method	by hand and shovel
Pick size	3 kg
Sample size	18 kg
Zero-point	see drawing

Coordinates/mixed sample arrangement

Pick no.	Y-coord.	X-coord.	Z-coord.	A/B	remarks
1	1,0	6,5	3,4	B	
2	8,5	10,5	1,2	A	1
3	26,5	31,0	2,3	A	2
4	26,5	41,5	2,2	A	
5	30,5	19,0	3,3	B	
6	45,0	20,0	5,5	B	
7	36,5	8,0	6,8	B	
8	37,0	14,0	6,5	B	
9	37,5	11,5	6,8	B	
10	39,0	17,0	6,8	A	
11	41,0	35,5	4,7	A	
12	42,0	12,0	6,8	B	

Execution deviations from sampling schedule

All samples are taken by hand at which at the points (1) and (2) a part of the above laying pumices is removed. At point (1) also the x-coordinate is adjusted 2.5 meters. Also the Z-coordinate is adjusted at most picks because it was not possible to turnover the depot. The depot is turned over a few times from the extraction on. Besides of this sampling as building material a sampling as "soil" is executed.

Handing over of samples

Initials laboratory	date

Appendix 3: Analysis results building material

Grontmij-De Weger
att. Mr. S. van den Berg
PB 203
3730 AE DE BILT
THE NETHERLANDS

Place and date
Waddinxveen, 5 September 2000

Refers to
AP04 analysis of Yali-pumices (batch testing) 2288621-4

Dear Mr. Van den Berg,

Herewith you find the results of the laboratory examination.

The examination is executed in conformity with the regulations as set in AP04, ACCREDITATION PROGRAMME "Building Materials Decree" of June 1998.

If you have any questions about these results, you may contact the chief of analysis group Anorganic Analysis & Acceptation, phone (0031) 10 286 55 88.
If you are of the opinion that the examination and/or the report is not executed in conformity with the made agreements, you may contact with undersigned, phone 010 286 55 35.

We have confidence to have informed you as wished,

Sincerely yours,
IWACO B.V.

J. Warbout
Manager Environment Laboratory

Author: IWACO
Environment Laboratory
Rotterdam
- Member ONRI
- Qualified by Sterlab
- Bouwstoffenbesluit

Descripton: AP04 analysis on Yali-bims (batch test) 2288621-4

Analysis results base material

Analysis results AP04 Building material(s)

Sample code: 1 Yali-bims 1
2 Yali-bims 2

Sample code			1	2
Parameter	unit	report limit		
Sample date			08/05/10	08/05/10
Leaching examination				
Q Column test			x	x
Physical chemical investigation				
Q dry material	% (w/w)	0,1	81,6	83,4
Fenol-index (NEN 6670)	mg/kgds	0,010	0,013	0,046
Analyses on mineral oil and oil products				
Q Min. olie (GC) AP-04	mg/kgds	20	< 20	< 20
Q fraction C10-C14 (AP04)	%	5,0	< 5,0	< 5,0
Q fraction C20-C26 (AP04)	%	5,0	< 5,0	< 5,0
Q fraction C26-C34 (AP04)	%	5,0	< 5,0	< 5,0
Q fraction C34-C40 (AP04)	%	5,0	< 5,0	< 5,0
Polycyclic Aromatic Hydrocarbons (HPLC)				
Q * PAK 10 van Vrom (tot.)	mg/kgds	-	0,21	<0,10 @)
Q Naftaleen *	mg/kgds	0,010	<0,010	<0,010
Q Fenanthreen	mg/kgds	0,010	0,031	<0,010
Q Anthraceen	mg/kgds	0,010	0,010	<0,010
Q Fluorantheen	mg/kgds	0,010	0,060	0,014
Q Chryseen *+	mg/kgds	0,010	0,022	<0,010
Q Benzo(a)anthraceen	mg/kgds	0,010	0,033	<0,010
Q Benzo(a)pyreen *+	mg/kgds	0,010	0,023	<0,010
Q Benzo(k)fluorantheen *+	mg/kgds	0,010	0,014	<0,010
Q Indeno(1,2,3-c,d)pyreen*+	mg/kgds	0,010	<0,010	0,056
Q Benzo(ghi)peryleen *+	mg/kgds	0,010	0,016	<0,010
Q + PAK 7 van WGA (total)	mg/kgds	-	0,17	0,070

Analyses marked with 'Q' have a STERLAB admission.

Descripton: AP04 analysis on Yali-bims (batch test) 2288621-4

Analysis results base material

Analysis results AP04 Building material(s)

Sample code: 1 Yali-bims 1
2 Yali-bims 2

Sample code			1	2
Parameter	unit	report limit		
Sample date			08/05/10	08/05/10
Halogenated hydrocarbons				
Q EOX (NEN 5735)	mg/kgds	0,10	<0,10	<0,10
Q 01,2,3-Trichloorbenzeen	mg/kgds	0,003	<0,003	<0,003
Q 01,2,4-Trichloorbenzeen	mg/kgds	0,003	<0,003	<0,003
Q 01,3,5-Trichloorbenzeen	mg/kgds	0,003	<0,003	<0,003
Q 1,2,3,4-Tetrachl.benzeen	mg/kgds	0,001	<0,001	<0,001
Q 1,2,3,5-+1,2,4,5-Te.Cl.B.	mg/kgds	0,001	<0,001	<0,001
Volatile Aromatic Hydrocarbons				
Q BTEX (totaal)	mg/kgds	-	<0,20 @)	<0,20 @)
Q Benzeen	mg/kgds	0,050	<0,050	<0,050
Q Tolueen	mg/kgds	0,050	<0,050	<0,050
Q Ethylbenzeen	mg/kgds	0,050	<0,050	<0,050
Q Xylenen	mg/kgds	0,050	<0,050	<0,050
Polychlorinebiphenyls				
Q PCB (totaal)	mg/kgds	-	<0,009 @)	<0,009 @)
Q PCS no. 28	mg/kgds	0,002	<0,002	<0,002
Q PCB no. 52	mg/kgds	0,002	<0,002	<0,002
Q PCB no. 101	mg/kgds	0,001	<0,001	<0,001
Q PCS no. 118	mg/kgds	0,001	<0,001	<0,001
Q PCB no. 138	mg/kgds	0,001	<0,001	<0,001
Q PCB no. 153	mg/kgds	0,001	<0,001	<0,001
Q PCS no. 180	mg/kgds	0,001	<0,001	<0,001
Organochlorine pesticides				
Q OCB (total)	mg/kgds	-	<0,024	<0,024 @)
Q Drins (total)	mg/kgds	-	<0,005	<0,005 @)

Analyses marked with 'Q' have a STERLAB admission.

Descripton: AP04 analysis on Yali-bims (batch test) 2288621-4

Analysis results base material

Analysis results AP04 Building material(s)

Sample code: 1 Yali-bims 1
2 Yali-bims 2

Sample code			1	2
Parameter	unit	report limit		
---	---	---	---	---
Sample date			08/05/10	08/05/10
Organochlorine pesticides (continued)				
HCH-verbindingen (total)	mg/kgds	-	< 0,003 @)	< 0,003 @)
Q DDT/DDE/DDD (total)	mg/kgds	-	< 0,008 @)	< 0,008 @)
Q Pentachloorbenzeen	mg/kgds	0,001	< 0,001	< 0,001
Q Hexachloorbenzeen (HCB)	mg/kgds	0,001	< 0,001	< 0,001
Q a-HCH	mg/kgds	0,001	< 0,001	< 0,001
Q B-HCH	mg/kgds	0,001	< 0,001	< 0,001
Q y-HCH (lindaan)	mg/kgds	0,001	< 0,001	< 0,001
Q Heptachloor	mg/kgds	0,001	< 0,001	< 0,001
Q Aldrin	mg/kgds	0,001	< 0,001	< 0,001
Q Telodrin	mg/kgds	0,001	< 0,001	< 0,001
Q Isodrin	mg/kgds	0,001	< 0,001	< 0,001
Q cis Heptachloor epoxide	mg/kgds	0,001	< 0,001	< 0,001
Q 2,4-DDE	mg/kgds	0,001	< 0,001	< 0,001
Q a-Endosulfan	mg/kgds	0,001	< 0,001	< 0,001
Q 4,4-DDE	mg/kgds	0,001	< 0,001	< 0,001
Q Dieldrin	mg/kgds	0,001	< 0,001	< 0,001
Q Endrin	mg/kgds	0,001	< 0,001	< 0,001
Q 2,4-DDT	mg/kgds	0,001	< 0,001	< 0,001
Q 4,4-DDT	mg/kgds	0,003	< 0,003	< 0,003
Q 2,4-DDD	mg/kgds	0,001	< 0,001	< 0,001
Q 4,4-DDD	mg/kgds	0,001	< 0,001	< 0,001
Q Hexachloor-1,3 butadieën	mg/kgds	0,002	< 0,002	< 0,002
Q cis-Chloordaan	mg/kgds	0,001	< 0,001	< 0,001
Q trans-Chloordaan	mg/kgds	0,001	< 0,001	< 0,001
Q trans-Heptachloorepoxide	mg/kgds	0,001	< 0,001	< 0,001
Organo-phosphorus pesticides)				
Q Mevinphos	mg/kgds	0,010	< 0,010	< 0,010

Analyses marked with 'Q' have a STERLAB admission.

Descripton: AP04 analysis on Yali-bims (batch test) 2288621-4

Analysis results base material

Analysis results AP04 Building material(s)

Sample code: 1 Yali-bims 1
2 Yali-bims 2

Sample code			1	2
Parameter	unit	report limit		
Sample date			08/05/10	08/05/10
Organochlorine pesticides (continued)				
Q Chloorpyrifos-methyl	mg/kgds	0,010	< 0,010	< 0,010
Organo nitrogen pesticides				
Q Terbutryn	mg/kgds	0,002	< 0,002	< 0,002

Analyses marked with 'Q' have a STERLAB admission.

Descripton: AP04 analysis on Yati-bims (batch test) 2288621-4

Analysis results base material

Analysis results AP04 Building material(s)

Sample code: 1 Yali-bims 1
2 Yali-bims 2

Sample code			1	2
Parameter	unit	report limit		
Sample date			08/05/10	08/05/10
Quantitative GCMS analysis after liquid extraction (not volatile)				
Phosphorus pesticides				
Q Dichloorvos	mg/kgds	0,010	< 0,010	<0,010
Q Dimethoaat	mg/kgds	0,010	< 0,010	<0,010
Q Diazinon	mg/kgds	0,010	< 0,010	<0,010
Q Disulfoton	mg/kgds	0,010	< 0,010	<0,010
Q Parathion-methyl	mg/kgds	0,010	< 0,010	<0,010
Q Malathion	mg/kgds	0,010	< 0,010	<0,010
Q Chloorpyrifos-ethyl	mg/kgds	0,010	< 0,010	<0,010
Q Fenthion	mg/kgds	0,010	< 0,010	<0,010
Q Parathion-ethyl	mg/kgds	0,010	< 0,010	<0,010
Q Bromophos-methyl	mg/kgds	0,010	< 0,010	<0,010
Q Bromophos-ethyl	mg/kgds	0,010	< 0,010	<0,010
Q OPB (som)	mg/kgds	-	< 0,13 @)	<0,13 @)
Nitrogen pesticides				
Q Simazine	mg/kgds	0,004	< 0,004	<0,004
Q Atrazine	mg/kgds	0,002	< 0,002	<0,002
Q Propazine	mg/kgds	0,002	< 0,002	<0,002
Q ONS (som)	mg/kgds	-	< 0,010 @)	<0,010 @)
ONB/OPB (som)	mg/kgds	-	< 0,14 @)	<0,14 @)

@) Report limit is the sum of the detection limits of the components.

Descripton: AP04 analysis on Yali-bims (batch test) 2288621-4

Calculation cumulative emission leaching test
At the calculation of the minimum cumulative emission the analysis results that are lower than the detection limit, are set at zero. At the calculation of the maximum cumulative emission, these analysis results are entered in the calculation as being the detection limit value.

Sample code: 1 Yali-bims 1

Parameter	emission column test LIS= 10 min. mg/kgds	max. mg/kgds
Physical chemical examination		
Q Bromide (HPLC)	1,22	1,22 +)
Q Chloride (HPLC)	269	269 +)
Q Sulfaat (HPLC)	51,2	51,2 +)
Q Fluoride free	0,810	0,810 +)
Metals (AAS, AES)		
Q Antimoon (Hydride)	0	0,0090 +)
Q Arseen	0	0,0200 +)
Q Barium	0	0,100 +)
Q Cadmium	0	0,0010 +)
Q Chroom	0,0235	0,0235 +)
Q Cobalt	0	0,0300 +)
Q Koper	0	0,0200 +)
Q Kwik	0	0,0003 +)
Q Lood	0	0,0500 +)
Q Molybdeen	0	0,0300 +)
Q Nikkel	0	0,0500 +)
Q Seleen (Hydride)	0	0,0090 +)
Q Tin	0	0,0300 +)
Q Vanadium	0	0,0200 +)
Q Zink	0	0,0500 +)

+) One or more percolates/extracts are not analysed

Descripton: AP04 analysis on Yali-bims (batch test) 2288621-4

Calculation cumulative emission leaching test
At the calculation of the minimum cumulative emission the analysis results that are lower than the detection limit, are set at zero. At the calculation of the maximum cumulative emission, these analysis results are entered in the calculation as being the detection limit value.

Sample code: 2 Yali-bims 2

Parameter	emission column test LIS= 10 min. mg/kgds	max. mg/kgds
Physical chemical examination		
Q Bromide (HPLC)	0,290	0,290 +)
Q Chloride (HPLC)	254	254 +)
Q Sulfaat (HPLC)	38,8	38,8 +)
Q Fluoride free	0,881	0,881 +)
Metals (AAS, AES)		
Q Antimoon (Hydride)	0	0,0090 +)
Q Arseen	0	0,0200 +)
Q Barium	0	0,100 +)
Q Cadmium	0	0,0010 +)
Q Chroom	0,0202	0,0202 +)
Q Cobalt	0	0,0300 +)
Q Koper	0	0,0200 +)
Q Kwik	0	0,0003 +)
Q Lood	0	0,0501 +)
Q Molybdeen	0	0,0300 +)
Q Nikkel	0	0,0501 +)
Q Seleen (Hydride)	0	0,0090 +)
Q Tin	0	0,0300 +)
Q Vanadium	0	0,0200 +)
Q Zink	0	0,0501 +)

+) One or more percolates/extracts are not analysed

Descripton: AP04 analysis on Yali-bims (batch test) 2288621-4

Analysis results leaching percolates/extracts

Analysis results AP04 Building Material(s)

Sample code: 1.1 Extract L/S=1, Yali-bims 1
1.2 Extract L/S=10, Yali-bims 1
1.3 Mengextract L/5=10, Yali-bims 1

Sample code			1.1	1.2	1.3
Parameter	unit	report limit			
Sample date			10/05/10	10/05/10	10/05/10
Leaching examination					
Q Column test			x	x	x
Physical chemical investigation					
Q Bromide (HPLC)	mg/l	0,020			0,12
Q Chloride (HPLC)	mg/l	0,			27
Q Sulfaat (HPLC)	mg/l	0,10			5,1
Q Fluoride free	mg/l	0,050			0,081
Metals (AAS, AES)					
Q Antimoon (Hydride)	µg/l	0,90			< 0,90
Q Arseen	µg/l	2,0			< 2,0
Q Barium	µg/l	10			< 10
Q Cadmium	µg/l	0,10			< 0,10
Q Chroom	µg/l	1,0			2,4
Q Cobalt	µg/l	3,0			< 3,0
Q Koper	µg/l	2,0			< 2,0
Q Kwik	µg/l	0,030			< 0,030
Q Lood	µg/l	5,0			< 5,0
Q Molybdeen	µg/l	1,0			< 3,0
Q Nikkel	µg/l	5,0			< 5,0
Q Seleen (Hydride)	µg/l	0,90			< 0,90
Q Tin	µg/l	3,0			< 3,0
Q Vanadium	µg/l	2,0			< 2,0
Q Zink	µg/l	5,0			< 5,0
Leaching examination					
Q pH (extract)		-	8,0	8,1	

Descripton: AP04 analysis on Yali-bims (batch test) 2288621-4

Analysis results leaching percolates/extracts

Analysis results AP04 Building Material(s)

Sample code: 1.1 Extract L/S=1, Yali-bims 1
1.2 Extract L/S=10, Yali-bims 1
1.3 Mengextract L/5=10, Yali-bims 1

Sample code			1.1	1.2	1.3
Parameter	unit	report limit			
---	---	---	---	---	---
Sample date			10/05/10	10/05/10	10/05/10
Leaching examination (continued)					
Q Geleidbaarheid (extract)	µS/cm	2,0	1030	61	
Q cumulatieve L/S	-		0,99	10	10

Descripton: AP04 analysis on Yali-bims (batch test) 2288621-4

Analysis results leaching percolates/extracts

Analysis results AP04 Building Material(s)

Sample code: 2.1 Extract L/S=1, Yali-bims 1
2.2 Extract L/S=10, Yali-bims 1
2.3 Mengextract L/5=10, Yali-bims 1

Sample code			1.1	1.2	1.3
Parameter	unit	report limit			
Sample date			10/05/10	10/05/10	10/05/10
Leaching examination					
Q Column test			x	x	x
Physical chemical investigation					
Q Bromide (HPLC)	mg/l	0,020			0,029
Q Chloride (HPLC)	mg/l	0,10			25
Q Sulfaat (HPLC)	mg/l	0,10			3,9
Q Fluoride vrij	mg/l	0,050			0,088
Metals (AAS, AES)					
Q Antimoon (Hydride)	µg/l	0,90			< 0,90
Q Arseen	µg/l	2,0			< 2,0
Q Barium	µg/l	10			< 10
Q Cadmium	µg/l	0,10			< 0,10
Q Chroom	µg/l	1,0			2,0
Q Cobalt	µg/l	3,0			< 3,0
Q Koper	µg/l	2,0			< 2,0
Q Kwik	µg/l	0,030			< 0,030
Q Lood	µg/l	5,0			< 5,0
Q Molybdeen	µg/l	1,0			< 3,0
Q Nikkel	µg/l	5,0			< 5,0
Q Seleen (Hydride)	µg/l	0,90			< 0,90
Q Tin	µg/l	3,0			< 3,0
Q Vanadium	µg/l	2,0			< 2,0
Q Zink	µg/l	5,0			< 5,0
Leaching examination					
Q pH (extract)		-	7,9	8,2	

Descripton: AP04 analysis on Yali-bims (batch test) 2288621-4

Analysis results leaching percolates/extracts

Analysis results AP04 Building Material(s)

Sample code: 2.1 Extract L/S=1, Yali-bims 1
2.2 Extract L/S=10, Yali-bims 1
2.3 Mengextract L/5=10, Yali-bims 1

Sample code			1.1	1.2	1.3
Parameter	unit	report limit			
---	---	---	---	---	---
Sample date			10/05/10	10/05/10	10/05/10
Leaching examination (continued)					
Q Geleidbaarheid (extract)	µS/cm	2,0	1010	62	
Q cumulatieve L/S		-	0,98	10	10

Descripton: AP04 analysis on Yali-bims (batch test) 2288621-4

Sample receipt form

Sampling by : Client
Samples submitted by : Client
Accepted by : Dept. Acceptation

Reference client : 228M21-4
Expected end date : 7/7/2000

Type of sample	Number	Preservation	State of delivery
AP04 Building Material(s)	2	Not preserved	Cooled

STORAGE OF SAMPLES:

* Soil samples are saved during a period of 42 days at a temperature of 4 - 8 C°.
* Water samples are only saved in behalf of analyses on metals during 42 days at room temperature.
* If deviant sample storage is required (temperature and/or saving time), you are requested to contact the department Planning and Acceptation of the laboratory, phone 010 286 55 88.

Appendix 4: Analysis results "soil"

GRONTMIJ VERKEER & INFRA
S. van den Berg
Postbus 203
3730 AE DE BILT

Plaats en datum
Hoogvliet, 17 july 2000

Dear Mr. Van den Berg,

Herewith we send you the analysis results of the laboratory investigation of the sample material as offered by you with the description as given with the sample specification.
These results are referring to:

Your project name:	Yali-pumices
Your project number:	2288621
Alcontrol report number:	0019128

This analysis report consists of: 4 pages of which 3 as appendix.
Comprehensive information on the analysis methods as used by us you can find in our general information guide, issue 97-1.
If you have questions and / or remarks in relation with these results, we request you to contact the Customer Services department.
Only the multiplication of the whole report is allowed.

Trusting that with this information we are at your service,

sincerely yours,

W. van Wijk
Chief Laboratory

GRONTMIJ VERKEER & INFRA
S. van den Berg

Project name : Yali-bims
Project number : 2288621
Date of receipt : 8/5/2000
Date of start : 9/5/2000

Appendix 1 of 3

Report no: 0019128
Reporting date: 17/5/2000

Analysis	Unit	X01	X02
dry material	weight-%	84.8	90.0
organic material			
loss due to burning	% of DM	4.2	4.1
Grain size division			
lutum (bottom)	% of DM	2.4	5.4
Metals			
arseen	mg/kgds	<4	<4
cadmium	mg/kgds	<0.4	<0.4
chroom	mg/kgds	<15	<15
koper	mg/kgds	6.5	<5
kwik	mg/kgds	<0.05	<0.05
lood	mg/kgds	<13	<13
nikkel	mg/kgds	6.0	9.5
zink	mg/kgds	8.2	9.2
Polycyclische aromatische koolwaterstoffen			
naftaleen	mg/kgds	<0.1	<0.1
antraceen	mg/kgds	<0.05	<0.05
fenantreen	mg/kgds	<0.05	<0.05
fluoranteen	mg/kgds	<0.05	<0.05
benzo(a)antraceen	mg/kgds	<0.05	<0.05
chryseen	mg/kgds	<0.05	<0.05
benzo(a)pyreen	mg/kgds	<0.05	<0.05
benza(ghi)peryleen	mg/kgds	<0.05	<0.05
benzo(k)fluoranteen	mg/kgds	<0.05	<0.05
indeno(1,2,3-cd)			
pyreen	mg/kgds	<0.05	<0.05
Eox	mg/kgds	<0.1	0.12
Minerale olie			
fractie C10 - C12	mg/kgds	<5	<5
fractie C12 - C22	mg/kgds	<5	<5
fractie C22 - C30	mg/kgds	<5	5
fractie C30 - C40	mg/kgds	<5	5
totaal olie C10-C40	mg/kgds	<20	<20
chloride	mg/kgds	540	580

Code	Type of sample	Sample specification
X01	rubble	Mixed sample A Joo34347
X02	rubble	Mixed aample B Joo34351

GRONTMIJ VERKEER & INFRA
S. van den Berg

Project name : Yali-bims
Project number : 2288621
Date of receipt : 8/5/2000
Date of start : 9/5/2000

Appendix 2 of 3

Report no: 0019128
Reporting date: 17/5/2000

Analysis	type of sample	relation with standard
dry material	rubble	conformable to NEN 5747
organic material (loss due to burning)	rubble	conformable to NEN 5754
lutum (bottom)	rubble	Own method, pipette method with fast ineralisation, NEN 5753
arsenic	rubble	Own method, dissolution thinned aqua regia, NVN 5770, measuring conformable to NEN 6426 and NEN 7322
cadmium	rubble	Own method, dissolution thinned aqua regia, NVN 5770, measuring conformable to NEN 6426 and NEN 7322
chromium	rubble	Own method, dissolution thinned aqua regia, NVN 5770, measuring conformable to NEN 6426 and NEN 7322
copper	rubble	Own method, dissolution thinned aqua regia, NVN 5770, measuring conformable to NEN 6426 and NEN 7322
mercury	rubble	Own method, dissolution thinned aqua regia, NVN 5770, analysis based on o-NEN 5779
lead	rubble	Own method, dissolution thinned aqua regia, NVN 5770, measuring conformable to NEN 6426 and NEN 7322
nickel	rubble	Own method, dissolution thinned aqua regia, NVN 5770, measuring conformable to NEN 6426 and NEN 7322
zinc	rubble	Own method, dissolution thinned aqua regia, NVN 5770, measuring conformable to NEN 6426 and NEN 7322
EOX	rubble	Own method, acetone-hexane-extraction, analysis by way of micro-coulometer (NEN 5735)
chloride	rubble	Own method, segmented instead of contineous flow NEN 6651
PAK (total, 10)	rubble	Own method, acetone-SPE-extraction, analysis by way of HPLC-UV-FLU (NVN 5731)
oil (GC, incl. clean-up)	rubble	Own mehtod, acetone-hexane-extraction, clean-up, analysis by way of GC-FID (NEN 5733)

The analyses marked with * are not covered by the Sterlab recognition.

GRONTMIJ VERKEER & INFRA
S. van den Berg

Project name	: Yali-bims	Appendix 3 of 3
Project number	: 2288621	
Date of receipt	: 8/5/2000	Report no: 0019128
Date of start	: 9/5/2000	Reporting date: 17/5/2000

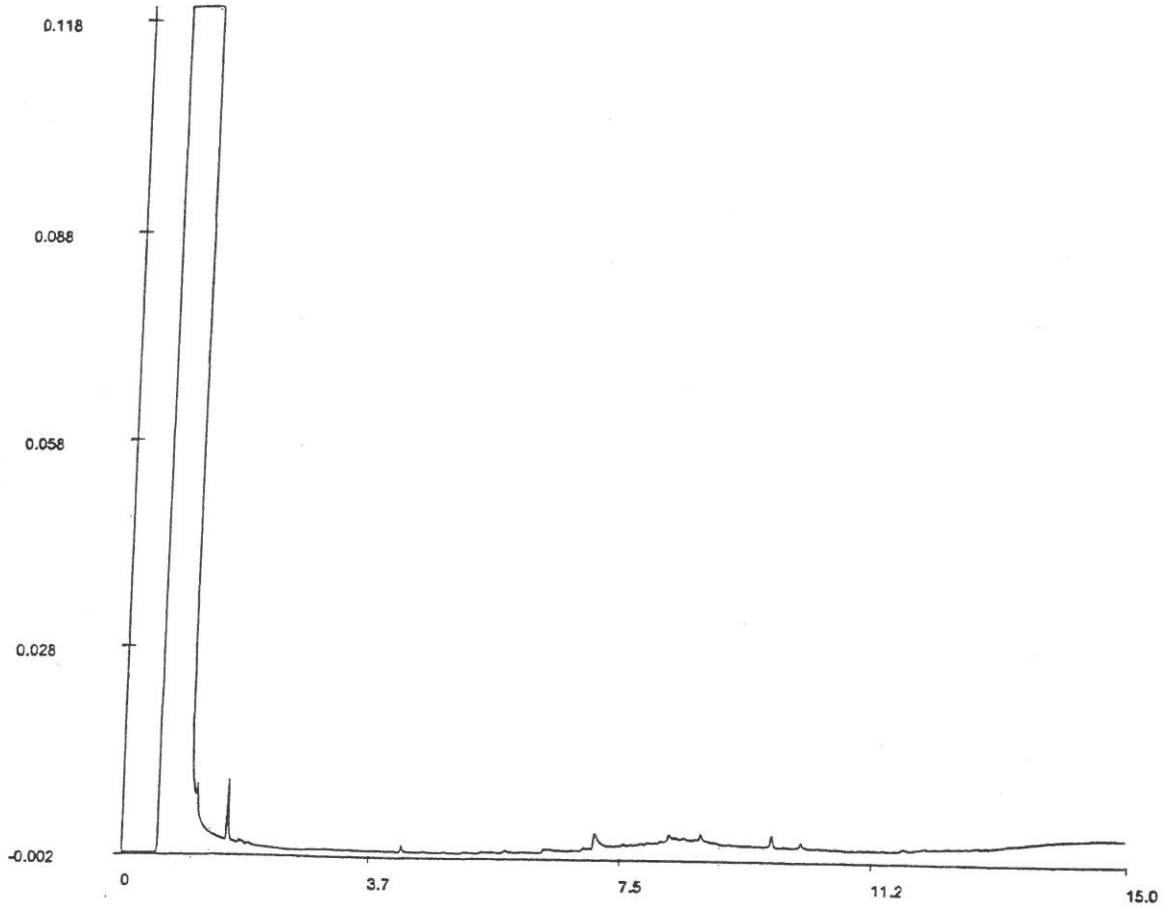
Sample information

X001	j0034347
X002	j0034351

Author: IWACO
Environment Laboratory
Rotterdam
- Member ONRI
- Qualified by Sterlab
- Bouwstoffenbesluit

Oil GC – chromatogramme

Sample no: 191289 X002
Date analyse: 15/5/2000



For analysis results: see report

Characterisation of alkane path		Retention times of the even alkanes in minutes	
petrol	C9-C14	C10	1.7
kerosene and paraffin oil	C10-C16	C12	2.9
diesel oil	C10-C28	C22	6.5
engine oil	C20-C36	C30	8.7
fuel oil	C10-C36	C40	11.2
humus	C28-C40		

Appendix 5: Sampling certificate

PROCES CERTIFICATE

It is hereby declared that the management system of:

Grontmij Verkeer & Infrastructuur b.v.
Zeist, Nederland

has been evaluated and approved by Lloyd's Register Quality Assurance in accordance with the:

The review directive for the proces certificate sample inspection bouwstoffenbesluit (building materials decree)

The management system is applying to the following protocols:

VKB protocol 19:	sample inspection materials paving structures in behalf of batch tests
VKB protocol 20:	sample inspection non-shaped building materials from static batches in behalf of batch tests
VKB protocol 21:	sample inspection shaped building materials from static batches in behalf of batch tests

Date of issue first certificate: 15 July 1999

Certificate no: 653918

Date of issue present certificate: 15 July 1999

Date of expiration: 31 July 2002

For LRQA (Rotterdam)

PROCES CERTIFICATE APPENDIX

Grontmij Verkeer & Infrastructuur b.v.
Zeist, Nederland

Branches
(if applying, these are mentioned here)

Date of issue first certificate: 15 July 1999

Certificate no: 653918

Date of issue present certificate: 15 July 1999

Date of expiration: 31 July 2002

Indications for the client:

1. The order commissioning client will - in case of complaints - address to the order receiving contractor (as mentioned on this certificate) and if necessary to LRQA Tld.
2. The order receiving contractor has to mention in his offer and report that the order for the sample inspection of soil and/or building materials is executed under certificate.
3. The way of sampling as this is executed under certificate, is complying with the rules as set in the Bouwstoffenbesluit (Building materials Decree).
4. The certified order receiving contractor is registered by way of this process certificate, at the Ministry of VROM, directorate Soil at The Hague.