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FINAL REPORT

TAILINGS FROM NCC Industry
STORE SKUTVIK SKIEN, GNEISS PINK
ANALYSES & RISK ASSESSMENT
CAPPING MATERIALS FOR CONTAMINATED SEABED

Korssund, 12st September 2017

CLIENT:

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WORD-doc.: NCC_Industry-RiskAssessmentCappingMaterials-M411-StoreSkutvikSkienPinkFinal20170912.doc

SUMMARY

The tailings from NCC Industry, Skien Quarry Gneiss Pink, Skutvik Store have been analysed in accordance with the guidelines in the report M-411 Test program for capping materials - Contaminated seabed, as forwarded by the Norwegian Environment Agency.

A challenge to documentation were the established values of acceptance, which resulted from a back calculation from seawater in accordance with the requirements in the EU Water Regulation. For several chemical parameters, these low levels could not be measured because of limits of quantification (LOQ) that laboratories offer.

Hence, the chemical analyses were combined with an evaluation of probabilities of occurrence concerning a row of the organic contaminants, and also a risk analysis for bursting of oil hoses from construction machineries, and related to action plans in the Quality system to avoid and collect oil spills.

The assessment has concluded that the tailings from NCC Industry Skien Quarry, Gneiss Pink, have met the requirements of Step 1 in M-411.

INTRODUCTION

This risk assessment is based on the guidelines in the report M-411 *Test program for capping materials - Contaminated seabed*, as forwarded by the Norwegian Environment Agency.

These guidelines describe tests and evaluation criteria for general documentation of the suitability of materials proposed for application to cap contaminated marine sediments. The test system comprises three suitability steps – two chemical and one of biological response. In addition to documentation of general suitability, appropriateness of the capping materials must be fit for the environmental conditions at the actual location for the scheduled capping (step four). In the revised guideline, some changes are made in the evaluation criteria for each step, and the acceptance limits are harmonised with limit values in the EU Water Regulation.

However, the demand for any possible contribution from sediments, including the capping materials, to be smaller than the deducted values as calculated backwards from the water phase, has derived requirements to such low levels of concentrations that analytical methods, at least in service laboratories, cannot fulfil these detection limits. With necessary uncertainty in laboratory work, the laboratories will not forward them with confidence. They normally would report LOQ values, to avoid reporting false values due to casual errors.

The fig. 1 below illustrates the relationship between the blank, the *limit of detection* (LOD), and the *limit of quantification* (LOQ) by showing the probability density function for normally distributed measurements at the blank, at the LOD defined as 3 * standard deviation of the blank, and at the LOQ defined as 10 * standard deviation of the blank. For a signal at the LOD, the alpha error (probability of false positive) is small (1%). However, the beta error (probability of a false negative) is 50% for a sample that has a concentration at the LOD (red line). This means a sample could contain an impurity at the LOD, but there is a 50% chance that a measurement would give a result less than the LOD. At the LOQ (blue line), there is minimal chance of a false negative.

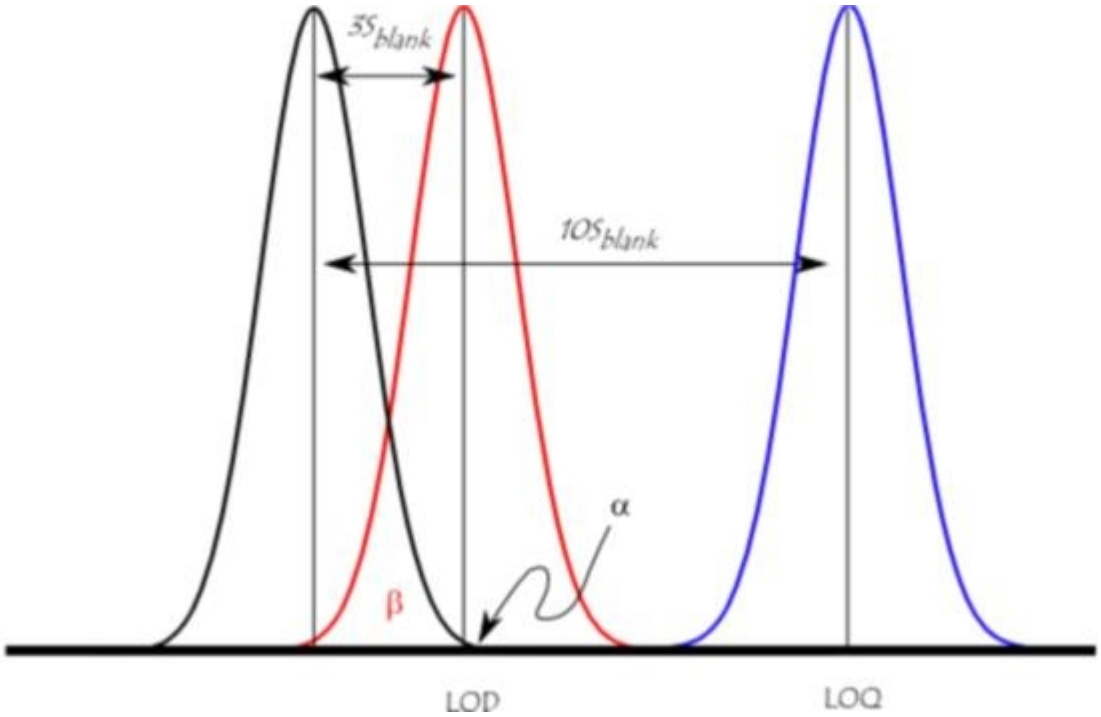

Figure 1. Illustration of the concept of detection limit and quantitation limit by showing the theoretical normal distributions associated with blank, detection limit, and quantification limit level of samples (Source: Wikipedia).

Moreover, some chemical compounds do not belong to or originate from these minerals or rocks from quarries, and analytical methods do not exist to analyse for these compound in these given matrices. Siloxan was an organic compound originating from cosmetics, but has no relationship to rock materials as a matrix, and had to be removed from the analytical program.

This also implies that when we could not prove to be below the extremely depressed fixed limit, the guidelines of M-411 have opened for risk analyses and assessments, comprising whether or not any compounds are likely to be found in the masses foreseen to be used as capping materials.

METHODS

For the first step, quarry material from Skien (at the store Skutvik) was sieved and prepared in laboratory to meet the requested grading 0,1-8 mm that was planned for use at an upcoming project. 4 kg of the tailing from the quarry, were packed into solid Tub-Ex Rilsan bags, kept cool in Styrofoam boxes together with freeze elements, and forwarded to Eurofins Environmental Testing. Eurofins set up an analytical program to meet the parameter list given tabs. E 1 and E 2 of the Guidelines M-411.

Further, subsequent steps were undertaken, which included estimating the probability to find in the quarries any of the listed contaminants that Eurofins could not have analysed at such as low level as claimed. Risk analyses of possible accidents, including the contaminants involved and the emergency plans to clean polluted spots, were performed, too.

In case of exceeding limits given, previous field works to study environmental impacts, chemically and in particular biological, were valuable to estimate the suitability of the

material on sites of capping contaminated seabeds. This would be the fourth and ultimate step of assessment.

RESULTS

STEP 1

According to the Guidelines M-411 the analyses were performed and presented as given in tab. 1. At this current date not all of the data (PFOS and PFOA) were completed, but will very soon follow. None of the chemical parameters analysed were outside the range of acceptance in the Skien Quarry Gneiss Pink. Most of the figures included LOQ, but at low levels, as for dioxins, the LOQ was excluded, because it was apparent that any real content of these compounds were not detected.

Tab. 1. Analytical results for the tailings of Skien Quarry Pink and Skien Quarry Gabbro Blue, and values of acceptance of step 1, capping materials on contaminated seabed, in accordance with Guidelines M-411, the Norwegian Environment Agency.

Parameter	CAS no.	Tailings NCC Industry Quarries	Eurofins LOQ Low values	Values of acceptance Capping materials	
		Skien Gneis Pink		Dredged	Others
Table E 1 (M-411/2005)					
Total organic carbon (TOC) (mg/kg) - calculated		2000	1000	10000	10000
Metals (mg/kg)					
Arsenic (As)		0,85	0,5	< 18	< 8
Bly (Pb)		3,6	0,5	< 150	< 60
Cadmium (Cd)		0,035	0,01	< 2,5	< 1,5
Copper (Cu)		6	0,5	< 84	< 84
Chromium total (Cr)		0,99	0,5	< 660	< 50
Mercury (Hg)		<0,001	0,001	< 0,52	< 0,52
Nickel (Ni)		2,7	0,5	< 42	< 42
Zinc (Zn)		30	2	< 139	< 139
Table E 2 (M-411/2005)					
TBT (µg/kg)	688-73-3	5	0,1	5	5
Triphenyltin (µg/kg)	668-34-8	<0,1	0,1	0,036	0,036
∑PCB(7) (µg/kg)		nd	0,5	4,1	4,1
PAH (µg/kg)					
Naphthalene	91-20-3	<0,1	0,2	27	27
Acenaphthylene	208-96-8	<0,1	0,1	33	33
Acenaphthene	83-32-9	<0,1	0,1	96	96
Fluorene	86-73-7	<0,1	0,1	150	150
Phenanthrene	85-01-8	0,18	0,1	780	780
Anthracene	120-12-7	<0,1	0,1	4,6	4,6
Fluoranthene	206-44-0	0,38	0,1	400	400
Pyrene	129-00-0	0,42	0,1	84	84
Benzo[a]anthracene	56-55-3	0,11	0,1	60	60

Chrysene	218-01-9	0,18	0,1	280	280
Benzo[b]fluoranthene	205-99-2	0,12	0,1	140	140
Benzo[k]fluoranthene	207-08-9	<0,1	0,1	135	135
Benzo(a)pyrene	50-32-8	<0,1	0,1	183	183
Indeno[123cd]pyrene	193-39-5	<0,1	0,1	63	63
Dibenz[ah]anthracene	53-70-3	<0,1	0,1	27	27
Benzo[ghi]perylene	191-24-2	0,19	0,1	84	84
PAH16 [1)]		1,86		-	2000
Chlorinated pesticides (µg/kg)					
Lindane	58-89-9	< 0,0789	1		1
DDT	50-29-3	<0,07	40	84	84
Chlorinated benzenes (µg/kg)					
Monochlorobenzene	68411-45-0	<10	10		30
Dichlorobenzene	95-50-1	<10	10		170
Trichlorobenzenes (all isomers)	12002-48-1	<1	1	5,6	5,6
Pentachlorobenzene	608-93-5	<0,158	10	400	100
Hexachlorobenzene	118-74-1	<0,158	1	17	10
Phenols and chlorophenols (µg/kg)					
Nonylphenols /4-n-nonylfenol	25154-52-3	<25/ <1,78	5	16	16
Octylphenol	1806-26-4	<1,78	5	0,27	0,27
Pentachlorophenol	87-86-5	<5	5	14	6
Dodecylphenol (all isomers)	27193-86-8		150	4,4	4,4
PFOS compounds (µg/kg)					
PFOS	1763-23-1	<0,1	<0,1	0,1	71
PFOA	335-67-1	<0,1	<0,1	0,1	
Phthalates (µg/kg)					
DEHP	117-81-7	<1000	1000	10000	2800
Dioxins (1/10 of LOQ stated)	9014-42-0	<0,00023	0,0001	0,00086	0,00086
Brominated diphenyl ethers	32534-81-9	9,12	0,02 - 5	62	62
Hexachlorobutadiene	87-68-3	<50	50	49	49
Hexachlorocyclohexane *	319-84-6	<0,078	0,62-0,79	0,074	0,074
Alachlor	15972-60-8	<10	10	0,3	0,3
Chlorfenvinphos	470-90-6	<50	1,5	0,5	0,5
Chlorpyrifos	2921-88-2	<50	1	1,3	1,3
Endosulfan	115-29-7	<20	10	0,073	0,073
Trifluralin	1582-09-8	<10	0,2	1600	1600
HBCDD (or HBCD)	25637-99-4	nd	0,02 - 5	34	34
Bisphenol A	80-05-7	<10	10	1,1	1,1
TBBPA	79-94-7	<0,994	0,02 - 5	108	108
D5 (siloxane)	141-63-9			44	44
C10-13 chloroalkanes (SCCP)	85535-84-8	3,35	1 - 5	800	800
Short-chain chlorinated paraffins (MCCP)	85535-85-9	53,5	1 - 5	4600	4600

Triclosan	3380-34-5	<50	10	9,3	9,3
TCEP	51805-45-9	<1,01	10	72	72
Diflubenzuron	35367-38-5	<0,05	50	0,2	0,2
Teflubenzuron	83121-18-0	<0,05	50	0,0004	0,0004
BTEX (µg/kg)					
Benzene	71-43-2	<2,5	2,5	–	10
Toluene	108-88-3	<2,5	2,5	–	300
Ethylbenzene	100-41-4	<2,5	2,5	–	200
Xylene	1330-20-7	<7,5	7,5	–	200
Aliphatic hydrocarbons (µg/kg)		nd			
Aliphates C5-C6		<7,0	7000	–	7000
Aliphates >C6-C8		<7,0	7000	–	7000
Aliphates >C8-C10		<3,0	3000	–	10000
Aliphates >C10-C12		<5,0	5000	–	50000
Aliphates >C12-C35		<10,0	8000	–	100000
Brominated flame retardants (µg/kg)					
PBDE-99	60348-60-9	<0,119	0,002 - 5	–	80
PBDE-209	1163-19-5	<2,98	0,002 - 5	–	2
Volatile halogenated hydrocarbons (µg/kg)					
Dichloromethane	75-09-2	<2,5	2,5	–	60
Trichloromethane	67-66-3	<2,5	2,5	–	20
Trichloroethene	79-01-6	<2,5	2,5	–	100
Tetrachloromethane	56-23-5	<2,5	2,5	–	20
1,2-dichloroethane	107-06-2	<2,5	2,5	–	10
1,2-dibromoethane	106-93-4	<2,5	2,5	–	4
1,1,1-trichloroethane	71-55-6	<2,5	2,5	–	100
1,1,2-trichloroethane	76-13-1	<2,5	2,5	–	10
Cyanide free (µg/kg)	57-12-5	<500	500	–	1

* Analysing and summarising 4 isomers, or setting the sum equal to detection limit in case of nd – nd = not detected

	Exceeding value of limit step 1 (M-411)
	Values of limit cannot be met because of limit of quantification of methods and equipment
	Substance cannot be analysed in this matrix (rock materials)
	Substance lacked from the laboratory (Eurofins Environment Testing)

PROBABILITY OF ORGANIC CONTAMINANTS IN QUARRIES

For the moment, several analyses of organic compounds in question are not finished, but an overview of occurrences of these compounds could contribute to assess the likelihood of finding these ones in the tailings of Skien Gneiss Pink.

Guideline M-411 treated these topics and many other aspects in Chapter 3.1.3 *Particular requirements to processed masses*, but these assessments are also relevant to apply in probability studies of quarried and crushed materials, without chemical treatments.

Assessment of occurrences – lack of probability to find in quarries:

- TBT and Triphenyltin: For 40 years TBT was used as a biocide in anti-fouling paint, commonly known as bottom paint, which was applied to the hulls of ocean going vessels. Bottom paint improves ship performance and durability as it reduces the rate of biofouling, which is the growth of organisms on the ship's hull. It is unlikely to find these compounds in a quarry.
- PCB: Polychlorinated biphenyls were once widely deployed as dielectric and coolant fluids in electrical apparatus, carbonless copy paper and in heat transfer fluids. In principle, residues could be found almost anywhere, but we do not expect them in rock materials, and the analyses showed no trace of contamination at the NCC quarries.
- PAH: Polyaromatic hydrocarbons are neutral, nonpolar molecules found in coal and in tar deposits. They are produced as well by incomplete combustion of organic matter (e.g., in engines and incinerators, when biomass burns in forest fires, etc.). Even in mine industry with vehicles PAH may originate from bad combustion of fuels, but are not expected in more than negligible amounts.
- Chlorinated pesticides (Lindan, DDT): Dichlorodiphenyltrichloroethane (DDT) is a colourless, crystalline, tasteless, and almost odourless organochlorine known for its insecticidal properties and environmental impacts. Lindane, also known as gamma-hexachlorocyclohexane, (γ-HCCH), gammaxene, Gammallin. Both were used both as an agricultural insecticide and as a pharmaceutical treatment for e.g. lice and scabies. Banned in our agriculture for decades, but residues occur, as in biological communities in deep fjord systems – the greatly prized tusk (*Brosme brosme*) at the Norwegian West Coast, but not in mining areas.
- Chlorinated benzenes: The major use of chlorobenzenes is as an intermediate in the production of commodities such as herbicides, dyestuffs, and rubber. Chlorobenzene is also used as a high-boiling solvent in many industrial applications as well as in the laboratory. We see no application of this in mine industry, and it is not probable that tyres of vehicles should bring detectable amounts into the quarries and their rock products.
- Phenols and chlorophenols: Phenols consist of a hydroxyl group (—OH) bonded directly to an aromatic hydrocarbon group. The simplest of the class is phenol, carbolic acid C_6H_5OH. Phenolic compounds are synthesised industrially; plants and microorganisms, with variation between and within species, also produce them, which means they are occurring also very naturally. A chlorophenol is any

organochloride of phenol that contains one or more covalently bonded chlorine atoms, and we turn it into compounds that are more dangerous. They are used as pesticides, herbicides and disinfectants, not directly expected at any mining.

- PFOS compounds: Perfluorooctanesulfonic acid (conjugate base perfluorooctanesulfonate) (PFOS) is an anthropogenic fluorosurfactant and global pollutant. PFOS was the key ingredient in Scotchgard that is a 3M brand of products, a stain repellent and durable water repellent applied to fabric, furniture, and carpets to protect them from stains. As a persistent pollutant, it could pop up everywhere, but we scarcely find it reasonable to detect in rock products.
- Phthalates: These are esters of phthalic acid mainly used as plasticisers (substances added to plastics to increase their flexibility, transparency, durability, and longevity). DEHP is the most common member of this class. They are of great health concern, spread through the entire environment, brought into nutrition, but since 2010 forced to be replaced by other plasticisers in the western World. As at other sites exposed to plastics, they could be found also in quarries, but not add traceable amounts to the tailings.
- Dioxins (and furans): Dioxins have no common uses. They are manufactured on a small scale for chemical and toxicological research, but mostly exist as by-products of industrial processes such as bleaching paper pulp, pesticide manufacture, and low-temperature combustion processes such as waste incineration. The defoliant Agent Orange contained dioxins (Vietnam). The Stockholm Convention banned production and use of dioxins in 2001. There is a low background deposition from atmosphere, and we do not expect to find more than that in quarries and other open land.
- (Poly)brominated diphenyl ethers or PBDEs: Organobromine compounds that are used as flame retardant. The family of PBDEs consists of 209 possible substances, which are called congeners, and in the list of M-411 two of these are repeated again at the bottom of tab. E 2.
  Like other brominated flame retardants, PBDEs have been used in a wide array of products, including building materials, electronics, furnishings, motor vehicles, airplanes, plastics, polyurethane foams and textiles. Because of their toxicity and persistence, the industrial production of some PBDEs is restricted under the Stockholm Convention. They are found everywhere, but we do not expect elevated and detectable contents in mined products.
- Hexachlorobutadiene: It is mainly used to make rubber compounds. It is also applied as a solvent, to make lubricants, in gyroscopes, as a heat transfer liquid, and as a hydraulic fluid. It is possibly related to vehicles in quarries, but to result in contamination is not likely.
- Hexachlorocyclohexane: Any of several polyhalogenated organic compounds consisting of a six-carbon ring with one chlorine and one hydrogen attached to each carbon. The pesticide Lindane belongs to this group, too, and several of these compounds have played a role within plant protection – until they were banned. Quarries cannot be a source of these compounds.
- Alachlor: A herbicide from the chloroacetanilide family. It is an odourless, white solid. The greatest use is for control of annual grasses and broadleaf weeds in

crops. It is the second most widely used herbicide in the United States, but is banned in the European Union. We do not foresee to find it in our quarries.

- Chlorfenvinphos: A common name of an organophosphorus compound that was widely used as an insecticide and an acaricide. However, because of its toxic effect as a cholinesterase inhibitor it has been banned in several countries, including the United States (1991) and the European Union. It is improbable to find it in quarried products.
- Chlorpyrifos: This organophosphate insecticide is used around the world to control pest insects in agricultural, residential and commercial settings. Its use in residential applications is restricted in multiple countries. According to Dow, chlorpyrifos is registered for use in nearly 100 countries and is annually applied to approximately 8.5 million crop acres. It is not expected to be traced in quarry materials.
- Endosulfan. An off-patent organochlorine insecticide and acaricide that is being phased out globally. It was used to control insect pests including whiteflies, aphids, leafhoppers, Colorado potato beetles and cabbageworm, the latter also in Norway. Due to its unique mode of action, it is useful in resistance management; however, as it is not specific, it can negatively affect populations of beneficial insects. We do not expect any residuals within the quarries.
- Trifluralin: A commonly used pre-emergence herbicide. It has been banned in the European Union since 20th March 2008, primarily due to its high toxicity to fish and other aquatic life.
- HBCDD: Hexabromocyclododecane is a brominated flame retardant. Its primary application is in extruded (XPS) and expanded (EPS) polystyrene foam that is used as thermal insulation in the building industry. Other uses are upholstered furniture, automobile interior textiles, car cushions and insulation blocks in trucks, packaging material, videocassette recorder, housing, electric and electronic equipment. Still we do not assume to trace it in quarried materials.
- Bisphenol A: Bisphenol A is used primarily to make plastics, and products using bisphenol A-based plastics have been in commercial use since 1957. It is a key monomer in production of epoxy resins, and in the most common form of polycarbonate plastic. Its safety to health and environment is discussed. We forecast the findings in quarries will be very low.
- TBBPA: Tetrabromobisphenol A is a brominated flame retardant. It is mainly used as a reactive component of polymers, meaning that it is incorporated into the polymer backbone. It is used to prepare fire-resistant polycarbonates by replacing some bisphenol A. A lower grade of TBBPA is used to prepare epoxy resins, used in printed circuit boards. TBBPA degrades to bisphenol A and to TBBPA dimethyl ether, and experiments in zebrafish (*Danio rerio*) suggested that during development, TBBPA may be more toxic than either BPA or TBBPA dimethyl ether. The production of TBBPA is some limited, and we do not predict to track it in mining environment.
- D5 (siloxane): These are used in many cosmetic products where eventual complete evaporation of the siloxane carrier fluid is desired. In this way they are useful for products like deodorants and antiperspirants which need to coat the skin

but not remain tacky afterward. They are unlikely to find in products from quarries.

- Chlorinated paraffins (SCCP and MCCP): Production of CPs for industrial use started in the 1930s. Currently, over 200 CP formulations are in use for a wide range of industrial applications, such as flame retardants and plasticisers, as additives in metal working fluids, in sealants, paints, adhesives, textiles, leather fat and coatings. Short chain CPs (MCCP) are classified as persistent and imply a high potential for bioaccumulation. In spite that they are widely spread, we presume to find low incidence within the quarried materials.
- Triclosan: 5-Chloro-2-(2,4-dichlorophenoxy)phenol was used as a hospital scrub in the 1970s. Since then, it has expanded commercially and is now prevalent in soaps (0,1-1,0%), shampoos, deodorants, toothpastes, mouthwashes, cleaning supplies, and pesticides.] It is part of consumer products, including kitchen utensils, toys, bedding, socks, and trash bags. There is a wide concern of microbial resistance. However, we do not except to detect it within the quarries.
- TCEP: tris(2-carboxyethyl)phosphine) is a reducing agent frequently used in biochemistry and molecular biology applications. That is very far from mining industry, and it should not be found in the quarries.
- Diflubenzuron: N-[(4-Chlorophenyl)carbamoyl]-2,6-difluorobenzamide is a benzoylurea-type insecticide of the benzamide class. It is used in forest management and on field crops to selectively control insect pests. It is inconceivable to detect it in the quarries.
- Teflubenzuron: 1-(3,5-dichloro-2,4-difluorophenyl)-3-(2,6-difluorobenzoyl)urea could be used also as an insecticide in crops, but first of all to combat sea lice in bred salmon, against which resistance now is widely developed. On the other hand, quarries should not be the site to find residues.
- BTEX: These solvents occur naturally in crude oil and can be found in seawater near natural gas and petroleum deposits. Other natural sources of BTEX compounds include gas emissions from volcanoes and forest fires. The primary man made releases of BTEX compounds are through emissions from motor vehicles and aircrafts, and cigarette smoke. Their existence in quarries ought to be very limited.
- Aliphatic hydrocarbons: These chain or cyclic (still unstable) hydrocarbons are one to two parts of hydrocarbons – the other main group is aromates. They are closely related to petroleum products, but even with some spills they have to be kept low in quarries, not to contaminate products.
- Volatile halogenated hydrocarbons: Atmospheric concentrations of volatile, halogenated hydrocarbons (VHH) can be correlated with intensity of industrial or commercial activities and with demographic density, even if some are also naturally produced: enzyme-mediated synthesis by bacteria, fungi, and especially sea macro algae (seaweeds). They occur at all places, but should be at low levels in quarries.
- Free cyanide: In nature, cyanides are produced by certain bacteria, fungi, and algae and are found in a number of plants. Hydrogen cyanide is produced by the combustion or pyrolysis of certain materials under oxygen-deficient conditions.

E.g., it can be detected in the exhaust of internal combustion engines and tobacco smoke. Certain plastics, especially those derived from acrylonitrile, release hydrogen cyanide when heated or burnt. Free cyanide could be found only in minor contents in quarries, and there is, however, no chance to meet the detection limits required in M-411 (tab. E 2)..

PROCESSES AT THE QUARRIES AND RISK ASSESSMENT

The steps of processes of a rock quarry will be as follows:

1. Shot of ointment in mining
2. Uploading and transport to the jaw crusher
3. Transport on conveyor belt to hammer mill and fine crushing
4. Sieving of gradings, belt transport of over-sized gradings back to hammer mill
5. Uploading and transport for store or direct deliveries of readily produced quarry materials

It is underlined these tailings are quarried, not changed chemically, i.e. not any processed materials by use of chemicals for reactions.

Any real danger of contamination by external sources is connected to all vehicles (excavators, wheel loaders, drilling rigs etc.). It could be spill of fuel (diesel), or most exposed hydraulic oils.

COMPOSITION AND ENVIRONMENTAL ASPECTS OF MINERAL AND HYDRAULIC OILS AND GREASE

The subsequent hydraulic oils are used in the quarries of NCC Industry.

1. Equivis ZS 46 – Hydraulic oil
   Product containing mineral oil with less than 3% DMSO extract as measure by IP 346

2. Volvo Construction Super Hydraulic Oil ISO VG46 – Hydraulic fluid (base oil and additives)
   Product containing mineral oil (60-99%), 2,6-diterbuyl phenol (0,1-<1%), poly long-chain alkyl methacrylate (1-<5%)

3. Total Rubia TIR 7400 15W40 – Engine oil
   Product containing mineral oil (>90%), zinc alkyl di thiophosphate (<1,5%), and tetrapropenylphenol (<0,8%)

4. Volvo Ultra Diesel Engine Oil VDS 4, 15W40 – lubricating grease and oil
   Product consisting of mineral oil, solvent refined (60-100%)

5. Volvo Super Gear Oil, GO 101 - Synthetic Base Stocks and Additives
   Product containing mineral oil (60-99%), olefin sulphide (1-5%), and phosphoric acid ester – amine salt (0-1%)

Tab. 6 presents the ecological information, chapter 12 in MSDS of products, from the manufacturers and a few other sources about the materials.

The Quality system of NCC Industry, describes actions to collect and dispose all kinds of oil spill that could occur, given in Procedure 1004 Work on construction machinery and Procedure 1603 Waste treatment.
Hence, spilt oil should not be brought into manufacture of quarry products.

Table 6. Ecological information about the vehicle applied oil products from the MSDS of the manufacturer and other sources.

Part 1. Acute toxicity in water

Product	Chemical name	Toxicity for algae	Toxicity for Daphnia and invertebrates	Toxicity for fish	Toxicity for microorganisms
Equivis ZS 46	Distillates (petroleum), hydrogen treated fuel paraffin oil 64742-54-7	EC50 (48h) > 100 mg/l (*Pseudokirchnerella subcapitata* - OECD 201)	EC50 (48h) > 10 000 mg/l (*Daphnia magna* - OECD 202)	LC50 (96h) > 100 mg/l (*Oncorhynchus mykiss* - OECD 203)	No information available
Volvo Construction Super Hydraulic Oil ISO VG46	Mineral oil 8042-47-5	1rL50 (96h) > 1000 mg/l (*Scenedesmus subspicatus* - OECD 201)	EC50 (48h) > 1000 mg/l (*Daphnia magna* - OECD 202)	LC50 (96h) > 30 000 mg/l (*Pimephales promelas*)	No information available
Total Rubia TIR 7400 15W40	Mineral oil 147880-09-9 Zinc alkyl di thio-phosphate 68649-42-3	Zinc alkyl dithiophosphate EC50 (72h) 2,2 mg/l	Zinc alkyl dithiophosphate EC50 (48h) 1-1,5 mg/l (*Daphnia magna* - OECD 202)	Zinc alkyl dithiophosphate LC50 (96h) Static: 1-1,5 mg/l Semi-static: 10-35 mg/l (*Pimephales promelas*)	No information available
Volvo Ultra Diesel Engine Oil VDS 4, 15W40	Lubricating oils (petroleum), C15-C30 72623-86-0 (and mixtures)	No information available	No information available	No information available	No information available
Volvo Super Gear Oil, GO 101	Mineral oil 72623-86-0 (and mixtures) Olefin sulphide 68937-96-2	No information available	No information available	No information available	No information available

Part 2. Chronic toxicity in water

Product	Chemical name	Toxicity for algae	Toxicity for Daphnia and invertebrates	Toxicity for fish	Toxicity for microorganisms
Equivis ZS 46	Distillates (petroleum), hydrogen treated fuel paraffin oil 64742-54-7	No information available	NOEC (21d) 10 mg/l (*Daphnia magna* - QSAR Petrotox)	NOEC (14/28d) > 1000 mg/l (*Oncorhynchus mykiss* - QSAR Petrotox)	No information available
Volvo Construction Super Hydraulic Oil ISO VG46	Mineral oil 8042-47-5	No information available	No information available	No information available	No information available
Total Rubia TIR 7400 15W40	Mineral oil 147880-09-9 Zinc alkyl di thio-phosphate 68649-42-3	Zinc alkyl dithiophosphate NOEC 1,0 mg/l	Zinc alkyl dithiophosphate NOEC (21d) 0,4 mg/l (*Daphnia magna* - QSAR Petrotox)	Zinc alkyl dithiophosphate LC50 (96h) 1,8 mg/l (*Pimephales promelas*)	No information available
Volvo Ultra Diesel Engine Oil VDS 4, 15W40	Lubricating oils (petroleum), C15-C30 72623-86-0 (and mixtures)	No information available	No information available	No information available	No information available
Volvo Super Gear Oil, GO 101	Mineral oil 72623-86-0 (and mixtures) Olefin sulphide 68937-96-2	No information available	No information available	No information available	No information available

Part 3. Persistence and degradability, bio accumulative potential, mobility in soil

Product	Chemical name	Persistence and degradability	Bio accumulative potential	Mobility in soil	Results of PBT and vPvB assessment	Other adverse effects
Equivis ZS 46	Distillates (petroleum), hydrogen treated fuel paraffin oil 64742-54-7	Readily biodegradable	Bio accumulative pot.: Data lacking BCF: 2,16 Comments to bio acc.: Log Pow: 7,2	Given its physical and chemical characteristics, generally low	Not classified as PBT or vPvB	No information available
Volvo Construction Super Hydraulic Oil ISO VG46	Mineral oil 8042-47-5	Less than 10% biodegradation in standard 28-day test – environmentally not readily biodegradable	Low	Given its physical and chemical characteristics, generally low	No information available	No information available
Total Rubia TIR 7400 15W40	Mineral oil 147880-09-9 Zinc alkyl di thio-phosphate 68649-42-3	No information available	Zinc alkyl dithiophosphate Comments to bio acc.: Log Pow: 0,56	Given its physical and chemical characteristics, generally low	No information available	No information available
Volvo Ultra Diesel Engine Oil VDS 4, 15W40	Lubricating oils (petroleum), C15-C30 72623-86-0 (and mixtures)	No information available	High Comments to bio acc.: Log Pow: >3,5	Given its physical and chemical characteristics, generally low	Not applicable	No information available
Volvo Super Gear Oil, GO 101	Mineral oil 72623-86-0 (and mixtures) Olefin sulphide 68937-96-2	No information available, but expected to be biodegradable	High Comments to bio acc.: Log Pow: >3,5	Given its physical and chemical characteristics, generally low	Not applicable	No information available

REFERENCES (INCLUDING BIBLIOGRAPHIC)

EN 12457-2:2002. Characterisation of waste - Leaching - Compliance test for leaching of granular waste materials and sludges - Part 2: One stage batch test at a liquid to solid ratio of 10 l/kg for materials with particle size below 4 mm (without or with size reduction)

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Lu, H., F. Wei, J. Tang & J.P. Giesy. 2016. Leaching of metals from cement under simulated environmental conditions. Journal of environmental management 169, 319-327.

Multiconsult. 2008. Knust hyperitt fra Valberg, Kragerø. Undersøkelser av egnethet for tildekking av forurenset sjøbunn. Sammendragsrapport. N-102843-10. 26 s. + vedlegg. *In Norwegian.*

Shin, H. S., J.K. Koo, J.O. Kim & S.P. Yoon. 1990. Leaching characteristics of heavy metals from solidified sludge under seawater conditions. Hazardous Waste and Hazardous Materials 7(3), 261-271.

Ytelseserklæring

I henhold til vedlegg III til forordning (EU) nr. 574/2014
(Byggevareforordningen) for produktet:

Ytelseserklæring Nr. 0016-13242-61000017-CPR

1. Entydig identifikasjonskode for produkttypen	Tilslag for mekanisk stabiliserte og hydraulisk stabiliserte materialer til bruk i bygg- og anleggsarbeid og vegbygging. NS-EN 13242
2. Type-, parti- eller serienummer eller en annen form for angivelse som muliggjør identifisering av byggevaren i samsvar med artikkel 11 nr. 4	Tilslag for mekanisk stabiliserte og hydraulisk stabiliserte materialer til bruk i bygg- og anleggsarbeid og vegbygging. NS-EN 13242 **0/2- 0/16 – 0/32 – 0/63 – 0/120 – 0/250**
3. Produsentens tilsiktede bruksområder for byggevaren, i samsvar med den relevante harmoniserte tekniske spesifikasjonen	Tilslag til ubunden bruk NS-EN 13242:2002+A1:2007+NA:2009
4. Navn, registrert varemerke og kontaktadresse til produsenten i henhold til artikkel 11 nr. 5	NCC Industry AS. Avd Skien pukkverk Havneveien 22, 3739 Skien Hjemmeside: www.ncc.no Telf: 35 90 04 44
5. Navn og kontaktadresse til godkjent representant hvis mandat omfatter oppgavene angitt i artikkel 12 nr. 2 (om relevant)	Ikke relevant
6. Det eller de systemer for vurdering og kontroll av byggevarens konstante ytelse, som fastsatt i vedlegg V	System 4
7. Dersom ytelseserklæringen gjelder en byggevare som omfattes av en harmonisert Standard	NS-EN 13242:2002+A1:2007+NA:2009 Sertifiseringsorganet Kontrollrådet (1111) har utstedt sertifikat for produksjonskontrollen i samsvar med system 2+ basert på førstegangsrevisjon av produksjonsanlegget og produksjonskontrollen.
8. I tilfelle av at erklæringen om ytelse er et konstruksjon produkt som det er gjort en europeisk teknisk vurdering av:	Ikke relevant
9. Angitt ytelse	Se side 2 i denne ytelses erklæringen

10. Ytelsen for varen som angitt i nr. 1 og 2, er i samsvar med ytelsen angitt i nr. 8
Denne ytelseserklæringen er utstedt på eget ansvar av produsenten, som angitt i punkt nr. 4.

Undertegnet for og på vegne av produsenten av:

Hans Haugland (Site manager)

(Navn og stilling)

Skien 05.07.21

(Sted og Dato)

Hans Haugland

Digital signatur

Ytelseserklæring

I henhold til vedlegg III til forordning (EU) nr. 574/2014
(Byggevareforordningen) for produktet:

Ytelseserklæring Nr. 0016-13242-61000017-CPR

Deklarert verdi i samsvar med nr. 9:

Vesentlige egenskaper	Test metode	Ytelse						Harmonisert standard
Tilslagsstørrelse	EN 933-1	**0/2**	**0/16**	**0/32**	**0/63**	**0/120**	**0/250**	NS-EN 13242:2002+A1:2007+NA:2009
Gradering	EN 933-1	G_F80	G_A75, GT_A10	G_A75, GT_A25	G_A75, GT_A25	G_A75	G_A75	
Deklarert verdi	EN 933-1		D/2±10=69	D/2±25=76	D/2±25=66			
Kornform	EN 933-2	FI_{35}	FI_{35}	FI_{35}	FI_{35}	FI_{35}	FI_{35}	
Korndensitet	EN 1097-6	2,670 g/cm³	2,670 g/cm³	2,670 g/cm³	2,670 g/cm³	2,670 g/cm³	2,670 g/cm³	
Finstoff innhold	EN 933-1	f_{16}	f_{12}	f_{12}	f_{12}	f_{12}	f_{12}	
Kvalitet på finstoff	EN 933-8; EN 933-9	MB_F10	MB_F10	MB_F10	MB_F10	MB_F10	MB_F10	
Prosent andel knuste korn	EN 933-5	$C_{90/3}$	$C_{90/3}$	$C_{90/3}$	$C_{90/3}$	$C_{90/3}$	$C_{90/3}$	
Motstand mot knusing	EN 1097-2	LA_{30}	LA_{30}	LA_{30}	LA_{30}	LA_{30}	LA_{30}	
Motstand mot polering/slitasje	EN 1097-9	$M_{DE}15$	$M_{DE}15$	$M_{DE}15$	$M_{DE}15$	$M_{DE}15$	$M_{DE}15$	
Vannabsorpsjon	EN 1097-6	<0,5%	<0,5%	<0,5%	<0,5%	<0,5%	<0,5%	
Motstand mot frysing/tining for grovt tilslag	EN 1367-1	F_1	F_1	F_1	F_1	F_1	F_1	
Volumstabilitet		Ikke bestemt						
Radioaktive stoffer		Uran < 5 ppm						
Andre farlige stoffer		Ingen påvist						
Bestandighet mot forvitring		Ikke bestemt						
Forenklet petrografisk beskrivelse	NS-EN 932-2 NS-EN 933-7 NS-EN 932-2 NS-EN 1744-1-7 NS-EN 1744-1-11 NS-EN 1744-1-12 NB 21.	Rødlig middelskornet gneis, granitt, feltspatisk bergart (82%) Mørk tett-finkornet mafisk bergart (18%)						

CE

NCC Industry AS, Skien pukkverk
Havneveien 22, 3739 Skien
Norge
21
Nr: 0016-13242-61000017-CPR
NS-EN 13242

Tilslag for mekanisk stabiliserte og hydraulisk stabiliserte materialer til bruk i bygg- og anleggsarbeid og vegbygging.

De relevante / viktigste funksjonene i denne erklæringen om ytelse er nr. 9 Deklarert ytelse,