



# MATERIAL MANAGEMENT SUMMARY REPORT

WASTE IDENTIFICATION	WASTE IRON ORE SEDIMENTS
SOURCE	TRANSNET PORT TERMINALS Port of Saldanha, Western Cape
DATE OF ASSESSMENT	NOVEMBER, 2018

## RELEVANT REGULATIONS AND STANDARDS

- National Environmental Management: Waste Act (NEM: WA, 2008)
- National Environmental Management: Waste Amendment Act (NEM: WAA, 2014)
- Waste Classification and Management Regulations (GN R634 of 2013)
- National Norms and Standards for the Assessment of Waste to Landfill Disposal (GN R635 of 2013)
- National Norms and Standards for Disposal of Waste to Landfill (GN R636 of 2013)
- South African National Standard (SANS) 10234:2008, Globally Harmonised System of Classification and Labelling of Chemicals (GHS) (SANS 10234)
- South African National Standard (SANS) 11014:2010, Safety Data Sheet for Chemical Products – Content and Order of Sections (SANS 11014)

## SCOPE

INCLUDED	ELEMENT	DESCRIPTION
✓	Defined and Listed Waste Appraisal	Desktop appraisal of the waste's listing in Annexure 1 (Regulation 4(1) of the Waste Classification and Management Regulations, GN 634 of 2013) and/or Schedule 3 of Act No. 26 of 2014: National Environmental Management: Waste Amendment Act.
✓	Appraisal of Disposal Prohibitions	Determination of possible disposal prohibitions in terms of GN R636.
✓	Waste Type Profiling for Landfill Disposal	Profiling in accordance with GN R635 and/or Waste Acceptance Criteria as detailed in GN R636.
✓	Classification and Safety Data Sheet	Quantitative classification in broad accordance with SANS 10234.

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INCLUDED	ELEMENT	DESCRIPTION
✓	Safety Data Sheet	A Safety Data Sheet (SDS) is required for all hazardous waste (excluding Health Care Risk Waste) in terms of GN R634.

## WASTE DESCRIPTION

ORIGIN	CHEMICAL INPUTS	PHYSICAL CHARACTERISTICS
Thirteen stormwater retention ponds across the Port of Saldanha that retain fine sediments prior to discharge of stormwater to the harbour.	Iron ore	Red-brown clay-, silt- and sand-sized fraction sediments

## DEFINED WASTE APPRAISAL

LISTED IN SCHEDULE 3 OF NEM: WAA	No
DESCRIPTOR	No relevant entry identified

## LISTED WASTE APPRAISAL

LISTED IN ANNEXURE 1 OF GN R634	No
DESCRIPTOR	No relevant entry identified

## SAMPLING AND LABORATORY ANALYSIS

SAMPLER	DATE	COMMENTS	
WSP	24 October 2018	Sediment samples were separately collected from each of the thirteen retention ponds. The samples were individually submitted to Exova Jones Environmental South Africa and composited under laboratory conditions prior to analysis.	
ANALYTICAL SUITE		MATRIX	
		Total	Leachate
Metals and metalloids, as listed in GN R635		✓	✓
<ul style="list-style-type: none"> <li>– Antimony, arsenic, barium, boron, cadmium, chromium (total and hexavalent), cobalt, copper, lead, manganese, mercury, molybdenum, nickel, selenium, vanadium and zinc</li> </ul>			
Inorganics, as listed in GN R635		N/A	✓
<ul style="list-style-type: none"> <li>– Chloride, nitrate, sulphate and Total Dissolved Solids</li> <li>– Cyanide and fluoride</li> </ul>		✓	✓
Organics, as listed in GN R635		✓	✓
<ul style="list-style-type: none"> <li>– Benzene, toluene, ethylbenzene and xylenes (BTEX)</li> <li>– Petroleum hydrocarbons</li> <li>– Polychlorinated Biphenyls (PCB)</li> <li>– Polycyclic Aromatic Hydrocarbons (PAH)</li> <li>– Volatile and Semi-Volatile Organic Compounds (VOC and SVOC)</li> </ul>		✓	N/A
		✓	✓
		✓	N/A
		✓	✓

Pesticides, as listed in GN R635		
– Aldrin + Dieldrin	✓	✓
– DDT + DDD + DDE	✓	✓
– 2,4-D	✓	✓
– Chlordane	✓	✓
– Heptachlor	✓	✓
General Parameters, to supported classification and prohibitions appraisal		
– Calorific Value	✓	N/A
– Flashpoint	✓	N/A
– Mineral Oil	✓	N/A
– Moisture Content	✓	N/A
– pH	✓	N/A
– Total Organic Carbon (TOC)	✓	N/A
Other Determinants, reasonably anticipated as present		
– Calcium, iron, magnesium, potassium, sodium and sulphur	✓	N/A
Notes to Laboratory Analysis		
1 N/A = Not applicable		
2 Leachate analysis was undertaken using Reagent Water in accordance with GN R635 and relevant for mono-disposal of a non-putrescible waste. It is understood that an area at the Port of Saldanha has been identified for the management of the material on its own and, therefore, as communicated to Nsovo via email on 25 October 2018, the eluate extract is considered appropriate to ascertain management requirements		
3 The laboratory certificate of analysis is provided as <a href="#">Appendix A</a>		

## APPRAISAL OF DISPOSAL PROHIBITIONS

RESTRICTIVE CONDITION	DESCRIPTION
None identified	

## WASTE TYPE PROFILING FOR LANDFILL DISPOSAL<sup>1</sup>

WASTE TYPE	3
LANDFILL CLASS	C / GLB+
BARRIER DESIGN	<ul style="list-style-type: none"> <li>– WASTE BODY</li> <li>– 300mm thick finger drain of geotextile covered aggregate</li> <li>– 100mm protection layer of silty sand or a geotextile of equivalent performance</li> <li>– 1.5mm thick HDPE geomembrane</li> <li>– 300mm clay liner (of 2 x 150mm thick layers)</li> <li>– Under drainage and monitoring system in base preparation layer</li> <li>– IN-SITU SOIL</li> </ul>

<sup>1</sup> Subject to any prohibitions

### Notes to Waste Type Profiling

- 1 The Type 3 Profile is based on the total concentrations of barium (685mg/kg), manganese (1 231mg/kg) and lead (72mg/kg) exceeding their respective Total Concentration Thresholds (TCTs) as published in GN R635. This is also consistent with 7(6) of GN R635 that states “waste with all element or chemical substance leachable concentration levels for metal ions and inorganic anions below or equal to the LCT0 limits are considered to be Type 3 waste, irrespective of the total concentration of elements or chemical substances in the waste”, as well as the accompanying conditions thereof
- 2 Refer [Appendix B](#) for quantitative profiling assessment
- 3 While reference is made in GN R635 to the application of SANS 10234 classification to Waste Type Profiling, the Department of Environmental Affairs has confirmed during stakeholder engagement that Hazard Statement Codes for transportation and handling are not intended to be utilised for Waste Type Profiling for landfill disposal

## SANS 10234 CLASSIFICATION

HAZARDOUS		NON-HAZARDOUS	✓
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### Notes to SANS 10234 Classification

- 1 The sediments have been classified as non-hazardous (i.e. general) waste; refer to [Appendix C](#) for the detailed quantitative assessment
- 2 Assumptions in terms of the chemical form (speciation) in which elemental components are likely to occur have generally been conservative taking into account plausible thermodynamic and mineralogical assemblages, and are summarised at the bottom of [Appendix C](#)
- 3 The largest substance concentration was iron (271 800mg/kg); oxides of iron typical of those found in ores (i.e. magnetite, hematite), are not recognised as hazardous, irrespective of concentration
- 4 Results of laboratory analysis have been corrected according to sample-specific moisture content as determined by the laboratory
- 5 Where SANS 10234 guidance is either not available, unclear or relatively incomplete, cognisance has been taken of European Regulation (EC) No. 1272/2008 on the Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulation) which adopts, within the European community, the GHS as published by the United Nations Social and Economic Council
- 6 Hazard Statement Codes for chemical substances have been sourced from either the supplement to SANS 10234:2008 Edition 1, Table 3.1 of Annex VI of the CLP Regulations, or the European Chemicals Agency, Classification & Labelling Inventory Database
- 7 The classification undertaken assumes that the samples collected, and the resultant composite, is holistically representative of the waste

## SAFETY DATA SHEET

REQUIRED	No; as the waste is not hazardous, a SDS is not required.
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## ANNEXURES

No	Title
A	Laboratory Certificates of Analysis
B	Type Profiling Assessment (GN R635/R636)
C	Classification (SANS 10234)



## WAIVER

The Material Management Summary Report (Report) has been prepared by WSP Environmental Proprietary Limited (WSP) on behalf and at the request of Nsovo Environmental Consulting (Client). Unless otherwise agreed by WSP in writing, we do not accept responsibility or legal liability to any person other than the Client for the contents of, or any omissions from, this Report.

To prepare this Report, we have reviewed only the documents and information provided to us by the Client or any third parties directed to provide information and documents to us by the Client. We have not reviewed any other documents in relation to this Report and except where otherwise indicated in the Report.

## AUTHORISATION

Adam Sanderson  
Senior Associate

# APPENDIX

# A

LABORATORY ANALYTICAL  
CERTIFICATES





# Exova Jones Environmental South Africa

Unit D2/5  
9 Quantum Road  
Firgrove Business Park  
Somerset West  
7130  
South Africa

WSP - South Africa  
Building C, Knightsbridge  
33 Sloane Street  
Bryanston  
Johannesburg  
Gauteng  
South Africa  
2191



**Attention :** Adam Sanderson  
**Date :** 16th November, 2018  
**Your reference :** 41101314-001  
**Our reference :** Test Report 18/1096 Batch 1  
**Location :**  
**Date samples received :** 30th October, 2018  
**Status :** Final report  
**Issue :** 1

Fourteen samples were received for analysis on 30th October, 2018 of which one were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Analysis was undertaken at either Exova Jones Environmental (UK), which is ISO 17025 accredited under UKAS (4225) or Exova Jones Environmental (SA) which is ISO 17025 accredited under SANAS (T0729) or a subcontract laboratory where specified.

NOTE: Under International Laboratory Accreditation Cooperation (ILAC), ISO 17025 (UKAS) accreditation is recognised as equivalent to SANAS (South Africa) accreditation.

**Compiled By:**

**Paul Boden BSc**  
Project Manager

**Organics Laboratory:**

**David Adams**  
Technical Signatory (Organics)

**Inorganics Laboratory:**

**Musa Tiki**  
Technical Signatory (Inorganics)

**Client Name:** WSP - South Africa  
**Reference:** 41101314-001  
**Location:**  
**Contact:** Adam Sanderson  
**JE Job No.:** 18/1096

**Report :** Solid  
**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	14														
Sample ID	Pond Composite														
Depth															
COC No / misc															
Containers	J														
Sample Date	24/10/2018														
Sample Type	Soil														
Batch Number	1														
Date of Receipt	30/10/2018														
												LOD/LOR	Units	Method No.	
Antimony*	<1												<1	mg/kg	UK_TM30/UK_PM15
Arsenic*	<0.5												<0.5	mg/kg	UK_TM30/UK_PM15
Barium*	685												<1	mg/kg	UK_TM30/UK_PM15
Cadmium*	<0.1												<0.1	mg/kg	UK_TM30/UK_PM15
Calcium*	62130												<500	mg/kg	UK_TM30/UK_PM15
Chromium*	31.9												<0.5	mg/kg	UK_TM30/UK_PM15
Cobalt*	4.0												<0.5	mg/kg	UK_TM30/UK_PM15
Copper*	<1												<1	mg/kg	UK_TM30/UK_PM15
Iron*	271800												<20	mg/kg	UK_TM30/UK_PM15
Lead*	72												<5	mg/kg	UK_TM30/UK_PM15
Magnesium*	1570												<25	mg/kg	UK_TM30/UK_PM15
Manganese*	1231												<1	mg/kg	UK_TM30/UK_PM15
Mercury*	<0.1												<0.1	mg/kg	UK_TM30/UK_PM15
Molybdenum*	<0.1												<0.1	mg/kg	UK_TM30/UK_PM15
Nickel*	11.3												<0.7	mg/kg	UK_TM30/UK_PM15
Potassium*	849												<5	mg/kg	UK_TM30/UK_PM15
Selenium*	6												<1	mg/kg	UK_TM30/UK_PM15
Sodium*	1341												<5	mg/kg	UK_TM30/UK_PM15
Total Sulphur as SO4*	0.18												<0.01	%	UK_TM30/UK_PM15
Vanadium*	53												<1	mg/kg	UK_TM30/UK_PM15
Boron (Aqua Regia Soluble)*	17.37												<0.25	mg/kg	UK_TM30/UK_PM15
Zinc*	112												<5	mg/kg	UK_TM30/UK_PM15

Please see attached notes for all abbreviations and acronyms



**Client Name:** WSP - South Africa  
**Reference:** 41101314-001  
**Location:**  
**Contact:** Adam Sanderson  
**JE Job No.:** 18/1096

**Report : Solid**

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.											
Sample ID	Pond Composite										
Depth									Please see attached notes for all abbreviations and acronyms		
COC No / misc											
Containers	J										
Sample Date	24/10/2018										
Sample Type	Soil										
Batch Number	1										
Date of Receipt	30/10/2018								LOD/LOR	Units	Method No.
<b>VOC MS</b>											
Methyl Tertiary Butyl Ether	<2								<2	ug/kg	SA_TM15/SA_PM10
Vinyl Chloride	<2								<2	ug/kg	SA_TM15/SA_PM10
1,1-Dichloroethene (1,1 DCE) SA	<6								<6	ug/kg	SA_TM15/SA_PM10
Dichloromethane (DCM) SA	<30								<30	ug/kg	SA_TM15/SA_PM10
Chloroform SA	<3								<3	ug/kg	SA_TM15/SA_PM10
1,1,1-Trichloroethane SA	<3								<3	ug/kg	SA_TM15/SA_PM10
Carbon tetrachloride SA	<4								<4	ug/kg	SA_TM15/SA_PM10
1,2-Dichloroethane SA	<4								<4	ug/kg	SA_TM15/SA_PM10
Benzene SA	<3								<3	ug/kg	SA_TM15/SA_PM10
Trichloroethene (TCE) SA	<3								<3	ug/kg	SA_TM15/SA_PM10
Toluene SA	<3								<3	ug/kg	SA_TM15/SA_PM10
1,1,2-Trichloroethane SA	<3								<3	ug/kg	SA_TM15/SA_PM10
Tetrachloroethene (PCE) SA	<3								<3	ug/kg	SA_TM15/SA_PM10
Chlorobenzene SA	<3								<3	ug/kg	SA_TM15/SA_PM10
1,1,1,2-Tetrachloroethane SA	<3								<3	ug/kg	SA_TM15/SA_PM10
Ethylbenzene SA	<3								<3	ug/kg	SA_TM15/SA_PM10
Xylenes (sum of isomers)	<8								<8	ug/kg	SA_TM15/SA_PM10
Styrene	<3								<3	ug/kg	SA_TM15/SA_PM10
1,1,2,2-Tetrachloroethane	<3								<3	ug/kg	SA_TM15/SA_PM10
1,4-Dichlorobenzene SA	<4								<4	ug/kg	SA_TM15/SA_PM10
1,2-Dichlorobenzene SA	<4								<4	ug/kg	SA_TM15/SA_PM10
1,2-Dichloroethene (cis & trans)	<6								<6	ug/kg	SA_TM15/SA_PM10
Trichlorobenzenes (1,2,3 & 1,2,4)	<14								<14	ug/kg	SA_TM15/SA_PM10
Methyl Ethyl Ketone (MEK)	<100								<100	ug/kg	SA_TM15/SA_PM10
Surrogate Recovery Toluene D8	72								<0	%	SA_TM15/SA_PM10
Surrogate Recovery 4-Bromofluorobenzene	71								<0	%	SA_TM15/SA_PM10
<b>SVOC MS</b>											
<b>Phenols</b>											
2-Chlorophenol SA	<10								<10	ug/kg	SA_TM16/SA_PM8
2,4-Dichlorophenol SA	<10								<10	ug/kg	SA_TM16/SA_PM8
2,4,6-Trichlorophenol SA	<10								<10	ug/kg	SA_TM16/SA_PM8
<b>PAHs</b>											
Benzo(a)pyrene SA	<10								<10	ug/kg	SA_TM16/SA_PM8
PAH 16 Total	<160								<160	ug/kg	SA_TM16/SA_PM8
<b>Phthalates</b>											
Bis(2-ethylhexyl) phthalate SA	251								<100	ug/kg	SA_TM16/SA_PM8

**Client Name:** WSP - South Africa  
**Reference:** 41101314-001  
**Location:**  
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**JE Job No.:** 18/1096

**Report : Solid**

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	14																			
Sample ID	Pond Composite																			
Depth																				
COC No / misc																				
Containers	J																			
Sample Date	24/10/2018																			
Sample Type	Soil																			
Batch Number	1																			
Date of Receipt	30/10/2018																			
																	LOD/LOR	Units	Method No.	
SVOC MS																				
<b>Other SVOCs</b>																				
2,4-Dinitrotoluene <sup>SA</sup>	<10																	<10	ug/kg	SA_TM16/SA_PM8
Hexachlorobutadiene <sup>SA</sup>	<10																	<10	ug/kg	SA_TM16/SA_PM8
Nitrobenzene <sup>SA</sup>	<10																	<10	ug/kg	SA_TM16/SA_PM8
Surrogate Recovery 2-Fluorobiphenyl	106																	<0	%	SA_TM16/SA_PM8
Surrogate Recovery p-Terphenyl-d14	112																	<0	%	SA_TM16/SA_PM8
<b>Pesticides</b>																				
<b>Organochlorine Pesticides</b>																				
Aldrin*	<10																	<10	ug/kg	UK_TM42/UK_PM8
Dieldrin*	<10																	<10	ug/kg	UK_TM42/UK_PM8
Heptachlor*	<10																	<10	ug/kg	UK_TM42/UK_PM8
DDE (o,p & p,p)*	<20																	<20	ug/kg	UK_TM42/UK_PM8
DDT (o,p & p,p)*	<20																	<20	ug/kg	UK_TM42/UK_PM8
TDE (o,p & p,p)*	<20																	<20	ug/kg	UK_TM42/UK_PM8
Chlordane (cis & trans)*	<20																	<20	ug/kg	UK_TM42/UK_PM8
2,4-D	<100																	<100	ug/kg	SA_TM42/SA_PM8
EPH (C10-C36)	76																	<10	mg/kg	SA_TM5/SA_PM8
Mineral Oil (C10-C40)	38																	<30	mg/kg	SA_TM5/SA_PM8/PM16
GRO (C6-C9)	<0.1																	<0.1	mg/kg	SA_TM36/SA_PM12
PCBs (Total vs Aroclor 1254)*	<10																	<10	ug/kg	UK_TM16/UK_PM8
Total Phenols HPLC*	<0.15																	<0.15	mg/kg	UK_TM26/UK_PM21
Natural Moisture Content	1.8																	<0.1	%	SA_PM4/SA_PM0
Fluoride	<0.3																	<0.3	mg/kg	SA_TM27/SA_PM20
Hexavalent Chromium*	<0.3																	<0.3	mg/kg	UK_TM38/UK_PM20
Total Cyanide*	<0.5																	<0.5	mg/kg	UK_TM89/UK_PM45
Total Organic Carbon*	0.41																	<0.02	%	UK_TM21/UK_PM24
Calorific Value*	<1																	<1	MJ/kg	UK_TM21/UK_PM24
Flashpoint @ 93C*	>93																	>93	Degrees C	UK_TM79/UK_PM0
Formaldehyde (water soluble)	3																	<2	mg/kg	SA_TM5/SA_PM12
pH <sup>SA</sup>	7.71																	<2.00	pH units	SA_TM19/SA_PM11

Please see attached notes for all abbreviations and acronyms



**Client Name:** WSP - South Africa  
**Reference:** 41101314-001  
**Location:**  
**Contact:** Adam Sanderson  
**JE Job No.:** 18/1096

**Report :** ASLP (20:1) - Reagent Water

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	14																					
Sample ID	Pond Composite																					
Depth																						
COC No / misc																						
Containers	J																					
Sample Date	24/10/2018																					
Sample Type	Soil																					
Batch Number	1																					
Date of Receipt	30/10/2018																					
											LOD/LOR	Units	Method No.									
<b>VOC MS</b>																						
Methyl Tertiary Butyl Ether	<0.1																			<0.1	ug/l	SA_TM15/SA_PM88
Vinyl Chloride	<0.1																			<0.1	ug/l	SA_TM15/SA_PM88
1,1-Dichloroethene (1,1 DCE)	<3																			<3	ug/l	SA_TM15/SA_PM88
Dichloromethane (DCM)	<5																			<5	ug/l	SA_TM15/SA_PM88
Chloroform	<2																			<2	ug/l	SA_TM15/SA_PM88
1,1,1-Trichloroethane	<2																			<2	ug/l	SA_TM15/SA_PM88
Carbon tetrachloride	<2																			<2	ug/l	SA_TM15/SA_PM88
1,2-Dichloroethane	<2																			<2	ug/l	SA_TM15/SA_PM88
Benzene	<0.5																			<0.5	ug/l	SA_TM15/SA_PM88
Trichloroethene (TCE)	<3																			<3	ug/l	SA_TM15/SA_PM88
Toluene	<5																			<5	ug/l	SA_TM15/SA_PM88
1,1,2-Trichloroethane	<2																			<2	ug/l	SA_TM15/SA_PM88
Tetrachloroethene (PCE)	<3																			<3	ug/l	SA_TM15/SA_PM88
Chlorobenzene	<2																			<2	ug/l	SA_TM15/SA_PM88
1,1,1,2-Tetrachloroethane	<2																			<2	ug/l	SA_TM15/SA_PM88
Ethylbenzene	<1																			<1	ug/l	SA_TM15/SA_PM88
Xylenes (sum of isomers)	<3																			<3	ug/l	SA_TM15/SA_PM88
Styrene	<2																			<2	ug/l	SA_TM15/SA_PM88
1,1,2,2-Tetrachloroethane	<4																			<4	ug/l	SA_TM15/SA_PM88
1,4-Dichlorobenzene	<3																			<3	ug/l	SA_TM15/SA_PM88
1,2-Dichlorobenzene	<3																			<3	ug/l	SA_TM15/SA_PM88
1,2-Dichloroethene (cis & trans)	<6																			<6	ug/l	SA_TM15/SA_PM88
Trichlorobenzenes (1,2,3 & 1,2,4)	<6																			<6	ug/l	SA_TM15/SA_PM88
Methyl Ethyl Ketone (MEK)	<100																			<100	ug/l	SA_TM15/SA_PM88
Toluene-D8	141																			<0	%	SA_TM15/SA_PM88
4-Bromofluorobenzene	142																			<0	%	SA_TM15/SA_PM88
<b>SVOC MS</b>																						
<b>Phenols</b>																						
2-Chlorophenol	<1																			<1	ug/l	SA_TM16/SA_PM30
2,4-Dichlorophenol	<0.5																			<0.5	ug/l	SA_TM16/SA_PM30
2,4,6-Trichlorophenol	<1																			<1	ug/l	SA_TM16/SA_PM30
<b>PAHs</b>																						
Benzo(a)pyrene	<1																			<1	ug/l	SA_TM16/SA_PM30
PAH 16 Total	<11																			<11	ug/l	SA_TM16/SA_PM30
<b>Phthalates</b>																						
Bis(2-ethylhexyl) phthalate	<5																			<5	ug/l	SA_TM16/SA_PM30

Please see attached notes for all abbreviations and acronyms

**Client Name:** WSP - South Africa  
**Reference:** 41101314-001  
**Location:**  
**Contact:** Adam Sanderson  
**JE Job No.:** 18/1096

**Report :** ASLP (20:1) - Reagent Water

**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub

<b>J E Sample No.</b>	14											
<b>Sample ID</b>	Pond Composite											
<b>Depth</b>												
<b>COC No / misc</b>												
<b>Containers</b>	J											
<b>Sample Date</b>	24/10/2018											
<b>Sample Type</b>	Soil											
<b>Batch Number</b>	1											
<b>Date of Receipt</b>	30/10/2018											
Please see attached notes for all abbreviations and acronyms												
										<b>LOD/LOR</b>	<b>Units</b>	<b>Method No.</b>
<b>SVOC MS</b>												
<b>Other SVOCs</b>												
2,4-Dinitrotoluene	<0.5									<0.5	ug/l	SA_TM16/SA_PM30
Hexachlorobutadiene	<1									<1	ug/l	SA_TM16/SA_PM30
Nitrobenzene	<1									<1	ug/l	SA_TM16/SA_PM30
Surrogate Recovery 2-Fluorobiphenyl	100									<0	%	SA_TM16/SA_PM30
Surrogate Recovery p-Terphenyl-d14	121									<0	%	SA_TM16/SA_PM30
<b>Pesticides</b>												
<b>Organochlorine Pesticides</b>												
Aldrin*	<0.01									<0.01	ug/l	UK_TM149/UK_PM30
Dieldrin*	<0.01									<0.01	ug/l	UK_TM149/UK_PM30
Heptachlor*	<0.01									<0.01	ug/l	UK_TM149/UK_PM30
DDE (o,p & p,p)*	<0.02									<0.02	ug/l	UK_TM149/UK_PM30
DDT (o,p & p,p)*	<0.02									<0.02	ug/l	UK_TM149/UK_PM30
TDE (o,p & p,p)*	<0.02									<0.02	ug/l	UK_TM149/UK_PM30
Chlordane (cis & trans)*	<0.02									<0.02	ug/l	UK_TM149/UK_PM30
2,4-D*	<0.1									<0.1	ug/l	UK_TM42/UK_PM30
Formaldehyde	0.6									<0.5	mg/l	SA_TM51/SA_PM30
Hexavalent Chromium*	<0.006									<0.006	mg/l	UK_TM38/UK_PM30
Total Dissolved Solids	108									<35	mg/l	SA_TM20/SA_PM30

**Client Name:** WSP - South Africa

**Reference:** 41101314-001

**Location:**

**Contact:** Adam Sanderson

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 18/1096						

**Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.**

## NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 18/1096

### SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

### WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

### DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

### SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

### DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

### BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

### NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

### REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Please include all sections of this report if it is reproduced

All solid results are expressed on a dry weight basis unless stated otherwise.

**ABBREVIATIONS and ACRONYMS USED**

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range



JE Job No: 18/1096

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
SA_PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	SA_PM0	No preparation is required.			AR	
SA_TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds by Headspace GC-MS.	SA_PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
SA_TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds by Headspace GC-MS.	SA_PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
SA_TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds by Headspace GC-MS.	SA_PM88	A 20:1 ratio of deionised water to as received soil, is leached for 18 hours with zero headspace.			AR	No
SA_TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	SA_PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	No
SA_TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	SA_PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
SA_TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	SA_PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
SA_TM19	Determination of pH by bench pH meter	SA_PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
SA_TM20	Modified BS 1377-3: 1990 Gravimetric determination of Total Dissolved Solids	SA_PM80	A 20:1 ratio of leaching fluid to as received soil, is leached for 18 hours. The client can choose to use any of the following leaching fluids a) deionised water b) pH5 c) pH 5/pH2.9 depending on pH of sample d) pH9.2			AR	No
SA_TM27	Major ions by Ion Chromatography	SA_PM0	No preparation is required.				

JE Job No: 18/1096

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
SA_TM27	Major ions by Ion Chromatography	SA_PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a orbital shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a orbital shaker.			AD	Yes
SA_TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12, MTBE and BTEX by headspace GC-FID.	SA_PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
SA_TM42	Modified US EPA method 8270. Pesticides and herbicides by GC-MS	SA_PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
SA_TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	SA_PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
SA_TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	SA_PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
SA_TM51	Formaldehyde determination by reaction with Ammonium Ions and acetylacetone which is analysed spectrophotometrically.	SA_PM0	No preparation is required.				
SA_TM51	Formaldehyde determination by reaction with Ammonium Ions and acetylacetone which is analysed spectrophotometrically.	SA_PM112	As received soils are extracted with deionised water in a 4:1 ratio			AR	Yes
UK_TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	UK_PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
UK_TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	UK_PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				No
UK_TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	UK_PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				No

JE Job No: 18/1096

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
UK_TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	UK_PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.				Yes
UK_TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	UK_PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.				Yes
UK_TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	UK_PM0	No preparation is required.				No
UK_TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	UK_PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.				Yes
UK_TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	UK_PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				No
UK_TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	UK_PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.				Yes
UK_TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	UK_PM0	No preparation is required.				No
UK_TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	UK_PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.				Yes
UK_TM42	Modified US EPA method 8270. Pesticides and herbicides by GC-MS	UK_PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				No
UK_TM42	Modified US EPA method 8270. Pesticides and herbicides by GC-MS	UK_PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.				Yes

JE Job No: 18/1096

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
UK_TM79	Determination of Flashpoint using a Closed Cup Flashpoint Analyser	UK_PM0	No preparation is required.				No
UK_TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	UK_PM0	No preparation is required.				No
UK_TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	UK_PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.				Yes

# APPENDIX

# B

## TYPE PROFILING



Source of Waste: Transnet, Port of Saldanha, Western Cape, Waste Iron Ore Sediments											
Waste Matrix (Liquid / Solid): Solid											
Leachate Preparation (Solids Only): Non-Putrescible (Mono-Disposal): Reagent Water											
Substance	Concentration (ppm) - Solid/Total				Waste Type (based on TCTs and subject to LCTs)	Concentration (ppm) - Leachate/Liquid					Waste Type (based on LCTs and subject to TCTs)
	TCT0	TCT1	TCT2	Assessed Concentration		LCT0	LCT1	LCT2	LCT3	Assessed Concentration	
<b>Metal Ions</b>											
Arsenic	5.8	500	2000			0.01	0.5	1	4		
Boron	150	15000	60000	17.37	2, 3 or 4 - LCT Dependent	0.5	25	50	200	0.084	4
Barium	62.5	6250	25000	685	2 or 3 - LCT Dependent	0.7	35	70	280	0.189	4
Cadmium	7.5	260	1040			0.003	0.15	0.3	1.2		
Cobalt	50	5000	20000	4	2, 3 or 4 - LCT Dependent	0.5	25	50	200		
Chromium	46000	800000	-	31.9	2, 3 or 4 - LCT Dependent	0.1	5	10	40		
Chromium (Hexavalent)	6.5	500	2000			0.05	2.5	5	20		
Copper	16	19500	78000			2	100	200	800		
Mercury	0.93	160	640			0.006	0.3	0.6	2.4		
Manganese	1000	25000	100000	1231	2 or 3 - LCT Dependent	0.5	25	50	200		
Molybdenum	40	1000	4000			0.07	3.5	7	28		
Nickel	91	10600	42400	11.3	2, 3 or 4 - LCT Dependent	0.07	3.5	7	28		
Lead	20	1900	7600	72	2 or 3 - LCT Dependent	0.01	0.5	1	4		
Antimony	10	75	300			0.02	1	2	8		
Selenium	10	50	200	6	2, 3 or 4 - LCT Dependent	0.01	0.5	1	4		
Vanadium	150	2680	10720	53	2, 3 or 4 - LCT Dependent	0.2	10	20	80	0.0037	4
Zinc	240	160000	640000	112	2, 3 or 4 - LCT Dependent	5	250	500	2000		
<b>Inorganic Anions</b>											
Total Dissolved Solids	-	-	-		Not Applicable	1000	12500	25000	100000	108	4
Chloride	-	-	-		Not Applicable	300	15000	30000	120000	62.9	4
Sulphate	-	-	-		Not Applicable	250	12500	25000	100000	15.4	4
Nitrate	-	-	-		Not Applicable	11	550	1100	4400	0.38	4
Fluoride	100	10000	40000			1.5	75	150	600		
Cyanide	14	10500	42000			0.07	3.5	7	28		
<b>Organics</b>											
Benzene	-	10	40			-	0.01	0.02	0.08		
Benzo(a)pyrene	-	1.7	6.8			-	0.035	0.07	0.28		
Carbon tetrachloride	-	4	16			-	0.2	0.4	1.6		
Chlorobenzene	-	8800	35200			-	5	10	40		
Chloroform	-	700	2800			-	15	30	120		
2-Chlorophenol	-	2100	8400			-	15	30	120		
Bis(2-ethylhexyl)phthalate	-	40	160	0.251	2, 3 or 4 - LCT Dependent	-	0.5	1	4		
1,2-Dichlorobenzene	-	31900	127600			-	5	10	40		
1,4-Dichlorobenzene	-	18400	73600			-	15	30	120		
1,2-Dichloroethane	-	3.7	14.8			-	1.5	3	12		
1,1-Dichloroethene	-	150	600			-	0.35	0.7	2.8		
1,2-Dichloroethene	-	3750	15000			-	2.5	5	20		
Dichloromethane	-	16	64			-	0.25	0.5	2		
2,4-Dichlorophenol	-	800	3200			-	10	20	80		
2,4-Dinitrotoluene	-	5.2	20.8			-	0.065	0.13	0.52		
Ethylbenzene	-	540	2160			-	3.5	7	28		
Formaldehyde	-	2000	8000	3	2, 3 or 4 - LCT Dependent	-	25	50	200	0.6	3 or 4
Hexachlorobutadiene	-	2.8	5.4			-	0.03	0.06	0.24		
Methyl Ethyl Ketone (2-Butanone)	-	8000	32000			-	100	200	800		
Methyl Tertiary Butyl Ether	-	1435	5740			-	2.5	5	20		
Nitrobenzene	-	45	180			-	1	2	8		
Total PAHs	-	50	200			-	-	-	-		Not Applicable
>C6-C9	-	650	2600			-	-	-	-		Not Applicable
>C10-C36	-	10000	40000	76	2, 3 or 4	-	-	-	-		Not Applicable
Phenol	-	560	2240			-	7	14	56		
Polychlorinated Biphenyls (PCBs)	-	12	48			-	0.025	0.05	0.2		
Styrene	-	120	480			-	1	2	8		
1,1,1,2-Tetrachloroethane	-	400	1600			-	5	10	40		
1,1,2,2-Tetrachloroethane	-	5	20			-	0.65	1.3	5.3		
Tetrachloroethene	-	200	800			-	0.25	0.5	2		
Toluene	-	1150	4600			-	35	70	280		
Trichlorobenzenes (Sum)	-	3300	13200			-	3.5	7	28		
1,1,1-Trichloroethane	-	1200	4800			-	15	30	120		
1,1,2-Trichloroethane	-	48	192			-	0.06	1	4		
Trichloroethene	-	11600	46400			-	0.25	2	8		
2,4,6-Trichlorophenol	-	1770	7080			-	10	20	80		
Vinyl chloride	-	1.5	6			-	0.015	0.03	0.12		
Xylenes (Sum)	-	890	3560			-	25	50	200		
<b>Pesticides</b>											
Aldrin + Dieldrin	0.05	1.2	4.8			-	0.015	0.03	0.03		
DDT + DDD + DDE	0.05	50	200			-	1	2	2		
2,4-Dichlorophenoxyacetic Acid (2,4-D)	0.05	120	480			-	1.5	3	3		
Chlordane	0.05	4	16			-	0.05	0.1	0.1		
Heptachlor	0.05	1.2	4.8			-	0.015	0.03	0.03		
<b>Supplementary Consideration for Confirmation of Type 4 Waste Type</b>						<b>Notes to Waste Type Profiling</b>					
Organics	Concentration (mg/kg), unless stated				Satisfy Type 4	<p>1. The final waste type is determined from the most conservative type calculated for any individual substance, whether this be based on Total (TCT) or Leachable (LCT) concentrations.</p> <p>2. Where a number of waste types are applicable for any given substance (i.e. the consideration of TCTs in isolation cannot result in a Type 4 profile), the final waste type is determined by considering both the TCT and LCT analytical data simultaneously.</p> <p>3. Only where laboratory analysis has resulted in positive identification of substances (i.e. above laboratory limits of detection) have these been compared to their respective TCTs and LCTs (i.e. substances determined to be at concentrations less than laboratory limits of detection have been assumed to be absent).</p> <p>4. Notwithstanding disposal prohibitions, profiling of liquid wastes is undertaken by comparing the analytical results obtained directly from the liquid media to the LCT thresholds given that liquid wastes cannot provide a leachate extract for analysis.</p>					
	Threshold		Assessed Concentration								
Metals (all concentrations <TCT0 & LCT0):				No							
Anions (all concentrations <TCT0 & LCT0):				Yes							
Total Organic Carbon	(%)	3	0.41	Yes							
BTEX (Sum)	6	Not Detected	Yes								
Polychlorinated Biphenyls (PCBs)	1	Not Detected	Yes								
Mineral Oil (>C10-C40)	500	38	Yes								
<b>Pesticides</b>											
Aldrin + Dieldrin	0.05	Not Detected	Yes								
DDT + DDD + DDE	0.05	Not Detected	Likely								
2,4-Dichlorophenoxyacetic Acid (2,4-D)	0.05	Not Detected	Likely								
Chlordane	0.05	Not Detected	Yes								
Heptachlor	0.05	Not Detected	Yes								

Overall Screened Waste Type (notwithstanding potential disposal prohibitions, see below)

Category of Landfill (GN R636 of 2013)

## Type 3 Waste

Class C / GLB+

### Disposal Prohibitions (notwithstanding other potential restrictions associated with Waste Type)

PCBs > 50ppm	PCBs (ppm):	Not applicable, PCBs not detected
Explosive, corrosive or oxidising according to SANS 10234		No
pH <6 or >12	pH:	7.71
Flashpoint <61° Celsius	Flashpoint (°C):	>93
Moisture Content > 40%	Moisture Content (%):	1.8
Hazardous with Calorific Value >10MJ/kg	CV (MJ/kg):	<1
Hazardous with Total Organic Carbon >6%	TOC (%):	0.41
Brine (high salt content) >5% TDS	TDS (%):	N/A
Leachable TDS >100 000mg/l	TDS (mg/l):	108

# APPENDIX

C

CLASSIFICATION



WSP Reference:	41101314	Prepared For:	Nsovo Environmental Consulting
Generator:	Transnet		
Source Address:	Port of Saldanha, Western Cape		
Production Process:	Waste Iron Ore Sediments		

General Appearance	Classification Summary
Red-brown clay-, silt- and sand-sized fraction sediments	<b>Not Hazardous (General)</b>

Applicable Hazard Statement Codes

**Composition & Quantitative Classification**

Composition assessed in general accordance with the following hierarchy:

1. South African National Standard, Globally Harmonised System of Classification and Labelling of Chemicals (GHS), SANS 10234:2008, Edition 1.1
2. European Regulation (EC) No. 1272/2008, 'Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulation)

Hazard Statement Codes for individual compounds are sourced from:

1. Supplement to SANS 10234:2008 Edition 1
2. Table 3.1 of Annex VI of the CLP Regulations
3. European Chemicals Agency, Classification & Labelling Inventory Database
4. Product (Material) Safety Data Sheet

Where relevant, recorded concentrations have been converted from dry weight values to account for the recorded moisture content of material.

Quantitative screening assessment of individual Hazard Statement Codes presented on the following pages.



Hazard Statement Code	Hazard Statement	Threshold (%)	Threshold (ppm)	Threshold and Test Comments	Assessment Concentration (ppm)	Outcome(s) of Further Testing	Hazardous (Yes / No)	Additional Comments
Physical Hazard Statements								
H200	Unstable explosive	0	0	If >0% then classified under H200 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H201	Explosive; mass explosion hazard	0	0	If >0% then classified under H201 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H202	Explosive; severe projection hazard	0	0	If >0% then classified under H202 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H203	Explosive; fire blast or projection hazard	0	0	If >0% then classified under H203 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H204	Fire or projection hazard	0	0	If >0% then classified under H204 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H205	May explode in fire	0	0	If >0% then classified under H205 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H220	Extremely flammable gas	0	0	If >0% then classified under H220 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	

Hazard Statement Code	Hazard Statement	Threshold (%)	Threshold (ppm)	Threshold and Test Comments	Assessment Concentration (ppm)	Outcome(s) of Further Testing	Hazardous (Yes / No)	Additional Comments
H221	Flammable gas	0	0	If >0% then classified under H221 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H222	Extremely flammable aerosol	0	0	If >0% then classified under H222 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H223	Flammable aerosol	0	0	If >0% then classified under H223 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H224	Extremely flammable liquid and vapour	0	0	If >0% then classified under H224 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H225	Highly flammable liquid and vapour	0	0	If >0% then classified under H225 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H226	Flammable liquid and vapour	0	0	If >0% then classified under H226 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H227	Combustible liquid	0	0	If >0% then classified under H227 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	

Hazard Statement Code	Hazard Statement	Threshold (%)	Threshold (ppm)	Threshold and Test Comments	Assessment Concentration (ppm)	Outcome(s) of Further Testing	Hazardous (Yes / No)	Additional Comments
H228	Flammable solid	0	0	If >0% then classified under H228 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H229	Pressurised container: may burst if heated	0	0	Relevant only for pressurised containers	Not applicable	Not applicable	No	
H230	May react explosively even in the absence of air	0	0	If >0% then classified under H230 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H231	May react explosively even in the absence of air at elevated pressure and/or temperature	0	0	If >0% then classified under H231 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H240	Heating may cause an explosion	0	0	If >0% then classified under H240 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H241	Heating may cause a fire or explosion	0	0	If >0% then classified under H241 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H242	Heating may cause a fire	0	0	If >0% then classified under H242 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	

Hazard Statement Code	Hazard Statement	Threshold (%)	Threshold (ppm)	Threshold and Test Comments	Assessment Concentration (ppm)	Outcome(s) of Further Testing	Hazardous (Yes / No)	Additional Comments
H250	Catches fire spontaneously if exposed to air	0	0	If >0% then classified under H250 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H251	Self-heating; may catch fire	0	0	If >0% then classified under H251 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H252	Self-heating in large quantities; may catch fire	0	0	If >0% then classified under H252 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
		0	0	If >0% then classified under H260 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
		0.0076	76.1	<u>Element-specific assessment</u> Concentration of aluminium phosphide required to evolve sufficient volume of phosphine in contact with water to render hazardous; based on stoichiometry	No analysis for aluminium	Not applicable	No	
		1.177	11773	<u>Element-specific assessment</u> Concentration of free caesium required to evolve sufficient volume of hydrogen in contact with water to render hazardous; based on stoichiometry	No analysis for caesium	Not applicable	No	
		0.061	614.7	<u>Element-specific assessment</u> Concentration of free lithium required to evolve sufficient volume of hydrogen in contact with water to render hazardous; based on stoichiometry	No analysis for lithium	Not applicable	No	

Hazard Statement Code	Hazard Statement	Threshold (%)	Threshold (ppm)	Threshold and Test Comments	Assessment Concentration (ppm)	Outcome(s) of Further Testing	Hazardous (Yes / No)	Additional Comments
H260	In contact with water releases flammable gases that may ignite spontaneously	0.108	1076	<u>Element-specific assessment</u> Concentration of free magnesium required to evolve sufficient volume of hydrogen in contact with water to render hazardous; based on stoichiometry	All magnesium assumed to be bound/complexed	Not applicable	No	
		0.346	3463	<u>Element-specific assessment</u> Concentration of free potassium required to evolve sufficient volume of hydrogen in contact with water to render hazardous; based on stoichiometry	All potassium assumed to be bound/complexed	Not applicable	No	
		0.757	7571	<u>Element-specific assessment</u> Concentration of free rubidium required to evolve sufficient volume of hydrogen in contact with water to render hazardous; based on stoichiometry	No analysis for rubidium	Not applicable	No	
		0.204	2036	<u>Element-specific assessment</u> Concentration of free sodium required to evolve sufficient volume of hydrogen in contact with water to render hazardous; based on stoichiometry	All sodium assumed to be bound/complexed	Not applicable	No	
		0.388	3881	<u>Element-specific assessment</u> Concentration of free strontium required to evolve sufficient volume of hydrogen in contact with water to render hazardous; based on stoichiometry	No analysis for strontium	Not applicable	No	
		0	0	If >0% then classified under H261 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
		0.608	6082	<u>Element-specific assessment</u> Concentration of free barium required to evolve sufficient volume of hydrogen in contact with water to render hazardous; based on stoichiometry	All barium assumed to be bound/complexed	Not applicable	No	

Hazard Statement Code	Hazard Statement	Threshold (%)	Threshold (ppm)	Threshold and Test Comments	Assessment Concentration (ppm)	Outcome(s) of Further Testing	Hazardous (Yes / No)	Additional Comments
H261	In contact with water releases flammable gas	0.177	1775	<u>Element-specific assessment</u> Concentration of free calcium required to evolve sufficient volume of hydrogen in contact with water to render hazardous; based on stoichiometry	All calcium assumed to be bound/complexed	Not applicable	No	
		0	0	<u>Compound-specific assessment</u> Ferrosilicon may evolve sufficient hydrogen in contact with water to render hazardous; based on ratio of iron:silicon	Ferrosilicon not identified	Not applicable	No	
		0.696	6964	<u>Element-specific assessment</u> Concentration of free gadolinium required to evolve sufficient volume of hydrogen in contact with water to render hazardous; based on stoichiometry	No analysis for gadolinium	Not applicable	No	
		0.666	6659	<u>Element-specific assessment</u> Concentration of free samarium required to evolve sufficient volume of hydrogen in contact with water to render hazardous; based on stoichiometry	No analysis for samarium	Not applicable	No	
H270	May cause or intensify fire; oxidiser	0	0	If >0% then classified under H270 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H271	May cause a fire or explosion; strong oxidiser	0	0	If >0% then classified under H271 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H272	May intensify fire; oxidiser	0	0	If >0% then classified under H272 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	

Hazard Statement Code	Hazard Statement	Threshold (%)	Threshold (ppm)	Threshold and Test Comments	Assessment Concentration (ppm)	Outcome(s) of Further Testing	Hazardous (Yes / No)	Additional Comments
H280	Contains gas under pressure; may explode if heated	0	0	If >0% then classified under H280 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H281	Contains refrigerated gas; may cause cryogenic burns or injury	0	0	If >0% then classified under H281 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	
H290	May be corrosive to metals	0	0	If >0% then classified under H290 unless further information and/or testing proves otherwise	No substances identified	Not applicable	No	

Hazard Statement Code	Hazard Statement	Threshold (%)	Threshold (ppm)	Threshold and Test Comments	Assessment Concentration (ppm)	Outcome(s) of Further Testing	Hazardous (Yes / No)	Additional Comments
Health Hazard Statements								
H300	Fatal if swallowed	1	10000	If cumulative/additive >1% classified under H300 (Category 1 Acute Toxicity); pending further assessment	No substances identified	Not applicable	No	
H301	Toxic if swallowed	1	10000	If individual substance >1% classified under H301 (Category 3 Acute Toxicity); pending further assessment	8.28	Further assessment not necessary	No	
H302	Harmful if swallowed	1	10000	If individual substance >1% classified under H302 (Category 4 Acute Toxicity); pending further assessment	1912.92	Further assessment not necessary	No	
H303	May be harmful if swallowed	1	10000	If individual substance >1% classified under H303 (Category 5 Acute Toxicity); pending further assessment	No substances identified	Not applicable	No	
H304	May be fatal if swallowed and enters airways	1	10000	If cumulative/additive >1% classified under H304 (Category 1 Acute Toxicity); pending further assessment	37.32	Further assessment not necessary	No	
H305	May be harmful if swallowed and enters airways	1	10000	If individual substance >1% classified under H305 (Category 5 Acute Toxicity); pending further assessment	No substances identified	Not applicable	No	
H310	Fatal in contact with skin	1	10000	If cumulative/additive >1% classified under H310 (Category 1 Acute Toxicity); pending further assessment	No substances identified	Not applicable	No	



Hazard Statement Code	Hazard Statement	Threshold (%)	Threshold (ppm)	Threshold and Test Comments	Assessment Concentration (ppm)	Outcome(s) of Further Testing	Hazardous (Yes / No)	Additional Comments
H311	Toxic in contact with skin	1	10000	If individual substance >1% classified under H311 (Category 3 Acute Toxicity); pending further assessment	2.95	Further assessment not necessary	No	
H312	Harmful in contact with skin	1	10000	If individual substance >1% classified under H312 (Category 4 Acute Toxicity); pending further assessment	No substances identified	Not applicable	No	
H313	May be harmful in contact with skin	1	10000	If individual substance >1% classified under H313 (Category 5 Acute Toxicity); pending further assessment	No substances identified	Not applicable	No	
H314	Causes severe skin burns and eye damage	1	10000	If cumulative/additive >1% classified under H314 (Category 1 Skin Corrosion/Irritant); pending further assessment	2.95	Further assessment not necessary	No	
		≤2 pH Units ≥11.5		<u>pH-specific assessment</u> If ≤2 or ≥11.5 pH then classified as corrosive	7.71	Not applicable	No	
H315	Causes skin irritation	1	10000	If cumulative/additive >1% classified under H315 (Category 3 Skin Corrosion/Irritant), >10% then Category 2; pending further assessment	3325.85	Further assessment not necessary	No	
H316	Causes mild skin irritation	10	100000	If cumulative/additive >10% classified under H316 (Category 3 Skin Corrosion/Irritant); pending further assessment	No substances identified	Not applicable	No	

Hazard Statement Code	Hazard Statement	Threshold (%)	Threshold (ppm)	Threshold and Test Comments	Assessment Concentration (ppm)	Outcome(s) of Further Testing	Hazardous (Yes / No)	Additional Comments
H317	May cause an allergic skin reaction	1	10000	If individual substance >1% classified under H317 (Category 1 Skin Sensitisation); pending further assessment	14.12	Further assessment not necessary	No	
H318	Causes severe eye damage	1	10000	If cumulative/additive >1% classified under H318 (Category 2 Skin/Eye Sensitisation); pending further assessment	No substances identified	Not applicable	No	
H319	Causes severe eye irritation	10	100000	If cumulative/additive >10% classified under H319 (Category 2 Eye Sensitisation); pending further assessment	1558.25	Further assessment not necessary	No	
H320	Causes eye irritation	10	100000	If cumulative/additive >10% classified under H320 (Category 2 Eye Sensitisation); pending further assessment	No substances identified	Not applicable	No	
H330	Fatal if inhaled	1	10000	If cumulative/additive >1% classified under H330 (Category 1 Acute Toxicity); pending further assessment	No substances identified	Not applicable	No	
H331	Toxic if inhaled	1	10000	If individual substance >1% classified under H331 (Category 3 Acute Toxicity); pending further assessment	8.28	Further assessment not necessary	No	
H332	Harmful if inhaled	1	10000	If individual substance >1% classified under H332 (Category 4 Acute Toxicity); pending further assessment	1912.92	Further assessment not necessary	No	

Hazard Statement Code	Hazard Statement	Threshold (%)	Threshold (ppm)	Threshold and Test Comments	Assessment Concentration (ppm)	Outcome(s) of Further Testing	Hazardous (Yes / No)	Additional Comments
H333	May be harmful if inhaled	1	10000	If individual substance >1% classified under H333 (Category 5 Acute Toxicity); pending further assessment	No substances identified	Not applicable	No	
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled	0.1	1000	If individual substance >0.1% classified under H334 (Category 1 Respiratory Sensitisation); pending further assessment	No substances identified	Not applicable	No	
H335	May cause respiratory irritation	20	200000	If cumulative/additive >20% classified under H335 under Generic Limits; pending further assessment	1473.52	Further assessment not necessary	No	
H336	May cause drowsiness or dizziness	20	200000	If cumulative/additive >20% classified under H336 under Generic Limits; pending further assessment	No substances identified	Not applicable	No	
H340	May cause genetic defects	0.1	1000	If individual substance >0.1% classified under H340 (Category 1 Mutagen); pending further assessment	No substances identified	Not applicable	No	
H341	Suspected of causing genetic defects	1	10000	If individual substance >1% classified under H341 (Category 2 Mutagen); pending further assessment	2.95	Further assessment not necessary	No	
H350	May cause cancer	0.1	1000	If individual substance >0.1% classified under H350 (Category 1 Carcinogen); pending further assessment	14.12	Further assessment not necessary	No	

Hazard Statement Code	Hazard Statement	Threshold (%)	Threshold (ppm)	Threshold and Test Comments	Assessment Concentration (ppm)	Outcome(s) of Further Testing	Hazardous (Yes / No)	Additional Comments
H351	Suspected of causing cancer	0.1	1000	If individual substance >0.1% classified under H351 (Category 2 Carcinogen); pending further assessment	74.63	Further assessment not necessary	No	
H360	May damage fertility or the unborn child	0.1	1000	If individual substance >0.1% classified under H360 (Category 1 Teratogen); pending further assessment	70.70	Further assessment not necessary	No	
H361	Suspected of damaging fertility or the unborn child	0.1	1000	If individual substance >0.1% classified under H361 (Category 2 Teratogen); pending further assessment	No substances identified	Not applicable	No	
H361d	Suspected of damaging the unborn child	0.1	1000	If individual substance >0.1% classified under H361d; pending further assessment	No substances identified	Not applicable	No	
H362	May cause harm to breast-fed children	0.1	1000	If individual substance >0.1% classified under H362 (Additional Category Teratogen); pending further assessment	No substances identified	Not applicable	No	
H370	Causes damage to organs	1	10000	If individual substance >1% classified under H370 (Category 1 Single Exposure); pending further assessment	No substances identified	Not applicable	No	
H371	May cause damage to organs	1	10000	If individual substance >1% classified under H371 (Category 2 Single Exposure); pending further assessment	No substances identified	Not applicable	No	

Hazard Statement Code	Hazard Statement	Threshold (%)	Threshold (ppm)	Threshold and Test Comments	Assessment Concentration (ppm)	Outcome(s) of Further Testing	Hazardous (Yes / No)	Additional Comments
H372	Causes damage to organs through prolonged or repeated exposure	1	10000	If individual substance >1% classified under H372 (Category 1 Repeat Exposure); pending further assessment	14.12	Further assessment not necessary	No	
H373	May cause damage to organs through prolonged or repeated exposure	1	10000	If individual substance >1% classified under H373 (Category 2 Repeat Exposure); pending further assessment	70.70	Further assessment not necessary	No	
		0.005	50	<u>PCB-specific assessment</u> If PCBs are present >0.005% then classified hazardous under H373	No substances identified	Not applicable	No	

Environmental Hazard Statements

H400	Very toxic to aquatic life	1	10000	If cumulative/additive >1% classified under H400 (Category 1 Acute Aquatic Toxicity); pending further assessment	212.60	Further assessment not necessary	No	
H401	Toxic to aquatic life	25	250000	If modified cumulative/additive >25% classified under H401 (Category 2 Acute Aquatic Toxicity); pending further assessment	2125.96	Further assessment not necessary	No	
H402	Harmful to aquatic life	25	250000	If modified cumulative/additive >25% classified under H402 (Category 3 Acute Aquatic Toxicity); pending further assessment	21259.63	Further assessment not necessary	No	
H410	Very toxic to aquatic life with long lasting effects	1	10000	If cumulative/additive >1% classified under H410 (Category 1 Chronic Aquatic Toxicity); pending further assessment	220.88	Further assessment not necessary	No	

Hazard Statement Code	Hazard Statement	Threshold (%)	Threshold (ppm)	Threshold and Test Comments	Assessment Concentration (ppm)	Outcome(s) of Further Testing	Hazardous (Yes / No)	Additional Comments
H411	Toxic to aquatic life with long lasting effects	25	250000	If modified cumulative/additive >25% classified under H411 (Category 2 Chronic Aquatic Toxicity); pending further assessment	2208.76	Further assessment not necessary	No	
H412	Harmful to aquatic life with long lasting effects	25	250000	If modified cumulative/additive >25% classified under H412 (Category 3 Chronic Aquatic Toxicity); pending further assessment	22087.60	Further assessment not necessary	No	
H413	May cause long lasting harmful effects to aquatic life	25	250000	If modified cumulative/additive >25% classified under H413 (Category 4 Chronic Aquatic Toxicity); pending further assessment	235.00	Further assessment not necessary	No	
H420	Harms public health and the environment by destroying ozone in the upper atmosphere	0.1	1000	If individual substance >0.1% classified under H420 (Category 1). Substances based on Annexes to the Montreal Protocol.	No substances identified	Not applicable	No	

#### Assumptions and Comments

1. Acute Toxicity Estimates (ATE) have not been derived from LD50 data or conversion factors presented in SANS 10234; classification has been based on generic screening thresholds. Where more detailed assessment is recommended, appropriate LD50 should be sourced based on current available data.
2. Ecotoxicity for Category 1 Acute and Chronic Hazards have assumed 1% threshold and additive compounds rather than utilisation of Modification Factors presented in SANS 10234. Where more detailed assessment is recommended, this should follow the mixture-specific principles defined in SANS 10234.
3. Classification does not include European Union (EU), or other territory-specific, Hazard Statement Codes that may be applicable outside of the Republic of South Africa.
4. Only where data is presented, or where laboratory analysis has resulted in positive identification (i.e. above laboratory limits of detection), have the applicable Hazard Statement Codes been appraised (i.e. substances determined to be at concentrations less than laboratory limits of detection have been assumed to be absent).
5. Unless exact speciation has been established through detailed analysis, classification has been based on reasonable assumptions of substances most-likely present based on expected behaviour within the material. It is recognised that this may not be applicable in all instances and, for clarity, a list of the individual substances appraised where assumptions have been made are listed below.
6. Where laboratory analysis has reported concentrations on a dry weight basis these have been converted to take account of sample moisture content using the formula:  
Wet Weight Concentration = Dry Weight Concentration x ((100 - %moisture content)/100).
7. Where assessment has been undertaken on liquids, it has been assumed that 1-litre (volume) is equivalent to 1-kg (mass).
8. For additional details in respect of the individual substances that may render any given material type as hazardous, reference should be made to the appropriate Safety Data Sheet (SDS) which takes account of this classification or, if the SDS has not been prepared, the Waste Management Summary Report relevant for this classification.

Hazard Statement Code	Hazard Statement	Threshold (%)	Threshold (ppm)	Threshold and Test Comments	Assessment Concentration (ppm)	Outcome(s) of Further Testing	Hazardous (Yes / No)	Additional Comments
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List of Assumed Substances

Barium Oxide, Boron Trioxide, Calcium Carbonate, Chromium (iii) Oxide, Cobalt (ii) Oxide, Iron Oxide (Magnetite), Lead Compounds, Magnesium Carbonate, Manganese Dioxide, Nickel (ii) Oxide, Potassium Carbonate, Selenium Dioxide, Sodium Chloride, Sulphur, Vanadium (iv) Oxide, Zinc Oxide, Diesel Range Organics (DRO), Other / Misc Oils,

End of Classification