PAGE 1 of 10	**BASE METALS REFINERY** IMPALA Member of the Implats Group
REVISION Nº.: 19 ORIGINAL DATE ISSUED : <27-JUN-2005 **LAST REVIEWED: 26-Jan-2018*	**SAFETY DATA SHEET – NICKEL Briquettes** DOCUMENT NO.: **MAN-HDS-004**

DISTRIBUTION CONTROL SHEET

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11	Alice Lourens	Manager Investor Relations (for inclusion on Implats' Web Page)

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Nickel Briquettes

Synonyms: Nickel ingots, Impala Nickel Briquettes, Air Sintered Nickel, Bulk Air Sintered Nickel, Sintered Nickel

***Use(s):** Printing Industry, Metal Alloys, Nickel Plating, Ceramic Manufacture, Process Chemical, Industrial Application, *Steel Manufacturing.*

Supplier Details:
Impala Platinum Ltd – Refineries
Base Metals Refinery
P.O. Box 222
SPRINGS
1560
GAUTENG
Republic of South Africa

***Contact Persons:**
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Nickel Manager – Sakhumzi Ndlebe;
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Emergency Contact Information:
For emergency information – see above for Impala Platinum contacts.
South Africa Poisons Information Centre (24 hours): 0861-555-777 (South Africa only).

2. HAZARDS IDENTIFICATION

Classification according to GHS Classification (SANS 10234):

Health hazards:

Acute toxicity, oral	Category 4	H302 – Harmful if swallowed (highly unlikely in briquette form)
Respiratory sensitisation	Category 1	H334 – May cause allergy or asthma symptoms or breathing difficulties if dust inhaled
Skin sensitisation	Category 1	H317 – may cause an allergic skin reaction
Carcinogenicity	Category 2	H351 – limited evidence of human or animal carcinogenicity
Environmental hazards:	Category 4	H413 – May cause long lasting harmful effects in aquatic life

Hazard Summary:

Physical hazards: Not classified for physical hazards

Health hazards: Harmful if swallowed. May cause sensitisation by inhalation or skin contact.

Environmental hazards: May cause long lasting adverse effects in aquatic environment

Specific hazards: Chronic exposure may result in blood, liver, kidney, lung, heart and thyroid damage and skin disease. Nickel and nickel compounds are classified as possibly carcinogenic to humans (IARC Group 2B). Occupational exposure to the sub-sulfides of nickel (not Nickel Powder) has been associated with lung cancer, and with repeated exposure, scarring of the lungs (pulmonary fibrosis. Eco-toxicity is highly unlikely in product form, e.g. during transportation in sealed containers, as eco-toxic only if reacted with oxidising agents, reactive metals or acids (see section 10), which may dissolve the nickel powder into a solution form, and this will only occur under specially applied conditions.

Label Elements:

Hazard Pictograms:

Signal Word: DANGER

Health Statements:
H301 – Harmful if swallowed
H317 – May cause an allergic skin reaction
H334 – May cause allergy or asthma symptoms or breathing difficulties if inhaled
H413 – May cause long lasting harmful effects to aquatic life

Precautionary statements:

***Prevention:**
P201 – Obtain special instruction before use
P202 – Do not handle until all safety precautions have been read and understood
P261 – Avoid breathing dust/fume
P264 – Wash thoroughly after handling
P270 – Do not eat, drink or smoke when using this product
P272 – Contaminated work clothes must not be allowed out of the work place
P273 – Avoid release to the environment
P280 – Wear protective gloves, protective clothing and eye protection
P285 – In case of inadequate ventilation wear respiratory protection

Response:
P330 – Rinse mouth
P363 – Wash contaminated clothing before reuse
P101 + P312 – IF SWALLOWED: Call a poison centre/doctor
P302 + P352 – IF ON SKIN: Wash well with plenty of soap and water
P308 + P313 – If exposed or concerned get medical advice/attention
P304 + P340 – IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing
P342 + P311 – If experiencing respiratory symptoms call a poison centre or doctor
P305 + P351 + P338 – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P337 + P313 – If eye irritation persists get medical advice/attention
P333 + PP313 – If skin irritation or rash occurs get medical advice/attention

Storage:
P405 – Stored locked up

Disposal: P501 – Dispose of contents/container in accordance with local/ regional/national/international regulations

Supplemental label information: None

Other Hazards: Not a BPT or vPvB substance or mixture. No other acute or chronic health impact noted.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	**:**	Nickel
Formula	**:**	Ni
CAS Nº.	**:**	7440-02-0
Poison Sched.	**:**	None Allocated
***Conc. Ni**	**:**	*≥99.80%*
Conc. Co	:	≤0.15%
RTECS No.	**:**	QR5950000
EC No.	**:**	231-111-4
****ICSC No***	**:**	0062
Hazchem.	**:**	None Allocated
UN No.	**:**	None Allocated
D.G Class	**:**	None Allocated
PKG Group	**:**	None Allocated
EPG	**:**	None Allocated
Sub/Tert. Risk	**:**	None Allocated

4. FIRST AID MEASURES

Eye: Due to product form eye contact is considered highly unlikely.. If Ni dust contacts the eye, flush gently with running water for minimum 15 minutes. Seek medical attention if irritation develops.

Inhalation: Due to product form inhalation is considered highly unlikely. If over exposure to Ni dust occurs leave exposure area immediately. If other than minor symptoms are displayed seek immediate medical attention.

Skin: Remove contaminated clothing and gently flush affected areas with soap and water. Seek medical attention if irritation develops. Launder clothing before reuse.

Ingestion: Due to product form ingestion is considered highly unlikely. If over exposure to Ni dust, poisoning may occur - contact a Doctor or Poisons Information Centre (24 hours): 0861-555-777 (South Africa only). Do not induce vomiting. Seek immediate medical attention.

First Aid Facilities: Eye wash facilities should be available if exposure to Ni dust.

5. FIRE FIGHTING MEASURES

Flash Point: Not detected

Flammable Limits: Not detected. Very fine dust (<3um) may burn when exposed to ignition sources or mixed with strong oxidising agent. May evolve toxic cobalt oxides when heated to decomposition. May evolve explosive hydrogen gas on contact with water / acid.

Auto-ignition Point: Not detected. Toxic cobalt oxides may be evolved when heated. Remain upwind and notify those downwind of hazard. Wear full protective equipment (see spillage section 6.1 below) including Self Contained Breathing Apparatus (SCBA) when combating fire. Use water fog to cool intact containers and nearby storage areas.

Fire Extinguishing Media: Non-flammable. Prevent contamination of drains or waterways; absorb runoff with sand or similar (**NOT** carbon dioxide or water).

Special Fire Fighting Procedures: None

Hazardous Chemical Code: None allocated.

6. ACCIDENTAL RELEASE MEASURES

Spillage: If spilt (bulk), wear dust-proof goggles, PVC/rubber gloves, a Class P2 (Particulate) respirator (or Class P3 at high dust levels) and overalls. Collect spill and place in sealable container for disposal. Avoid generating dust. May cause long lasting harmful effects in aquatic life. Do not flush residues to sewer. Absorb all residues.

7. HANDLING AND STORAGE

Packaging Material:

Sintered Briquettes:	Packed in black 250kg drums and loaded in 1000kg lots on a pallet. Each drum sealed with a security seal.
or	Packed in bags and loaded in 1000kg lots on a pallet.
Un-Sintered Briquettes:	Packed in bags and loaded in 1000kg lots on a pallet.
Air-Sintered Briquettes:	Packed in bags and loaded in 1000kg lots on a pallet. Bulk product emptied into a tipper/truck directly from feed bin

Handling: Before use, read the product label. Use safe work practices to avoid eye or skin contract and inhalation. Observe good personal hygiene. Prohibit eating, drinking and smoking in contaminated areas (e.g. if container is damaged). Wash hands before eating or smoking.

Storage: Store in cool, dry, well ventilated area, removed from oxidising agents(e.g. hypochlorites), acids (sulfuric acid), heat sources and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use. Large storage areas should have appropriate ventilation systems.

Transport: Not regulated for transport purposes.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits:

SA Legislation:	Ni soluble = 0.1 mg/m^3 Ni insoluble = 0.5 mg/m^3 Ni metal = 0.5 mg/m^3
**ICSC0062:*	Ni soluble = 0.1 mg/m^3 Ni insoluble = 0.2 mg/m^3 Ni metal = 1.5 mg/m^3 A5 (not suspected as a human carcinogen) this conflicts with IARC below
IARC Group 213:	Possible carcinogen to humans – this conflicts with *ICSC0062* above & EU and AUS below.
*ASCC (AUS)	Ni Metal: TWA 1mg / m^3
	Ni Soluble compounds

	(as Ni):	*TWA 0.1mg / m³*
	Carcinogenity:	Limited evidence of a carcinogenic effect
EU Hazard Classification from ATP:	Acute oral:	None
	Acute inhalation:	None
	Skin irritation:	None
	Eye irritation:	None
	Skin sensitisation:	R43 = concentration limit based on release rate of 0.5µg Ni/cm²/week
	Respiratory sensitisation:	None
	Chronic toxicity:	T:R48/23 = 1% concentration limit; toxic/danger of serious damage to health by prolonged exposure through inhalation
	Reproductive toxicity:	None
	Mutagenity:	None
	Carcinogenity:	Category 2 = limited evidence of human or animal carcinogenicity
	Aquatic toxicity:	None in Ni metal powder form

Biological Limits:
No biological limit allocated for nickel

Exposure Controls: Do not inhale dust / powder. Use with adequate natural ventilation. Where a dust inhalation hazard exists, mechanical extraction ventilation is recommended. Maintain dust / fume levels below the recommended exposure standard.

PPE: Wear dust-proof goggles and PVC or rubber gloves. Where heavy skin contamination is likely wear overalls. Where an inhalation risk exists, wear a Class P2 (Particulate) respirator. At high dust levels, wear a Full-Face Class P3 (Particulate) or Powered Air Purifying Respirator (PAPR). Do **not** take working clothes home.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Small silver-grey ingots or briquettes
Odour	:	Odourless
Flammability	:	Non Flammable
Flash Point	:	Not Relevant
Lower Explosion Limit	:	Not Relevant
Upper Explosion Limit	:	Not Relevant
Auto Ignition Temperature	:	Not Relevant
Boiling Point	:	2730 ºC
Melting Point	:	1455 ºC
Evaporation Rate	:	Not Relevant
pH	:	Not Relevant
%Volatiles	:	Not Relevant
Specific Gravity	:	8.90
Vapour Pressure	:	Not Relevant
Solubility (water)	:	Insoluble
Molecular Weight	:	58.71g/mole
Ni concentration - sintered	:	≥99.80%
Ni concentration – un-sintered	:	≥99.70%
Ni concentration – air-sintered	:	≥99.70%
Co concentration	:	≤0.15%

10. STABILITY AND REACTIVITY

Flammability: Non-flammable. May evolve toxic metal oxides when heated. Very fine dusts may explode in very high concentrations if exposed to high energy heat or ignition sources (highly unlikely in current form). May evolve flammable – explosive hydrogen gas in contact with strong acids.

Reactivity: Incompatible with oxidising agents (e.g. hypochlorites, peroxide, ammonium nitrate) and acids (e.g. sulfuric acid, hydrochloric acid) reacts slowly with non oxidising acids and more rapidly with oxidising acids. Also incompatible with nitrates, sulfur, selenium, Halogens, Halogen-Halogen Compounds, nitryl compounds and organic solvents. Reacts violently in powder form with titanium powder and potassium perchlorate.

Decomposition Products: Will evolve toxic metal oxides when heated to decomposition.

11. TOXICOLOGICAL INFORMATION

Health Hazards Summary: Moderate Toxicity. Use safe work practices to avoid eye-skin contact and dust inhalation. Nickel is classified as possibly carcinogenic (IARC Group 2B), but limited evidence of human or animal carcinogenicity. Skin and respiratory sensitizer. Those individuals with pre-existing lung or skin sensitivities – disease are advised to avoid exposure.

Eye: Not applicable in briquette form; product may only present an irritant hazard if Nickel dust is generated - Dust contact may result in lacrimation, irritation, pain redness and conjunctivitis. Prolonged contact – corneal burns and possible permanent damage.

Inhalation: Not applicable in briquette form; product may only present an irritant hazard if Nickel dust is generated – dust may be slightly corrosive. Over exposure to dust may result in respiratory mucous membrane irritation and sensitisation. A respiratory sensitiser. Early inhalation symptoms include nausea, giddiness, weakness, and non-productive cough, followed by breathing difficulties, pulmonary oedema and interstitial fibrosis. Half-life in the body: 667 days. Chronic exposure to nickel compounds may result in increased incidence of asthma and decreased pulmonary function. Carcinogenicity of this compound has not been confirmed, but special precaution should be taken as to not inhale dust. At high levels toxic systemic effects may occur. Nickel salts have been shown to cause an increased incidence of asthma and bronchitis, decreased pulmonary function.

Skin: Slightly corrosive – irritant. Repeated contact may result in irritation, dermatitis with severe itching and possible sensitisation. A skin sensitiser. “Nickel itch” may begin with a burning and itching sensation, followed by redness and blister. Once acquired, nickel sensitivity usually persists. Nickel and its compounds can be absorbed through the skin, but not in amounts sufficient to cause intoxication. Individuals with pre-existing lung or skin sensitivities/diseases are advised to avoid exposure.

Ingestion: Not applicable in briquette form; product may only present an irritant hazard if Nickel dust is generated. Ingestion may result in gastric irritation, ulceration and burns to the mouth and throat with nausea, vomiting and abdominal pain. Nickel is poorly absorbed through the stomach.

Nickel is poorly absorbed through the gastrointestinal tract, which accounts for its low toxicity via this route. Large doses, 1-3 mg/kg of nickel compounds have been reported to cause intestinal disorders, convulsions & asphyxia in dogs. Heart, brain, liver and kidney damage reported in animals. Exposure to dust / fumes may result in asthma and pneumonitis. Mutagen.

Toxicity Data: Nickel

LD50 (Intraperitoneal)	:	250 mg/kg (rat)
LDLo (Subcutaneous)	:	7.5 mg/kg (rabbit)
LDo (Ingestion)	:	5 mg/kg (guinea pig)
TCLo (Inhalation)	:	15mg/m^3/91W-I (guinea pig tumours)
TDLo (Ingestion)	:	158mg/kg (rat foetotoxic)

12. ECOLOGICAL INFORMATION

Only if reacted with acids under specially applied conditions.
Limited ecotoxicity data was available for this product at the time this report was prepared. Ensure appropriate measures are taken to prevent this product from entering the environment and reacting with strong acids.

Environment: AQUATIC – mobility of nickel is controlled by various sorbents which scavenge it from solution. In pristine environments, hydrous oxides of iron and manganese control its mobility via sorption and co-precipitation. In polluted environments, the most abundant organic material will keep nickel soluble. Nickel is one of the most mobile heavy elements in aquatic environments and can persist indefinitely in natural waters. It is toxic to plants at 50-200ppm. Avoid acid dissolution of the nickel metal.

Ecotoxicity: Limited ecotoxicity data was available for this product at the time this report was prepared. Metallic nickel may be harmful to aquatic life with long lasting effects – Aquatic toxicity classification relates to particle sizes less than 1mm diameter (equivalent spherical diameter).

Persistence/Degradability: Not applicable for inorganic substances.

Mobility: Nickel mobility in soil is dependent on many parameters, including pH, and naturally occurring silica and hydrous oxides of iron and manganese.

13. DISPOSAL CONSIDERATION

Waste Disposal: Collect and reuse where possible. Minimise dust generation. *Contact Impala Refineries Laboratory Manager on +27 11 360 3478 or Nickel Manager on +27 11 360 3317.*

Legislation: Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD

Hazchem.	None Allocated
U.N. No.	None Allocated
D.G Class	None Allocated
PKG Group	None Allocated
EPG	None Allocated
Sub/Tert. Risk	None Allocated

15. REGULATORY INFORMATION

SA Hazardous Substances Act 15/1973
SANS 10228:2012 SA National Standard – The identification and classification of dangerous goods for transportation by road and rail modes

GHS of Classification and Labelling of Chemicals ST/SG/AC.10/3-/Rev.6

Regulation (EC) No. 1907/2006 of the European Parliament and the Council of December 2006

16. OTHER INFORMATION

Nickel Exposure 1: NIOSH-USA recommended that workers exposed to Nickel and inorganic nickel compounds should have an initial medical exam covering.

1. Comprehensive medical and work history with emphasis on skin conditions, allergies, upper and lower respiratory tract illnesses and smoking.

2. Complete physical exam with emphasis on upper respiratory tract and skin.

3. Specific clinical tests such as X-ray, pulmonary function and indicated sputum cytology and urine nickel analysis.

Nickel: Reported and potential adverse health effects associated with occupational exposure to Nickel metal and inorganic compounds include; an increased risk of nasal, lung and possibly laryngeal cancer in nickel refinery workers; increased risk of gastric cancer; increased risk of sarcoma (cancer arising from connective tissue); severe irritation of the upper respiratory tract; pulmonary irritation and fibrosis; pneumoconiosis; bronchial asthma; increased susceptibility to respiratory infections; and dermatitis.

Respirators: In general the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Remember that some respirators may be extremely uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.

Colour Rating System: Amber. Chem Alert reports are assigned a colour rating of Green, Amber or Red for the purpose of providing users with a quick and easy means of determining the hazardous nature of a product. Safe handling recommendations are provided in all Chem Alert reports so as to clearly identify how users can control the hazards and thereby reduce the risk (or likelihood) of adverse effects. As a general guideline a Green colour rating indicates a low hazard, and Amber colour rating indicates a moderate hazard and a Red colour indicates rating indicates a high hazard.

Whist all due care has been taken in the preparation of the Colour Rating System, it is intended as a guide only and does not provide any warranty in relation to the accuracy of the Colour Rating System. As far as is lawfully possible, Impala accepts no liability or responsibility whatsoever for the actions or omissions of any person in reliance on the Colour Rating System.

Personal Protective Equipment Guidelines: The recommendation for protective equipment contained within this Chem Alert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made. Information provided by Risk Management Technologies is summarised for ease of use. Additional technical information is available by calling +27 11 360 3478 or *+27 11 360 3317.*

Health Effects from Exposure: It should be noted that the effects from exposure to this will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a Chem Alert report which encompasses all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

Abbreviations:

mg/m3 – Milligrams per cubic metre.
ppm – Parts Per Million.
TWA/ES – Time Weighted Average of Exposure Standard.
pH – Relates to hydrogen ion concentration - this value will relate to a scale of 0 – 14, where 0 is highly acidic and 14 is highly alkaline.
CAS No. - Chemical Abstract Service number – used to uniquely identify chemical compounds.
M – Moles per litre, a unit of concentration.

IARC – International Agency for Research on Cancer.
RTECS – The Registry of Toxic Effects of Chemical Substances
ICSC – International Chemical Safety Card.
**EC No. – European Commission Number*

EU – European Union
AUS - Australia

Report Status: Impala Platinum Ltd. have exercised reasonable care in the preparation of the information contained in this SDS, however, it assumes no responsibility or liability to the accuracy and suitability of such information, for application to the Buyer's intended purposes or consequences of its use. As regulatory standards and guideline recommendations are revised from time to time, Impala gives no assurance that the information contained in this SDS will be current at the time that the SDS is used. It is the responsibility of the Buyer/User to ensure that the most recent version of this document is available.

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