Drawn up/updated on: **June 4th, 2003 / July 5th, 2012**

SECTION 1. Identification of the substance/mixture and of the company/undertaking

1.1. Identification of the substance/preparation
Commercial product name: *COPPER SULPHATE PENTAHYDRATE, TECHNICAL*
Name according to IUPAC: copper (II) sulphate pentahydrate
UN number: *3077*
CAS number: *7758-99-8*
EC number: -
Index number: *029-004-00-0*
Registration number: 01-2119520566-40-0004

1.2. Relevant identified uses of the substance or mixture and uses advised against
Recommended use: *For production of pigments and as a starting material for production of other copper compounds. Used as fungicide and algaecide. As a fodder additive preventing copper deficiency in animals. Used for preservation of wood and animal skins. For galvanising baths (copper-plating of galvanised items).*
Uses advised against: *not known.*

1.3. Material Safety Data Sheet provider details

Manufacturer: **KGHM Polska Miedź S.A.**
"Legnica" Copper Smelter and Refinery
Złotoryjska 194
59-220 Legnica

Telephone number:
***Head of the Copper Electrorefining Department: (48 76) 747 53 01**, Mon-Fri 7:15 a.m.-3:15 p.m.*
***Head of the Customer Service and Finished Products Warehouse: (48 76) 747 28 00** Mon-Fri 7:15 a.m.-3:15 p.m.*
Telefax: ***(48 76) 747 20 05***
Person responsible for MSDS: ***(48 76) 747 52 06/*** e-mail: ***karty.charakterystyki@kghm.pl***

1.4. **Emergency telephone number:**
***(48 76) 747 50 02** – manufacturer's emergency telephone number operating 24/7.*
***112** (general emergency number), **998** (fire brigade), **999** (ambulance)*

SECTION 2. Hazards identification

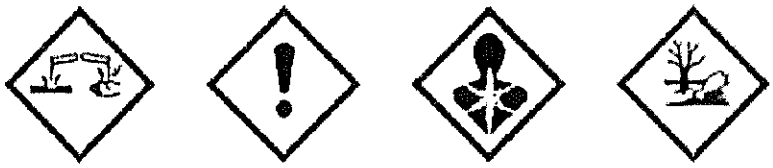
2.1 Substance classification

Classification in accordance with the Regulation No 1272/2008 (CLP):
Carc 1A; H350: May cause cancer;
Repr 1B; H360D: May damage the unborn child;
Acute Tox 4; H302: Harmful if swallowed;
Eye Irrit 1; H318: Causes serious eye damage;
Skin Sens 1; H317: May cause an allergic skin reaction;
STOT RE 2; H373: May cause damage to organs through prolonged or repeated exposure;
Aquatic acute 1; H400: Very toxic to aquatic life;
Aquatic chronic 1; H410: Very toxic to aquatic life with long lasting effects;

Classification in accordance with the Directive No 67/548/EEC
Cancer. Cat. 1; R49 – May cause cancer by inhalation;
Repro. Cat. 2. R61 – May cause harm to the unborn child;
Muta. Cat/ 3; Possible risk of irreversible effects;
Xi; R36/38 – Irritating to eyes and skin
Xn; R20/22 – Harmful by inhalation and if swallowed
T; R48/23 – Toxic: danger of serious damage to health by prolonged exposure through inhalation
N; R50/53 – Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

2.2. Labelling

GHS05 GHS 07 GHS 08 GHS 09



Warning: "DANGER"
Hazard statements (H):
H350 – May cause cancer;
H360D – May damage the unborn child;
H302 – Harmful if swallowed;
H318 – Causes serious eye damage;
H317 – May cause an allergic skin reaction;
H373 – May cause damage to organs through prolonged or repeated exposure;
H410 – Very toxic to aquatic life with long lasting effects;

Precautionary statements (P):
P201 – Obtain special instructions before use
P308+313 – If exposed or concerned: Get medical advice/attention
P501 – Dispose of contents/container to the semi-product manufacturer
P273 – Avoid release to the environment
P260 – Do not breathe dust

2.3. Other hazards
Irritating to skin
Hazards not included in classification criteria: *none*

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3. **Composition/information on ingredients** according to the Regulation No 1272/2008 (CLP)	Percentage content	Symbols	H statements
$CuSO_4$ 5 H_2O CAS Number: 7758-99-8 EC Number: 231-847-6 Index number: 029-004-00-0	Above 85%	Acute Tox. 4 Eye Irrit. 2 Skin Irrit. 2 Aquatic Acute 1 Aquatic Chronic 1	H 302 H 319 H 315 H 400 H 410
$NiSO_4$ CAS Number: 7786-81-4 EC Number: 232-104-9 Index number: 028-009-00-5	Below 0.3%	Carc 1A; Muta 2; Repr 1B; STOT RE 2; Acute tox. 4; Skin Irrit 2; Resp Sens 1; Skin Sens 1; Aquatic Acute 1;	H350i; H341; H360d; H373; H302; H332; H315; H334; H317; H400; H410
Composition/information on ingredients according to the Directive No 1999/45/EC	**Percentage content**	**Symbols**	**R phrases**
$CuSO_4$ 5 H_2O CAS Number: 7758-99-8 EC Number: 231-847-6 Index number: 029-004-00-0	Above 85%	Xn Xi N	R: 22-36/38-50/53
$NiSO_4$ CAS Number: 7786-81-4 EC Number: 232-104-9 Index number: 028-009-00-5	Below 0.3%	Carc. Cat. 1; Muta. Cat. 3; Repr. Cat. 2; T; Xn; Xi; N	R49; R68; R61; R20/22; R48/23; R38; R42/43; R50/53

3.2. Mixtures
Not applicable

SECTION 4. First aid measures

4.1 Description of first aid measures

Inhalation: *First aid: Move the patient from the exposed area. Ensure rest in a semi-recumbent or sitting position. Immediate medical attention is necessary.*

Ingestion: *First aid: Drink plenty of lukewarm water and induce vomiting. Immediate medical attention is necessary.*

Eye contact: *First aid: Rinse immediately with plenty of cool, possibly running water for about 15 minutes. Remove contact lenses if present and easy to remove, and continue rinsing. Avoid water-jet due to the risk of damage to conjunctivas. Immediate medical attention is necessary.*

Skin contact: *First aid: Remove clothes, wash skin with plenty of cold water, possibly running. If skin irritation develops, consult a physician.*

4.2. Most important acute and delayed symptoms and effects

Pain in the whole abdomen may occur (colic) usually preceded by a few days long constipation and increased blood pressure. Acute poisoning may cause damage to the liver, kidneys, and central and peripheral nervous system. Chronic poisoning may cause hypochromic anaemia (drop in haemoglobin levels in blood), changes in peripheral nerves, mainly in limbs, changes in the central nervous system.

4.3. Recommendations concerning immediate medical assistance and special treatment for a patient.

Decision on a type of emergency aid is taken by a physician following a thorough assessment of patient's status.

SECTION 5. Fire-fighting measures

5.1 Extinguishing media:

Suitable extinguishing media: *the semi-product is not flammable. In case of a fire in the immediate surroundings, fire should be extinguished with extinguishing media suitable for the burning substance.*

Unsuitable extinguishing media: *unknown.*

5.2 Special hazards related to the substance.

At high temperatures, sulphur dioxide and/or sulphur trioxide and copper oxides may be released.

5.3. Information for fire-fighters

Depending on burning materials. In case of semi-product getting in direct contact with fire, complete protective clothing and a self-contained breathing apparatus.

General recommendations: *notify persons in the vicinity about the fire. Remove from the hazardous zone all persons not participating in fire fighting. Notify Senior Shift Master at the Smelter.*

SECTION 6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures.

Remove from the hazardous zone all persons not participating in the emergency action. Use personal protective equipment specified in section 8.

6.2. Environmental precautions

In case of a breakdown prevent product from entering the environment. Prevent product from entering the drains. Try to collect, when possible, to suitable containers for further disposal. In case of significant spillages or contamination of the environment, relevant authorities and chemical rescue services should be advised.

6.3. Methods and materials preventing spreading of spillages and used for cleaning up:

Secure the surface against spillage of the substance. Contain a leak (seal the damaged container, place in a protective container). Collect the spilled substance in a suitable container and observe disposal considerations for hazardous waste. In case of solutions, collect the spilled product with absorbing material (diatomaceous earth, sand or other neutral absorbing material) in a closed container.

6.4. References to other sections

Information on personal protection equipment is provided in section 8, waste disposal considerations are described in section 13.

SECTION 7. Handling and storage

7.1. Safety precautions concerning safe handling

Avoid forming of aerosols at the work post. Use only small amounts of the substance in an appropriately marked room with efficient ventilation. Agents for containing product spillage or leakage should be available at the work post. Containers with the substance should be labelled. When not used, containers should be stored closed. Empty containers may contain remains that are hazardous. When handling, do not eat, drink or smoke. When

using the product, wash your hands before eating. Do not swallow. Rooms should be furnished with a suitable exhaust system. The work post should be equipped with a safety shower (for washing of a whole body) and a separate shower (spray) for eye rinsing.

7.2 Safe storage
Always store in original, tight, suitably labelled containers, in a cold, dry, well-ventilated storage room, equipped with electrical and ventilation systems. Protect the container against damage. Product storage place should be marked suitably and accessible only to suitably trained persons.

7.3. Special end use(s):
Identified uses are listed in section 1.2.

SECTION 8. Exposure controls/personal protection
8.1. Control parameters

The highest acceptable levels at the workplace that should be controlled:
Copper and its inorganic compounds – expressed as Cu (TLV-TWA, TLV-STEL) – TLV-TWA: 0.2 mg/m^3; TLV-STEL: undetermined

Copper levels with no harmful effects to the body:
DNEL (skin, respiratory tract; long-term exposure) – 0.041 mg/kg b.w./day);
DNEL (oral; short-term exposure) – 0.082 mg/kg b.w./day);

Copper levels with no harmful environmental effect:
PNEC (surface waters) – 7.8 µg/L
PNEC (sea waters) – 5.2 µg/L
PNEC (freshwater bottom sediments) – 87 mg/kg dry weight
PNEC (sea water sediments) – 676 mg/kg dry weight
PNEC (soil) – 65.5 mg/kg dry weight

Additional guidelines
Regulation of the Minister of Labour and Social Policy of November 29th, 2002 concerning the highest acceptable concentrations and levels of harmful agents at a workplace (Journal of Laws, 02.217.1833, as amended);
Regulation of the Minister of Health of December 30th, 2004 concerning occupational safety and health related to chemical agents present at a workplace (Journal of Laws, 05.11.86, as amended);

Monitoring in the air at a workstation
PN-91/Z-04030.05 Determination of the total dust level with the filtration-gravimetric method for the range of 0.05-80.00 mg/m^3.
PN-91/Z-04030.06 Determination of the respirable dust level with the filtration-gravimetric method for the range of 0.05-80.00 mg/m^3.
PN-Z-04008-7.2002 Protection of air quality – Collection of air samples – Rules for collecting air samples at work posts and interpretation of the results.
PN-EN 689:2002 Workplace atmospheres – Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy.
PN-EN 482:2006 Workplace atmospheres – General requirements for the performance of procedures for the measurement of chemical agents.
PN ISO 4225/Ak:1999 Air quality – General aspects – Terminology (national edition).
8.2 Occupational exposure controls
Ensure adequate general ventilation of production rooms and workstations. Do not inhale dusts.

When processing copper, means of personal protection suitable for hazards present should be used, in accordance with relevant national and Community regulations.
Eyes and face protection: *safety goggles*
Hand protection: *necessary – protective gloves protecting against chemical agents*
Skin protection: *protective clothing.*
Respiratory protection: *required in case of dust formation – anti-dust half-face mask, P-3 class*
Hygiene measures: *immediately change contaminated clothing. Contaminated clothing should be cleaned before next use. After work with the product wash your hands and face. When using, do not eat or drink.*

SECTION 9. Physical and chemical properties
9.1 Information on basic physical and chemical properties

Appearance: *pale blue to blue solid substance*
Odour: *odourless*
Odour level: *not applicable*
pH: *approx. 4 (50 g/L H_2O, 20°C)*
Melting point: *110°C*
Boiling point: *150 °C*
Flash point: *not applicable*
Auto-ignition temperature: *not applicable*
Flash point: *not applicable*
Evaporation rate: *not applicable*
Flammability limits: *not applicable*
Explosive limit: *not applicable*
Vapour pressure: *not applicable*
Vapour density: *not applicable*
Specific gravity: *2.284 g/cm^3 (25°C)*
Bulk density: *approx. 1100 kg/ m^3*
Solubility:
in water: *423 g/L (20°C), 2 023 g/L (100°C)*
in organic solvents: *slightly soluble in alcohols, well soluble in glycerine*
n-octanol water partition coefficient: *not applicable*
Auto-ignition temperature: *not applicable*
Decomposition temperature: *no data*
Viscosity: *not applicable*
Explosive properties: *not applicable*
Oxidative properties: *not applicable*

9.2. Other information
None

SECTION 10. Stability and reactivity
10.1. Reactivity: *product slightly reactive*
10.2. Chemical stability: *stable under normal conditions of use and storage.*
10.3. Possible hazardous reactions: *no data*
10.4. Conditions to avoid: *sources of heat (high temperature).*
10.5. Incompatible products: *strong acids, aluminium, acetylene, nitromethane, hydrazine. Reacts with hydroxylamine. Copper sulphate solutions are acidic and in a reaction with magnesium hydrogen is produced.*
10.6 Hazardous decomposition products: *during a fire or after heating copper oxides and sulphur oxides may form.*

SECTION 11. Toxicological information
11.1 Product toxicity data

Acute toxicity: *harmful when swallowed*

Inhalation toxicity: *on the basis of available data, classification criteria are not met.*

Corrosive/irritating effect on skin: *on the basis of available data, classification criteria are not met.*

Severe damage to eyes/irritating to eyes: *causes severe damage to eyes*

Sensitising effect on respiratory tract or skin: *may cause allergic skin reaction.*

Mutagenic effect on generative cells: *on a basis of available data, classification criteria are not met.*

Carcinogenicity: *may cause cancer.*

Harmful effect on fertility: *may harm an unborn child.*

Toxic effect for target organs – repeatable exposure: *may cause damage to organs following a long-term or repeatable exposure.*

Hazards related to inhalation: *on the basis of available data, classification criteria are not met.*

Concentrations and lethal and toxic doses:

LDL_0 (p.o. human)	*875 mg/kg*	*LD_{50} (i.p., mouse)*	*18 mg/kg*
LDL_{50} (p.o. rat)	*300 mg/kg*	*LDL_0 (s.c. mouse)*	*500 mg/kg*
LDL_{50} (s.c. rat)	*43 mg/kg*	*LDL_0 (i.v., mouse)*	*50 mg/kg*
LDL_{50} (unknown, rat)	*630 mg/kg*	*LDL_0 (i.v., rat)*	*18 mg/kg*

The lowest published lethal dose (LDL_0) for a human after consuming 50-857 mg/kg body weight.
The lowest published toxic dose (TDL_0) for a human after consuming 11-150 mg/kg body weight.
Pathomorphic damage to kidneys and disruptions in the blood picture were found.

11.2 Information on possible routes of exposure
Routes for absorbing: *inhalation, from gastrointestinal tract*
Due to slow absorption by inhalation and through the gastrointestinal tract, and slight absorption through the skin, only very high doses result in acute poisoning. Chronic absorption causes weakening of peripheral muscles, anaemia and changes in the central nervous system. Accumulates in the body, usually in bones, but also in kidneys and other tissues.

11.3. Delayed, direct and chronic effects of short- and long-term exposure:
Detailed information on symptoms related to the product properties together with possible exposure effects are described in section 4.2.

SECTION 12. Ecological information
12.1 Ecotoxicity:
Acute toxicity (LC_{50}/96h) to fish ≤ 1 mg/L – very toxic to aquatic organisms
IC_{50}/72h value (medial growth inhibiting concentration) for algae < 1 mg/L
Very toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.
Prevent from entering tap water intakes, soil and sewage.
Fungicide.

Toxic levels for copper in the aquatic environment

Threshold values for surface water quality indicators

Copper: 0.05 mg/L	*an indicator belonging to the group particularly harmful to the aquatic environment, concerning good and better than good ecological status of the uniform surface waters*

Sulphates
1^{st} cleanness class < 150 mg SO_4^{--}/L; pH = 6.0 ÷ 8.5;
2^{nd} cleanness class – 250 mg SO_4^{--}/L; pH = 6.0 ÷ 9.5;

Acceptable level in sewage discharged to water and soil:
Cu – 0.5 mg/L; SO_4/L – 500 mg/L

Limiting toxic concentration ($CuSO_4*H_2O$) for fish
Cyprinus carpio LC 50 (96h) – 0.81 mg/L
Pimephales promelas LC 50 (96h) – 0.45 mg/L

Limiting toxic concentration for
crustaceans Daphnia magna LC 50 (48h) – 0.0098 mg/L
algae *Pseudokirchneriella subcapitata EC 10 (72h) – 0.108 mg/L*

12.2 Durability and degradability: *not biodegradable in soil or in water and may contaminate ground and surface waters*
12.3. Bioaccumulation: *bioconcentration value determined for copper sulphate in experimental tests exceeds 100, thus indicating a possibility of significant bioaccumulation.*

12.4. Mobility in soil: *product slightly mobile in soil and water*
12.5. PBT and vPvB assessment results: *not applicable for inorganic substances*
12.6. Other harmful effect: *no data*

SECTION 13. Disposal considerations
13.1. Waste disposal methods
Do not discharge into a sewage system. Prevent contamination of surface and ground waters. Should not be disposed of together with household waste. Methods for liquidation of collected waste should each time be agreed upon with a local Environmental Protection Department.
Waste classification:

- Waste catalogue (Journal of Laws. 01.112.1206):	*06 04 05 Waste containing other heavy metals*
- OECD green waste catalogue:	*GA 120 Copper waste and scrap*
- OECD amber waste catalogue:	*AA 040 Copper ash and residues*

Legal grounds: *Waste Act of 27 April 2001 (Journal of Laws 2010.185.1243 and Journal of Laws 2010.203.1351, as amended)*
Act of 11 May 2001 on packaging and packaging waste (Journal of Laws No 63, item 638, as amended)
Regulation of the Minister of Environment of September 27th, 2001 concerning the waste catalogue (Journal of Laws No 112, item 1206, as amended)
Regulation of the Minister of Economy of October 25th, 2005 concerning detailed procedures for disposal of packaging waste (Journal of Laws No 219, item 1858, as amended)

SECTION 14. Transport information

The product is covered by general transport regulations. Covered transport is recommended.

14.1. Material identification number:	UN 3077
14.2. UN proper shipping name:	MATERIAL HAZARDOUS TO ENVIRONMENT, SOLID, N.O.S.
14.3. Transport hazard class:	9/M7
14.4. Packing group:	III
14.5. Environmental hazards	*90*

14.6. Special safety precautions for users: *in transport secure pallets against movement*
14.7. Bulk transport in accordance with appendix II to the MARPOL convention 73/78 and IBC code: *not applicable*

SECTION 15. Regulatory information
15.1. Regulations concerning safety, health and environmental protection specific for the substance.

The substance is not covered by *provisions of the Regulation (EC) No 2037/2000 of the European Parliament and of the Council of 29 June 2000 on substances that deplete the ozone layer (OJ L 244 of 29 Sept. 2000, as amended) and the Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants and amending Directive 79/117/EEC (OJ L 158 of 30 April 2004, as amended).*
The substance is not subject to *provisions of the Regulation (EC) No 689/2008 of the European Parliament and of the Council of 17 June 2008 concerning the export and import of dangerous chemicals (OJ L 204 of 31 July 2008, as amended)*
Copper compounds are not listed *in the Appendix X to the Decision No 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 establishing the list of priority substances in the field of water policy and amending Directive 2000/60/EC (OJ L 331, 15 December 2001)*

Regulations
Regulation (EC) 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing the European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC; Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (OJ L 353/1, as amended); Commission Regulation (EU) No 453/2010 of 20 May 2010 amending

Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (OJ L 133/1 of 31 May 2010).
Act of 27 April 2001, Environmental Protection Law (Journal of Laws 01.62.627, as amended); Act of 27 April 2001 on Waste (Journal of Laws 2010.185.1243 and Journal of Laws 2010.203.1351, as amended); Regulation of the Minister of Environment of September 27th, 2001 concerning the waste catalogue (Journal of Laws No 112, item 1206, as amended); Act of May 11th, 2001 on packaging and packaging waste (Journal of Laws No 63, item 638, as amended;) Regulation of the Minister of Labour and Social Policy of November 29th, 2002 concerning the highest acceptable concentrations and levels of harmful agents at a workstation (Journal of Laws, 02.217.1833, as amended); Regulation of the Cabinet of August 24th, 2004 concerning the list of works prohibited for youth and conditions for their employment for some of those works (Journal of Laws 04.200.2047,a s amended), Act of 28 October 2002 concerning hazardous freight by road (Journal of Laws 02.199.1671, as amended); Act of 31 March 2004 concerning hazardous freight by railway (Journal of Laws 04.97.962); Regulation of the Minister of Economy of December 21st, 2005 concerning specific requirements for personal protection equipment (Journal of Laws 2005.259.2173); Regulation of the Minister of Health of April 20th, 2005 on tests and measurements for substances hazardous to health in work environment (Journal of Laws 2005.73.645); Regulation of the Minister of Environment of August 20th, 2008 concerning classification of condition of uniform parts of surface waters (Journal of Laws 2008.162.1008); Regulation of the Minister of Environment of January 28th, 2009 amending the regulation concerning conditions to be met when discharging sewage to waters or to the ground and on substances particularly harmful to the aquatic environment (Journal of Laws 2009.27.169), Act of 25 February 2011 on chemical substances and their mixtures (Journal of Laws 2011.63.322)

15.2 Chemical safety assessment
The chemical safety assessment was carried out for the product. The Chemical Safety Report for lead is available at KGHM Polska Miedź S.A., "Legnica" Copper Smelter and Refinery.

SECTION 16. Other information
R- and H- phrases that were not specified in sections 2-15:
R38 – Irritating to skin
R42/43 – May cause sensitization by inhalation and skin contact
H315 – Causes skin irritation
H341 – Suspected of causing genetic defects
H332 – Harmful if inhaled
H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled

Meaning of abbreviations and acronyms used in the MSDS:
CAS number – *unique numerical identifiers assigned by the American organisation – Chemical Abstracts Service (CAS) to every chemical, allowing identification of the substance*
EC number – *the number that is assigned to a chemical substance listed in the European Inventory of Existing Chemical Substances (EINECS) or the number that is assigned to a chemical substance listed in the European List of Notified Chemical Substances (ELINCS), or the number in the list of chemical substances specified in the paper "No longer polymers".*
Index number – *the identification code provided in section 3, Append. VI, of the Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures.*
Registration number – *the number assigned by the European Chemicals Agency (ECHA) when the substance/semi-product is registered by a manufacturer/importer in accordance with the REACH Regulation.*
LD_{50} – *a dose of a toxic substance expressed in milligrams per kg of body weight, required to kill 50% of a studied population.*
LC_{50} – *concentration of a substance in the inhaled air, expressed in mg/l, causing death of 50% of a studied population after inhaling for the specified time.*
EC_{50} – *a dose of a substance expressed in mg/litre, causing a specified pharmacological effect (e.g. growth inhibition) in 50% of a studied population in the specified time.*
NOEC – *the highest level of a toxic substance at which its adverse effect is not observed.*
TLV-TWA – *Threshold limit value – Time weighted average – a time weighted average concentration, whose effect on an employee during 8 hours a day and an average work schedule specified in the Labour code throughout his/her occupational activity should not have an adverse effect on his/her health and on health of his/her descendants.*

TLV-STEL – *Threshold limit value – Short-term exposure limit – an average concentration that should not have an adverse effect on employee's health when it is present in the work environment for no longer than 15 minutes and no more often than twice during a shift, at a time interval no shorter than 1 hour.*
DNEL – *the derived no-effect level.*
PNEC – *predicted concentration without any effect for the environment.*

Required trainings: *on-job training on safe use of a substance, considering its hazardous properties for human and for environment.*

Sources of information used to draw up this MSDS:

- *Own results of qualitative and quantitative analyses of refined lead*
- *"Niebezpieczne Substancje Praktyczny Poradnik"(Hazardous Substances Practical Guidelines) ALFA-WEKA*
- *European Chemical Substance Information System.*
- *Encyklopedia Techniki CHEMIA (Technical Encyclopedia CHEMISTRY), WNT*
- *CHEMISTRY: structure and reactions. Milton K. Snyder*
- *Chemical Safety Report*

All data is based on our current knowledge. Recipients of our product should take into account applicable legal regulations and other provisions.

This MSDS is a property of KGHM Polska Miedź S.A. Legnica Copper Smelter and Refinery and applies solely to our product.

Further information can be obtained *at telephone numbers listed in section 1.*

The MSDS was amended *as required by the Regulation (EC) 453/2010 of 20 May 2010, concerning:*

- *identification of the substance*
- *substance classification and labelling*
- *first aid measures*
- *fire fighting and accidental release measures*
- *handling and storage*
- *exposure control and personal protection equipment*
- *physical and chemical properties*
- *stability and reactivity*
- *toxicological information*
- *ecological information*
- *waste disposal considerations*
- *transport information*
- *regulatory information*
- *additional information in section 16.*

The MSDS was updated by: *Hubert Opaczewski*

Approved by:
Technical and Production
DIRECTOR
BoM REPRESENTATIVE

Leszek Garycki