Acute Oral Toxicity

(Acute Toxic Class Method)

with

Diniobium Pentaoxide (Nb_2O_5)

Report

Version: Final

Date: 16 September 2009

BSL BIOSERVICE Study No.: 092576A

Sponsor:

CBMM Europe BV

WTC H-tower

Zuidplein 96

1077 XV Amsterdam

The Netherlands

1. Copy of the GLP Certificate

BAYERISCHES LANDESAMT
FÜR GESUNDHEIT UND LEBENSMITTELSICHERHEIT,
LANDESINSTITUT FÜR ARBEITSSCHUTZ UND PRODUKTSICHERHEIT
Pfarrstraße 3 · 80538 München · Telefon (089) 21 84-0

GLP-Bescheinigung/Statement of GLP Compliance
(gemäß/according to § 19b Abs. 1 Chemikaliengesetz)

Eine GLP-Inspektion zur Überwachung der Einhaltung der GLP-Grundsätze gemäß Chemikaliengesetz bzw. Richtlinie 2004/9/EG wurde durchgeführt in:

Assessment of conformity with GLP according to Chemikaliengesetz and Directive 2004/9/EC at:

☒ Prüfeinrichtung/Test facility ☐ Prüfstandort/Test site

BSL Bioservice Scientific Laboratories GmbH
Behringstrasse 6 - 8
82152 Planegg

(Unverwechselbare Bezeichnung und Adresse/Unequivocal name and address)

Prüfungen nach Kategorien/Areas of Expertise
(gemäß/according ChemVwV-GLP Nr. 5.3/OECD guidance)

2 Prüfungen auf toxikologische Eigenschaften
3 Prüfungen auf mutagene Eigenschaften
9 Sonstige Prüfungen:
a) Mikrobiologische Sicherheitsprüfungen
b) Wirksamkeitsprüfungen an Zellkulturen

Datum der Inspektion/Date of Inspection
(Tag.Monat.Jahr/day.month.year)
16./17.09.2008

Die/Der genannte Prüfeinrichtung/Prüfstandort befindet sich im nationalen GLP-Überwachungsverfahren und wird regelmäßig auf Einhaltung der GLP-Grundsätze überwacht.

The above mentioned test facility/test site is included in the national GLP Compliance Programme and is inspected on a regular basis.

Auf der Grundlage des Inspektionsberichtes wird hiermit bestätigt, dass in dieser Prüfeinrichtung/diesem Prüfstandort die oben genannten Prüfungen unter Einhaltung der GLP-Grundsätze durchgeführt werden können.

Based on the inspection report it can be confirmed, that this test facility/test site is able to conduct the aforementioned studies in compliance with the Principles of GLP.

München, 06.04.2009

Ritter
Leitender Gewerbedirektor

L.S.

2. Contents

3. List of Tables and Figures

page

4. Preface

4.1. Abbreviations

aqua ad inject.	aqua ad injectionem
approx.	approximately
BGBl.	Bundesgesetzblatt
bw	body weight
EC	European Commission
EEC	European Economic Community
e.g.	for example
EPA	Environmental Protection Agency
GHS	Globally Harmonised System of Classification and Labelling of Chemicals
GLP	Good Laboratory Practice
IVC	Individually Ventilated Cage(s)
LD	lethal dose
LD50	median lethal dose
microbiol.	microbiological
OECD	Organisation of Economic Cooperation and Development
OPPTS	Office of Prevention, Pesticides, and Toxic Substances
QAU	Quality Assurance Unit
SOP	Standard Operating Procedures
SPF	specific-pathogen free

4.2. General

Sponsor:	CBMM Europe BV WTC H-tower Zuidplein 96 1077 XV Amsterdam The Netherlands
Study Monitor:	Mr. Jorge Davo CBMM Companhia Brasileira de Metalurgia e Mineração Córrego da Mata s/n38183-903 Araxá - MG BRASIL
Test Facility:	BSL BIOSERVICE Scientific Laboratories GmbH Behringstraße 6/8 82152 Planegg Germany
BSL BIOSERVICE Study No.:	092576A
Test Item:	Diniobium Pentaoxide (Nb_2O_5)
Title:	Acute Oral Toxicity (Acute Toxic Class Method) with Diniobium Pentaoxide (Nb_2O_5)

4.3. Project Staff

Study Director:	Dr. Pradeep Takawale
Deputy Study Director:	Dr. Achim Albrecht
Management:	Dr. Wolfram Riedel Dr. Angela Lutterbach
Head of Quality Assurance Unit:	Dipl.-Biol. Uwe Hamann

4.4. Schedule

Arrival of the Test Item:	20 July 2009
Date of Draft Study Plan:	27 July 2009
Date of Final Study Plan:	31 July 2009
Acclimatisation Period:	Step 1, animal no. 1, 2, 3: 30 July 2009 - 11 August 2009 Step 2, animals no. 4, 5, 6: 30 July 2009 - 12 August 2009
Start of Experiment:	11 August 2009
Dose Administration:	Step 1, animal no. 1, 2, 3: 11 August 2009 Step 2, animals no. 4, 5, 6: 12 August 2009
End of Experiment:	26 August 2009
Date of Draft Report:	09 September 2009
Date of Final Report:	16 September 2009

5. Project Staff Signatures

Study Director Dr. Pradeep Takawale

.....

Date: .....

Management

.....

Print name:

Date: .....

6. Quality Assurance

6.1. GLP Compliance

This study was conducted to comply with:

Chemikaliengesetz ("Chemicals Act") of the Federal Republic of Germany, Appendix 1 to § 19a as amended and promulgated on June 20, 2002 (BGBl. 1 Nr. 40 S. 2090), revised October 31, 2006 (BGBl. I Nr. 50 S. 2407).

OECD Principles of Good Laboratory Practice (as revised in 1997); OECD Environmental Health and Safety Publications; Series on Principles of Good Laboratory Practice and Compliance Monitoring - Number 1. Environment Directorate, Organisation for Economic Co-operation and Development, Paris 1998.

This study was assessed for compliance with the study plan and the Standard Operating Procedures of BSL BIOSERVICE. The study and/or the test facility were periodically inspected by the Quality Assurance unit according to the corresponding SOPs. These inspections and audits were carried out by the Quality Assurance unit, personnel independent of staff involved in the study. A signed Quality Assurance Statement, listing all performed audits, is included in the report.

6.2. Guidelines

This study followed the procedures indicated by internal BSL BIOSERVICE SOPs and the following internationally accepted guidelines and recommendations:

First Addendum to OECD Guidelines for Testing of Chemicals, Section 4, No. 423, "Acute Oral Toxicity – Acute Toxic Class Method" adopted 17 December 2001

Commission Regulation (EC) No. 440/2008, L 142, Annex Part B, 30 May 2008

EPA Health Effects Test Guidelines, OPPTS 870.1000 "Acute toxicity testing background", EPA 712-C-02-189, December 2002

EPA Health Effects Test Guidelines, OPPTS 870.1100 "Acute oral toxicity", EPA 712-C-02-190, December 2002

6.3. Archiving

The following records will be stored in the scientific archives of BSL BIOSERVICE Scientific Laboratories GmbH according to the GLP Regulations:

A copy of the final report, the study plan and a documentation of all raw data generated during the conduct of the study (documentation forms as well as any other notes of raw data, printouts of instruments and computers) and the correspondence with the Sponsor concerning the study.

If test item is left, a sample will be stored according to the period fixed by the GLP Regulations. Samples that are unstable may be disposed of before that time. No raw data or material relating to the study will be discarded without the Sponsor's prior consent. Unless otherwise agreed upon, the remaining test item will be discarded three months after the release of the report.

7. Statement of Compliance

BSL BIOSERVICE- Study No.:	092576A
Test Item:	Diniobium Pentaoxide (Nb_2O_5)
Title:	Acute Oral Toxicity (Acute Toxic Class Method) with Diniobium Pentaoxide (Nb_2O_5)
Study Director:	Dr. Pradeep Takawale

This study performed in the test facility BSL BIOSERVICE Scientific Laboratories GmbH was conducted in compliance with Good Laboratory Practice Regulations:

Chemikaliengesetz ("Chemicals Act") of the Federal Republic of Germany, Appendix 1 to § 19a as amended and promulgated on June 20, 2002 (BGBl. Nr. 40 S. 2090), revised October 31, 2006 (BGBl. I Nr. 50 S. 2407).

"OECD Principles of Good Laboratory Practice (as revised in 1997)", Paris 1998.

There were no circumstances that may have affected the quality or integrity of the study.

Study Director: Dr. Pradeep Takawale

.....

Date: .....

8. Statement of the Quality Assurance Unit

BSL BIOSERVICE- Study No.:	092576A
Test Item:	Diniobium Pentaoxide (Nb_2O_5)
Title:	Acute Oral Toxicity (Acute Toxic Class Method) with Diniobium Pentaoxide (Nb_2O_5)
Study Director:	Dr. Pradeep Takawale

This report was audited by the Quality Assurance unit and the conduct of this study was inspected on the following dates:

Phases of QAU Inspections	*Dates of QAU Inspections*	*Dates of Reports to the Study Director and Management*
Audit Final Study Plan:	06 August 2009	06 August 2009
Audit Experimental Phase (Method Audit):	29 July 2009	29 July 2009
Audit Final Report:	21 September 2009	21 September 2009

This report reflects the raw data.

Member of the
Quality Assurance unit:

.....

Print name:

Date: .....

9. Summary

Two groups, each of three female WISTAR Crl: WI (Han) rats were treated with the test item by oral gavage administration at a dosage of 2000 mg/kg body weight. The test item was suspended in deionised water at a concentration of 0.2 g/mL and administered at a dose volume of 10 mL/kg.

All animals after their entrance at BSL were allowed to acclimatise to the laboratory conditions. The animals were observed on delivery, on inclusion in the study and before administration for mortality/morbidity and other clinical signs. All animals were examined for clinical signs several times on the day of dosing and once daily until the end of the observation period. Their body weights were recorded on day 1 (prior to the administration) and on days 8 and 15. All animals were necropsied and examined macroscopically on day 15.

Table 1: Results per Step

Step	*Sex/no.*	*Dose (mg/kg)*	*Number of animals*	*Number of intercurrent deaths*
1	f/1-3	2000	3	0
2	f/4-6	2000	3	0

All animals survived until the end of the study without showing any signs of toxicity.

Throughout the 14-day observation period the weight gain of the animals was within the expected range.

At necropsy, no macroscopical findings were observed in any animal of any step.

On the basis of the test results given below and in conformity with the criteria given in Annex VI to Commission Directive 2001/59/EC as well as in Annex I of Regulation (EC) 1272/2008, the substance should be:

classified as very toxic	[ ]
classified as toxic	[ ]
classified as harmful	[ ]
not classified	[X]
Limit test	[X]
LD_{50} cut off:	5000 mg /kg bw
Species/strain:	WISTAR Crl: WI(Han) rats
Number of animals:	3 per step / 2 steps performed
Vehicle:	aqua ad injectionem
Method:	OECD 423 Commission Regulation (EC) 440/2008 OPPTS 870.1000 OPPTS 870.1100

9.1. Conclusions

Under the conditions of the present study, single oral application of the test item Diniobium Pentaoxide (Nb_2O_5) to rats at a dose of 2000 mg/kg body weight was neither associated with signs of toxicity nor mortality.

The median lethal dose of Diniobium Pentaoxide (Nb_2O_5) after single oral administration to female rats, observed over a period of 14 days is:

LD_{50} cut off (rat): 5000 mg/kg body weight

In conformity with the criteria given in Annex VI to Commission Directive 2001/59/EC the test item Diniobium Pentaoxide (Nb_2O_5) has no obligatory labelling requirement for toxicity (for details see *Evaluation of Results*).

According to Annex I of Regulation (EC) 1272/2008 the test item Diniobium Pentaoxide (Nb_2O_5) is unclassified (for details see *Evaluation of Results*).

According to OECD-GHS (Globally Harmonized Classification System) the test item Diniobium Pentaoxide (Nb_2O_5) is unclassified (LD_{50} cut off 5000 mg/kg bw) (for details see *Evaluation of Results*).

10. Aim of the Study

10.1. Justification for Selection of the Test System

The test for acute toxicity is performed on the rat. Although several mammalian species may be used, the rat has been the preferred rodent species.

It is the principle of the acute toxic class method that, based on a stepwise procedure with the use of a minimum number of animals per step, sufficient information is obtained on the acute toxicity of the test item to enable its classification. The item is tested using a stepwise procedure with four fixed doses. Absence or presence of compound-related mortality of the animals dosed at one step will determine the next step.

This study provides information both for hazard assessment purposes and for hazard classification purposes. Results enable compounds to be ranked in different classification systems.

10.2. Justification for Selection of the Test Method

No validated *in vitro* method is available for assessing acute toxicity.

11. Materials and Methods

11.1. Characterisation of the Test Item

The test item and the information concerning the test item were provided by the Sponsor. All data related to the test item are the responsibility of the Sponsor and have not been verified by the test facility.

Product:	Dinobium Pentoxide (Nb_2O_5)
CAS No.:	1313-96-8
Lot No.:	AD/4199
Components:	Nb_2O_5: > 98.5%
Density:	~ 4.5 g/cm3
Melting point:	1512 °C
Colour:	pale yellow
Physical state at RT:	solid
Storage conditions:	at room temperature
Safety precautions:	Use protective clothing, gloves and safety goggles.

11.2. Preparation of the Test Item

The test item was suspended in deionised water.

11.3. Vehicle

Deionised water (BSL, lot no. 09/07/14, expiry date: 14/09/2009)

This vehicle was chosen due to its non-toxic characteristics.

11.4. Test System

Species/strain: Healthy rats, WISTAR rats Crl: WI(Han) (Full-Barrier)

Source: Charles River, 97633 Sulzfeld, Germany

Sex: female, non-pregnant, nulliparous

Number of animals: 3 per step

Age at the beginning of the study: 8 - 10 weeks old

Body weight at the beginning of the study:

Animals no. 1 – 3, step 1: 162 – 181 g;
Animals no. 4 – 6, step 2: 165 – 170 g;

The animals were derived from a controlled full barrier maintained breeding system (SPF). According to Art. 9.2, No.7 of the German Act on Animal Welfare the animals were bred for experimental purposes.

11.4.1. Housing and Feeding Conditions

- Full barrier in an air-conditioned room
- Temperature: 22 ± 3 °C
- Relative humidity: 55 ± 10%
- Artificial light, sequence being 12 hours light, 12 hours dark
- Air change: 10 x / hour
- Free access to Altromin 1324 maintenance diet for rats and mice (lot no. 1131)
- Free access to tap water, sulphur acidified to a pH value of approx. 2.8 (drinking water, municipal residue control, microbiologically controlled at frequent intervals)
- The animals were kept in groups in IVC cages, type III H, polysulphone cages on Altromin saw fibre bedding (lot no. 050109)
- Certificates of food, water and bedding are filed at BSL BIOSERVICE
- Adequate acclimatisation period (for details see s*chedule*)

11.5. Preparation of the Animals

The animals were marked for individual identification by tail painting.

Prior to the administration a detailed clinical observation was made of all animals.

Prior to the administration food was withheld from the test animals for 16 to 19 hours (access to water was permitted). Following the period of fasting the animals were weighed and the test item was administered. Food was provided again approximately 4 hours post dosing.

11.6. Administration

The test item was administered at a single dose by gavage using a feeding tube.

For all animals, the test item was administered at a dose volume of 10 mL/kg body weight.

11.7. Dose Level

The starting dose was selected to be 2000 mg/kg body weight. No compound related mortality was recorded for any animal of step 1 or 2. Based on these results and according to the acute toxic class method regime no further testing was required.

11.8. Observation Period

All animals were observed for 14 days after dosing for general clinical signs, morbidity and mortality.

11.9. Weight Assessment

The animals were weighed on day 1 (prior to the administration) and on day 8 and on day 15.

11.10. Clinical Examination

A careful clinical examination was made several times on the day of dosing (at least once during the first 30 minutes and with special attention given during the first 4 hours post-dose). As soon as symptoms were noticed they were recorded. Thereafter, the animals were observed for clinical signs once daily until the end of the observation period. All abnormalities were recorded.

Cageside observations included changes in the skin and fur, eyes and mucous membranes. Also respiratory, circulatory, autonomic and central nervous systems and somatomotor activity and behaviour pattern were examined. Particular attention was directed to observations of tremor, convulsions, salivation, diarrhoea, lethargy, sleep and coma.

11.11. Pathology

At the end of the observation period, the animals were sacrificed by an overdosage of pentobarbital injected intraperitoneally (Narcoren®, Merial; lot no.: 189039; expiry date: March 2012) at a dosage of approx. 8 mL/kg bw.

All animals were subjected to gross necropsy. All gross pathological changes were recorded.

11.12. Evaluation of Results

Results were interpreted according to OECD Guideline 423, Annex 2 (see also flow charts in the appendix of the study plan).

Individual reactions of each animal were recorded at each time of observation.

Toxic response data were recorded by dose level.

Nature, severity and duration of clinical observations were described.

Body weight changes were summarised in tabular form.

Necropsy findings were described.

On the basis of the test results, the test substance was classified in any of the following classes in conformity with the criteria given in Annex VI to Commission Directive 2001/59/EC:

- *Very toxic*

Substances and preparations shall be classified as very toxic, and assigned the symbol “T+” and indication of danger “very toxic” in accordance with the criteria specified below:

R28 Very toxic if swallowed

- LD50 oral, rat ≤ 25 mg/kg
- less than 100% survival at 5 mg/kg oral, rat by the fixed dose procedure, or
- high mortality at doses ≤ 25 mg/kg oral, by the acute toxic class method.

- *Toxic*

Substances and preparations shall be classified as toxic, and assigned the symbol “T” and indication of danger “toxic” in accordance with the criteria specified below. Risk phrases shall be assigned in accordance with the following criteria:

R25 Toxic if swallowed

- LD50 oral, rat 25 < LD50 ≤ 200 mg/kg
- discriminating dose, oral rat 5 mg/kg: 100% survival but evident toxicity, or
- high mortality in the dose range > 25 to ≤ 200 mg/kg oral, rat, by the acute toxic class method.

- *Harmful*

Substances and preparations shall be classified as harmful, and assigned the symbol "Xn" and indication of danger "harmful" in accordance with the criteria specified below. Risk phrases shall be assigned in accordance with the following criteria:

R22 Harmful if swallowed

- LD50 per oral, rat 200 < LD50 ≤ 2000 mg/kg
- discriminating dose, oral rat, 50 mg/kg: 100% survival but evident toxicity,
- less than 100% survival at 500 mg/kg, rat oral by the fixed dose procedure, or
- high mortality in the dose range > 200 to ≤ 2000 mg/kg oral, rat, by the acute toxic class method.

On the basis of the test results, the following risk phrases shall be assigned in conformity with the criteria given in Annex I of Regulation (EC) 1272/2008:

Category 1: LD50 ≤ 5 mg/kg

and

Category 2: LD50 > 5 mg/kg ≤ 50 mg/kg DANGER. Skull and crossbones in diamond. Fatal if swallowed.

Category 3: LD50 > 50 mg/kg ≤ 300 mg/kg. DANGER. Skull and crossbones in diamond. Toxic if swallowed.

Category 4: LD50 > 300 mg/kg ≤ 2000 mg/kg. WARNING. Exclamation point in diamond. Harmful if swallowed.

On the basis of the test results, the following risk phrases shall be assigned in conformity with the criteria given in OECD-GHS - Globally Harmonised System of Classification and Labelling of Chemicals, second revised edition, 2007:

OECD-GHS Criteria:

Category 1: LD50 ≤ 5 mg/kg

and

Category 2: LD50 > 5 mg/kg ≤ 50 mg/kg. DANGER. Skull and crossbones in diamond. Fatal if swallowed.

Category 3: LD50 > 50 mg/kg ≤ 300 mg/kg. DANGER. Skull and crossbones in diamond. Toxic if swallowed.

Category 4: LD50 > 300 mg/kg ≤ 2000 mg/kg. WARNING. Exclamation point in diamond. Harmful if swallowed.

Category 5: LD50 > 2000 mg/kg ≤ 5000 mg/kg. (note (e) to GHS table 3.1.1). WARNING. No symbol. May be harmful if swallowed.

12. Deviations from the Study Plan

There was the following deviation from the study plan:

Concerning:

Housing and Feeding Conditions, study plan, p. 11

Before:

Semi-barrier in an air-conditioned room

New:

Full-barrier in an air-conditioned room

Reason:

Typing error.

This deviation did not influence the quality or integrity of the present study.

13. Results

The test item showed no acute oral toxic characteristics after a single dose administration. For individual data see Tables 2 and 3.

13.1. Clinical signs

Table 2: Clinical Signs - Individual Data

Animal no. / sex	*Time of observation post-dose*	*Observations*
1 / female	during the whole observation period	no signs of toxicity
2 / female	during the whole observation period	no signs of toxicity
3 / female	during the whole observation period	no signs of toxicity
4 / female	during the whole observation period	no signs of toxicity
5 / female	during the whole observation period	no signs of toxicity
6 / female	during the whole observation period	no signs of toxicity

Based on these results and according to the acute toxic class method regime no further testing was required.

Therefore, according to OECD Guideline 423, a sufficient estimation of the acute oral toxicity of the test item is provided.

13.2. Body Weight Development

None of the animals showed weight loss during the observation period (for individual data see Table 3).

Table 3: Absolute Body Weights in g and Body Weight Gain in %

Animal no. / sex	*g* *Day 1*	*g* *Day 8*	*g* *Day 15*	*%* *Day 1-15*
Step 1 *(2000 mg/kg bw)*				
1 / female	167	180	187	12
2 / female	162	181	183	13
3 / female	181	193	198	9
Step 2 *(2000 mg/kg bw)*				
4 / female	168	181	184	10
5 / female	170	185	198	16
6 / female	165	179	187	13

13.3. Pathology

With the exception of acute injection of blood vessels in the abdominal region, which is due to the euthanasia injection, no special gross pathological changes were recorded for any animal of the two steps.

13.4. LD50 cut-off

Table 4: LD50 cut off

Dose (unit)	*Number of animals investigated*	*Number of intercurrent deaths*	*LD50 cut off*
2000 mg/kg body weight	6	0	5000 mg/kg body weight

13.5. Conclusions

Under the conditions of the present study, single oral application of the test item Diniobium Pentaoxide (Nb_2O_5) to rats at a dose of 2000 mg/kg body weight was neither associated with signs of toxicity nor mortality.

The median lethal dose of Diniobium Pentaoxide (Nb_2O_5) after single oral administration to female rats, observed over a period of 14 days is:

LD_{50} cut off (rat): 5000 mg/kg body weight

In conformity with the criteria given in Annex VI to Commission Directive 2001/59/EC the test item Diniobium Pentaoxide (Nb_2O_5) has no obligatory labelling requirement for toxicity (for details see *Evaluation of Results*).

According to Annex I of Regulation (EC) 1272/2008 the test item Diniobium Pentaoxide (Nb_2O_5) is unclassified (for details see *Evaluation of Results*).

According to OECD-GHS (Globally Harmonized Classification System) the test item Diniobium Pentaoxide (Nb_2O_5) is unclassified (LD_{50} cut off 5000 mg/kg bw) (for details see *Evaluation of Results*).

14. Distribution of the Report

1 original (paper):	Sponsor
1 copy (paper):	BSL BIOSERVICE

15. References

BSL BIOSERVICE, Standard Operating Procedures (SOP) No. 11-4-2

Commission Regulation (EC) No 440/2008, L 142, Annex Part B of 30 May 2008 laying down test methods pursuant to Regulation (EC) No. 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

Commission Directive 2001/59/EC adapting to technical progress for the 28th time Council Directive 67/548/EC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances, August 06, 2001 (Official Journal of the European Communities no. L 225/1, August 21, 2001)

OECD, 2001: Acute Oral Toxicity - Acute Toxic Class Method, OECD Guidelines for Testing of Chemicals 423, adopted 17.12.2001

OECD-GHS - Globally Harmonised System of Classification and Labelling of Chemicals. Second revised edition, United Nations. New York / Geneva, 2007

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. Official Journal of the European Communities, L 353, 31.12.2008

Schlede E, Mischke U, Diener W, Kayser D.
The international validation study of the acute toxic class method (oral).
Arch Toxicol, 1995;69(10):659-670

US-EPA, 1998: Acute oral toxicity, Health Effects Test Guidelines OPPTS 870.1100. United States Environmental Protection Agency, Prevention, Pesticides and Toxic Substances (7101), EPA 712-C-02-190, December 2002

US-EPA, 2002: Acute Toxicity Testing - Background. Health Effects Test Guidelines, OPPTS 870.1000. United States, Environmental Protection Agency, Prevention, Pesticides and Toxic Substances (7101),EPA 712-C-02-189, December 2002

16. Appendix - Certificate of Analysis

CBMM

COMPANHIA BRASILEIRA DE METALURGIA E MINERAÇÃO
Córrego da Mata S/N - C.P. 08 - Araxá - Minas Gerais - Cep: 38.183-970 - Brasil
Phone: (55-34) 3669-3000 - Facsimile: (55-34) 3669-3300

CERTICATE OF ANALYSIS

NUM.	DATE
	06/22/2009

PRODUCT	LOT	SIZING	QUANTITY
NIOBIUM PENTOXIDE HIGH PURITY	AD/4199		9.0

MARK	CUSTOMER	PACKAGING
	REACH	1/1

Element	Analysis
% Nb2O5	99.2
% LOI	0.1
ppm Ta	707
ppm Ti	1305
ppm Fe	201
ppm Si	91
ppm P	85
ppm S	<20
ppm C	<30
ppm Na	<10
ppm K	76
ppm Sn	<3
ppm Pb	<1

Size Distribution

Screen (mm)	(%) Analysis

Observation

Emitted by	Approved by
f/ Leandro Oliveira Lima Chemist	f/ Andreia Duarte Menezes Teixeira Lab. Manager

xlsCert_AD_Inglês.xls