



# Chem-Science Laboratories cc

CK 90/08185/23

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 Fax: (031) 837686

Our certificate number: 93345A

## Certificate of Analysis

One sample of road mix product received on the 1993-11-10; sampled by yourselves. Marked: **STAB-TECK PLUS**

The analysis on an as received basis showed:

Test	Result in % m/m
Copper as Cu.....	0.0001
Lead as Pb.....	0.0002
Silver as Ag.....	0.00002
Zinc as Zn.....	0.0002
Total chromium as Cr.....	0.00004
Arsenic as As.....	<0.00001
Total mercury as Hg.....	<0.0005
Total cyanides as CN.....	<0.00005

### COMMENTS:

The sample submitted contains traces of heavy metals; however the levels are low and would be negligible once the product has been diluted 1 part in 500 parts as directed for its intended use. The LD50 value for the product should be ascertained by the long term bioassay experiments.

Signed..... this 18th day of November 1993.

V A Soffiantini  
 Sci. Nat., B. Com., M. S. A. Chem. I.

TO: Fosroc (Pty) Ltd.  
 Trotters Road  
 Pinetown

Attention:

CONFIDENTIAL  
 LABORATORY REPORT

For terms and conditions of issue, see reverse

MEMBERS: V. Soffiantini Sci. Nat., B. Com., C. Soffiantini, J.D. Soffiantini B. Sc., J.C. Soffiantini

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## Stab - Teck Plus

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BRITISH COLUMBIA ENVIRONMENT

REPORT NUMBER RTC5002

REPORT ON THE VARIOUS TOXICITY TESTS AND  
CHEMICAL ANALYSIS OF **Stab-Teck** ANIONIC  
SYNTHETIC THIO COMPOUND

ROBERTSON TECHNOLOGIES CORPORATION

Suite 900, 580 Hornby Street, Vancouver, B.C. V6C 3B6



NOSAFORM  
5.51.01

# HAZARDOUS MATERIAL RECORD

## SECTION 1 - BASIC INFORMATION

CHEMICAL NAME AND SYNONYMS

TRADE NAME AND SYNONYMS

SULPHONIC ACID AN DERIVATIVES

STAB-TECK . PLUS

CHEMICAL FAMILY

FORMULA

ORGANIC ACID MIXTURE

R - SO<sub>3</sub>H

MANUFACTURER'S NAME

TELEPHONE NO

AL . Nahda Road Work compas: x L.L.C

+97150615664

ADDRESS (Number, Street, City, Zip)

P.O BOX : 5441 Abu Dhabi U. AE

EMERGENCY TEL NO

CONTACT PERSON

(Phone) WHERE EMERGENCY HELP AVAILABLE

+97150615664

Mr. WAHID

STAB-TECK . PLUS

## SECTION 2 - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES AND SOLVENTS	%	TLV (UNITS)	*ACC TLV LEVELS	ALLOYS AND METALLIC COATINGS	%	TLV (UNITS)	*ACC TLV LEVELS
PIGMENT				BASE METAL			
CATALYST				ALLOYS			
VEHICLE				METALLIC COATING			
SOLVENTS				FILLER METAL PLUS COATING OR CORE FLUX			
ADDITIVES				OTHER			
SULPHONIC ACID	15	ppm	500 in air				

\* USING NOSA, SABS, FACTORIES ACT, MINES & WORKS, OR OTHER APPLICABLE STANDARDS

HAZARDOUS MIXTURES FIRMED WITH OTHER LIQUIDS, SOLIDS, OR GASES

N/A

## SECTION 3 - PHYSICAL PROPERTIES

BOILING POINT (°C)	100°	SOLUBILITY IN WATER	SOL.	PER CENT VOLATILE BY VOLUME (%)	83
VAPOUR PRESSURE	20	SPECIFIC GRAVITY (H20 - 1)	1.05	EVAPORATION RATE	0.1
VAPOUR DENSITY (AIR = 1)	+ 1.0	pH	0.5 ± 1.0	(N-BUTYL = 1 ACETATE)	

APPEARANCE AND ODOUR

RED VISCOUS FLUID. NO ODOUR

## SECTION 4 - FIRE AND EXPLOSION HAZARD

FLASH POINT (°C)	IGNITION TEMP (°C)	FLAMMABLE LIMITS % BY VOLUME	UPPER	LOWER
N/A	N/A	N/A		

EXTINGUISHING MEDIA

N/A

SPECIAL FIRE FIGHTING MEDIA

N/A

IN CASE OF FIRE SPECIAL PERSONAL PROTECTIVE EQUIPMENT TO BE USED

IF DRUMS BURST - ACIDIC PRODUCT - RUBBER GLOVES, BOOT, FACES SHIELD

IN CASE OF FIRE SPECIAL MEDICAL, FIRST AID FACILITIES AND TREATMENT

CONTACT WITH HOT LIQUID MAY GIVE ACID BURNS



**SECTION 5 - HEALTH HAZARD**

THRESHOLD LIMIT VALUE

500 PPM IN AIR

EFFECTS OF OVER EXPOSURE

MAY CAUSE SKIN IRRITATION UNDER LONG EXPOSURE

WILL CAUSE EYE IRRITATION WITH LIQUID CONTACT

EMERGENCY AND FIRST AID PROCEDURES

AVOID CONTACT WITH SKIN. WASH SOONEST WITH COPIOUS WATER.

FOR EYE CONTACT IF IRRITATION PERSIST AFTER WASHING - SEEK MEDICAL AID.

**SECTION 6 - REACTIVITY**

STABILITY	UNSTABLE	CONDITIONS TO AVOID	AVOID CONTACT WITH FOODSTUFF
	STABLE X		ALKALIS & OXIDISING AGENT

INCOMPATIBILITY (Materials to avoid)

Alkalies

HAZARDOUS DECOMPOSITION PRODUCTS

IN FIRE MY BE GIVE ACID FUMES - IRRITANTS

HAZARDOUS POLYMERIZATION	MAY OCCUR	CONDITIONS TO AVOID	N/A
	WILL NOT OCCUR X		

**SECTION 7 - SPILL OR LEAK PROCEDURES**

STEPS TO BE TAKEN IN CASE MATERIALS BE RELEASED OR SPILLED

PRODUCT IS BIODEGRADABLE. SPRAY WITH COPIOUS WATER AND WASH TO DRAIN.

WASTE DISPOSAL METHOD

NOT REQUIRED - BIODEGRADABLE AS DILUTED SOLUTION.

AUTHORITIES TO BE INFORMED E.G. ATOMIC ENERGY BOARD, INSPECTORATE, FIRE DEPARTMENT

NONE

**SECTION 8 - SPECIAL PROTECTION REQUIREMENTS**

RESPIRATORY PROTECTION (Specify type)

NOT REQUIRED

VENTILATION	LOCAL EXHAUST	NOT REQUIRED	SPECIAL
	MECHANICAL (General)	NOT REQUIRED	OTHER

PROTECTIVE GLOVES

RUBBER FOR CONCENTRATE

EYE PROTECTION

FACE SHIELD FOR CONCENTRATE

OTHER PROTECTIVE EQUIPMENT

STORE IN COOL PLACE

**SECTION 9 - SPECIAL PRECAUTIONS**

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

STORE IN COOL PLACE

OTHER PRECAUTIONS

KEEP DRUM SEALED WHEN NOT IN USE

**SECTION 10 - COMPILATION**

NAME OF COMPILER	DESIGNATION	DATE	RENEW EVERY 3/6/12 MONTHS
DR A W LAKE <i>[Signature]</i>	TECHNICAL DIRECTOR	23 AUGUST 1994	12 MONTHS

APPENDIX B

96-h LC50 Toxicity Tests — STAB-TECK diluted



**ENVIRONMENT  
CONSULTANTS**

Our File: 9/315-02  
W.O.: 930250

July 26, 1993

Mr. Rhino Rohrs  
Robertson Barrier Systems Corp.  
Suite 800 - 580 Hornby Street  
Vancouver, B.C.  
V6C 3B6

Dear Mr. Rohrs:

Re: Toxicity Testing on the Sample Identified as STAB-TECK (Collected July 7, 1993)

We have completed one (1) rainbow trout rangefinder and one (1) 96-h LC50 rainbow trout toxicity tests on the sample identified as (received on July 7, 1993). A rangefinder test was performed to determine the concentration range of the sample to be used in the definitive 96-h LC50 toxicity test. The test results are summarized in Table 1. The test methods, results and raw data are appended.

We trust that we have completed our assignment to your satisfaction. If you have any questions or comments, please do not hesitate to contact the undersigned at 986-4331.

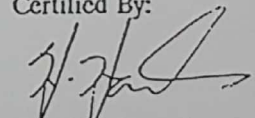
Yours truly,

E.V.S. CONSULTANTS

  
Edmund Canaria, B. Sc.  
Biologist

ECC/mc

Certified By:

  
QA/QC Committee:  
Hugh Hamilton, Ph.D.  
Judy Crane, Ph.D.  
Cathy McPherson, B.Sc.

● 195 Pemberton Avenue  
North Vancouver, B.C.  
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2517 Eastlake Ave. East  
Suite 200  
Seattle, WA  
USA 98102  
Tel: (206) 328-4188  
Fax: (206) 328-4291



## ROBERTSON BARRIER SYSTEMS CORP. TOXICITY TESTING PROGRAM

### 1.0 SAMPLE INFORMATION

One sample identified as STAB-TECK (collected July 7, 1993) was submitted to the E.V.S. Environment Consultants laboratory for rainbow trout toxicity testing. The sample was received at the laboratory on the same day (July 7, 1993) and was stored at 4°C in the dark until testing was completed.

### 2.0 METHODS

Standard toxicity test procedures were followed in accordance with A.P.H.A. Standard Methods, 17th Edition (1989), the "Provincial Guidelines and Laboratory Procedures for Measuring Acute Lethal Toxicity of Liquid Effluents to Fish" (1982), and Environment Canada's "Biological Test Method: Acute Lethality Test Using Rainbow Trout" (1990).

Juvenile rainbow trout were obtained from a commercial trout farm, and acclimated prior to test initiation. Water used for holding and acclimation was from the same source used for the dilution water and the controls during testing. The fish were allowed to acclimate to the test temperature ( $15^{\circ} \pm 1^{\circ}\text{C}$ ) prior to initiating the toxicity tests. Mortalities were monitored during acclimation to ensure they were within acceptable limits. Fish were fed daily during holding and acclimation, but not during the test.

For each batch of fish obtained, a positive (toxic) control was tested using the standard reference toxicant, Sodium Dodecyl Sulphate (SDS). The purpose of this was to monitor any changes in sensitivity between batches of fish which might have occurred as a result of disease, handling, etc.

The test chambers were 18 L glass aquaria with a test volume of 10 L. The tests were conducted in a constant environment chamber maintained at  $15^{\circ} \pm 1^{\circ}\text{C}$ , with 14:10 h light:dark photoperiod. Gentle aeration was provided to each test container by means of an airline fitted with a Pasteur pipette. The water used for test solution dilution and controls was dechlorinated water from the municipal supply. This water has been found to be of pristine quality in several hundred tests conducted each year.

For the rangefinder test (initiated July 8, 1993), four test concentrations (10, 100, 1,000, and 10,000 mg/L) of the sample and a negative control were prepared. The test treatments were prepared by adding the required amount of sample to the test chambers. For example, the 100 mg/L test concentration was prepared by adding 1,000 mg of STAB-TECK to the test tank and adding dilution water to a final volume of 10 L. Ten fish were added, semirandomly, to each test chamber. The largest fish was not more than twice the length of the smallest fish used. The test was allowed to proceed for 96 hours. Water quality measurements (dissolved oxygen, pH and temperature) were made daily, and mortalities were recorded and removed each day. The conductivity was measured at the beginning and end of testing.

Based on the rangefinder test it was determined that the 96-h LC50 value would lie between 10 mg/L and 100 mg/L. A definitive rainbow trout 96-h LC50 test was then set up (initiated July 13, 1993) following the same procedure. The test concentrations prepared for the 96-h LC50 toxicity test were 10, 18, 32, 56 and 100 mg/L, plus a negative (clean) control.



For the tests to be considered valid, percent survival in the negative control had to be at least 90%. The approximate 96-h LC50 value is the concentration of stabilizer at which 50% of the exposed fish die within 96 hours and is expressed in mg/L (e.g., 10 mg/L = 100 mg sample per 10 L total test volume). The 96-h LC50 value for the sample was calculated using the EFPL computer program (IBM/AT Version 1.0) according to Stephan (1977).

### 3.0 RESULTS

The results are summarized in Table 1. The 96-h LC50 value for the stabilizer sample was approximately 67 mg/L. The water quality parameters measured during testing was in the following ranges: temperature, 15 - 15.5°C; pH, 6.4 - 7.0; dissolved oxygen, 9.9 - 10.1 mg/L; and conductivity, 10 - 25  $\mu$ mhos/cm.

The 96-h LC50 value for the positive control (SDS) performed on the batch of fish used for testing was 38 mg/L. This LC50 value was within the acceptable range of values ( $33 \pm 15$  mg/L) obtained by this laboratory in previous testing.

### 4.0 REFERENCES

- APHA. 1989. Standard Methods for the Examination of Water and Wastewater, 17th ed. Amer. Publ. Health Assoc., Water Poll. Cont. Fed., and Amer. Waste Water Assoc. Wash., D.C. pp. 8 - 120 to 8 - 134.
- B.C. Ministry of Environment. 1982. Provincial Guideline and Laboratory Procedures for Measuring Acute Lethal Toxicity of Effluents to Fish. B.C. Ministry of Environment Bioassay Task Force. 18 pp.
- Environment Canada. 1990. Biological test method: acute lethality test using rainbow trout. Environmental Protection Series, Report EPS 1/RM/9, July 1990. 51 pp.
- Stephan, C.E. 1977. Methods for calculating an LC50. In: Aquatic Toxicology and Hazard Evaluation, edited by F.L. Mayer, J.L. Hamelink. ASTM STP 634. pp. 65-84. American Society for Testing and Materials. Philadelphia, PA.





TABLE 1 SUMMARY OF RESULTS

Sample I.D.	Exposure Period	Test Endpoint	96-h LC50 Value (mg/L) = PPM	96-h LC50 Value Determined and Confirmed by:
STAB-TECK	96 h	Mortality	=67	Interpolation (95% CL: 32 and 100 mg/L)

CL = Confidence Limits.





## CHEMICAL ANALYSIS REPORT

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Date: December 15, 1993  
ASL File No. D5232  
Report On: STAB-TECK Chemical Analysis  
Report To: Robertson Technologies Corp.  
Suite 902  
580 Hornby Street  
Vancouver, BC  
V6C 3B6  
Attention: Mr. Rhino Rohrs  
Received: October 28, 1993

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ASL ANALYTICAL SERVICE LABORATORIES LTD.

per:

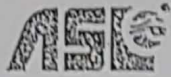
A handwritten signature in cursive script, appearing to read 'Frederick Chen'.

Frederick Chen, B.Sc.  
Project Chemist

A handwritten signature in cursive script, appearing to read 'Katherine Thomas'.

Katherine Thomas, B.Sc.  
Project Chemist



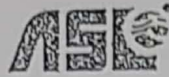


REMARKS

File No. D5232

The base and neutral compounds and dioxin and furan compounds were subcontracted to Axy's Analytical Services Limited for analysis. Their report is included in the appendix.



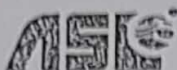


## STAB-TECK

Total Metals

Aluminum	T-Al	77.6
Antimony	T-Sb	<2.0
Arsenic	T-As	<2.0
Barium	T-Ba	<0.10
Beryllium	T-Be	<0.05
Bismuth	T-Bi	1.6
Cadmium	T-Cd	<0.10
Calcium	T-Ca	17.2
Chromium	T-Cr	<0.15
Cobalt	T-Co	<0.15
Copper	T-Cu	0.33
Iron	T-Fe	44.8
Lead	T-Pb	<0.50
Lithium	T-Li	<0.15
Magnesium	T-Mg	708
Manganese	T-Mn	0.70
Molybdenum	T-Mo	<0.30
Nickel	T-Ni	0.20
Phosphorus	T-P	81.9
Potassium	T-K	<20
Selenium	T-Se	<2.0
Silver	T-Ag	<0.15
Sodium	T-Na	<20
Strontium	T-Sr	0.11
Thallium	T-Tl	<1.0
Tin	T-Sn	<3.0
Titanium	T-Ti	0.38
Tungsten	T-W	1.2
Vanadium	T-V	<0.30
Zinc	T-Zn	0.58

Remarks regarding the analyses appear at the beginning of this report.  
Results are expressed as milligrams per litre except where noted.  
< = Less than the detection limit indicated.



## STAB-TECK

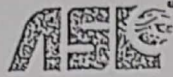
Halogenated Volatiles

Bromodichloromethane	<0.050
Bromoform	<0.050
Carbon Tetrachloride	<0.050
Chlorobenzene	<0.050
Chloroethane	<0.050
Chloroform	<0.050
Chloromethane	<0.050
Dibromochloromethane	<0.050
1,2-Dichlorobenzene	<0.050
1,3-Dichlorobenzene	<0.050
1,4-Dichlorobenzene	<0.050
1,1-Dichloroethane	<0.050
1,2-Dichloroethane	<0.050
cis-1,2-Dichloroethylene	<0.050
trans-1,2-Dichloroethylene	<0.050
1,1-Dichloroethylene	<0.050
Dichloromethane	<0.050
1,2-Dichloropropane	<0.050
cis-1,3-Dichloropropylene	<0.050
trans-1,3-Dichloropropylene	<0.050
1,1,1,2-Tetrachloroethane	<0.050
1,1,2,2-Tetrachloroethane	<0.050
Tetrachloroethylene	<0.050
1,1,1-Trichloroethane	<0.050
1,1,2-Trichloroethane	<0.050
Trichloroethylene	<0.050
Trichlorofluoromethane	<0.050
Vinyl Chloride	<0.050

Non-halogenated Volatiles

Benzene	<0.050
Ethylbenzene	<0.050
Styrene	<0.050
Toluene	<0.050
meta- & para-Xylene	<0.050
ortho-Xylene	<0.050

Remarks regarding the analyses appear at the beginning of this report.  
Results are expressed as milligrams per litre except where noted.  
< = Less than the detection limit indicated.



## METHODOLOGY

File No. D5232

Samples were analyzed by methods acceptable to the appropriate regulatory agency. Outlines of the methodologies utilized are as follows:

### Metals in Water

These analyses are carried out in accordance with procedures described in "Standard Methods for the Examination of Water and Wastewater" 18th Edition published by the American Public Health Association, 1992. The procedures involve a variety of instrumental analyses including atomic emission spectrophotometry (ICP) and atomic absorption spectrophotometry (AA) to obtain the required detection limit for each element. Specific details are available on request.

### Volatile Organic Priority Pollutants in Water

This analysis is carried out in accordance with U.S. EPA Method 624 and 524. These procedures involve purge and trap extraction of the sample and subsequent analysis of the volatile components by capillary column gas chromatography with mass spectrometric detection.



- c) Le produit contient des matières anioniques actives à 9,32% et peut stabiliser les sols à pH acide de la Cuvette Centrale.
- d) Les sables limoneux argileux à indice de Plasticité supérieur à 10% ne conviennent pas pour la stabilisation avec ce produit.

3.4.2. Résultats obtenus (CBR à 55 coups et à 25 coups)

	MFU	KINGANKATI	LUTENDELE 1	LUTENDELE 2
CBR 4jrs immers.	<u>24</u>	<u>20</u>	<u>16</u>	<u>14</u>

CBR STABILISE ET TENEUR EN EAU APRES IMMERSION ( )

2,50%

3 jrs air + 4 jrs eau

5 x 55 coups	19 (12,7)	14 (13,8)	19 (15,8)	19 (16,5)
5 x 25 coups	16 (12,9)	13 (14,0)	6 (17,6)	8 (18,0)

7 jrs air + 4 jrs eau

5 x 55 coups	<u>37</u> (11,5)	33 (12,4)	22 (15,6)	21 (16,1)
5 x 25 coups	18 (12,4)	21 (12,7)	19 (15,7)	10 (17,3)

5,00%

3 jrs air + 4 jrs eau

5 x 55 coups	<u>45</u> (11,1)	<u>42</u> (11,6)	32 (14,9)	23 (14,8)
5 x 25 coups	<u>41</u> (11,3)	<u>35</u> (11,9)	20 (15,3)	17 (15,4)

7 jrs air + 4 jrs eau

5 x 55 coups	<u>54</u> (10,9)	<u>48</u> (11,1)	33 (14,7)	26 (14,0)
5 x 25 coups	<u>46</u> (11,0)	<u>37</u> (11,7)	25 (15,0)	20 (15,2)

3.4.3. Commentaires sur les résultats

- Les teneurs en eau après immersion sont élevées pour le dosage à 2,5%. Il y aurait réaction entre le produit et l'eau contenue dans la fraction argileuse qui serait responsable du matelassage.
- A 5,0% du produit, les teneurs en eau + produit se retrouvent dans les plages de teneurs optimales avec des portances CBR appréciables. Les portances CBR doublent pour le fort compactage de 5 x 55 coups, exception de Lutendele 2.
- A 5,0% de stabilisation, l'indice de plasticité inférieur à 10% donne des valeurs CBR qui sont acceptables dans les spécifications des matériaux utilisables en fondation pour les routes nationales en République Démocratique du Congo.

#### 4. CONCLUSIONS

- A 5,0% du poids volumique sec maximal du sol, le produit donne une portance acceptable pour les sols dont l'indice de plasticité est inférieur à 10%. C'est le cas de la carrière MFU et du gîte KINGANKATI 1 dont le CBR à 95% de la densité sèche maximale est supérieur à 30%. (ASTM).
- Les matériaux sablo-argileux à employer dans les digues et les sous-fondations peuvent être stabilisés avec ce produit à 5,0% ; l'indice de plasticité doit être inférieur à 15%.
- On peut stabiliser à 5,0% les sables limono-argileux dont l'indice de plasticité est inférieur à 10% pour les couches de fondation des routes nationales ou en couches de base pour les routes secondaires dont le trafic est inférieur à 50 véhicules par jour en République Démocratique du Congo. (voir leur document : CBR minimum = 35% pour 50 véhicules par jour)
- Nous recommandons une planche d'essai de 1000 mètres ( 1 km) en réaction à la réponse à notre questionnaire ci-annexé. Pour la circonstance, la carrière de MFU située entre Kisia et Mato, sur la route de desserte agricole Bita – Mato, peut être utilisée.
- Nous pourrions aussi expérimenter le produit à 5,0% pour stabiliser les parois des érosions dont les sols sont soit pulvérulents, soit sablo-limono-argileux. Il est utilisé pour colmater les fines particules poussiéreuses du désert.

Fait à Kinshasa le 27 mai 2016.

Joshua MUTIA MWINDO

DIRECTEUR CHEF DE DEPARTEMENT