SPILL RESPONSE MEASURES FOR FUEL/PETROLEUM PRODUCTS

Identify the source of the leak or spill

Isolate or remove any potential ignition sources, if possible

Contain the spill or source, if possible

Contact the On-scene Coordinator and follow assessment/reporting flow sequence

Report the spill to the NWT 24-hour Spill Report Line

At the direction of the On-scene Coordinator, the Spill Response Team will initiate cleanup

The Operations Manager will request mutual spill response aid from external sources, if necessary

The following responses are available for fuel/petroleum product spills in different environmental media:

Spills on Land (gravel, rock, soil and vegetation)

- Trench or ditch to intercept or contain flow of fuel or petroleum products on land, where feasible (loose sand, gravel and surface layers of organic materials are amenable to trenching/ditching; trenching in rocky substrates is typically impractical and impossible)
- Construct a soil berm downslope of the spill. Use of synthetic, impervious sheeting can also be used to act as a barrier
- Where available, recover spills through manual or mechanical means including shovels, heavy equipment and pumps
- Absorb petroleum residue with synthetic sorbent pad materials
- Recover spilled and contaminated material, including soil and vegetation
- Transport contaminated material to approved disposal or recovery site. Equipment used will depend on the magnitude and location of the spill
- Where safe, disposal can be done through controlled in-situ combustion with the approval of government authorities and fire/safety consultants
- Land based disposal is only authorized with the approval of government authorities

Spills on Snow

- Trench or ditch to intercept or contain flow of fuel or petroleum products on snow, where feasible (ice, snow, loose sand, gravel and surface layers of organic materials are amenable to trenching/ditching; trenching in solid, frozen ground or rocky substrates is typically impractical and impossible
- Compact snow around the outside perimeter of the spill area
- Construct a dike or dam out of snow, either manually with shovels or with heavy equipment such as graders and dozers where available
- If feasible, use synthetic liners to provide an impervious barrier at the spill site
- Locate the low point of the spill area and clear channels in the snow, directed away from waterways, to allow non-absorbed material to flow into the low point
- Once collected in the low area, options include shovelling spilled material into containers, picking up with mobile heavy equipment; pumping liquids into tanker trucks or using vacuum truck to pick up material
- Where safe, disposal can be done through in-situ combustion with approval from government authorities
- Liquid oil wastes, oil contaminated snow and debris and oil residues left after controlled, in-situ burning will be picked up and disposed of a land disposal site approved by government authorities/fire and safety consultants
- Transport contaminated material to approved disposal site. Equipment used will depend on the magnitude and location of the spill

Spills on Ice

- Contain material spill using methods described above for snow, if feasible and/or mechanical recovery with heavy equipment
- Prevent fuel/petroleum products from penetrating ice and entering watercourses
- Remove contaminated material, including snow/ice as soon as possible
- Containment of fuel/petroleum products under ice surface is difficult given the ice thickness and winter conditions. However, if the materials get under ice, determine area where the fuel/petroleum product is located
- Drill holes through ice using ice auger to locate fuel/petroleum product
- Once detected, cut slots in the ice using chain saws and remove ice blocks
- Fuel/petroleum products collected in ice slots or holes can be picked via suction hoses connected to portable pump, vacuum truck or standby tanker. Care should be taken to prevent the end of the suction hose clogging up by snow, ice or debris
- Fuel/petroleum products that have collected in ice slots may be disposed of by in-situ burning if sufficient holes are drilled in ice. Once all the holes are drilled, the oil which collects in the holes may be ignited. Consult with fire/safety consultants and government authorities to obtain approval

Spills on Water

- Contain spills on open water immediately to restrict the size and extent of the spill
- Fuel/petroleum products, which float on water, may be contained through the use of booms, absorbent materials, skimming, and the erection of culverts
- Deploy containment booms to minimize spill area, although effectiveness of booms may be limited by wind, waves and other factors

- Use sorbent booms to slowly encircle and absorb spilled material. These absorbents are hydrophobic (absorb hydrocarbons and repel water)
- Once booms are secured, use skimmers to draw in hydrocarbons and minimal amounts of water. Skimmed material can be pumped through hoses to empty fuel tanks/drums
- Culverts permit water flow while capturing and collecting fuel along the surface with absorbent materials
- Chemical methods including dispersants, emulsion – treating agents and shoreline cleaning will be considered
- Use absorbent pads and similar materials to capture small spills/oily residue on water
- Tanker trucks that slip through ice into the water below will remain buoyant since the densities of fuel and petroleum products are less than water. Buoyancy will be maintained while pumping fuel from the truck to another vessel until the truck can be retrieved safely. Efforts will be made to pull out the truck as soon as possible.

Note:

1. In-situ combustion is a disposal method available for fuels and petroleum products.
   In-situ burning can be initiated by using a large size portable propane torch (tiger torch) to ignite the fuel/petroleum products. Highly flammable products such as gasoline or alcohol, or combustible material such as wood, may be used to promote ignition of the spilled product. The objective is to raise the temperature for sustained combustion of the spilled product.

   Precautions need to be taken to ensure safety of personnel. Also, spilled product should be confined to control burning. These include areas where the spilled material has pooled naturally or been contained via dikes, trenches, depressions or ice slots. Prior to any attempts at in-situ burning, consultation with experts and approval by government authorities are required.

2. Chemical response methods are also available and may include the use of dispersants, Emulsions-treating agents, visco-elastic agents, herding agents, solidifiers, and shoreline cleaning agents.

3. Biological response methods include nutrient enrichment and natural microbe seeding

General Chemical Canada Ltd.

Suite 850, 10655 Southport Rd., S.W.,
Calgary, Alberta T2W 4Y1 • (403) 278-9595 • Fax (403) 271-9333

General Chemical

SUBJECT: TOXICITY EVALUATION OF ROAD DUST ABATEMENT CHEMICALS
Author: Ministry of Environment, Province of British Columbia
Environmental Protection Division
Re: Summary of Findings/Report Interpretation

Please find attached the above mentioned report intended to evaluate and inform on the various road dust abatement chemicals commonly or proposed for use within and for the Province of B.C.

As the report is of a technical nature and not easily understood, we are providing a brief summary and interpretation of the terminology and results as follows:

TEST PARAMETERS:

1. 96-hr LC50 rainbow trout: this is the Lethal Concentration (LC) of product, expressed in parts per million (ppm) it takes to produce a 50% mortality rate in the test group over a 96-hour test time. Rainbow trout are considered to be higher in the food chain.

2. 48-hr LC50 daphnia: as above but over a 48-hour test duration. Daphnia is considered to be lower in the food chain than rainbow trout. Daphnia may also be a food source for rainbow trout.

3. Microtox LC50: this study is conducted on the low end of the food chain.

TEST RESULTS:

The bar graphs as illustrated are commonly misinterpreted. In this case, "big is not bad". The **LARGER OR LARGEST BAR GRAPH INDICATES THE LESS OR LEAST TOXIC MATERIAL.** The increments on the right hand side of the graphs express the parts per million of material it takes to product the desired effect (ie: 50% mortality). By example, it takes 45,000 ppm 35% Calcium Chloride solution to produce the same mortality rate as 9,000 ppm 30% magnesium chloride, or 6,400 ppm calcium lignosulphonate, etc. for the 96-hour LC50 on rainbow trout. As you can see, there are several orders of magnitude of difference between some products. A more thorough interpretation of the test results may be available from the author.

We have provided this submission as an information service only. We do not imply, nor should the language of this submission be construed as, a comparison of product and/or the relative toxicity of products.

General Chemical is an environmentally conscious company. General Chemical is an active member of the Responsible Care Program. Please call us for more information on all our products and services.

Responsible Care
A Total Commitment

British Columbia Environment

V8V 1X5

18 May 1990

File:10-3-3-20

COPY

Mr. Larry deBoer, P.Eng.
Director
Geotechnical & Materials Engineering
Ministry of Transportation
and Highways
940 Blanshard St.
Victoria, B.C.
V8W 3E6

Dear Mr. deBoer:

Re: Toxicity Evaluation of Road Dust Abatement Chemicals

In follow-up to the Ministry of Transportation and Highways request of October 5, 1989, the Ministry of Environment has now completed the requested toxicity studies for following select dust suppressants:

Product	Supplier
25% Calcium chloride	General Chemicals
35% Calcium chloride	General Chemicals
77% Calcium chloride	General Chemicals
29-35% Magnesium chloride	McTar Petroleum
Sodium lignosulfonate (Raybinder 27% solids)	ITT Rayonier
Calcium lignosulfonate (Lignosite 25% solids)	Georgia-Pacific
Emulsion oil	Mohawk Oil Co.

(Sunlight Laundry Detergent - evaluated for the purposes of comparison to a common non-dust suppressant product.)

Bioassays for aquatic toxicity were conducted by the Ministry of Environment Aquatic Toxicity Laboratory, North Vancouver and included the following standard tests:

i) 96 hr LC50 rainbow trout;
ii) 48 hr LC50 daphnia; and
iii) Microtox EC50 (marine bacterial assay).

The results of these tests indicated that all of the products evaluated, with the exception of emulsion oil supplied by Mohawk Oil, were in the range of practically nontoxic to nontoxic (ie. LC50 or EC50 of >1000 parts per million to > 10,000 parts per million) for each of the above mentioned assays. Mohawk emulsion oil was found to be slightly toxic in the trout assays with a

calculated LC50 of 200 parts per million. By contrast, Sunlight laundry detergent was shown to be of several orders of magnitude greater in toxicity towards trout and daphnia with a reported LC50 value equal to 10 parts per million for both species and had an EC50 of 36 parts per million.

Samples of Lignosite (calcium lignosulfonate) and Raybinder (sodium lignosulfonate) supplied by Georgia-Pacific Corporation and ITT Rayonier Inc respectively, were submitted for dioxin and furan analysis, carried out for the Ministry of Environment by Seakem Analytical Services Ltd, Sidney, B.C. Laboratory testing found no traces of dioxins or furans in either product at the levels of detection.

We have assessed the results of these tests and our assessment has not indicated any definite areas of environmental problems. In this regard we have no objection to the continued use of these products, subject to the use of good application practices which minimize potential impacts on the receiving environment. In this regard the Ministry of Environment recommends the implementation of training programs for all individuals working with these materials, to familiarize them with guidelines for application and that a product quality control program be endorsed for all dust suppressants. The adoption of these measures will ensure the protection of both the public and the environment.

A detailed report of our findings and the results of testing programs is in preparation and will be forwarded to your office at a later date. Copies of the results of toxicity testing and dioxin/furan analysis are enclosed for your reference.

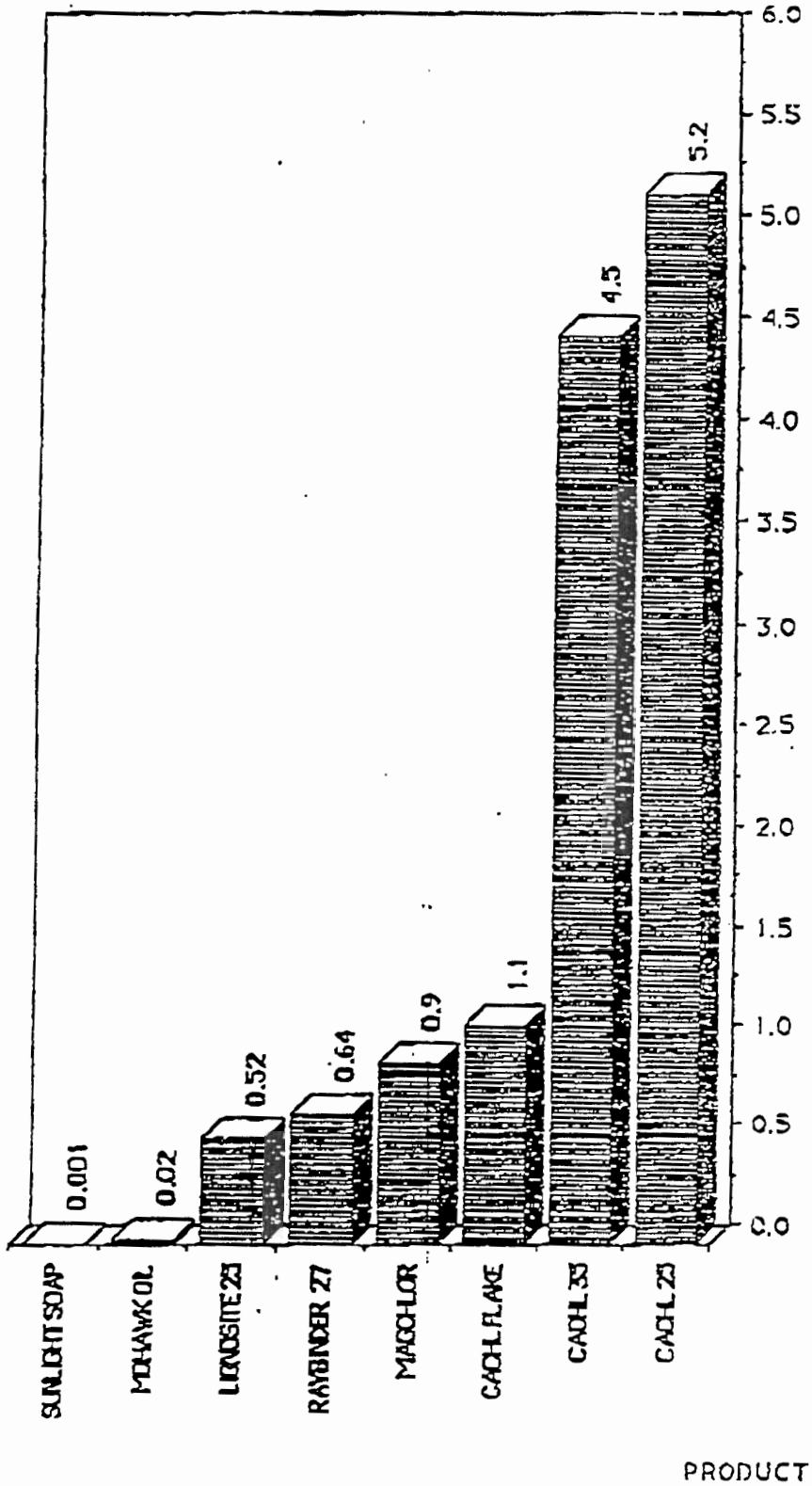
Thank you for your co-operation.

Yours very truly,

L.T. Hubbard, P.Eng.
A/Director
Municipal Liquid and
Industrial Waste Branch
Environmental Protection Division

Enclosures.

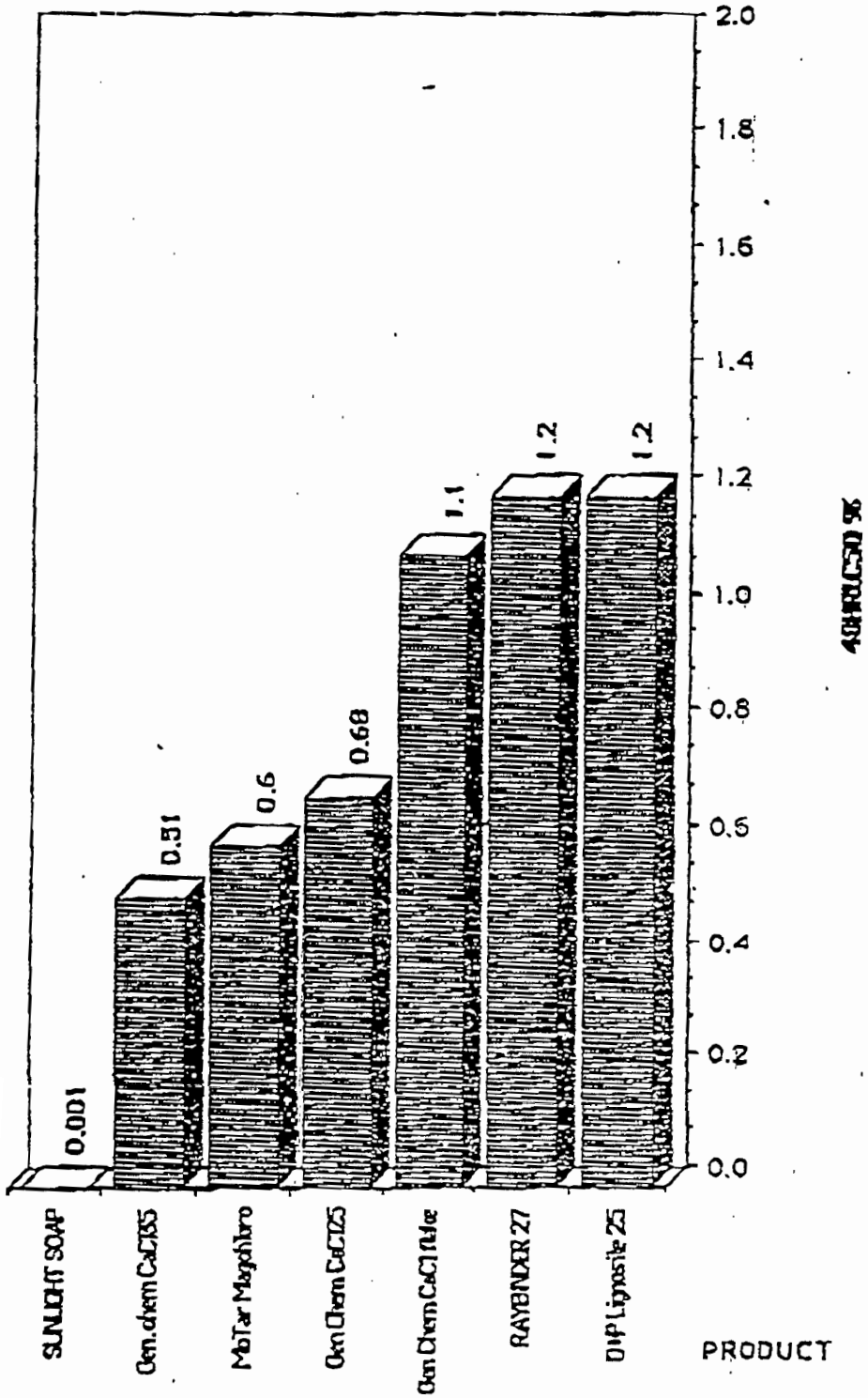
RAINBOW TROUT BIOASSAY RESULTS
DUST SUPPRESSANT STUDY



← 45,000 ppm

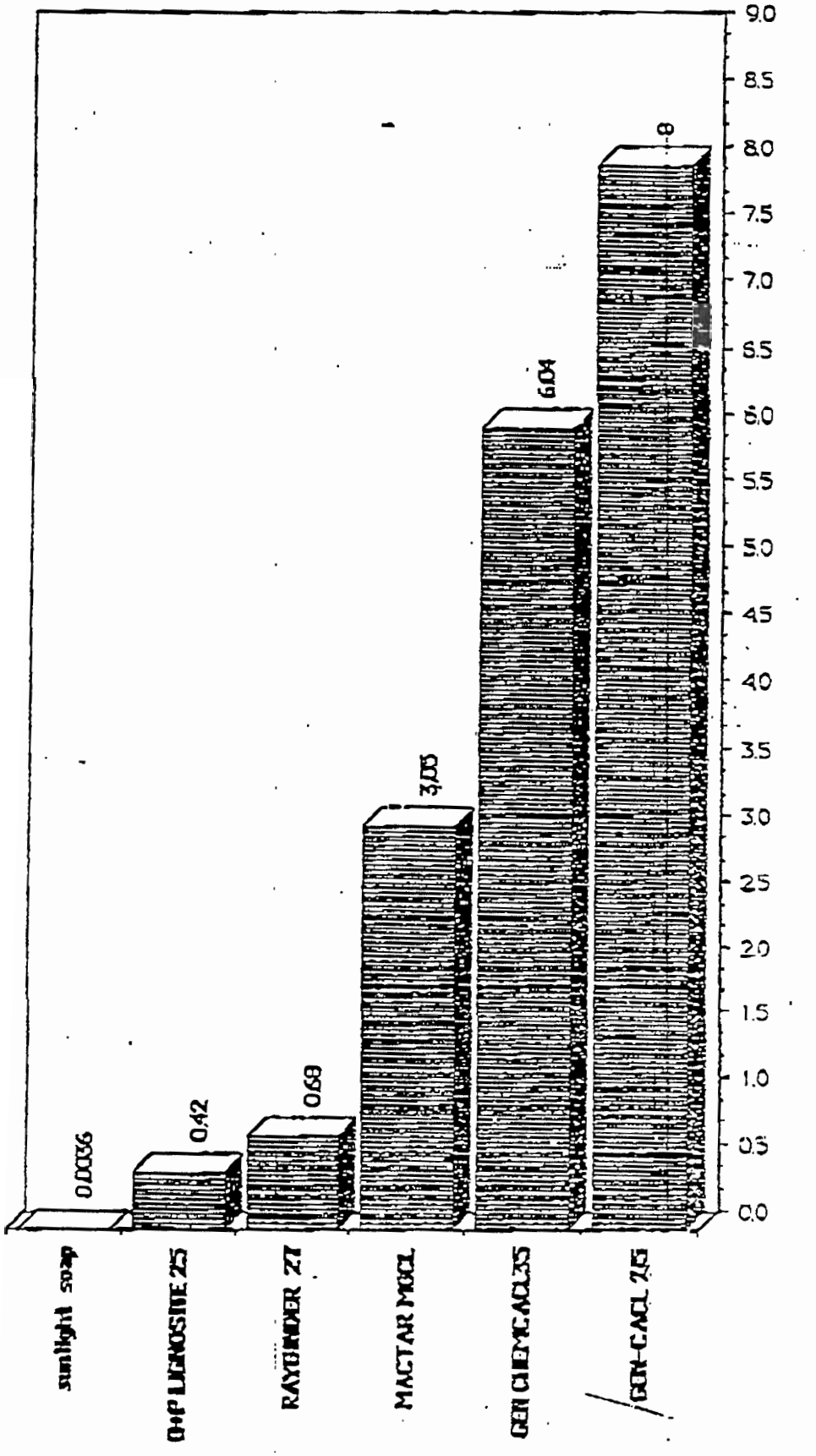
96 HR. LC50

DAPHNIA 48HRLC50 BIOASSAY RESULTS
DUST SUPPRESSANT STUDY



48 HR LC 50 on DAPHNIA

MICROTOX EC50 DATA SUMMARY
DUST SUPPRESSANT STUDY



WESTCOAST DRILLING SUPPLIES LTD.

#6 - 2351 SIMPSON ROAD
RICHMOND, B.C. V6X 2R2

TEL: (604) 278-4954
FAX: (604) 278-4914

EMERGENCY PHONE NO. (604) 278-4954

Serving the Drilling Industry

MATERIAL SAFETY DATA SHEET

SECTION I: IDENTIFICATION OF PRODUCT

PRODUCT NAME: **WDS 120L**

CHEMICAL FAMILY: Copolymer of acrylamide with sodium acrylate.

PRODUCT USE: Drilling additive

WHMIS CLASSIFICATION: Combustible liquid CLASS B-3.

WORK PLACE HAZARD: Toxic material, CLASS D-2B

TRANSPORTATION OF DANGEROUS GOODS (TDGR)

CLASSIFICATION: Not Applicable

PACKAGE GROUP: Not Applicable

PRODUCT IDENTIFICATION NUMBER (PIN): Not Applicable

SECTION II: HAZARDOUS INGREDIENTS

INGREDIENT	PERCENTAGE	CAS NUMBER	LD(50)	LC(50)
Mineral Spirits	20 - 40%	54742-47-8	6,480 mg/kg	Not Available
Alkyl phenol ethoxylate	8 - 7%	9016-45-9	3,000 mg/kg	Not Available

SECTION III: TOXICOLOGICAL PROPERTIES

ROUTE OF ENTRY:
[xxx] skin, [xxx] eye contact, [ ] inhalation, [xxx] ingestion

SKIN CONTACT: May cause irritation, redness, swelling or dermatitis.

EYE CONTACT: Will cause painful burning or stinging of the eyes and eye lids. Also will cause watering of the eyes and inflammation of the conjunctiva.

INHALATION: Not available INGESTION: May cause nausea and vomiting.

EFFECTS OF CHRONIC EXPOSURE: Skin irritation or dermatitis may occur upon frequent or prolonged contact.

SECTION IV: FIRST AID MEASURES

SKIN CONTACT: Wash exposed area with soap and water. If irritation or abnormalities persist, call a physician.

EYE CONTACT: Immediately flush eyes with water for 15 minutes and call a physician.

INHALATION: Remove to fresh air. If not breathing, apply artificial respiration, preferably mouth to mouth. If breathing is difficult, give oxygen. Call a physician.

INGESTION: *Do not induce vomiting.* If conscious, dilute by giving two glasses of water. Call a physician immediately

SECTION V: PHYSICAL DATA

APPEARANCE AND ODOUR:	Liquid emulsion
DENSITY:	Not Available
BOILING POINT:	Not Available
MELTING POINT:	Not Available
WATER SOLUBILITY:	Soluble
% VOLATILE BY VOLUME:	Not Available
EVAPORATION RATE:	Not Available
VAPOUR PRESSURE: (MM Hg)	Not Available
VAPOUR DENSITY: (Air = 1)	Not Available
pH:	7.0 - 9.0 (0.6% in D.W.)

SECTION VI: FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 70°C

FLAMMABLE LIMIT: Not Available

EXTINGUISHING MEDIA: Water spray, foam, dry chemical, carbon dioxide CO_2. Water will cause extreme slipperiness.

SPECIAL FIRE FIGHTING PROCEDURES: Self-contained respirators required for fire fighting personnel.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Sensitivity to static discharges.

SECTION VII: REACTIVITY DATA

STABLE [XXX] INSTABLE: [ ]

INCOMPATIBILITY (CONDITIONS TO AVOID): Strong oxidizing and reducing agent.

HAZARDOUS DECOMPOSITION PRODUCTS: Not available

HAZARDOUS POLYMERIZATION: Will not occur [xxx] May occur [ ]

SECTION VIII: PREVENTATIVE MEASURES

RESPIRATORY PROTECTION: In absence of proper ventilation, recommend approved organic vapour-type respirator.

VENTILATION: General mechanical; 10 changes per hour.

PROTECTIVE GLOVES: Suggest rubber or plastic gloves

EYE PROTECTION: Suggest goggles

OTHER PROTECTIVE EQUIPMENT: Suggest rubber apron.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Storage: Keep container closed when not in use. Store in a cool and dry location away from oxidizing and reducing agents. Keep away from oxidizing and reducing agents.

STEPS TO BE TAKEN IN CASE OF SPILL OR LEAK

Eliminate sources of ignition. Collect into waste container. Absorb remaining product with earth or sand and dispose of with solid waste. Wash spill site after material pick up. Do not breathe vapours. Will cause extreme slipperiness. Use NIOSH approved respirator if exposed to vapours

WASTE DISPOSAL METHOD

Dispose of waste according to federal, provincial and local regulations.

SECTION IX: PREPARATION

The information contained herein is given in good faith, but no warranty, expressed or implied is made.

Date issued: December 9, 1988 Reissued: March 1, 1992

By: Product safety committee

IRC
Integrated Resource Consultants Inc.

Suite 160
14480 River Road
Richmond, BC
Canada V6V 1L4
Tel. (604) 278-7714
Fax (604) 278-7741

DATE: 5 February 1994

TO: Mr. Ron Kunstman
Westcoast Drilling Supplies Ltd.
#6 - 2351 Simpson Road
Richmond, B.C. V6X 2R2

REPORT ON: RAINBOW TROUT BIOASSAY RESULTS

SAMPLE DESCRIPTION:

Source:	"WDS 120/L"
Description:	milky white, viscous liquid
Amount, Container:	1 X 221 plastic container
Shipping details:	By road
Date collected:	Not stated
Date, time received:	26 January 1994; 1100 hrs.
Date, time tested:	1 February 1994; 1330 hrs.
Set up technician:	MZ

RAINBOW TROUT 96 HR LC50 RESULTS:

The 96 hour (static) LC_{50} was 83 ppm (v/v sample), with a 95% confidence interval between 50 ppm and 200 ppm (or 83 µl/l, with a 95% confidence interval between 50 µl/l and 200 µl/l).

The LC_{50} is defined as the mean lethal concentration or the concentration at which there is 50% fish mortality. Results are calculated using the method described by Stephan (Methods for calculating an LC_{50} in: Aquatic Toxicology and Hazard Evaluation, American Society for Testing and Materials, 1977).

The test method followed was as per "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout" EPS 1/RM/13 (July, 1990) and the BC Ministry of Environment, 1982. Sample was initially dissolved at high concentrations in 1 litre glass beakers and allowed to sit for 24 hours before making up various lower concentrations for testing. A range finding test consisting of 3 wide ranging concentrations was carried out using 1 L glass beakers as test vessels and 3 fish per beaker. The final test was conducted with 5 concentrations in duplicate using 10 litre glass aquariums and eight fish per tank.

Please call should you have any questions.

IRC Integrated Resource Consultants Inc.

Marian Zazzi
Biologist
b097.1/WDS;01.26.94

RANGE FINDING TEST RESULTS:

Date started: 27 January 1994

SURVIVAL IN BEAKERS:

CONCENTRATION:	2 ml/l	0.2 ml/l	0.02 ml/l
after 24 hours	all dead	all dead	all alive
after 96 hours	all dead	all dead	all alive

FULL TEST RESULTS:

Date, time started: 1 February 1994; 1330 hrs.

TEST CONCENTRATION	SURVIVAL				
Hours:	0	24	48	72	96
200 µl/l	8/8	0/8			
Dissolved Oxygen (mg/L)	10.2	8.9			
Temperature (°C)	13.8	14.0			
pH	6.6	6.4			
Symptoms	1	-			
Loading Density (g/L)	0.44	-			
Aeration Rate (ml/L/min)	7.5	7.5			
Conductivity (µmhos)	22				
200 µl/l	8/8	0/8			
Dissolved Oxygen (mg/L)	10.2	9.0			
Temperature (°C)	13.8	14.0			
pH	6.6	6.5			
Symptoms	1	-			
Loading Density (g/L)	0.44	-			
Aeration Rate (ml/L/min)	7.5	7.5			
100 µl/l	8/8	4/8	4/8	3/8	2/8
Dissolved Oxygen (mg/L)	10.2	9.0	6.8	8.0	8.2
Temperature (°C)	13.8	14.0	13.9	13.1	13.3
pH	6.4	6.3	6.4	6.3	6.4
Symptoms	1	2,4	2,4	2	2
Loading Density (g/L)	0.44	0.22	0.22	0.16	0.11
Aeration Rate (ml/L/min)	7.5	7.5	7.5	7.5	7.5
100 µl/l	8/8	3/8	3/8	2/8	2/8
Dissolved Oxygen (mg/L)	10.3	8.0	8.3	8.7	8.5
Temperature (°C)	13.8	14.0	14.0	13.1	13.3
pH	6.4	6.2	6.4	6.3	6.4
Symptoms	1	2,4	2,4	2	2
Loading Density (g/L)	0.44	0.16	0.16	0.11	0.11
Aeration Rate (ml/L/min)	7.5	7.5	7.5	7.5	7.5

TEST CONCENTRATION	SURVIVAL				
Hours:	0	24	48	72	96
CONTROL	10/10	10/10	10/10	10/10	10/10
Dissolved Oxygen (mg/L)	10.2	9.8	9.3	9.0	8.8
Temperature (°C)	14.2	14.8	14.8	14.0	14.1
pH	6.2	6.1	6.4	6.5	6.4
Symptoms	1	1	1	1	1
Loading Density (g/L)	0.55	0.55	0.55	0.55	0.55
Aeration Rate (ml/L/min)	7.5	7.5	7.5	7.5	7.5
Conductivity (µmhos)	11				
Lab Technician	JP	BW	BW	BW	MZ

KEY TO SYMPTOMS:

1 = no apparent effect
2 = fish showing signs of stress
3 = slight opercular movement
4 = loss of equilibrium

TEST FISH:

Species: *Oncorhynchus mykiss* (Rainbow Trout)
Fork length:
Mean: 3.92cm ± 0.30cm
Range: 3.4cm - 4.7cm
Wet weight:
Mean: 0.55g ± 0.17
Range: 0.36g - 1.05g

CONDITION FACTOR (100 x wt(g)/length³cm): 0.91

ACCLIMATION HISTORY (STOCK RECEIVED: JANUARY 17, 1994):

Acclimation temperature: 14.0 - 16.0° CELSIUS
Treatments: None
Water: Dechlorinated tap water
Feeding: Moore Clark Fry Feed
Mortality: Less than 1%
Source: Sun Valley Trout Farm
Reference Toxicant Information:
Chemical used: Phenol
LC_{50}: 11ppm, with a 95% confidence interval between 8ppm and 14ppm.
Lab Mean: 11.6ppm ± 3.64 (two standard deviations)

CONTROL/DILUTION WATER QUALITY:

Hardness: 6.4 mg/L
Total Residual Chlorine: < 0.05 mg/L

FINAL TEST RESULTS: continued

TEST CONCENTRATION	Hours: 0	24	48	PERCENT SURVIVAL 72	96
50 µl/l	8/8	8/8	8/8	8/8	8/8
Dissolved Oxygen (mg/L)	10.4	9.3	8.4	9.0	8.9
Temperature (°C)	13.8	14.0	13.9	13.1	13.3
pH	6.2	6.2	6.3	6.2	6.4
Symptoms	1	2	2	1,2	1,2
Loading Density (g/L)	0.44	0.44	0.44	0.44	0.44
Aeration Rate (ml/L/min)	7.5	7.5	7.5	7.5	7.5
50 µl/l	8/8	8/8	8/8	8/8	8/8
Dissolved Oxygen (mg/L)	10.5	8.2	8.8	8.1	8.4
Temperature (°C)	13.9	14.0	13.9	13.1	13.3
pH	6.2	6.2	6.0	6.2	6.4
Symptoms	1	2	2	1,2	1,2
Loading Density (g/L)	0.44	0.44	0.44	0.44	0.44
Aeration Rate (ml/L/min)	7.5	7.5	7.5	7.5	7.5
25 µl/l	8/8	8/8	8/8	8/8	8/8
Dissolved Oxygen (mg/L)	10.5	9.0	8.7	8.4	8.3
Temperature (°C)	13.9	14.0	13.9	13.1	13.3
pH	6.0	6.2	6.3	6.2	6.2
Symptoms	1	1,2	1,2	1,2	1,2
Loading Density (g/L)	0.44	0.44	0.44	0.44	0.44
Aeration Rate (ml/L/min)	7.5	7.5	7.5	7.5	7.5
25 µl/l	8/8	8/8	8/8	8/8	8/8
Dissolved Oxygen (mg/L)	10.5	8.7	8.3	8.2	8.1
Temperature (°C)	13.9	14.0	13.9	13.1	13.3
pH	6.0	6.2	6.0	6.2	6.2
Symptoms	1	1,2	1,2	1,2	1,2
Loading Density (g/L)	0.44	0.44	0.44	0.44	0.44
Aeration Rate (ml/L/min)	7.5	7.5	7.5	7.5	7.5
10 µl/l	8/8	8/8	8/8	8/8	8/8
Dissolved Oxygen (mg/L)	10.5	8.5	8.5	8.4	8.3
Temperature (°C)	14.0	14.0	13.9	13.1	13.3
pH	6.0	6.0	6.1	6.3	6.2
Symptoms	1	1,2	1,2	1	1
Loading Density (g/L)	0.44	0.44	0.44	0.44	0.44
Aeration Rate (ml/L/min)	7.5	7.5	7.5	7.5	7.5
10 µl/l	8/8	8/8	8/8	8/8	8/8
Dissolved Oxygen (mg/L)	10.6	9.2	9.1	9.1	8.8
Temperature (°C)	14.0	14.0	13.9	13.1	13.3
pH	6.0	6.1	6.3	6.2	6.2
Symptoms	1	1,2	1,2	1	1
Loading Density (g/L)	0.44	0.44	0.44	0.44	0.44
Aeration Rate (ml/L/min)	7.5	7.5	7.5	7.5	7.5