

MEMORANDUM

SUBJECT: EPA Reg. No./File Symbol 64348-1  
BSP Lime-Sulfur Solution

FROM: William S. Woodrow WSW S-692  
Precautionary Review Section  
Registration Support Branch  
Registration Division (H75-05C) E 1/8/93

TO: Schweis / Robert Rose (PM 21)  
Fungicide - Herbicide Branch  
Registration Division (H75-05C)

APPLICANT: Best Sulfur Products, Inc.  
1540 E. Shaw, Suite 101  
Fresno, CA 93710

FORMULATION FROM LABEL:

<u>Active Ingredient(s):</u>	<u>g by wt.</u>
<u>Calcium Polysulfide</u>	<u>29.0</u>
_____	_____
_____	_____
<u>Inert Ingredient(s):</u> . . . . .	<u>71.0</u>
Total	100.0g

*1512*

## BACKGROUND

The Best Sulfur Products, Inc. Co. submitted acute oral, acute inhalation and dermal sensitization studies to support registration of BSP Lime-Sulfur Solution (EPA Reg. No. 64348-1). MRID NOS. used were 421132-01, and 421132-02.

Mary Waller (9-27-58) reviewed and accepted acute dermal and skin irritation studies for this product.

## RECOMMENDATION

1) The acute oral, acute inhalation, and dermal sensitization studies currently reviewed are acceptable. The oral and inhalation studies were classified guideline studies, while the sensitization study was classified Core Minimum; because the challenge and re-challenge concentrations of test material used were the same used for induction. The challenge---

BEST AVAILABLE COPY

5  
J

applications should have been reduced  
- compared to the induction applications.

2) Current acute toxicity profile for BSP  
Lime-Sulfur Solution:

study	Classification	Toxicity	Category
acute oral LD <sub>50</sub> 820 mg/kg	Guideline		III
acute dermal LD <sub>50</sub> > 2000 mg/kg	Guideline		III
acute inhalation LC <sub>50</sub> 3d mg/l	Guideline		III
- eye irritation - (missing)	-		-
skin irritation	Remains slight	ER 2 hrs	Guideline
dermal sensitization	did not sensitize		Minimum

3) The Registrant must submit an acute  
eye irritation study.

4) The pH of BSP Lime-Sulfur Solution  
must be submitted; if the product  
pH is  $\leq 2.0$ , or greater than 11.5, an  
eye study will not be necessary. A WAIVER  
MAY BE GRANTED IF REQUESTED ON NOV 2018.

P.M. Note: A CSE (Confidential Statement  
of Formula) was not (is not) now in the  
product File Jacket.

BEST AVAILABLE COPY

## LABELLING

A Precautionary Labeling review will be conducted upon receipt of the requested eye irritation study.

PM NOTE: Unless the Registrant can substantiate the corrosive nature of B&P Lime-Sulfur, the Precautionary Labelling and DANGER signal word ~~must be changed~~ IS NOT WARRANTED. **E**

BEST AVAILABLE COPY

if

DATA REVIEW FOR ACUTE ORAL TOXICITY TESTING (81-1)

010130

Product Manager: (21) 11-13-91 Reviewer: Woodrow  
 MRID No.: 421132-01 Report Date: 5-5-92  
 Testing Facility: Northview Pacific Labs. Report No. XIG 0049  
 Author(s): R. O'Meara  
 Species: Rat, female Sprague Dawley, males also  
 Age: not given Observation Days (Post Exposure): (4); other ( )  
 Weight: 150-200g  
 Source: Simonsen's Labs, Gilroy CA.  
 Test Material: lime sulfur solution  
 Quality Assurance (40 CFR §160.12): yes (Q.A. & G.L.P.)

Conclusion:

- LD50 (mg/kg): Males = 820 mg/kg (745-902); Females = 920 mg/kg (773-1095); Combined =
- The estimated LD50 is 820 mg/kg (745-902)
- Tox. Category: III. Classification: Guideline

Procedure (Deviations from 81-1): Animals fasted 16 hrs prior to test. 5 MASE rats per dose level were housed by groups by garage with different levels of test material.  
 Results: seeing a volume of 10 ml/kg b.wt. Control groups

Reported Mortality

DOSAGE ( /kg)	(NUMBER KILLED/NUMBER TESTED)		
	Males	Females	Combined
<u>10 ml/kg</u>			
<u>5 ml/kg</u>			
<u>2.5 ml/kg</u>			
<u>1.25 ml/kg</u>			
<u>0.625 ml/kg</u>			

Symptomology & Gross Necropsy Findings:

rats were dosed (10 ml/kg) with water. Animals weighed on 7, 14 days, or death.  
Clinical observations & higher dose levels - death, (within 2 days) death, lethargy, morbidity, diarrhea & wt. loss.

5

Dose	mg/kg	dead/dosed	
		males	Females
1	100	0/5	0/5
2	250	0/5	0/5
3	700	—	1/5
4	750	1/5	2/5
5	850	4/5	—
6	950	4/5	3/10
7	1200	—	4/5
8	2500	5/5	5/5
9	3500	5/5	5/5
10	5000	5/5	4/5

Necropsy: 1) enlarged or enlarged adrenals, dark red lungs, dark kidneys, dark liver, dark spleen + test material/gas in stomach + intestines. Conclusions: No abnormalities

## DATA REVIEW FOR ACUTE INHALATION TOXICITY TESTING (S81-3)

Product Manager: (21) 7-10-91 Reviewer: W. Woodrow  
 MRID No.: 421132-02 Report Date: 5-5-92  
 Testing Laboratory: Product Safety Labs. Report No. T-802  
 Author(s): R. Shapiro  
 Species: Rat, Sprague-Dawley  
 Sex: 15m (5F) Weight: M222-250, F221-243g  
 Source: Hilltop Lab. Animals  
 Test Material: Limer Sulfur Sol. - odiferous liquid (Calcium polysulfides)  
 Quality Assurance (40 CFR §160.12): yes (Q.A. & G.L.P.)  
 Summary: Animals acclimated (2, 21 or 26 days).

- LC<sub>50</sub> (mg/kg): Males = 3.9 mg/L; Females = 3.1 mg/L (4.17-2.3); Combined = 3.6 mg/L (4.42-2.93)
- The estimated LC<sub>50</sub> is 3.1 (4.17-2.3) mg/L
- Mean Concentration:
- Tox. Category: III. Classification: Guideline

Procedure (~~Deviations from S81-21~~): 3 groups of 5M & 5F each were separately exposed to three different dose levels of test material aerosol for 4 hours each. The exposure chamber used was a

## Results:

Exposure Concentration (mg/L)	Reported Mortality (NUMBER KILLED/NUMBER TESTED)		
	Males	Females	Combined
2.41 mg/L	1/5	2/5	3/10
3.78 mg/L	1/5	3/5	4/10
5.08 mg/L	4/5	4/5	8/10

~~Symptomology & Gross Necropsy Findings:~~

rectangular perspex with a volume of 100 liters, operated at slight negative pressure. Animals were observed frequently during exposure, and at least once daily thereafter to day 14. Body weights were recorded on days 0, 1, 2, 4, 7, 10 and 14.

BEST AVAILABLE COPY

All animals were subjected to gross necropsy examinations. Air was supplied to the spray atomization nozzle from a compressed gas cylinder, and additional air was supplied directly to the chamber from a filtered ambient source.

Atomization: Venich 100 atomizer (5 psig system, etc.) #2050 fluid cap. + #7360 air cap.

Chamber Concentration measurements - gravimetric samples collected on 5 occasions from breathing zone of animals using membrane filters. Filters were pre-weighed.

Particle size distribution: Determined by use of an eight stage Andersen Cascade Impactor - filter paper collection stages pre-weighed. MMAD + GSD. Air flow measured and controlled using a transducer & linearizer.

### Results:

1) Chamber Concentrations - Each dose level based on the average of 5 samples collected:

2.41 mg/l

3.78 mg/l

5.08 mg/l



2) Particle size distribution

dose level 2.41 mg/L : MMAD GSD

MMAD-GSD sample # 142 @ 2.5  $\mu$  2.20  
@ 2.2  $\mu$  2.00

Nr. Samples 142 @ stage 4 (2.1  $\mu$  cutoff) = 43.4% cumulative particles.

dose level 3.78 mg/L MMAD GSD

@ 2.1  $\mu$  1.91  
@ 2.1  $\mu$  1.86

Nr. Samples 142 @ stage 4 (2.1  $\mu$  cutoff) = 50.3% cumulative particles.

dose level 5.08 mg/L

MMAD GSD

1.9  $\mu$  2.03

1.7  $\mu$  1.58

Nr. of Samples 142 @ stage # 4 (2.1  $\mu$  cutoff) = 52.1% cumulative particles.

Clinical Observations included: abnormal respiration, facial staining, hunched posture, reduced movement, anorexia, staining alopecia, ocular irritation, decedents lost weight prior to death.

Necropsy: Red discoloration of lungs, gaseous distention of gastric tract, red, edematous lungs, 3 of 5.08 animals showed dark lines with inner surfaces.

DATA REVIEW FOR SKIN SENSITIZATION TESTING (§81-6)

Product Manager: (21) 11-13-91  
 MRID No.: 421132-0  
 Testing Laboratory: Northview Pacific Labs.  
 Author(s): Roger Amato  
 Species: Guinea Pig, Hartley strain  
 Sex: M&F Weight: > 300g.  
 Source: Trents Canary, Madala, CA  
 Test Material: Lime sulfur solution  
 Positive Control Material: dinitrochlorobenzene (DNCB)  
 Quality Assurance (40 CFR §160.12): yes (P.A. & G.L.P.)

Reviewer: Woodson  
 Report Date: 5-5-72  
 Report No.: X1G004G

Method: Modified Buehler

Summary: should have used reduced conc. for challenge

1. This product is is not a dermal sensitizer.
2. Classification: Care Minimum

Procedure (~~Deviation From §81-6~~): "Pilot Study": 12 pigs sent to determine the "primary irritancy" of the test material. 10 concentrations from 1% to 50% of test material diluted with water used. Three groups received of 4 g.p. each dosed with 0.5ml/site in pilltop chambers. 6 hour exposure. Chambers removed, sites rinsed. Results of pilot study: Concentrations of 1-20% no irritation. Moderate irritation produced from 25% to 50%. Thus, main study employed a concentration of 20% of the test material.

Induction:

- Protocol- 10 test animals
- 5 negative controls
  - 5 positive controls
  - 10 naive controls:
    - (5 challenge controls)
    - (5 rechallenge controls)

One day prior to dosing, dorsal surface of each animal clipped free of hair. Day of dosing, test sites

re-shaved using Braun shaver. 0.5 ml of a 20%  
 dilution of test material (in water) placed into each of 10  
 Hill-top chambers, and were applied to shaved dorsal  
 area of each animal. Chambers secured with epoxy and  
 tape. 5 positive controls received 0.5 ml of 0.1% DMCB.  
 5 negative controls treated similarly, using 0.5 ml  
 deionized water. 6 hours skin contact. Chambers  
 removed, sites rinsed. 24 hrs post application, test  
 sites scored (similar scoring scheme to Buehler).  
 This procedure repeated at each site, 3 times per week,  
 for two weeks; to total 6 exposures. Animals reshaved  
 on needed. Following last induction exposure, animals  
 rested two weeks.

Challenge: Animals re-shaved. Each dose with  
 0.5 ml of the 20% dilution of the test material or  
 control material, as used in the induction  
 phase, using a previously unexposed site (on nape  
 site). Chambers left in place 24 hours.  
 Chambers removed, sites scored. Being repeated  
 in 14 days later. Again (rechallenge) controls  
 also challenged at 48 hr rechallenge.

## Challenge

Results:	24 hr	48 hr
Tests:	4/10 = 0.5 scores	6/10 = 0.5 scores
	2/10 = 1.0 scores	3/10 = 1.0 scores
negative controls	3/5 (6/10) @ 0.5 scores	3/5 (6/10) @ 0.5 scores
Naive controls	2/5 = 0.5 scores (4/10) <sup>n to</sup>	3/5 (6/10) = 0.5 scores, 3/5 (4/10) = 1.0 scores

Discussion: A comparison of 24 and 48 hour results with test animals compared to negative controls (animals induced and challenged with distilled water), and naive controls (previously unexposed animals), indicates that it is not possible to distinguish test from control results.

Conclusion: The test material is not considered a sensitizing agent.