

STATE OF NEVADA

Department of Conservation & Natural Resources

Jim Gibbons, Governor Allen Biaggi, Director

DIVISION OF ENVIRONMENTAL PROTECTION

Leo M. Drozdoff, P.E., Administrator

January 15, 2009

Mr. Mark Paris Basic Remediation Company 875 West Warm Springs Road Henderson, NV 89011 Ms. Susan Crowley Tronox LLC PO Box 55 Henderson, NV 89009 Mr. Curt Richards Olin Corporation 3855 North Ocoee Street, Suite 200, Cleveland, TN 37312

Mr. Joe Kelly Montrose Chemical Corp of CA 600 Ericksen Ave NE, Suite 380 Bainbridge Island, WA 98110 Mr. Brian Spiller Stauffer Management Co LLC 1800 Concord Pike Wilmington, DE 19850-6438 Mr. Craig Wilkinson Titanium Metals Corporation PO Box 2128 Henderson, NV 89009

Re. BMI Plant Sites and Common Areas Projects, Henderson, Nevada

Revised Toxicological Information on Dichlorobenzil Compounds

Dear Sirs and Madam:

All of the parties listed above shall be referred to as "the Companies" for the purposes of this letter. Revised toxicological information for dichlorobenzil compounds is provided in Attachment A.

Please contact me with any questions (tel: 702-486-2850 x247; e-mail: <u>brakvica@ndep.nv.gov</u>).

Sincerely,

Brian A Rakvica, P.E. Supervisor, Special Projects Branch Bureau of Corrective Actions

BAR:s

CC: Jim Najima, NDEP, BCA, Carson City Marysia Skorska, NDEP, BCA, Las Vegas Shannon Harbour, NDEP, BCA, Las Vegas Todd Croft, NDEP, BCA, Las Vegas Greg Lovato, NDEP, BCA, Carson City

Barry Conaty, Holland & Hart LLP, 975 F Street, N.W., Suite 900, Washington, D.C. 20004

Brenda Pohlmann, City of Henderson, PO Box 95050, Henderson, NV 89009

Mitch Kaplan, U.S. Environmental Protection Agency, Region 9, mail code: WST-5, 75 Hawthorne Street, San Francisco, CA 94105-3901

Ebrahim Juma, Clark County DAQEM, PO Box 551741, Las Vegas, NV, 89155-1741

Ranajit Sahu, BRC, 311 North Story Place, Alhambra, CA 91801

Rick Kellogg, BRC, 875 West Warm Springs, Henderson, NV 89011

Kirk Stowers, Broadbent & Associates, 8 West Pacific Avenue, Henderson, Nevada 89015

George Crouse, Syngenta Crop Protection, Inc., 410 Swing Road, Greensboro, NC 27409

Nicholas Pogoncheff, PES Environmental, Inc., 1682 Novato Blvd., Suite 100, Novato, CA 94947-7021

Lee Erickson, Stauffer Management Company LLC, P.O. Box 18890 Golden, CO 80402

Keith Bailey, Environmental Answers, 3229 Persimmon Creek Drive, Edmond, OK 73013

Susan Crowley, Crowley Environmental LLC, 366 Esquina Dr., Henderson, NV 89014

Mike Skromyda, Tronox LLC, PO Box 55, Henderson, Nevada 89009

Jeff Gibson, AMPAC, 3770 Howard Hughes Parkway, Suite 300, Las Vegas, Nevada 89109

Sally Bilodeau, ENSR, 1220 Avenida Acaso, Camarillo, CA 93012-8727

Cindi Byrns, Olin Chlor Alkali, PO Box 86, Henderson, Nevada 89009

Paul Sundberg, Montrose Chemical Corporation, 3846 Estate Drive, Stockton, California 95209

Joe Kelly, Montrose Chemical Corporation of CA, 600 Ericksen Avenue NE, Suite 380, Bainbridge Island, WA 98110

Deni Chambers, Northgate Environmental Management, Inc., 300 Frank H. Ogawa Plaza, Suite 510, Oakland, CA 94612

Robert Infelise, Cox Castle Nicholson, 555 California Street, 10th Floor, San Francisco, CA 94104-1513 Michael Ford, Bryan Cave, One Renaissance Square, Two North Central Avenue, Suite 2200, Phoenix, AZ 85004

Dave Gratson, Neptune and Company, 1505 15th Street, Suite B, Los Alamos, NM 87544 Paul Black, Neptune and Company, Inc., 8550 West 14th Street, Suite 100, Lakewood, CO 80215

Teri Copeland, 5737 Kanan Rd., #182, Agoura Hills, CA 91301

Paul Hackenberry, Hackenberry Associates, 550 West Plumb Lane, B425, Reno, NV, 89509

Attachment A

An earlier memorandum (NDEP, 2008a) outlined the database deficiencies for 2,2'- and 4,4'- dichlorobenzil. This memorandum provides additional research and recommendations on surrogate toxicity criteria for these compounds.

Ochoa and Roberts (2003) provided recommendations regarding toxicity criteria for 4,4'-dichlorobenzophenone (DCBP), which has some structural similarity to dichlorobenzil. They noted that an NCEA provisional RfD for DCBP of 0.03 mg/kg-day was based on a 90-day rat study and use of a combination of uncertainty factors (totaling 3000) that led NCEA to place "low confidence" in this value. The provisional RfD for DCBP was noted to be similar to the RfD of 0.02 mg/kg for chlorobenzilate, but Ochoa and Roberts (2003) cautioned that predictions of carcinogenic potential for both compounds should be considered:

"There is some reason to suspect this contaminant may have some carcinogenic potential. NCEA's evaluation included using TopKat, a quantitative structure-toxicity relationship program, to examine the carcinogenic potential of DCBP, dicofol, chlorobenzilate, DDT, and p-chlorobenzoic acid. This program relies on data from actual chronic rodent bioassays in its prediction of carcinogenicity for structurally related chemicals. Four submodels are run by TopKat, for male and female mice and rats. . ."

The TopKat predictions for carcinogenicity were noted to be positive for DCBP, dicofol and chlorobenzilate in male and female mice, and for dicofol and benzilate in male rats. The structural difference between DCBP and dichlorobenzil is the addition of a second carbonyl group between the two phenyl rings, making a viscinal diketone structure that bridges two chlorophenyl groups. This change in structure is likely to make dichlorobenzil more stable to environmental breakdown due to tautomerism of the chemical bond strength across the viscinal carbonyl groups and the adjacent chlorophenyl groups. In addition, the presence of viscinal ketones in the bridge region is likely to promote a more coplanar structure for the chlorophenyl groups, particularly for the 4,4'-dichlorobenzil structure. Both of these changes have the capability of increasing environmental persistence and increasing potential for carcinogenicity and/or toxicity of 4,4'-dichlorobenzil.

It appears that DDT and compounds are among the best studied organochlorine compounds with reasonable structural similarity to dichlorobenzil and the possible surrogates DCBP and chlorobenzilate. DDT and its breakdown products (DDE and DDD) are liver carcinogens in multiple strains of mice and exhibit primary neurological and reproductive/developmental effects in mammals that would be primary non-cancer effects of concern for structurally similar compounds (ATSDR, 2002). DDT and compounds have been assigned toxicity criteria by USEPA (2008) in accordance with their carcinogenic properties in mice (SF 3.4E-01 per mg/kg-d for DDT and DDE; 2.4E-01 per mg/kg-d for DDD), with corresponding residential soil criteria of 1.7 to 2.4 mg/kg (NDEP, 2008b). The RfD value associated with DDT and compounds is 5.5E-04 mg/kg-d and would likely correspond to residential soil criteria between 25 and 50 mg/kg. Thus, if DDT and compounds were considered as possible surrogates for dichlorobenzil, a derived residential soil criterion approaching the range of 1.7 to 50 mg/kg may be considered protective despite the considerable database deficiencies.

In sum, the plausible carcinogenic potential of dichlorobenzil is suggested by the TopKat predictions for structurally similar surrogates with limited toxicological data (DCBP and chlorobenzilate), and physical/chemical considerations point to possible greater persistence and coplanar structure of the 4,4'-dichlorobenzil. These considerations support a more conservative approach for defining toxicity criteria for dichlorobenzil. If it is assumed that the better studied surrogates, DDT and compounds, may represent a reasonable upper bound for dichlorobenzil toxicity, then assigning this compound a toxicity criterion within an order of magnitude for DDT may be appropriate. Accordingly, it is recommended that the NCEA provisional RfD for DCBP (0.03 mg/kg-d) be utilized as a surrogate for dichlorobenzil, with the addition of uncertainty factors of 10-fold for likely greater environmental persistence and use of structure-activity relationships, and 10-fold for database deficiencies beyond those recognized for chlorobenzilate and dichlorobenzophenone, resulting in a provisional RfD for dichlorobenzil of 3.0E-04 mg/kg-d. The derived soil criteria for dichlorobenzil based on this provisional RfD should be within 10-fold of those derived based on carcinogenic endpoints for DDT and compounds.

References:

ATSDR. 2002. Toxicological profile for DDT, DDE ad DDD. U.S. Dept. of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Atlanta, Georgia, September 2002.

NDEP. 2008a. Technical Memorandum: Updated toxicology review for 4.4'-dichlorobenzil. Available from Nevada Dept. of Environmental Protection, Bureau of Corrective Action. October 30, 2008.

NDEP. 2008b. Basic Comparison Levels Table, December. http://ndep.nv.gov/bmi/docs/bcl_table1208.pdf

Ochoa, HG, and Roberts, SM. 2003. Letter to Florida Dept. of Environmental Protection regarding cleanup target level for 4,4'-dichlorobenzophenone. University of Florida Center for Environmental & Human Toxicology, October 21, 2003.

USEPA 2008. Integrated Risk Information System (IRIS). Online database of USEPA toxicity criteria. www.epa.gov/ncea/iris/