

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

January 7, 1997

TO: Files for BIOSAM TP-1.5 (product contains proteases with CAS#'s 9001-92-7 and 37259-58-8 and amylase with CAS# 9000-90-2) and PURAFECT 4000G (contains Bacillus subtilis with CAS# 9014-01-1)

FROM: Mary Lee Hultin, Toxics Unit, Air Quality Division

SUBJECT: Averaging time for Subtilisins

The averaging times in previous derivations of screening levels for subtilisin compounds were listed with 8 hour averaging. It has been determined that the averaging time should be changed to 1 hour. The basis for the screening level derivation is found in ACGIH, 1991 which lists a TLV CEILING for subtilisins as 100% crystalline active pure enzyme and equivalent TLV values for variations of percent enzyme in products. Initially, the TLV values for various preparations were thought to represent 8 hour time-weighted average values. However, after further review of the document and communication with ACGIH, it was noted that the various formulations are also TLV-CEILING values and not 8 hour time weighted averages. In order to protect against short-term health impacts, it has been determined that screening level derivations using TLV-CEILING values will be associated with a one hour averaging time. Thus, subtilisin and related compounds, including compounds with CAS Nos. 9001-92-7, 37259-58-8, and 9000-90-2 and 9014-01-1 and any others determined by staff of the toxics unit to meet the definition of subtilisins listed in the ACGIH documentation, will have an associated averaging time of 1 hour.

MLH:slb

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

INTEROFFICE COMMUNICATION

September 9, 1994

TO: Files for BIOSAM TP-1.5 (product contains proteases with CAS#'s 9001-92-7 and 37259-58-8 and amylase with CAS# 9000-90-2) and PURAFECT 4000G (contains Bacillus subtilis with CAS# 9014-01-1)

FROM: Mary Lee Hultin, Toxics Unit

SUBJECT: Screening levels for BIOSAM TP-1.5 and PURAFECT 4000G

Screening levels for these products have been derived in response to a request from AMWAY for Permit 140-94. The initial request was for a product called alkaline stable protease enzyme. No toxicity information was available for this product. A material safety data sheet was obtained from the company which identified the product as BIOSAM TP-1.5 containing proteases with CAS#'s 9001-92-7 and 37259-58-8 and amylase with CAS# 9000-90-2. A second product was subsequently added to the permit request. This product, called PURAFECT 4000G, contains a subtilisin with CAS# 9014-01-1. Literature searches were performed for toxicity data on these compounds including the following references:

RTECS
EPA IRIS
DNR EPB and NUTSHELL
NIOSH
ACGIH TLV
CAS Online
NLM Toxline database
AQD files and screening level databases
HEAST
NTP Management Status Report
IARC

The RTECS name for the BIOSAM product protease CAS# 9001-92-7 is Bacillus subtilis neutral protease. The Purafect product subtilisin is listed as Bacillus subtilis Carlsberg in the RTECS databases. While there is not sufficient data for derivation of inhalation reference concentrations for the individual components in these products, the subtilisins have an ACGIH TLV. The TLV varies depending on the enzyme content of product preparation. The TLV documentation for subtilisins lists CAS numbers for Bacillus subtilis Carlsberg, Bacillus subtilis BPN, as well as various product trade names. The document states, "The term subtilisins refers to

September 9, 1994

a group of proteolytic enzymes derived from Bacillus subtilis or closely related organisms."

Information obtained from AMWAY indicates that the appropriate TLV associated with the enzyme preparations is 0.002 mg/m³ listed in the TLV documentation as "As Received" Enzyme. The TLV clearly applies to the Purafect product since the CAS# is listed in the documentation. As mentioned above, the TLV documentation notes that the exposure level applies to proteolytic enzymes derived from Bacillus subtilis or "closely related organisms". Studies on the Bacillus subtilis neutral protease CAS# 9001-92-7 and alpha-amylase contained in the BIOSAM product (see AQD INTERIM CHEMICAL EVALUATIONS for these compounds) indicate that their mode of toxic action is similar (i.e., pulmonary sensitization) to other subtilisins. Therefore, the TLV value for subtilisins will be applied to the BIOSAM product.

Since both products will be emitted and both have pulmonary sensitizing properties, the combined impacts from these emissions must meet the following Initial Threshold Screening Level (ITSL), as per Rule 230 (9)(b):

TLV = 0.002 mg/m³ based on 8 hour averaging

$$ITSL = \frac{0.002 \frac{mg}{m^3}}{100} = 2 \times 10^{-5} \frac{mg}{m^3} = 0.02 \frac{ug}{m^3} \text{ based on 8 hour averaging}$$

MLH:ma