**_ENVIRO TECH_**
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# ENVIRONMENTAL ASSESSMENT

RE: FCN 000641

1. **Date:** June 30, 2006. ***Revised 7-27-06***
2. **Submitter:** Enviro Tech Chemical Services, Inc.
3. **Address:** 500 Winmoore Way, Modesto, CA. 95358
4. **Description of Proposed Action:**
   a. FCN is composed of peroxyacetic acid , hydrogen peroxide, acetic acid, HEDP, and (optionally) sulfuric acid for microbiological control in wash water during the production of lactose. Maximum concentrations of the FCS is noted on pg 51, Attachment #8 in the FCN.
   b. Typical lactose production includes adjusting pH to below pH 3 with an acid additive in order to control (primarily) fungal and bacterial growth. These efforts and the associated results have been marginal at best, and a need exists to utilize an indirect additive (process aid) that yield more adequate and consistent microbiological control.
   c. The FCS is used at the end of the lactose production flow diagram as depicted in Attachment #7 of the FCN (pgs 45-48). The method is used by injecting the equilibrium peroxyacetic acid product (PAA) using flow-proportional dispensing equipment in the final stage "refining process", just prior to the TEMA separator (which is the stage that separates the liquid from the crystal lactose just prior to drying).

5. **Identification of Substance:**
The FCS is a liquid equilibrium mixture of peroxyacetic acid, hydrogen peroxide and acetic acid. It is made by blending acetic acid, hydrogen peroxide, RO water, and HEDP as a transition metal stabilizer. Sulfuric acid is optionally added in winter time to aid in the speed of the reaction process.

Ingredients: (note pg. 4 of FDA Form 3480):

| | |
|---|---|
| Acetic acid | CAS # 64-19-7 |
| Hydrogen Peroxide | CAS # 7722-84-1 |
| HEDP | CAS # 2809-21-4 |
| Sulfuric acid | CAS # 7664-93-9 |
| Purified water | CAS # 7732-18-5 |

The basic reaction by the above combination is as follows:
$CH_3CO_2H + H_2O_2 = CH_3CO_3H + H_2O$ (molecular weight is 76 gms/mole)

**6. Introduction of Substance into the Environment:**

a. The FCS is currently manufactured in an EPA approved facility (EPA Establishment Number 63838-CA-01) at the address listed above, and no unusual or factual threat to the environment exists. No extraordinary environmental circumstances would apply to the continued on-going manufacture of the FCS.

b. The FCS is proposed for use in the manufacture of lactose prior to the dehydration process. During the subsequent dehydration process the lactose, and a small amount of the FCS that remains, is subjected to drying temperatures of 195-210° F. Peroxyacids and hydrogen peroxide cannot exist in a dehydrated form, and thus decompose to their degradation products carbon dioxide, oxygen and water. Small amounts of the stabilizer HEDP may remain, as well as the degradation by-products acetate and sulfate, as a result of the dehydration process.

The FCS substance, if accidentally discharged or released as over-flow from the process area, would be directed to the food plant wastewater discharge system. Treatment of the FCS in this method would represent a 99.4% degradation of the peroxyacetic acid, hydrogen peroxide and acetic acid into their degradation products carbon dioxide, water, oxygen, and acetic acid. (2)(3). The stabilizer in the formulation HEDP would be diluted many thousands of times by wt. with the balance of the food plant wastewater and would result in a HEDP concentration in excess of parts per billion quantities, which would not present an environmental concern.

**7. Fate of the Substance in the Environment:**

It is well documented and accepted in the scientific community that PAA and HP are short lived in the environment, do not bioaccumulate, have innocuous degradation byproducts, and are of no toxicological or ecotoxicity concern(2)(3). The HEDP biodegrades into carbon dioxide, water, and simple orthophosphate(9).

Peroxyacetic acid and hydrogen peroxide are not expected to survive treatment at the primary wastewater treatment facility due to their reactivity and pH sensitivity[1]. Both compounds are rapidly degraded on contact with organic matter, transition metals, and upon exposure to sunlight[2][3]. The half-life of PAA in buffered solution solutions was 63 hrs at pH 7 for a 748 ppm solution, and 48 hrs for a 95 ppm solution, also at pH 7[2].

The half-life of hydrogen peroxide in natural river water ranged from 2.5 days when initial concentrations were 10,000 ppm, and increased to 15.2 days when the concentration decreased to 250 ppm[3]. However, the half-life of hydrogen peroxide in ground water, taken from wells in a shallow sand and gravel aquafier at 11-32 meters below ground level was < 1 hr. [4]

Since PAA and HP rapidly degrade, they will not be introduced into the natural environment in wastewater at toxic levels. Therefore toxicity and fate data should not be required for these compounds.

In biodegradation studies of acetic acid, 99% degraded in 7 days under anaerobic conditions [5].

Degradation of HEDP phosphonate occurs slowly in sunlight-illuminated river water as shown by loss of chelant titer and the production of orthophosphate. Degradation has also been shown in several test soils at rates similar to biodegradable linear alkylbenzene sulfonate. Some species of algae can slowly utilize the phosphorous present in HEDP as a nutrient, and thus degrading the active molecule. [6]

In addition, literature reports indicate that HEDP is removed from water and wastewater by classical precipitation treatment with aluminum sulfate or lime.[7][8]

According to HERA, HEDP has a very high adsorption rate coefficient in wastewater activated sludge operations, and this rate of removal has been estimated at >90% for secondary-treated wastewater (page 20), and further proportionate reductions for tertiary treatment[9].

**8. Environmental Effects of Released Substances:**

Attachment 7 of the FCN (pages 45-48) shows the typical flow diagram and mass balance of the FCN in use concentrations. The FCS (in water) flows countercurrent to the direction of product flow, and is ultimately discharged to the plant wastewater system. The peroxyacetic acid, hydrogen peroxide and acetic acid are expected to degrade rapidly and should not create an environmental concern. [1]

HEDP will persist in the wastewater to some degree. The proposed FCN maximum level of the FCS will result in a maximum of 3.2 ppm in the lactose wash water, of which 4% will logically remain with the lactose crystals. Thus, one would expect a maximum of 3.07 ppm to be discharged from the lactose refining operation into the wastewater system.

In this particular plant, lactose operation discharges are 8,400 lbs/hr (201,000 lbs/day) from the lactose manufacture. It is mixed with other plant wastewater that averages 1.1 million gallons/day (9.16 million lbs), which yields a 46-1 dilution ratio. Thus, one would expect a discharge concentration of 67 ppb (parts/billion) in the overall wastewater contribution.

If one assumes a 90% adsorption rate[9] in typical sewage plant operations, the remaining HEDP would be potentially 6.7 ppb.

The ultimate degradation products of HEDP phosphonate are carbon dioxide, water and phosphate. The phosphate released from HEDP degradation would not result in measurable increases of phosphate in soils amended with wastewater sludge, or in water receiving the treated effluent.

This low level of HEDP would not pose any environmental concerns with the use of the FCS as proposed in this Notification.

9. **Use of Resources and Energy:**
The proposed FCS would not pose any additional burden on existing resources or energy in the manufacture, transport, use or disposal of the FCS above and beyond those already existing, and the proposed use will not create any additional burden on resources or energy.

10. **Mitigation Measures:**
As discussed above, no significant adverse environmental impacts are expected to result from the use and disposal of the FCS mixture. Thus, the use of the FCS mixture is not reasonably expected to result in any new environmental problem requiring mitigation measures of any kind.

11. **Alternatives to Proposed Action:**
There are no known alternatives to this proposed FCN. The alternative of NOT approving the FCS Notification proposed herein would simply result in the continued use of large amounts of acid-based additives, which would have a more *negative* impact on the environment than using the FCS as proposed in this Notification.

**12. List of Preparers:**

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b. Jonathan N. Howarth, Ph.D., Physical Chemistry, Univ. of Southampton, England
   BS (Honors), Applied Chemistry, Leicester Polytechnic, England

**13. Certification:**

The undersigned official certifies that the information presented is true, accurate, and complete to the best of the knowledge of Enviro Tech Chemical Services, Inc.

Date: 7-29-06

Signature:

Name and Title: Michael S. Harvey, President

## BIBLIOGRAPHY


(1) EPA: *Reregistration eligibility Decision: Peroxy compounds*; EPA Case 4072. Doc #738-F-93-026; Dec. 1993.

(2) ECETOC: European Centre for Ecotoxicology and Toxicology of Chemicals, JACC No. 40, "Peracetic Acid and its Equilibrium Solutions"; January 2001

(3) ECETOC: European Centre for Ecotoxicology and Toxicology of Chemicals, JACC No. 22, "Hydrogen Peroxide"; January 1993

(4) HOLM, T.R, et al, (1987) "Fluorometric determination of hydrogen peroxide in groundwater"; Anal. Chem, 59, 582-586

(5) U.S. High Production Volume (HPV) Chemical Challenge Program: "Assessment Plan for Acetic Acid and Salts Category". Acetic Acid and Salts Panel, American Chemistry Council, June 28, 2001.

(6) Monsanto Technical Bulletin, No. 9024, "Dequest 2010 Phosphonate" (HEDP)

(7) Ralston, P.H., Materials Performance, June 1972, p 39

(8) Wehle, Y., VGB Kraftwerkstechnik, 56(3), 173 (1976)

(9) HERA. "Human & Environmental Risk Assessment of Ingredients of European Household Cleaning Products: Phosphonates (2004)".