514.1(b)10

ENVIRONMENTAL ASSESSMENT

514.1(b)10 Environmental Assessment

1. December 22, 1989

2. A. L. Laboratories, Inc.

3. One Executive Drive
PO Box 1399
Fort Lee, NJ 07024

4. Description of Proposed Action

The proposed action is for approval of a supplement to approved New Animal Drug Application (NADA) 46-592 listed in 21 CFR 558.76 which provides for the use of bacitracin methylene disalicylate (BMD) in the ration of chickens, turkeys, swine, cattle, pheasant and quail variously for increased rate of weight gain, improved feed conversion and control/prevention of certain diseases.

This supplement adds the claim for control of clostridial enteritis in piglets when the pregnant dam is fed BMD at a rate of 250 grams/ton of feed during the period 14 days prior to and 21 days after parturition.

Current approvals under 21 CFR 558.76 provide for use of BMD in swine at levels of 10-30 grams/ton for increased feed conversion and increased rate of weight gain and 250 grams/ton for control of swine dysentery. In essence, this submission requests approval for us of BMD in those farms where clostridial enteritis is an occasional problem - the feeding level, 250 grams/ton, is already approved by the agency.

This supplement contains reports on four (4) viable confirmatory field trials among naturally infected animals. Sows on infected premises were fed BMD at a level of 250 grams/ton for 14 days before through 21 days after farrowing and efficacy was determined by monitoring results in piglets including morbidity, mortality, degree of diarrhea present and rate of weight gain of the piglets. Results, statistically analyzed, showed significant reduction of mortality (21%) in treated over control animals, reduced incidence of diarrhea and an increase of 0.69 lbs/day/body weight in piglets from treated sows.

BMD will be produced at the Chicago Heights, IL plant of A. L. Laboratories, Inc. This facility meets all federal and state regulations pertaining to manufacturing.

5. Identification of Chemical Substances that are the Subject of the Proposed Action

Bacitracin methylene disalicylate is a polypeptide antibiotic. A biomass powder material it has a white to light brown color with a disagreeable odor and bitter taste.

CAS No: 55852-84-1. Molecular Formula is $C_{66}H_{103}N_{17}O_{16}S$. Insoluble in acetone, ether, chloroform, pentane and benzene. Soluble in pyridine and ethanol. A Material Safety Data Sheet is attached for easy reference.

6. Introduction of BMD into the Environment

BMD is manufactured at the A. L. Laboratories, Inc. plant located at 400 State Street, Chicago Heights, IL 60411, Phone 708-758-0111.

This plant operates in conformance to Environmental Requirements; both federal and state.

A copy of Operating Permit I.D. No. 031045ACP, Expiration Date September 24, 1991 and Wastewater Discharge Permit No. 001-70032 effective dates February 1988 to December 31,

1991 (see Attachment A). These documents address the nature, extent and disposition/control of waste materials.

7. Fate of Emitted Substances in the Environment

a. Previously approved submissions provided for the use of BMD for increased rate of weight gain, improved feed efficiency and control of swine dysentery.

This submission provides for the use of BMD at the already approved 250 gram/ton level for use in pregnant sows to control clostridial enteritis in piglets.

Potential BMD use for the new claim is estimated as follows: 4.5 million sows produce 9.2 million litters per year. The incidence of Clostridial Enteritis is approximately 5%. Assuming that these sows plus an additional 5% of the sows are medicated with BMD to protect against this disease, then 920,000 sows would be medicated with BMD each year. Each sow consumes approximately 127 kg of feed during the 5-week treatment period. Thus, the 920,000 sows would consume 117,000 metric tons of feed containing a total of 32 million grams of BMD. This additional use of BMD represents a 13% increase in total BMD usage.

b. The bacitracin methylene disalicylate feed concentrate is manufactured by:

A. L. Laboratories, Inc.
400 State Street
Chicago Heights, IL 60411

Its manufacture involves fermentation using harmless nutrients and a non-pathogenic organism, with subsequent spray drying of the total components, blending and packaging to obtain the final bulk product.

No significant impact on the environment is created because any pollutants generated during manufacture are negligible and controlled. In the manufacture of the product for feed use, the total fermenter contents goes via a closed system into a spray drier. The water vapors, odors and gases are collected in a closed system and passed through an incinerator at 1500°F with only carbon dioxide and water vapor returned to the atmosphere. No organic solvents are used in the process. In blending, any dust that is generated is collected in a dust collector and disposed of in compliance with Illinois state requirements.

BMD premixes (Type A Medicated Articles) are all formulated at the above cited Chicago Heights plant and comply with federal and state requirements as per attached permits.

c. Introduction into the environment through excretion by target animals:

It has been demonstrated in experiments that chickens, dogs and swine given bacitracin orally absorb little, if any, of the antibiotic and the portion that is excreted appears to be essentially intact in the feces. Commercially, the methylene disalicylate and zinc salts are used as feed additives to promote growth and for disease control in poultry, swine and cattle. These salts disassociate upon ingestion releasing the active bacitracin base. (Feinman and Matheson III, 1978). Thus, there is a similarity in the excretion pattern of the bacitracins and consequently the experimental data for all forms of bacitracin apply equally.

Concerning fish, diets containing 57.5 and 104 ppm bacitracin zinc fed for 110 days evinced no adverse effects. Marten (1967) found no bacitracin residues in the mixed tissues (see Attachment B).

Treatment of eye fungal infections in the yellow head jawfish (Noyes, J.C., 1974, Marien Aquariest 5,43) includes their exposure to 67 ppm of bacitracin in aquarium water. Bacitracin zinc has also been used in the prophylaxis of furunculosis in trout (Deufel, J., 1967, Allegemeine Fisherie Zeitung, 92, NR 4).

The following data from a swine trial where 500 grams of either bacitracin zinc or bacitracin methylene disalicylate per ton of feed fed to two pigs per salt showed a rapid bacitracin inactivation in fresh feces held at room temperature (18-22°C). The pigs, including two controls in the above study, consumed an average of 5.4 lbs feed per day and excreted an average of 3.8 lbs feces per day. Their average weight was 89 lbs.

	Bacitracin Found (ppm)		
Sample	Controls	Zinc	BMD
Fresh Feces*	0, 0	19.0, 22.0	14.8, 10.3
Same held 4 days RT	0, 0	7.1, 4.7	3.9, 3.5
Same held 14 days RT	0, 0	1.6, 0.2	2.6, 0.5

* average for each animal

A. L. Laboratories, Inc., Experiment No. NJ-S. Rutgers, 7/77.

In a similar experiment with broiler chickens fed continuously a mash feed containing 500 grams bacitracin methylene disalicylate per ton parallel rapid degradation was found also.

Sample	Bacitracin Found (ppm) Dry Matter Basis
Fresh feces	6.17
Same held 24 hours RT	5.00
Same held 72 hours RT	4.89
Same held 7 days RT	1.30
Same held 14 days RT	0.14
Same held 21 days RT	0.14

The experiment was done by Dr. T. Chang, Michigan State University, East Lansing.

Bacitracin inactivation in fresh excreta of swine at 500 grams bacitracin per ton of feed parallels that of broiler and layer chickens, where half-life of 2-4 days can be estimated.

Breakdown in broiler feces appears to run parallel to that reported for swine feces. The half-life of zinc bacitracin activity ranges from 2-7 days, according to temperature. (Thommassen, et al, 1976).

The practice of applying livestock manure to fertilize agricultural soil necessitates an assessment of the degradation of bacitracin and any potential phytotoxic effects. Admixtures of poultry feces with soil degraded zinc bacitracin completely in less than one week according to Jagnow (1977).

The use of excreta from chickens fed zinc bacitracin (20-100 ppm) had no inhibitory effect on plant growth nor had the addition of 150 ppm zinc bacitracin added to the feces on the composting process (Vogtmann, et al, 1978).

Jagnow (1977) followed the degradation of antibiotics after addition to chicken manure. 25 ppm of zinc bacitracin were inactivated by 90% within two days under aerobic and anaerobic conditions. After mixing the manure with soil, the degradation of zinc bacitracin was complete within one week.

d. Effect of the bacitracin(s) on soil and water environment:

Hagedorn (1979) reported all 50 *Rhizobium trifolii* isolates concerned in nitrogen fixation that were tested as being resistant to high concentrations of bacitracin.

Pinck, Holton and Allison (1961) demonstrated bacitracin to be one of a group of amphoteric antibiotics which are weakly absorbed and easily released in active form from clay-antibiotic complexes that would occur in soils. This antibiotic was released from all soil types and clays tested.

Based on the preceding reports and the high water solubility of bacitracin, it may be concluded that this antibiotic is mobile in soils with temporary or partial retention depending on soil pH, temperature, soil composition and content.

Barrett (1981) studied the stability of selected antibiotics in surface water. The degradation of bacitracin zinc in two surface waters was followed over a period of 30 days. One hundred milliliter samples were supplemented with 5 u/ml zinc bacitracin and incubated at three different pH's (6, 7, 8) and three different temperatures (4, 20, 28°C). A set of sterile incubation conditions were identical to those of the non-sterile samples. The half-lives of bacitracin in surface waters are shown below.

		Farrington Lake*		Farm Pond*	
		Sterile	Non-Sterile	Sterile	Non-Sterile
pH 8,	4°C	30 days	30 days	30 days	30 days
	20°C	16	8	--	27
	28°C	4	6	--	12
pH 7,	4°C	30 days	30 days	30 days	30 days
	20°C	19	30	21	21
	28°C	9	13	14	11
pH 6,	4°C	30 days	30 days	30 days	30 days
	20°C	30	30	30	30
	28°C	24	27	21	28

* Farrington Lake is located east of the Rutgers University, Cook College campus, the Farm Pond is a run-off water acceptor. The half-lives were calculated using linear regression of the data. All curves appeared to be zero-order.

Bacitracin had no effect on two strains of the green alga *Chlorella* (Van Dijck and Van de Voorde, 1976). Whereas, the green alga *Chlorella ellipssida* was not affected by bacitracin at 10,000 ug/ml, the blue-green alga *Anabaena variabilis* have been found to be inhibited by bacitracin (IC50:10 ug/ml) (Matsuhashi, et al, 1969).

Bacitracin inhibits growth of *Halobacterium* a genus of bacteria found in salt water, which lacks the peptidoglycan layer characteristic of the cell wall of the prokaryotes (Mescher and Strominger, 1975). Bacitracin probably has no effect upon the gram-negative free-living nitrogen fixers *(azotobacter)* or symbiotic nitrogen fixers *Rhizobium)* or upon the nitrate and sulfate oxidizing organisms *(Nitrosomonas, Nitrobacter, Thiobacillus)* since it acts mainly upon gram-positive organisms and gram-negative cocci. (Feinman and Matheson, 1978).

Bacitracin had no effect on 6 strains of the Amoeba Naeglaria (Van Dijck and Van de Voorde, 1976).

Among the methane-producing bacteria, *Methanobacterium* (4 strains) is inhibited by bacitracin, whereas *Methanospirillum* and *Methanosarcina* are not inhibited by bacitracin (Hammes, et al, 1979). *Methanococcus vannielii* is inhibited by bacitracin at 10 ug/ml (Jones, et al, 1977).

Mutant strains of *Rhizobium leguminosarium* and *R. trifolii* with low level resistance (2-5 ug/ml) to bacitracin have been examined for symbiotic effectiveness (Schwinghamer, 1967: Hagedorn, 1979). Eight of fourteen strains examined exhibited a partial loss of symbiotic effectiveness.

Bacitracin has been found to be inhibitory to the halophilic bacteria *Halobacterium salinarium* (IC50:5 ug/ml), *H. halobium* (IC50:12 ug/ml) (Mescher and Strominger, 1975).

Bacitracin related phytotoxicity has not been observed in the available data. Bacitracin at 50-200 ppm prevented microbial contamination of the periwinkle, *Vinca rosea*, in tissue culture, without exhibiting any toxic effects on callus tissue growth (Carew and Patterson, 1970). Data from one greenhouse study indicate that bacitracin stimulates production of clover nodules and number of fungi in cropped soil (Hervey, 1955). Bacitracin from the excreta of medicated target animals did not affect yield in potted oats (Tietjen, 1975).

In summary, the following microorganisms would be expected to be affected by bacitracin in low concentrations (<100 ppm): *Flavobacterium, Methanobacterium, Methanococcus, Halobacterium, Rhizobium* and *Anabaena.*

The following genera are not inhibited by bacitracin in low concentrations: *Mycoplana, Cytophaga, Hyphomicrobium, Hydrogenomonas, Citrobacter, Thiobacillus, Nitrobacter, Nitrosomonas, Methanospirillum, Methanosarcina, Chlorella* and *Naeglaria.*

Rhodopseudomonas and streptomycetes show variable sensitivity towards bacitracin.

e. Effect on insects in the environment.

In insects the data available indicate that bacitracin is of low toxicity. Bacitracin was toxic to rice-weevil larvae *(sitophilus oryza)* fed at 20,000 ppm (Baker and Lum, 1973). The toxic level for larvae of flesh-eating flies *(Agria affinis)* was greater than 50,000 ppm in feed (Singh and House, 1970).

f. Probably pathway of degradation of the bacitracin molecule:

The rapid inactivation of bacitracin antimicrobial activity in excreta and soil is well documented (Thomassen et al, 1976; Jagnow, 1977).

In view of the relatively low stability constant of $10^{3.4}$ for bacitracin zinc (Craig, et al, 1969), this salt would be expected to dissociate into zinc ions and free bacitracin under environmental conditions. Bacitracin methylene disalicylate will dissociate similarly into methylene disalicylic acid and bacitracin.

The compounds formed on inactivation of bacitracin's antimicrobial activity have not been identified. From the chemical experience with bacitracin A, the first step is likely to be the oxidation to bacitracin F which has negligible antimicrobial activity

(Newton and Abraham (1953); Konigsberg and Craig (1962); Mussbaumer (1965)]. At high pH, some inactivation might take place by formation of desamido-bacitracin which has little antimicrobial activity [Newton and Abraham (1953); Konigsberg and Craig (1962)]. Alternatively, after primary steps of deamidation and deamination, hydrolysis of microbial proteases would lead to smaller peptides and amino acids.

Although bacitracin is not susceptible to animal or plant proteolytic enzymes (Hickey, 1964), the bacitracins are likely to be digested by bacterial peptidases similar to what is known for other cyclic peptide antibiotics (e.g. the polymyxins).

g. Occupational Exposure

A number of publications deals with the hypersensitivity of bacitracin (Pirilä and Rantnen, 1960; Pirilä et al, 1964, Schwant, 1965; et al, 1967, Pirilä et al, 1969). The frequency of hypersensitivity to bacitracin range from 0.3% of 380 patients (Schwank, 1965) to 7.8% of 17,500 patients (Pirilä et al, 1967). The frequency apparently increasing with increased use of topical bacitracin (Pirilä et al, 1967).

h. The use of the marketed product in animal feeding has not been shown to have deleterious effects on animals or plants.

The use of bacitracin in amounts of 500 grams/ton of feed or 2 grams/gallon of drinking water have not produced detectable tissue residues (NADAs 65-470, 46-592), thus, there cannot be a human effect from consumption of food derived from animals.

Data indicates that bacitracin has no effect on plant growth, bioaccumulation in plant tissues, minimal accumulation in soil with a short half-life and rapid disappearance from water (NADA 65-280). The residual effect would be of short duration since application of bacitracin containing manure would be of low concentration due to storage and wide time-interval application.

Bacitracin is considered a non-toxic material when ingested as shown in a Toxicology Review submitted August 25, 1980, as a supplement to NADAs 65-470 and 46-592.

A wealth of tissue residue data shows that bacitracin(s) are very poorly absorbed, if at all, through the gastro-intestinal tract of the target animal. Thus, complete excretion and/or partial destruction of bacitracin(s) in the gut suggests that bioaccumulation is not a problem in mammals and birds (NADAs 46-592, 65-470, 98-452).

8. Utilization of Resources and Energy

Resources consumed in the manufacture of feed grade bacitracin methylene disalicylate are natural sources of nutrients for protein and energy and are manufactured from the soy bean or corn or barley. Minerals are readily available from commercial sources.

In the production of each standard kilogram of bacitracin methylene disalicylate there are 3,690,000 BTU used. Wastes generated are exhausted into the air as carbon dioxide and moisture laden air from incineration of odors, gases or dust from the process.

Since bacitracin methylene disalicylate is produced by bacterial fermentation process and recovery of the final usable product by spray drying, the expenditure of manufacturing resources is minimal. Hence, no irretrievable commitment or resources will result from production of bacitracin methylene disalicylate.

9. Mitigation Measures

There are no disruptions due to noise, odors, construction or other disruptions associated directly or indirectly with this action. No objections to the current operations by any agencies, organizations or individuals are known to have been raised or to be in existence. The operation of the manufacturing facilities comply with local and state regulations. We are not aware or potential adverse environmental impacts associated with this action.

10. Alternatives to the Proposed Action

The only specific alternative to the proposed action would be to refuse approval of this supplement to the new drug application. This would deny the swine producer the benefits which could be realized by use of bacitracin methylene disalicylate afforded for the treatment and control of clostridial enteritis in young pigs. Such action would seem unjustifiable in view of the lack of toxicity, the absence of animal/human health hazard and the negligible impact on the environment associated with the use of bacitracin methylene disalicylate.

a. Other factors which favor the safe use of bacitracin for this purpose are:

i. It is a gram-positive active antibiotic and unlikely to induce bacterial resistance.

ii. No withdrawal is required because it is poorly absorbed, if at all, from the digestive tract of domestic animals.

iii. It is not used systemically in human or animal therapeutics.

iv. It has met the Human and Animal Health Safety Criteria for Animal Feeds.

v. It is non-toxic, excreted totally in the feces at less concentration than ingested and is rapidly degraded.

Thus it is not believed that the action "not to approve" would result in greater environmental protection, even though there may be short-term effects that could be temporarily adverse on some microorganisms.

b. Short-term use of the environment vs long-term productivity:

With time there have been significant changes in the agricultural areas of the American economy. Growing populations, domestically and abroad, have increased the demand for the entire range of food, grain and meat products. Large-scale production to meet this need has become a highly technical and efficient process. Among the numerous tools employed toward this end are a vast array of animal health products. By employing antibacterial agents to control disease and thus improving productivity, a more efficient utilization of feed stuffs has been realized. The result has been to increase the supply of food by increasing the supply of food-animal products with the high quality protein essential for good nutrition and health at reasonable cost to the consumer.

c. Benefits to the public vs potential risk:

Controlled clinical studies have demonstrated the potential benefits bacitracin methylene disalicylate can offer the swine producer by treating and controlling the impact of clostridial enteritis on mortality, reducing morbidity of affected animals and their improved health and performance. In the market place, these effects could be translated into increased numbers of healthier animals at a lower cost to the consuming public, in return for negligible changes in the environment.

11. List of Preparers

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12. Certification

The undersigned official certifies that the information presented herein is true, accurate and complete to the best of the knowledge of the firm or agency responsible for preparation of the Environmental Assessment.

Larry A. Muir, Ph.D.
Vice President
Research & Development

Larry A. Muir 12/4/89
Signature Date

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MATERIAL SAFETY DATA SHEET

A.L. LABORATORIES, INC.

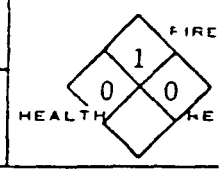
CODE	DATE ISSUED	ISSUED BY
	May 14, 1987	Arnold L. Hirsch, PhD Director, R&D Laboratory

SECTION I – IDENTIFICATION OF MATERIAL

CHEMICAL NAME OR COMPOSITION

BACITRACIN METHYLENE DISALICYLATE PREMIX

HAZARD RATING



TRADE NAME & SYNONYMS

BMD 50

CHEMICAL FAMILY	MOLECULAR FORMULA
Polypeptide Antibiotic	Mostly Bacitracin A MF = $C_{66}H_{103}N_{17}O_{16}S$

SECTION II – SIGNIFICANT COMPONENTS AND CONTAMINANTS

CAS NO.	COMPONENT	PERCENT	PERMISSIBLE EXPOSURE LIMIT	SHORT TERM EXPOSURE LIMIT	RTEC NUMBE
55852-84-1	Bacitracin methylene bis(2-Hydroxybenzoate)			See Sec. V.	CP-17
	Silicon dioxide (Aerosil 200)	0.66	80 mg/M^3/%SiO_2		VV 73
25322694	Polypropylene glycol - P1200	0.40	LD_{50} (ipr-mus) 113 mg/kg		TR 61
	Methylene disalicylic acid	~5.0%	Non-toxic: excreted unchanged from various animals		
	Edible Grain Mixture	Balance	Non-toxic		
1317653	Calcium Carbonate	~10-30%	Non-toxic		EV 95

SECTION III – PHYSICAL DATA

PHYSICAL CHARACTERISTICS

White to light brown powder with slightly, disagreeable odor; bitter taste.

BOILING POINT	FREEZING POINT	SPECIFIC GRAVITY (WATER = 1)
NA	NA	0.6 g/ml

VAPOR PRESSURE (MM OF MERCURY)	PH
NA	NA

VAPOR DENSITY (AIR = 1)	SOLUBILITY IN WATER
NA	Insoluble

SECTION IV – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (SPECIFY METHOD)	FLAMABLE (EXPLOSIVE) LIMITS (PERCENT BY VOLUME)	
	LOWER EXPLOSIVE LIMIT	UPPER EXPLOSIVE LIMIT
NA	NA	NA

FIRE EXTINGUISHING MEDIA

Water or chemical extinguisher.

SPECIAL FIRE FIGHTING PROCEDURES

None required.

UNUSAL FIRE AND EXPLOSION HAZARDS

None.

000006

EFFECTS OF OVEREXPOSURE

ACUTE
LD_{50}: >10 gm/Kg in rat; 2 gm/Kg in guinea pig

CHRONIC
Daily doses of 250 mg/Kg in dogs for 3 months showed no overt symptoms of toxicity. Primary route of entry would be ingestion or inhalation of dust.

EMERGENCY AND FIRST AID PROCEDURES

Remove from source.

This material is not a carcinogen.

SECTION VI – REACTIVITY DATA

GENERAL REACTIVITY

Unreactive.

INCOMPATABILITY (MATERIALS TO AVOID)

None

HAZARDOUS DECOMPOSITION PRODUCTS

None

HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID
Does not polymerize.	Extremes of temperature, light and humidity.

SECTION VII – SPILL PROCEDURES/DISPOSAL REQUIREMENTS

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Sweep or vacuum spilled material; transfer to paper bag.

TE DISPOSAL METHOD

Burn or bury in approved landfill; biodegradable.

CONTAINER DISPOSAL

Burn or bury in approved landfill; biodegradable.

SECTION VIII – SPECIAL PROTECTION INFORMATION (SPECIFY IN DETAIL)

EYE PROTECTION	GLOVES
Wear light eye covering to protect against dust.	May cause skin irritation; wear light gloves when handling.

RESPIRATORY

Avoid breathing dust; wear filter mask when handling.

VENTILATION	OTHER
No special requirements.	For manufacturing registered poultry and livestock feed only.

SECTION IX – SPECIAL PRECAUTIONS

STORAGE REQUIREMENTS

Store in cool, dry location protected from direct sunlight.

MATERIAL OF CONSTRUCTION

Multilayered paper bags with HDPE liner.

LABELING

NA

OTHER

NA

SECTION X – SHIPPING REGULATIONS (D.O.T. NOMENCLATURE)

PROPER SHIPPING NAME

Bacitracin Methylenedisalicylate; Bacitracin MD; BMD

HAZARD CLASS	TYPE OF PACKAGING	LABEL
hazardous	Multilayered paper bags with HDPE liner.	No special label required.
CARD	MARKING	EXEMPT
NA	NA	Not governed by D.O.T. regulations (GRAS).

SECTION XI – NOTES

ATTACHMENT A

000607

Illinois Environmental Protection Agency 2200 Churchill Road, Springfield, IL 62706

217/782-2113

RECEIVED

MAR - 7 1988

OPERATING PERMIT

PERMITTEE

A.L. Laboratories, Inc.
Attn: Carl McKnight
400 State Street
Chicago Heights, IL 60411

Application No.: 81060048 I.D. No.: 031045ACP
Applicant's Designation: JCOPAG0687 Date Received: February 10, 1988
Subject: Animal Feed Supplement Manufacturing
Date Issued: March 2, 1988 Expiration Date: September 24, 1991
Location: 400 State Street, Chicago Heights

Permit is hereby granted to the above-designated Permittee to OPERATE emission source(s) and/or air pollution control equipment consisting of 3 reactors with 3 condensers; 5 receiving silo tanks with 4 baghouses; 2 mix tanks with 2 baghouses; 4 fermentors; 1 spray dryer with cyclone, scrubber, baghouse, condenser and afterburner; 11 storage bins with 11 baghouses; 2 blender-packagers with 2 baghouses; 6 boilers; 4 storage tanks; 2 evaporators; 1 make-up tank and 1 drum dryer with 1 scrubber; 1 ribbon blender and 1 screw conveyor with 1 baghouse; 1 ribbon blender and 1 drum drop conveyor with 1 baghouse; 1 natural gas fired engine with electric generator; and 1 calcium carbonate bin with 1 baghouse as described in the above-referenced application. This Permit is subject to standard conditions attached hereto and the following special condition(s):

1. Emissions of particulate matter, sulfur dioxide, nitrogen oxides, carbon monoxide and organic material from the original processes and boilers shall not exceed 0.7, 0.2, 13.0, 6.4 and 1.2 tons/yr, respectively. These limits are based on the maximum hours of operation indicated in the permit application.

2. Emissions of particulate matter from the storage bin and baghouse in construction permit 84060052 shall not exceed 0.2 tons/year. This limit is based on the allowable emission limit (0.88 lb/hr) at the maximum operating rate (200 lb/hr) and the maximum hours of operation (520 hr/yr) indicated in the permit application.

3. Emissions of particulate matter from receiving silo tanks RST #4, RST #5, storage bins SB #4 and SB #5 each shall not exceed 1.4 tons/year. This limit is based on the allowable emission limit (1.35 lb/hr each) at the maximum operating rate (600 lb/hr each) and the maximum hours of operation (2080 hr/yr each) indicated in the permit application.

4. This permit is issued based upon a minimal hourly emission rate and negligible annual emissions (less than 0.1 ton/year) of organic material from the additional condenser and reactor.

Illinois Environmental Protection Agency 2200 Churchill Road, Springfield, IL 62706

5. Operation of the make-up tank and drum dryer without the scrubber is not permitted.

6. This permit is issued based upon a minimal hourly emission rate and negligible annual emissions (less than 0.1 ton/year) of particulate matter from the make-up tank and drum dryer.

7. Annual emissions from the equipment in construction permit 87010059 shall not exceed the amounts specified in the table below.

Item of Equipment	Operating Hours (Hours/Year)	Hourly Particulate Matter Emissions (lb/hr)	Annual Particulate Matter Emissions (Tons/Year)
Ribbon Blender RB #1	1000	1.2	0.6
Screw Conveyor SC #1	1000	1.2	0.6
Ribbon Blender RB #2	1000	0.9	0.45
Drum Drop Conveyor DD #1	1000	0.9	0.45

These limits are based on the allowable emission limit at the maximum operating rate and the maximum hours of operation indicated in the permit application.

8. Emissions of nitrogen oxides and carbon monoxide from the electric generator shall not exceed 64.2 and 64.2 tons/yr, respectively. These limits are based on the maximum emission rate (39.5 lb/hr) and the maximum hours of operation (3250) indicated in the permit application.

9. This permit is issued based upon a minimal hourly emission rate and negligible annual emissions (less than 0.1 ton/year) of particulate matter from the sources described in construction permit 88020029.

It should be noted that this permit has been revised to include operation of the equipment described in construction permit 88020029.

Terry A. Sweitzer, P.E.
Manager, Permit Section
Division of Air Pollution Control

TAS:DAA:jmm/4673H/41-42

cc: Region 1

000679

THORN CREEK BASIN SANITARY DISTRICT
INDUSTRIAL WASTEWATER DISCHARGE PERMIT

Ident: 001-70032

Company Name: A.L. Laboratories, Inc.

Address: 400 State St.

Chicago Heights, Il. 60411

Telephone: (312) 758 - 0111

Authorized Representative: Carl McKnight

Effective Date: February, 1988 to December 31, 1991

Regulated Processes:

1. Bacitracin fermentation
2. MDA production
3. _____

Compliance Schedule: In compliance at issue

Special Conditions: None

Issued this 26th day of February in 1988

Name: Barbara Weadon Title: Chemist

Official Signature: Barb Weadon

000620

THORN CREEK BASIN SANITARY DISTRICT
INDUSTRIAL WASTEWATER DISCHARGE PERMIT

Ident: 001-70032

SIC Code: 2830 (Regulated Process)

Description: Organic fermentation of bacitracin MD and vitamin D blending.

Monitoring and Sampling Facilities:

Metered outfall flume

Manhole at shed on SW corner of property

Self Monitoring:

	Samples	Frequency	Pollutant	Daily Std.	Month Std.
1.	composite	1/week	COD	-	-
2.	composite	1/week	NH3-N	-	-
3.	grab	1/week	pH	5.5-9.0	-
4.	composite	1/month	Zn	1.0	-
5.	composite	1/month	Cr	3.5	-
6.	composite	1/quarter	bacitracin	-	-
7.	composite	1/week	formaldehyde	-	-
8.	grab	1/week	formaldehyde	-	-
9.					
10.					

Reporting Requirements:

Monthly report of COD, NH3-N, pH, Zn, Cr, & formaldehyde.

Quarterly report of bacitracin.

Translation of German letter, dated September 22, 1967

TRIAL

We received from Bundesforschungsanstalt fur Fischerei, Institut fur Kusten- und Binnenfischerei, on August 31, 1967, some deep frozen trout from a feeding trial with Bacitracin. Trial Group I received, for three months, feed containing 57.5 mg per kilo Bacitracin. Group II received feed containing 104.0 mg per kilo Bacitracin.

The trial was conducted according to the method from Commercial Solvents Corporation. Approximately 15 grams tissue was homogenized with Ultra-TURRAX, with the addition of 33% Pyridine. The protein in solution was precipitated with Methanol and thoroughly centrifuged. The upper solution was evaporated until dryness, in a rotary evaporator, and extracted with a pH 6.5 buffer solution. A corresponding standard was made with Bacitracin added to the Control Group.

RESULTS

No Bacitracin could microbiologically be detected in either of the two trial groups. The lower limit for detecting is 0.006 IE/g.