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LETTER REGARDING REGULATORY REVIEW AND COMMENTS ON FINAL DRAFT
FEASIBILITY STUDY AT OPERABLE UNIT 3 (OU 3) NTC ORLANDO FL
2/8/1999
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Department of Environmental Protection

09.01.03.0007

00292



Jeb Bush
Governor

Twin Towers Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Kirby B. Green, III
Secretary

February 8, 1999

Mr. Wayne Hansel
Code 18B7
Southern Division
Naval Facilities Engineering Command
P.O. Box 190010
North Charleston, South Carolina 29419-0068

RE: Final Draft, Feasibility Study, Operable Unit 3 (OU 3), NTC
Orlando, Florida

Dear Mr. Hansel:

I have completed the review of the Final Draft Feasibility Study for OU 3, Study Areas 8 and 9, NTC Orlando, dated December 1998 (received December 7, 1998), prepared and submitted by Harding Lawson Associates. I have attached comments from Bill Neimes, P.E. I have the following comments that should also be addressed:

- (1) One issue that was not addressed in the Remedial Investigation Report and therefore not addressed in this Feasibility Study Report was the leachability of the herbicides MCPA and MCPP. Both herbicides were detected in groundwater at concentrations several orders of magnitude above their respective groundwater cleanup target levels (GCTLs). MCPA has a leachability soil cleanup target level (SCTL) of .02 mg/kg. This concentration is several orders of magnitude lower than the maximum detected concentration of MCPA at Study Areas 8 and 9.
- (2) MCPP does not have SCTLs computed for it. It is likely that SCTLs calculated for MCPP would be in the same range as those calculated for MCPA based upon their similar chemical structure. Both herbicides would probably have similar leaching potentials. Therefore, it is likely that the MCPP soil concentrations detected at both Study Areas would be several orders of magnitude above a calculated leachability SCTL.
- (3) The aerial extent of the herbicides MCPA and MCPP have not been delineated to their respective leachability SCTLs. In order to eliminate further leaching of the two herbicides to groundwater, it may be necessary to expand the soil remediation scenarios.

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(4) A review of the EXTTOXNET Extension Toxicology Network Pesticide Information Profiles found that "MCPA and its formulations are rapidly degraded by soil microorganisms and has low persistence, with a reported half-life of 14 days to 1 month, depending on soil moisture and soil organic matter." It is also stated that "mecoprop's (MCPP) residual activity in soil is about two months." It may be that concentrations detected in soil and groundwater have been substantially degraded by microorganisms since soil and groundwater sampling for the Remedial Investigation was conducted. On the other hand, it is possible that concentrations of arsenic and other pesticides in the soil have created conditions in soil and groundwater that are not conducive to microorganism survival or growth. Further study of soil and groundwater microorganism populations and activities may provide new, potentially less costly remedial alternatives for the reduction in concentration levels of MCPA and MCPP. These alternatives could include restoration of microorganism populations in soil and groundwater, enhancement of microorganism growth and reproduction by addition of nutrients, etc. I have attached the EXTTOXNET profiles for MCPA and MCPP to this letter.

(5) It would appear that concentrations of MCPA and MCPP as toxic organics in groundwater are the main drivers for the requirement for treatment prior to discharge to Orlando's POTW. Substantial reduction in the concentrations of the two herbicides could remove or reduce the amount of time UV/oxidation would be required to treat groundwater prior to either discharging to the Orlando POTW or to Lake Baldwin via a NPDES permit.

(6) Modelled groundwater elevation contours for predicted steady state conditions after the pump and treat groundwater remedial alternatives for Study Areas 8 and 9 would be helpful. I am interested in the groundwater hydraulics created by pumping the recovery wells, especially in association with Lake Baldwin.

(7) The calculated groundwater retardation factor for arsenic was 24.2. Using this retardation factor in conjunction with calculated groundwater flow velocities at the site has arsenic being essentially immobile. However, based upon monitoring well analytical results, arsenic appears to be much more mobile than that. It may be that arsenic has a much higher mobility in groundwater than is predicted in the report. As the retardation factor for arsenic seems to be the main factor contributing to the predicted length of time a groundwater pump and treat system would need to operate, testing to determine the actual retardation factor may help refine actual pumping durations and cost estimates for the groundwater remediation scenarios.

If I can be of any further assistance with this matter, please contact me at (850)488-3693.

Mr. Wayne Hansel
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Sincerely,



David P. Grabka
Remedial Project Manager

cc: Lt. Gary Whipple, NTC Orlando
Barbara Nwokike, Navy SouthDiv
Nancy Rodriguez, USEPA Region 4
Richard Allen, HLA, Jacksonville
Steve McCoy, Brown & Root, Oak Ridge
Robert Cohose, Bechtel, Knoxville
Bill Bostwick, FDEP Central District

TJB

B

JJC

JJC

ESN

ESN

TO: David Grabka - Project Manager

THROUGH: Tim Bahr - Technical Review Section ⁸

FROM: Bill Neimes - Technical Review Section *wa*

DATE: January 29, 1999

SUBJECT: Draft Feasibility Study Report
Naval Training Center, Orlando;
Operable Unit 3; Study Area's 8 & 9

I have reviewed the subject document dated December 1998 and prepared by Harding Lawson Associates. This document discusses and selects remedial options for soils and groundwater at Study Area 8 and Study Area 9. Both of these study area's were affected with related contaminants which contain metals and chlorinated organics. Accordingly, the remedial alternatives for both the study areas are similar. There were five remedial alternatives evaluated for the surface soils and five remedial alternatives evaluated for the groundwater.

- **Soil Remediation Alternative.** Of the remedial alternatives for the soils, the alternative that is most promising is the excavation and disposal option. Although the cost of this alternative varies significantly depending on whether the soils are considered to be hazardous or not, this alternative would not only eliminate most of the contaminated soils but would have the highest certainty of attaining site action levels once remediation is complete.

- **Hazardous Waste.** The criteria for determining whether the soils are hazardous is through the TCLP test. This test is only a characteristic test and assumes that none of the wastes are listed hazardous waste. For clarification purposes, has someone determined that these soils are not listed hazardous waste?

- **Groundwater Remediation Alternatives.** Even though I realize much effort and work went into reviewing and selecting groundwater remedial alternatives, I was disappointed in the recommended alternatives that were evaluated. I am not critical of the methodology of selecting the remedial alternatives nor am I being critical of the detailed, systematic approach used to generate treatment alternatives. What concerns me in the selection process of groundwater remedial alternatives is that two of the treatment alternatives are unproven at efficiently treating the mixture of contaminants and two of the treatment alternatives would require a very detailed and precise treatment train. Therefore, each of the selected alternatives, other than the limited action alternative, has either an unproven performance track record or would require a rather complicated treatment train.

"Protect, Conserve and Manage Florida's Environment and Natural Resources"

MEMORANDUM

David Grabka

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The two unproven technologies are permeable treatment walls and phytoremediation.

The difficulty I have in accepting a permeable treatment wall (Alternative G-2) as a viable treatment technology is because of the uncertainties involved in this technology. Page 5-36 of this report notes that "The reduction in toxicity of pesticides and herbicides by reactive walls is questionable". An appropriate question to ask the preparers of this report is: Has there ever been a reactive wall that effectively treated pesticides and herbicides? I am not aware of any.

Phytoremediation (Alternative G-3) is another questionable technology which has been processed through the screening as a recommended alternative. Although many plants have demonstrated an ability to reduce contaminant concentrations, the underlining question is whether plants can efficiently reduce concentrations in the groundwater to acceptable levels for disposal. For example, on Page 5-37, this report notes removal efficiencies between 40-90 percent for VOCs and SVOCs. Is a technology with removal efficiencies such as these acceptable for discharging to either Orlando's POTW or via an NPDES discharge?

Both Alternatives G-4 and G-5 are treatment processes involving several different stages in the overall treatment train. For both of these treatment processes I am concerned on the reliance of relatively complex system adjustments for both of these processes to operate effectively. Alternative G-4 requires a significant pH alteration to preclude precipitation of metals during the UV oxidation process.

Given the relative low concentration of contamination and the relative small plume size for both of these areas, the estimated cost for to treat each gallon of water recovered is 6.7 cents for Alternative G-4 and 8.1 cents per gallons for Alternative G-5. This is assuming a groundwater recovery rate of 1.5 gpm and pumping for 18 years in Study Area 9 and a recovery rate of 10 gpm while pumping for 30 years in Study Area 8.

- **Estimate Time for Groundwater Extraction.** There is a discrepancy in this report estimating the time involved with groundwater extraction from Study Area 8. In Appendix F, the amount of time calculated was 38 years. However, a 30 year cleanup time was used for the cost estimates in Appendix G.

- **Arsenic Contamination in Wetland.** This report estimated an area of 315 feet by 375 feet as the square footage of land in Study Area 8 requiring remediation to achieve the residential action level of 1.0 mg/kg. However only 75 percent of this contaminated area is being considered for remediation. The other 25 percent of this contaminated area is considered off-limits since this area is dense wooded wetlands. What should be a concern in this wetland area is that the highest concentration of arsenic on record at this site was sampled in this area.

- **Hydrogeologic Calculations.** In reviewing Appendix B and F, I have noted some of the designers assumptions which may not be correct. These include:

Appendix B - Estimating Radius of Influence. The equation used to estimate the radius of influence is a derivation of the Cooper-Jacob equation or modified Theis equation. This equation is used to calculate hydrogeologic values based on pump test data. The value of 100 days used by the designers in this equation based on a maximum time between rainfall events is not the correct use of this term. To obtain the value for time, one must plot the data of time versus drawdown as shown in the figure below. The time value in this equation is a plotted value from pump test data of the x-intercept at zero drawdown.

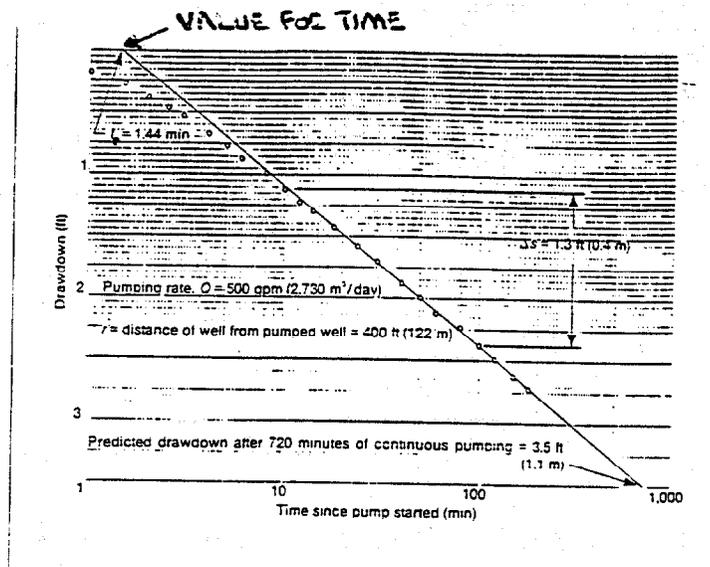


Figure 9.13. When data from Table 9.1 are plotted on semilogarithmic graph paper, most of the plotted points fall on a straight line. The reason for determining Δs and t_0 are explained in the text.

The time value at zero drawdown is typically a small value (in minutes) and would not be near 100 days. The resultant radius of influence would be a much smaller value than that indicated in this report.

Appendix B - Transmissivity Values. The difference between the transmissivity values in Study Area 8 and Study Area 9 was 20 times (54.8 ft²/day at SA8 and 2.8 ft²/day at SA9). Considering that these two study areas are only a few hundred feet from each other and the aquifer depth and thickness were identical for both study areas, this is a rather significant difference in transmissivity values.

Appendix F - Pumping Rate. When calculating the pumping rate for Study Area's 8 & 9 the authors assumed an aquifer drawdown of 10 feet. I used the Cooper-Jacob equation to calculate drawdown and to compare it with the assumed value of 10 feet.

$$s = \frac{264Q}{T} \log \frac{0.3Tt}{r^2S}$$

MEMORANDUM

David Grabka

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Where: s - drawdown in feet
Q - 2.7 gpm (value provided)
T - 410 gpd/ft² (value provided)
t - 365 days (my estimate)
r - 250 ft (value provided)
S - 0.2 (value provided)

The calculated drawdown is 1.0 feet. This value is significantly less than the assumed drawdown of 10 feet. To achieve a 10 foot drawdown in a recovery well the pumping rate would have to be approximately 28 gpm. The author should explain why a 10 foot drawdown was used for this equation.

If you have any comments or questions on this review, please see me in my office.

EXTOXNET

Extension Toxicology Network

Pesticide Information Profiles

A Pesticide Information Project of Cooperative Extension Offices of Cornell University, Oregon State University, the University of Idaho, and the University of California at Davis and the Institute for Environmental Toxicology, Michigan State University. Major support and funding was provided by the USDA/Extension Service/National Agricultural Pesticide Impact Assessment Program.

EXTOXNET primary files maintained and archived at Oregon State University

Revised June 1996

MCPA

Trade and Other Names: Trade or other names for MCPA or products containing it include: Agritox, Agroxone, Agrozone, Agsco MXL, Banlene, Blesal MC, Bordermaster, Cambilene, Cheyenne, Chimac Oxy, Chiptox, Class MCPA, Cornox Plus, Dakota, Ded-Weed, Empal, Envoy, Gordon's Amine, Kilsem, Legumex, Malerbane, Mayclene, MCP, Mephanac, Midox, Phenoxylyene, Rhomene, Rhonox, Sanaphen-M, Shamrox, Selectyl, Tiller, U 46 M-Fluid, Vacate, Weed-Rhap, and Zhelan.

Regulatory Status: MCPA is a slightly toxic compound in EPA toxicity class III, and is a General Use Pesticide (GUP). Labels for products containing MCPA must carry the Signal Word DANGER due to its potential to cause severe eye irritation.

Chemical Class: phenoxy compound

Introduction: MCPA is a systemic postemergence phenoxy herbicide used to control annual and perennial weeds (including thistle and dock) in cereals, flax, rice, vines, peas, potatoes, grasslands, forestry applications, and on rights-of-way. This herbicide is very compatible with many other compounds and may be used in formulation with many other products, including bentazone, bromoxynil, 2,4-D, dicamba, fenoxaprop, MCPB, mecoprop, thifensulfuron, and tribenuron.

NOTE: As with some of the other phenoxy herbicides, MCPA is an acid, but is often formulated as a salt (e.g. dimethylamine salt) or an ester (e.g. isooctyl ester). Unless otherwise indicated, this document will refer to the acid form.

Formulation: This herbicide is very compatible with many other compounds, and may be used in formulation with many other products, including bentazone, bromoxynil, 2,4-D, dicamba, fenoxaprop, MCPB, mecoprop, thifensulfuron, and tribenuron.

Toxicological Effects:

- **Acute toxicity:** MCPA acid is slightly toxic via ingestion, with reported oral LD50 values for

- the technical product in rats ranging from 700 mg/kg to 1160 mg/kg [5,5] and ranging in mice from 550 to 800 mg/kg [5,6]. It is slightly toxic via the dermal route as well, with reported dermal LD50 values ranging from greater than 1000 mg/kg in rats to greater than 4000 mg/kg in rabbits [5,6]. Symptoms in humans from very high acute exposure could include slurred speech, twitching, jerking and spasms, drooling, low blood pressure, and unconsciousness [1].
- **Chronic toxicity:** Dietary levels of approximately 50 mg/kg/day and 125 mg/kg/day over 7 months caused reduced feeding rates and retarded growth rates in rats [1]. White blood cell counts and ratios were not affected, but some reductions in red blood cell counts and hemoglobin did appear to be associated with exposure to MCPA at oral dose levels of approximately 20 mg/kg/day. In the same study, oral doses of approximately 5 mg/kg/day caused increased relative kidney weights, and oral doses of approximately 20 mg/kg/day caused increased relative liver weights [1]. Another study in rats showed no effects on kidney or liver weights over an unspecified period at oral doses of 60 mg/kg/day, but oral doses of 150 mg/kg/day did cause reversible increases in these weights over a course of 3 months [1]. Very high dermal doses of 500 mg/kg/day caused reduced body weight, and even higher dermal doses of 1000 and 2000 mg/kg/day resulted in increased mortality and observable changes in liver, kidney, spleen, and thymus tissue [1].
 - **Reproductive effects:** A two-generation rat study at doses of up to 15 mg/kg/day affected reproductive function. Even smaller amounts of the compound were toxic to the fetuses. Dogs receiving relatively small amounts of MCPA (8 and 16 mg/kg) for 13 weeks showed adverse sperm and testes changes [8]. It is unlikely that humans will experience these effects under normal exposure conditions.
 - **Teratogenic effects:** Offspring of pregnant rats fed low to moderate doses of MCPA (20 to 125 mg/kg) on days 6 to 15 of gestation, had no birth defects. However, when the ethyl ester form of MCPA was fed to pregnant rats (2 to 100 mg/kg/day on days 8 to 15 of gestation), cleft palate, heart defect, and kidney anomalies were observed in the offspring [7]. Mice fed 5 to 100 mg/kg/day of MCPA on days 6 to 15 showed significantly reduced fetal weight and delayed bone development at the highest dose [24]. Teratogenic effects in humans are unlikely at expected exposure levels.
 - **Mutagenic effects:** MCPA is reportedly weakly mutagenic to bone marrow and ovarian cells of hamsters, but negative results were reported for other mutagenic tests [38]. It was negative in a bacterial test system (both with and without metabolic activation), negative in spot tests, and negative in host-mediated tests [1]. It produced no detectable increase in chromosomal aberrations in house flies [4]. Some irregularities occurred in gene transfer during cell division in brewers yeast, although at levels which caused massive cell death [1]. It appears that the compound poses little or no mutagenic risk.
 - **Carcinogenic effects:** All of the available evidence on MCPA indicates that the compound does not cause cancer [1]. Forestry and agricultural workers occupationally exposed to MCPA in Sweden did not show increased cancer incidence [39].
 - **Organ toxicity:** Target organs identified in animal studies include the liver, kidneys, spleen, and thymus. Farm worker exposure has resulted in reversible anemia, muscular weakness, digestive problems, and slight liver damage [1].
 - **Fate in humans and animals:** MCPA is rapidly absorbed and eliminated from mammalian systems [1]. Rats eliminated nearly all of a single oral dose within 24 hours, mostly through urine with little or no metabolism [1,6]. In another rat study, three quarters of the dose was eliminated within 2 days. All was gone by the 8 days [1]. Humans excreted about half of a 5 mg dose in the urine within a few days. No residues were found after day 5 [1]. Cattle and sheep

fed low to moderate doses of MCPA in the diet for 2 weeks showed no residues from levels less than about 18 mg/kg [1]. The major metabolite of MCPA is 2-methyl-4-chlorophenol in the free and conjugated form, which is formed in the liver [38].

Ecological Effects:

- **Effects on birds:** MCPA is moderately toxic to wildfowl; the LD50 of MCPA in bobwhite quail is 377 mg/kg [5,6].
- **Effects on aquatic organisms:** MCPA is only slightly toxic to freshwater fish, with reported LC50 values ranging from 117 [5] to 232 mg/L in rainbow trout [6]. MCPA is practically nontoxic to freshwater invertebrates, and estuarine and marine organisms.
- **Effects on other organisms:** It is nontoxic to bees, with a reported oral LD50 of 104 ug/bee [5,6].

Environmental Fate:

- **Breakdown in soil and groundwater:** MCPA and its formulations are rapidly degraded by soil microorganisms and it has low persistence, with a reported field half-life of 14 days to 1 month, depending on soil moisture and soil organic matter [21]. Decreased soil moisture and microbial activity, as well as increased soil organic matter, will prolong the field half-life for MCPA [12]. With less than 10% organic matter in soil, the compound is degraded in 1 day and, with greater than 10% levels in soil, it takes 3 to 9 days to degrade. The half-life is 5 to 6 days in slightly acidic to slightly alkaline soils [12]. MCPA readily leaches in most soils, but its mobility decreases with increasing organic matter [12]. MCPA and its formulations show little affinity for soil.
- **Breakdown in water:** It is relatively stable to light breakdown [5], but can be rapidly broken down by microorganisms. In sterilized water, it takes about 5 weeks for half of the compound to degrade due to the action of sunlight. In rice paddy water, however, MCPA is almost totally degraded by aquatic microorganisms in under 2 weeks [12].
- **Breakdown in vegetation:** MCPA is readily absorbed and translocated in most plants [5]. It works by concentrating in the actively growing regions of a plant (meristematic tissue), where it interferes with protein synthesis, cell division, and ultimately the growth of non-resistant plants [7]. It is actively broken down in plants, the major metabolite being 2-methyl-4-chlorophenol [5].

Physical Properties:

- **Appearance:** Pure MCPA occurs as colorless crystals [6].
- **Chemical Name:** (4-chloro-2-methylphenoxy)acetic acid [6]
- **CAS Number:** 94-74-6
- **Molecular Weight:** 200.62
- **Water Solubility:** 825 mg/L @ 25 C (acid) [5]
- **Solubility in Other Solvents:** v.s. in ether, ethanol, toluene, xylene; s. in methanol [6]
- **Melting Point:** 118-119 C [6]
- **Vapor Pressure:** 0.2 mPa @ 20 C [6]
- **Partition Coefficient:** Not Available

- **Adsorption Coefficient:** MPCA acid, 100; MCPA salts, 20 (estimated); MCPA ester, 1000 (estimated) [21]

Exposure Guidelines:

- **ADI:** Not Available
- **MCL:** Not Available
- **RfD:** 0.0005 mg/kg/day [31]
- **PEL:** Not Available
- **HA:** 0.01 mg/L (lifetime) [38]
- **TLV:** Not Available

Basic Manufacturer:

Gilmore, Inc.
5501 Murray Road
Memphis, TN 38119-3703

- **Phone:** 901-761-5870
- **Emergency:** Not Available

References:

References for the information in this PIP can be found in Reference List Number 7

DISCLAIMER: The information in this profile does not in any way replace or supersede the information on the pesticide product labeling or other regulatory requirements. Please refer to the pesticide product labeling.

EXTOXNET

Extension Toxicology Network

Pesticide Information Profiles

A Pesticide Information Project of Cooperative Extension Offices of Cornell University, Oregon State University, the University of Idaho, and the University of California at Davis and the Institute for Environmental Toxicology, Michigan State University. Major support and funding was provided by the USDA/Extension Service/National Agricultural Pesticide Impact Assessment Program.

EXTOXNET primary files maintained and archived at Oregon State University

Revised 9/95.

MECOPROP

TRADE OR OTHER NAMES: Mecoprop is commonly called MCPP. Trade names include Kilprop, Mecopar, Triester-II, Mecomin-D, Triamine-II (with MCPA and 2,4-DP), Triplet (with 2,4-D and dicamba), TriPower (with MCPA and dicamba), Trimec (with 2,4-D and dicamba), Trimec-Encore (with MCPA and dicamba), and U46 KV Fluid (41, 43).

REGULATORY STATUS: Mecoprop is a general use pesticide (GUP).

INTRODUCTION: Mecoprop is a selective, hormone-type phenoxy herbicide. It is applied postemergence and is used on ornamentals and sports turf, for forest site preparation, and on drainage ditch banks for selective control of surface creeping broadleaf weeds such as clovers, chickweed, lambsquarters, ivy, plantain and others. It is also used on wheat, barley, and oats (41, 43). Mecoprop is absorbed by plant leaves and translocated to the roots. It affects enzyme activity and plant growth (6). It acts relatively slowly requiring three to four weeks for control (43). The U.S. EPA has classified mecoprop as toxicity class III- slightly toxic. Products containing mecoprop bear the Signal Word "Caution" (41). It is available as a liquid concentrate, granules, and is sprayed on fertilizer pellets to produce weed and feed products (45).

TOXICOLOGICAL EFFECTS

- **Acute Toxicity:** Mecoprop has a low acute toxicity to test animals. The LD50, the oral dose that kills half of the test animals, is 930 -1210 mg/kg for rats and 650 mg/kg for mice (41, 43, 44). The LD50 for rats exposed dermally is greater than 4000 mg/kg (41, 40). Mecoprop is irritating to skin and eyes. It causes redness and swelling and can cause cloudy vision (46). The concentration in air which kills half of the test animals, the LC50 (4 hours) for rats, is greater than 12.5 mg/l air (6).
- **Chronic Toxicity:** No information is currently available.
- **Reproductive Effects:** No information is currently available.
- **Teratogenic Effects:** Mecoprop is a teratogen in rats at moderate to high doses. Oral doses of 125 mg/kg/day of MCPP in pregnant rats from days 6 to 15 of gestation caused increased intra-uterine deaths, decreased body lengths, and an increased incidence of delayed or absent

bone formation in offspring. Mecoprop is not teratogenic in rabbits (45).

- **Mutagenic Effects:** Studies show that mecoprop may be mutagenic at very high doses. Tests of mecoprop on four strains of salmonella and on *S. colelicolor* showed no mutagenic effects (43). However, MCPP caused an increase in sister chromatid exchange after single oral doses of 470 and 3,800 mg/kg in Chinese hamsters (45).
- **Carcinogenic Effects:** A study of people employed in the manufacture of phenoxy herbicides including mecoprop showed an association between these herbicides and cancer of soft tissues and non-Hodgkin's lymphoma (47). However, other data do not support this conclusion (49). Thus, it is not clear if occupational exposures to phenoxy herbicides can cause cancer.
- **Organ Toxicity:** Oral doses of 9 mg/kg/day to female rats and 27 mg/kg/day to male rats cause kidney damage (45).
- **Fate in Humans and Animals:** Mecoprop is eliminated unchanged in the urine of mammals(6).

ECOLOGICAL EFFECTS

- **Effects on Birds:** Mecoprop is practically non-toxic to birds. The LC50 is greater than 5,620 ppm for mallard ducks and 5,000 ppm for bobwhite quail (45). The LD50 (oral) is 740 mg/kg for Japanese quail and 700 mg/kg for bobwhite quail (6).
- **Effects on Aquatic Organisms:** Mecoprop is virtually non-toxic to fish. Available data indicate a low potential of mecoprop to bioaccumulate in fish (45). The LC50 (96 hours) is 124 ppm for rainbow trout and greater than 100 ppm for bluegill sunfish (6, 45).
- **Effects on Other Animals (Nontarget species):** Mecoprop is not toxic to bees (41).

ENVIRONMENTAL FATE

- **Breakdown of Chemical in Soil and Groundwater:** The duration of mecoprop's residual activity in soil is about two months. Adsorption of mecoprop increases with an increase in organic matter in the soil. Unaged MCPP and its salt forms are very mobile in a variety of soils (6). Because of this high mobility, it may potentially leach into groundwater (45). However, in general, phenoxy herbicides such as MCPP are not sufficiently persistent to reach groundwater (45).
- **Breakdown of Chemical in Surface Water:** No information is currently available.
- **Breakdown of Chemical in Vegetation:** No information is currently available.

PHYSICAL PROPERTIES AND GUIDELINES

It exists as a mixture of two optically active isomers of which one, the R+ form, mecoprop-p is herbicidally active (6). It is stable to heat, hydrolysis, reduction, and oxidation. It is acidic. Solutions of the salts of mecoprop are stable for several years under normal storage conditions. In cooler temperatures, the salt may crystallize out of solution but will re-dissolve on warming (41, 45).

Physical Properties: Properties are of the acid form unless otherwise noted.

- **Appearance:** Mecoprop is an odorless, white to light brown crystalline solid.
- **Chemical Name:** 2-(4-chloro-2-methyl phenoxy) propionic acid
- **CAS Number:** 7085-19-0 (acid) 1929-86-8 (potassium salt) 1432-14-0 (diethanolamine salt) 28473-03-2 (isooctyl ester)

- **Molecular Weight:** 214.6
- **Water Solubility:** all forms are very soluble in water at 20 degrees C (6) Soluble in acetone, alcohol, benzene, diethyl ether, and ethyl acetate (6)
- **Solubility in Other Solvents:** In acetone, diethyl ether, ethanol > 1000
- **Melting Point:** 94-95 degrees C (6)
- **Vapor Pressure:** 0.31 mPa (20 degrees C)
- **Partition Coefficient:** 1.26 at pH 7 (6)
- **Adsorption Coefficient:** Not Available

Exposure Guidelines: Guidelines are for the acid form unless otherwise noted.

- **ADI:** Not Available
- **MCL:** Not Available
- **RfD:** 1 x 10 to the minus 3 mg/kg/day (48)
- **PEL:** Not Available
- **HA:** Not Available
- **TLV:** Not Available

BASIC MANUFACTURER:

PBI/Gordon
P.O. Box 4090
1217 W. 12th Street
Kansas City, MO 64101

- **Telephone:** 816-421-4070

REFERENCES

References for the information in this PIP can be found in Reference List Number 7

DISCLAIMER: The information in this profile does not in any way replace or supersede the information on the pesticide product label/ing or other regulatory requirements. Please refer to the pesticide product label/ing.