EXHIBIT 17

State of California

Memorandum

: Jack C. Parnell
Director

Date : August 6, 1987

Place : Sacramento

AUG 07 1987

From : **Department of Food and Agriculture** - Lyndon S. Hawkins, Chair
Subcommittee of the Pesticide Registration and Evaluation Committee

Subject : Bromacil

Attached is the Findings and Recommendations regarding bromacil. This report is pursuant to the requirements of the Pesticide Contamination and Prevention Act and is submitted on behalf of the Subcommittee of the Pesticide Registration and Evaluation Committee.

Attachment

cc: Don Mengle
Syed Ali
Tobi Jones

SURNAME

SO-106

SUBCOMMITTEE OF THE
PESTICIDE REGISTRATION AND EVALUATION COMMITTEE

IMPLEMENTATION OF THE PESTICIDE CONTAMINATION PREVENTION ACT
BROMACIL: FINDINGS AND RECOMMENDATIONS

AUG 07 1987

August 6, 1987

Bromacil has been found in ground water in Tulare County in 11 of 120 sampled wells at concentrations ranging from 0.09 to 6.7 ppb.[1] Simulation models and the chemical properties of bromacil indicate that it has a potential to leach to ground water. This information is on file at the California Department of Food and Agriculture.

Pursuant to California Notice 86-11, Notice of Bromacil Finds in California Ground Water, and the Notice of Hearing Pertaining to Bromacil (October 21, 1986), the subcommittee held hearings to review registrant reports, public comment, and other appropriate information regarding the presence of bromacil in ground water and soil in California. After review of this information, the subcommittee offers the following findings and recommendations to the Director. These findings were unanimously agreed upon by the subcommittee on July 9, 1987.

FINDINGS

Finding One

1. The subcommittee finds that a pollution level for bromacil cannot be identified due to lack of complete health data as specified in the Birth Defect Prevention Act (SB 950), and therefore, the subcommittee cannot make Finding One in the Food and Agricultural Code, Section 13150(c)(1).

Reason for Finding

Because a pollution level as specified in the Act has not yet been established, it is not possible to determine that bromacil has not polluted or does not threaten to pollute the ground waters of the state.

Finding Two

2. The subcommittee finds that the agricultural use of bromacil can be modified so that there is a high probability that continued bromacil use will not threaten to pollute ground water of the state and, therefore, the subcommittee makes Finding Two in the Food and Agricultural Code, Section 13150(c)(2). The subcommittee concludes that the high probability not to pollute can only be ensured provided that the recommended monitoring and accompanying specified actions are followed.

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1. A recent report (July 7, 1987) indicates that higher, unverified concentrations of bromacil occur in wells on two properties in San Joaquin County.

Reason for Finding

Testimony presented at hearings and information gathered during informal meetings with U.C. Cooperative Extension and County Agricultural Commissioner staffs indicate that recommendations regarding modifications of bromacil use are appropriate.

Finding Three

3. The subcommittee cannot determine whether modified use of bromacil would cause severe economic hardship on the agricultural industry of the state. The subcommittee further cannot recommend a level of bromacil that does not significantly diminish the margin of safety not to cause adverse health effects because the SB 950 health data base is not complete. Therefore, the subcommittee cannot make Finding Three in the Food and Agricultural Code, Section 13150(c)(3).

Reason For Finding

The information made available to the subcommittee regarding economic consequences of modification of bromacil use or cancellation was not conclusive regarding economic hardship to the state's agricultural industry (Attachment 1).

Chronic Toxicity Determination

The bill requires that when the subcommittee makes Finding Two or Three, the subcommittee shall determine whether the economic poison is carcinogenic, mutagenic, teratogenic, or neurotoxic. The subcommittee cannot make this determination.

Reason for Determination

The toxicological data for bromacil are not sufficient to establish its carcinogenicity, mutagenicity, teratogenicity, or neurotoxicity (Attachment 2).

RECOMMENDATIONS

1. The subcommittee recommends that the Director require soil and ground water monitoring to ensure that there is a high probability that pollution will not occur with the modifications of use specified in these recommendations. Monitoring should be designed to demonstrate whether the modifications of use are followed and effective. This monitoring program should be established in cooperation with the Department of Health Services, the State Water Resources Control Board, County Agricultural Commissioners, registrants, and users of bromacil.

The subcommittee recommends that the Director record certain parameters which define the range of characteristics of previous detections. Such parameters should include concentrations of bromacil found in ground water and concentrations by depth of bromacil found in soil. If detections of bromacil with modified use exceed these parameters at or below eight feet in soil or in ground water, the subcommittee recommends that bromacil be resubmitted into the

detection response process. If these parameters are exceeded above eight feet in soil, the Director should consider resubmitting bromacil into the detection response process based on an evaluation of site characteristics.

The subcommittee further recommends that the monitoring program should collect sufficient information to determine more accurately the mobility and persistence of bromacil. The monitoring program should be discussed at State Environmental Hazards Assessment Committee meetings to (1) coordinate soil and ground water monitoring with other agencies; (2) develop a standard protocol and testing procedure for bromacil and other economic poisons on the ground water protection list; and (3) report and discuss monitoring results with the State Department of Health Services and the State Water Resources Control Board.

2. The subcommittee recommends the following modifications of use:

a. For non-cropland uses, annual application rates should not exceed maximum application rates specified by soil type for cropland uses (up to 6.4 pounds per acre).

b. Alternate bromacil use with herbicides that do not pose a threat to ground water.

c. In conjunction with county agricultural commissioners, re-emphasize the critical need for growers and Pest Control Operators to establish company programs that require employees handling pesticides to follow all laws and regulations regarding pesticide mixing and loading operations. These programs should give special focus to areas in proximity to wells, including dry wells, that are a potential source of ground water contamination. In this regard, recommendations by the Tulare County Farm Bureau regarding diuron are relevant for many pesticides, including bromacil, and therefore should be consulted (Attachment 3).

d. Develop guidelines for storing pesticides around wells.

e. Act with the State Water Resources Control Board, Department of Water Resources, Department of Health Services, local agencies, and users to:

(1) Identify the locations of abandoned (dry and other) wells and provide for their proper destruction (as specified in Water Well Standards: State of California. 1981. Bulletin 74-81).

(2) Establish guidelines for bromacil users to prevent runoff water containing bromacil residues from entering ground water through any well (Attachment 3).

f. Ban statewide the use of bromacil in all artificial recharge areas. These areas shall be defined as any man-made structure which receives water or waste water to replenish ground water or to manage excess surface water. Many of these areas are identified in the Department of Water Resources' draft publications, "Ground Water Recharge Projects within the USBR Mid-Pacific Region (October 19, 1983)" and "Ground Water Recharge Projects within the USBR Lower Colorado River Region (October 18, 1983)."

g. Develop with appropriate state, county, and local agencies a program to minimize agency use of pesticides which have been detected in ground water or which are potential ground water contaminants. This program would involve evaluating alternative pesticides and practices, improving water use, and, in general, implementing integrated pest management techniques that could help prevent pollution of ground water. The program adopted by Los Angeles County is an example of such a program (County of Los Angeles. 1972. Report on the Use and Control of Simazin [sic] and other Herbicides by the County of Los Angeles).

h. Allow the use of bromacil only when recommended by a licensed pest control advisor.

3. Fund and conduct, cooperatively with the University of California and the agricultural industry, research to determine the relationship between the leaching potential of pesticides and the following factors: physical and chemical properties of soil; soil organic matter; pesticide application rates; time and method of application; chemical properties of pesticides; amount, timing, and method of irrigation; and depth to ground water. There are as yet no conclusive data which establish relationship between chemical properties, use and cultural practices, or geographical characteristics and the presence of pesticides in ground water.

ACKNOWLEDGMENTS

The subcommittee thanks those who provided information about bromacil, including facts about toxicology, use, and potential relationships to ground water pollution. We also thank County Agricultural Commissioners, and U.C. Extension Service staff who took the time to discuss with us during our field investigations the agricultural practices in areas where bromacil occurs in ground water.

Lyndon S. Hawkins
Chair of Subcommittee
Pest Management Specialist IV
California Department of Food and Agriculure

Syed M. Ali, Ph.D.
Environmental Specialist
State Water Resources Control Board

Donald C. Mengle
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ALTERNATIVES TO BROMACIL

Bromacil has been found in California groundwater, under the conditions specified in the Pesticide Contamination Prevention Act (AB 2021). This act requires the subcommittee of the Pesticide Registration and Evaluation Committee to make and the Director to adopt, one or more of three findings regarding the continued use of bromacil. For two of these findings, the subcommittee/Director must determine whether there are alternative products or practices that can be effectively used to not cause groundwater pollution. This report is an analysis of other herbicides and practices that are potential alternatives to the major reported uses of bromacil.

For the purposes of this analysis, alternatives to bromacil are limited to: (1) products and practices which are reasonably effective and practicable and (2) products which do not contain chemicals detected in soils or groundwater under the conditions specified in AB 2021.

Bromacil is a selective herbicide with both residual and foliar activity. In California, it is registered to control annual and perennial weeds in many citrus crops and in non-cropland areas such as railroad, highway and pipeline rights-of-ways; storage areas; industrial plant sites; and drainage ditches. It is also used for brush control in non-cropland areas.

According to the 1985 CDFA Pesticide Use Report, the following uses of bromacil were reported: rights-of-way, orange, landscape maintenance, citrus, public health, lemon, grapefruit, and non-agricultural areas among others. Because 72% of all reported bromacil use occurs on rights-of-way and oranges, this analysis will focus on evaluating alternatives for these two uses. The remaining 28% of use is categorized either as other citrus crops or non-cropland uses for which alternatives are very similar to the two major uses analyzed.

Bromacil is formulated as a single active ingredient for crop and non-cropland uses (Hyvar), in combination with diuron principally for use on citrus (Krovar), and in various combinations with sodium chlorate, anhydrous sodium metaborate, aromatic naptha, pentachlorophenol, 2,4-D, and/or petroleum base oils for use on non-cropland areas.

Bromacil can be used to control annual weeds anytime during the year shortly before or after weed growth begins. When used to control perennial weeds or in combination with diuron to control annual and perennial weeds, bromacil can be applied once in late fall or early winter (Krovar), or in winter or early summer (Hyvar). Alternately, two applications can be used, at lower rates, once in the fall and again in spring. In non-cropland areas, intermediate rates are used both for extended control of annual weeds and for control of selected perennials, and higher rates are used for control of hard-to-kill perennials. Within these general dosage ranges, lower rates are recommended for light (coarse) soils low in organic matter and higher rates for heavier or high organic matter soils.

Almost 700 species of weeds have been identified in California, and the University of California has described more than 200 weed species in the Grower's Weed Identification Handbook. Although individual fields are more likely to be infested with 10-30 species, the weed spectrum of those fields can vary widely. Because most herbicides are species specific, weed control programs are designed to use the herbicide or combination of herbicides that most economically control a given spectrum of weeds.

Typically, no single herbicide will economically control all species of weeds found in a particular crop or site. At best, combinations or sequential applications of two or more herbicides, along with various cultural practices are needed to control weeds. Each herbicide used in a program has its own combination of strengths and weaknesses that is never exactly the same as any other herbicide.

For example, in grapes herbicide A may control seven out of ten weed species present and herbicide B the other three. Herbicide C, if substituted for A, may control four of the seven species controlled by herbicide A and all three species controlled by herbicide B. However, another herbicide, D, is required to control the remaining three species previously controlled by A. Thus, in this simplified example, there is no single herbicide alternative to herbicide A; rather, herbicides C and D are alternatives to herbicides A and B.

Herbicides, such as A-D above, are selected based on registration status in a given location, comparative efficacy under local conditions, cost, and possible adverse impacts. The latter three factors are in turn influenced by soil type and organic matter, irrigation method, topography, timing and amount of rainfall, specialized equipment needed, and application timing, among other considerations. Thus, selection of appropriate herbicides is a complex process.

In order to simplify the complexity of identifying alternatives to bromacil on the two principal uses, the following assumptions are made:

(1) Chemical alternatives to bromacil are identified based on their ability to control, under optimum conditions 23 common annual and two perennial weed species in oranges identified in the UC Publication No. 3303, Integrated Pest Management for Citrus (Table I).

(2) Comparative costs of materials are based on application at rates that are the average of the lowest and highest rate allowed on the label for agricultural crop use. Herbicide prices are based on those quoted in the April, 1987 edition of the publication, Agchemprice, or, if not available there, those quoted by selected distributors or registrants in California.

Rights-of-Way

Rights-of-way herbicides are used where crop tolerance levels and phytotoxicity to non-target species are not primary considerations. As a result, many active ingredients are registered for such uses. After eliminating pesticides subject to the conditions described above, there are at least nine residual and fifteen foliar active ingredients registered for rights-of-way that could be used in weed control programs designed to control the same weeds as bromacil (Table II). If current weed control managers are making rational economic, health, and safety decisions, then the use of alternative herbicides will probably result in higher material and application costs and/or greater health and environmental risks than the current uses of bromacil.

Oranges

Chemical weed control in oranges is usually practiced both in tree rows and in middles between rows. It is commonly stated that such a program maximizes frost protection; minimizes root pruning, compaction, and "plow pans" caused by repeated tillage; and avoids competition for water and nutrients by weeds under a mowing regime.

The least expensive herbicide program in oranges involves the use of simazine and diuron in combination. However, in many groves this combination misses puncture vine, sprangletop, spurge, and various perennial weeds. To help control these missed weeds, the more expensive combination of bromacil and diuron is substituted for simazine and diuron in alternate years. This rotation allows producers to achieve maximum weed control at minimum cost.

In Table 3, the efficacy and cost of glyphosate, weed oil and various two-herbicide combinations are compared to bromacil + diuron. Because all other single herbicide alternatives fail to control 6-20 of the weed species in Table

1, glyphosate and weed oil, which miss two and four species, respectively, are the only single herbicides compared. Only two contact herbicides, glyphosate and gramoxone, are included among the various two-herbicide combinations. Dalapon, MSMA, and 2,4-D are three other contact herbicide alternatives useful in specific situations. However, because they are generally less effective or pose greater safety risks to crops than either glyphosate or gramoxone, these three foliar herbicides are excluded from the comparisons.

The various potential alternatives are listed in order of decreasing efficacy and, within similar efficacy groups, in order of increasing cost. It should be noted that the UC sample cost estimate for herbicide use in oranges is $78 per acre, $9 more than the cost of a single application of bromacil + diuron. These differences result from producers either applying these herbicides at higher rates or frequencies than assumed in Table 3, or spot treating annual and especially perennial weeds not controlled solely by these herbicide combinations. Similarly, cost figures shown for all other two-herbicide combinations do not include costs of using such combinations at higher rates or frequencies, or of spot treating weeds not controlled.

The most effective alternatives are combinations of various residual herbicides plus the foliar herbicides glyphosate or gramoxone. The least expensive of these alternative herbicides (except combinations with trifluralin) increases costs by $66 per acre. However, alternative combinations that rely on foliar herbicides to control weeds missed by residual herbicides have several disadvantages:

1. Timing is critical. If not controlled when small, weeds become more difficult and expensive to control. Because the application "window" is smaller for foliar versus residual herbicides, sufficient equipment must be available to cover the crop acreage more quickly.

2. Wet ground in early spring may prevent timely application.

3. If operated on wet soil, standard spray rigs can damage soil structure and cause compaction, which decreases water infiltration rates, irrigation efficiency, root growth and crop yields.

4. Drift or misting during application increases the chance for target and adjacent crop phytotoxicity, foliage "feathering," or delayed fruiting the following spring.

5. Repeated applications are necessary as weeds germinate--thus both soil compaction, chance for phytotoxicity, and costs increase.

Thus, reliance on foliar herbicides as alternatives to residual herbicides increases the risk of weed control failures. Such failures increase clean-up costs, interfere with other production operations, and can increase weed seed production as well as reduce crop yields.

It should be noted that because the use of trifluralin requires soil incorporation, one of the reported advantages of chemical weed control in citrus--to minimize root pruning in shallow rooted citrus--is lost. In addition, soil incorporation in effect prepares a favorable seed bed for weed species not controlled by trifluralin. Thus, although alternatives involving trifluralin + contact herbicides are the least expensive, there are significant disadvantages to their use.

The least costly and most effective alternative combinations of only residual herbicides (except as noted in Table 3) are oryzalin + terbacil and napropamide + terbacil. Both combinations miss two weed species and increase costs $68-70 per acre.

Various characteristics of residual herbicides registered on oranges are given in Table 4. As indicated, not all combinations shown in Table 3 can be used in every orange grove situation. For example, the combination napropamide + norflurazon would not be an alternative in a Kern County citrus grove under flood

irrigation because (1) norflurazon cannot be used in Kern County and (2) application of napropamide in a relatively low rainfall area like Kern County without sprinkler irrigation is likely to result in poor weed control.

Other weed control options in oranges are: 1) discing middles and applying herbicides in a band along the row, and 2) mowing middles and applying herbicides in a band along the row. Comparative direct cost figures of these alternatives are also presented in Table 3. Potential indirect costs, such as increased frost damage, mechanical damage to fruit, and yield reductions often mentioned by growers and UC specialists are not included.

Some growers control weeds without the use of any herbicides. Such a program involves either extensive hand hoeing, which would require a large manual labor force, or discing or mowing in two directions, which is only feasible under furrow or flood irrigation. However, it is estimated that more than 70% of orange groves in Tulare County are under either sprinkler, mini-sprinkler, mister, or drip irrigation. Thus, controlling weeds without the use of any herbicides is not considered practicable for citrus in that area.

Table 1. Common Weed Species in Oranges

Annual	Perennial
Cheeseweed	Burmudagrass
Chickweek	Nutsedge
Fiddleneck	
Filaree	
Flax-leaved fleabane	
Groundsel	
Henbit	
Horseweed	
Knotweed	
Lambsquarters	
Mustards	
Nightshade	
Pigweed	
Puncturevine	
Purslane	
Shepherdspurse	
Sowthistle	
Annual bluegrass	
Barnyardgrass	
Crabgrass	
Foxtail	
Lovegrass	
Sprangletop	

Table 2. Herbicides Registered for Rights-of Way Use

Residual	Foliar
Chlorfenac	Ametryn
Chlorsulfuron	Ammonium thiosulfate
Hexazinone	Bentazon
Linuron	Chlorfenac
Metribuzin	Chlorsulfuron
Monuron	Dicamba
Oxyfluorfen	Glyphosate
Picloram	Gramoxone
Prometryn	Metsulfluron
Tebuthiuron	Oxyfluorfen
Terbutryn	Picloram
	Sodium chlorate
	Sulfometuron
	Trifluralin
	Triclopyr

Table 3. Potential alternatives to bromacil on oranges.

Potential[1,2] Alternatives	No. Weed Species in Table I Not Controlled	Cost per Planted Acre	% of Pre-harvest Cash Costs	Increase (Decrease) in Cost over Bromacil + Diuron	Typical Weed Species Not Controlled
UC Sample Cost	-	78	8	9	-
Bromacil	3	75	8	6	Barnyardgrass, crabgrass, Lovegrass
Bromacil + diuron	0	69	7	0	-
Terbacil + glyphosate[4]	0	137	14	68	-
Terbacil + gramoxone	1	135	14	66	Barnyardgrass
Trifluralin + glyphosate	2	78	8	9	Cheeseweed, nutsedge
Napropamide + glyphosate	2	136	14	67	Cheeseweed, nutsedge
Norflurazon + glyphosate	2	118	12	43	Cheeseweed, filaree
Oryzalin + terbacil	2	137	14	68	Groundsel, puncturevine
Napropamide + terbacil	2	139	15	70	Puncturevine, sprangletop
Trifluralin + gramoxone	3	76	8	7	Cheeseweed, bermudagrass, nutsedge
EPTC + glyphosate	3	90	9	21	Cheeseweed, filaree, nutsedge
Oryzalin + gramoxone	3	132	14	63	Cheeseweed, bermudagrass, nutsedge
Napropamide + gramoxone	3	134	14	65	Cheeseweed, bermudagrass, nutsedge
Oryzalin + glyphosate	3	134	14	65	Cheeseweed, filaree, nutsedge
Dichlobenil + glyphosate	3	210	22	141	Cheeseweed, filaree, nutsedge
EPTC + gramoxone	4	88	9	19	Cheeseweed, knotweed, bermudagrass, nutsedge
Napropamide + norflurazon	4	120	13	51	Many
Weed oil[5]	4	207	22	138	

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(Cont)

Potential[1,2] Alternatives	No. Weed Species in Table II Not Controlled	Cost per Planted Acre	% of Pre-harvest Cash Costs	Increase (Decrease) in Cost over Bromacil + Diuron	Typical Weed Species Not Controlled
Norflurazon + gramoxone	5	116	12	47	Many
Trifluralin + norflurazon	6	69	7	0	Many
Dichlobenil + trifluralin	6	156	16	87	Many
Dichlobenil + gramoxone	6	208	22	139	Many
EPTC + norflurazon	7	74	8	5	Many
Dichlobenil + terbacil	7	213	22	144	Many
EPTC + trifluralin	8	34	4	(35)	Many
EPTC + napropamide	8	92	10	23	Many
Norflurazon + oryzalin	8	118	12	49	Many
Trifluralin + napropamide	9	87	9	18	Many
Dichlobenil + norflurazon	9	194	20	125	Many
EPTC + oryzalin	10	90	9	21	Many
Napropamide + oryzalin	10	136	14	67	Many
Trifluralin + oryzalin	11	85	9	16	Many
EPTC + dichlobenil	11	166	17	97	Many

Page 3
(Cont)

Potential[1,2] Alternatives	No. Weed Species in Table I Not Controlled	Cost per Planted Acre	% of Pre-harvest Cash Costs	Increase (Decrease) in Cost over Bromacil + Diuron	Typical Weed Species Not Controlled
Discing + herbicide banding[6]	3	146	15	77	Cheeseweed, bermudagrass. nutsedge
Mowing + herbicide banding[7]	3	136	14	67	Cheeseweed, bermudagrass, nutsedge

1. Assume all residual herbicides are applied with gramoxone plus one quart spreader in 100 gallon mixture per treated acre except for combinations with trifluralin.
2. For alternatives shown as residual + foliar herbicide combinations, assume the foliar herbicide is applied two times by itself following the residual herbicide application.
3. Sample calculation: [simazine ($8) + diuron ($9) + gramoxone ($15) + spreader ($4) + application ($7)] = 43
4. Sample calculation: [terbacil (57) + gramoxone ($15) + spreader ($4) + application ($7)] + [glyphosate ($19) + spreader ($1) + application ($7)] x [2] = $137
5. Nine applications per year.
6. (8 passes per year) x ($11/pass) + [oryzalin ($4) + gramoxone ($15) + spreader ($4)] x [.33] + [application ($7)] + {[gramoxone ($15) + spreader ($4)] x [.33] + application ($7)} x {2}
7. (6 times per year) ($13/acre) + [oryzalin ($4) + gramoxone ($15) + spreader (4)] x [.33] + [application $7)] + {[gramoxone ($15) + spreader (4)] x [.33] + application ($7)] } x {2}

Table 4. Characteristics of Residual Herbicides Registered on Oranges.

Herbicide	Activation period rainfall or overhead irrigation	Cost	Other
Dichlobenil	Immediate	Very high	- Controls some perennials - Not for use on light sand soil - Frequently results in leaf symptoms
Oryzalin	3 weeks	High	- Suppresses some perennials - Trash reduces efficacy - Can be applied through sprinklers during dormancy
Napropamide	1 week	High	- Suppresses nutsedges under sprinklers - Trash reduces efficacy - Reduces burndown of glyphosate when used in combination - Works best under sprinklers
Norflurazon	Flood or sprinkler 4 weeks	Moderate	- Cannot be used south of the Monterey, Kings, and Tulare County lines - Suppresses some perennials
Simazine	1 month	Low	- Little affected by trash - Contaminates ground water - Not for use on sand or loamy sand soils - May damage less vigorous black wine varieties grown in warmer areas under drip or sprinkler irrigation - Can cause damage where soils are low in organic matter or high in calcium and pH.

Table 4 (Cont)

Herbicide	Activation period rainfall or overhead irrigation	Cost	Other
Terbacil	1 week	High	- Contact activity on weeds less than 2" - Suppresses some perennials - Subject to leaching on sandy loams - Cannot be used in Kern County - Not for use on sands with less than 1% organic matter or poorly drained soils
EPTC	Applied in irrigation water	Low	- Apply in enough water to reach 3-4 inches in soil
Trifluralin	Immediate soil incorporation required	Low	- Destroy all weeds with soil tillage before application - Incorporation may require specialized equipment

ATTACHMENT 2

State of California

Department of Health Services

Memorandum

To : Donald C. Mengle, M.S.

Date : July 28, 1987

Subject: Adverse Health Effects from Bromacil

From : Hazard Evaluation Section

According to CDFA, Medical Toxicology Branch, Summary of Toxicology Data for Bromacil (Hyvar) of December 8, 1986 (the most recent evaluation), data gaps exist on all toxicological tests required by SB 950 viz.: combined chronic toxicity/oncogenicity on rats, chronic toxicity on dogs, oncogenicity on mice, reproductive toxicity on rats, teratogenicity on rats and rabbits, and a battery of mutagenicity tests to evaluate gene mutation, chromosomal aberrations, and DNA effects.

All these studies were evaluated by CDFA as inadequate. In some of them, possible adverse effects were suggested. This was the case for the combined chronic toxicity/oncogenicity study on rats (hyperplasia of the thyroid), oncogenicity study on mice (liver and testes effects in males and liver effects at high dose in females), and studies on gene mutation effects (positive results in the Drosophila and mouse lymphoma studies).

EPA holds a different opinion than CDFA on bromacil toxicological data gaps' status. According to EPA, toxicological requirements for bromacil are fulfilled. At least, the available data were sufficient for the Agency to establish an ADI first of 0.063 mg/kg/day (2) and more recently, a value of 0.13 mg/kg/day (4). The National Academy of Sciences has calculated an ADI of 0.0125 mg/kg/day (5). Still another value for an ADI of 0.0075 mg/kg/day can be derived if the NOEL of 7.5 mg/kg/day (from one-generation rabbit reproduction study identified by the registrant) and an uncertainty factor of 1000 are used as the basis for its establishment (3).

Table 1 presents data on bromacil relevant to setting action levels for drinking water.

Table 1. Bromacil's current NOEL's and their potential use in establishing action level for drinking water.

Type of Study	NOEL mg/kg/day	Uncertainty Factor	ADI mg/kg/day	Action Level in Drinking Water µg/L	Agency	Reference
2-year feeding study on rats	12.5	1000	0.0125	88	NAS	5
2-year feeding study on dogs	6.5	100	0.0630	441	EPA	2
2-year feeding study on rats/ dogs	12.5	100	0.1300	910	EPA	4
1-generation reproduction study on rabbits	7.5	1000	0.0075	53		3 1

If the current lowest NOEL of 7.5 mg/kg/day identified for bromacil from long-term toxicity study is used for setting the Action Level in Drinking Water, it would give a value of 53 ppb. However, the toxicological data base on bromacil is far from complete and this precludes an overall evaluation of the adverse health effects from this compound.

Besides toxicity tests required by SB 590, pharmacokinetic studies in animals and metabolic fate studies in different environmental elements would be helpful in evaluating bromacil's potential health effects. Present available data are not sufficient for use in such evaluation.

Jolanta Bankowska

Jolanta Bankowska, Ph.D.
Staff Toxicologist

JB:sr
cc: Peter E. Berteau, Ph.D.
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Richard J. Jackson, M.D.
James W. Stratton, M.D.

References

1) Bankowska, J. State of California Department of Health Services, Berkeley, CA, 1987.

2) Burnam B. (EPA Toxicologist), personal communication to J. Bankowska, July 1986.

3) Du Pont De Nemours & Company. A report pertaining to Detection of Bromacil in California Groundwater, chapter 3, pg. 22, Wilmington, Delaware, no. 19898, undated.

4) EPA. Verified ADI Report of 2/20/87. Environmental Protection Agency, Washington, D.C.

5) NAS. Drinking Water and Health, pg. 537-543, National Academy of Sciences, Washington, D.C. 1977.

ATTACHMENT 3

Tulare County Farm Bureau

Post Office Box 748 • 737 North Ben Maddox Way • Visalia, California 93279 • (209) 732-8301

June 5, 1987

JUN 05 1987

Lyndon S. Hawkins, Chairman
Subcommittee, Pesticide Registration
and Evaluation Committee
California Department of Food & Agriculture
1220 N Street
Sacramento, CA 95814

Re: Diuron

Dear Mr. Hawkins:

Our organization is intensely concerned with your subcommittee's plans to implement the Pesticide Contamination Prevention Act with regard to Diuron in groundwater supplies.

The first and most important point for consideration is the fact that there are no viable substitutes for Diuron. To prohibit its use, or to restrict its use in the manner applied to Atrazine, would impose a tremendous economic hardship on production agriculture in Tulare County.

Diuron is the only product available for below water weed control. Without it our ditches and waterways would again be clogged with noxious weeds and would transmit great quantities of weed seed to crop production areas.

Diuron has been used in Tulare County for more than 25 years without oversight and strict use regulations. While we recognize that some level of detection was made in the 122 Tulare County wells tested by the State, we submit that if continued Diuron use is allowed under some controls the amount found in groundwater would drop sharply, if not disappear completely.

Therefore, it is our recommendation that certain rules be applied which might mitigate the danger but which will allow our farmers continued use of a necessary and irreplaceable production tool.

Among those mitigating standards might be:

- -closure of abandoned dry and drain wells
- -requirement that well heads be raised to meet current standards
- -requirement that all well heads be sealed to current standards
- -elimination of pump backflow from tank-fill operations through mandatory use of check valves or air gaps
- -institution of an educational program to ask voluntary compliance on all the above

It is clear the entire problem of groundwater contamination needs to be studied further with rational action levels established by state government.

Please feel free to call on Tulare County Farm Bureau for further assistance. Our farmers must be allowed to use beneficial chemicals to maintain a healthy agricultural economy, but we also recognize the responsibilities inherent in their use. We will do our part.

Yours very truly,

Shirley Kirkpatrick

Shirley Kirkpatrick, Chairman
Environmental Affairs Committee

SK:mer

cc: Clyde Churchill