State of California

Memorandum

To: Kean S. Goh, Ph. D.
Agricultural Program Supervisor IV
Environmental Monitoring and
Pest Management Branch

Date: June 30, 1997

From: **Department of Pesticide Regulation -** 1020 N Street, Room 161
Sacramento, California 95814-5624

Subject: SUMMARY OF RESULTS FOR FY 1996-97 GROUND WATER PROTECTION LIST MONITORING

BACKGROUND

In 1992, a group of 45 pesticide active ingredients (ai's) on the Ground Water Protection List [Title 3, California Code of Regulations, Section 6800(b)] were prioritized for monitoring as previously described (1). Through FY 1995-96, a total of 17 ai's (2)(3)(4)(5)(6) have been monitored with each ai having between 25 and 40 wells sampled as required by the Ground Water Protection List monitoring protocol. This memorandum summarizes information on monitoring locations and analytical results for the single ai monitored during FY 1996-97.

In the future, a revised protocol will be used to select ai's from the Ground Water Protection List for monitoring. The ai's on the list will no longer be ranked. Instead, previously used factors (whether or not an ai has been found in ground water; high priority on SB950 list; number of pounds sold; physicochemical factors) will be integrated with current knowledge about agricultural practices and any other pertinent information to select the next pesticide(s) for monitoring.

METHODS

EHAP monitored one active ingredient on the Ground Water Protection List during FY 1996-97. Norflurazon was selected because of a detection reported

in Florida ground water (7) and an increase in use (total pounds of ai) reported yearly between 1991 and 1993, especially in areas of California where ground water pollution has occurred. Norflurazon was monitored during August 1996. This was the first time that this chemical was investigated by EHAP.

Areas surveyed for well sampling were selected based on pesticide use reports for 1994. Sampling crews drove through preselected sections of land in each county with the goal of sampling one well per section. For each well sampled, two primary samples, two backup samples, and two field blank samples were collected. One primary sample was analyzed for norflurazon with a minimum detection level (MDL) of 0.1 parts per billion (ppb). The second primary sample was analyzed for atrazine, bromacil, simazine, diuron, prometon, prometryn, hexazinone, cyanazine, and metribuzin each with an MDL of 0.05 ppb. In addition, this sample was also analyzed for 2-amino-4-chloro-6-isopropylamino-s-triazine (DEA, deethylatrazine) and 2-amino-4-chloro-6-ethylamino-s-triazine (ACET) each with an MDL of 0.1 ppb. DEA is a breakdown product of atrazine and ACET is a breakdown product of atrazine and simazine.

RESULTS

A total of 40 wells were sampled in seven counties (Table 1). Overall, one or more herbicide residues were detected in 18 of the 40 wells. Norflurazon residues were found in one well each in Fresno and Tulare Counties. The norflurazon positive well in Fresno County also contained residues of simazine, diuron, and ACET and the well in Tulare County contained simazine, diuron, bromacil, and ACET residues. In addition, simazine residues were detected in seven wells in Fresno County and six wells in Tulare County; diuron was detected in three wells in Fresno County and four wells in Tulare County; bromacil was detected in two wells in Fresno County and three wells in Tulare County; hexazinone was detected in one well in Stanislaus County; and ACET was detected in five wells in Fresno County, one well in San Joaquin County, and four wells in Tulare County. None of the wells contained atrazine, prometon,

prometryn, cyanazine, metribuzin, or DEA residues.

A four-section well survey was initiated for each of the norflurazon detections in Fresno and Tulare Counties. This was done to determine if norflurazon residues could be found at a second site located within the four-section area around each of the original positive wells. Those results will be presented in separate memoranda.

REFERENCES CITED

1. Weaver, Don. March 9, 1992. Memorandum to John Sanders: Prioritization of chemicals on the ground water protection list.
2. Weaver, Don and Joe Marade. July 15, 1992. Memorandum to Kean Goh: Summary of results for FY 1991-92 ground water protection list monitoring.
3. Weaver, Donald J. and Joe Marade. August 23, 1993. Memorandum to John S. Sanders: Summary of results for FY 1992-93 ground water protection list monitoring.
4. Weaver, Don J. and Joe Marade. August 19, 1994. Memorandum to Kean S. Goh: Summary of results for FY 1993-94 ground water protection list monitoring.
5. Weaver, Donald J. and Joe Marade. June 30, 1995. Memorandum to Kean S. Goh: Summary of results for FY 1994-95 ground water protection list monitoring.
6. Weaver, Don J. and Joe Marade. August 1996. Memorandum to Kean S. Goh: Summary of results for FY 1995-96 ground water protection list monitoring.
7. Personal communication. (John Troiano, Senior Environmental Research Scientist, Environmental Hazards Assessment Program, California Department of Pesticide Regulation).

If you have any comments or questions, please feel free to call us.

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Table 1. Number of wells sampled for norflurazon during the FY 1996-97 Ground Water Protection List Monitoring study.

County	Number of Wells Sampled
Fresno	12
Kern	2
Madera	3
Merced	5
San Joaquin	4
Stanislaus	4
Tulare	10
Total	40

From: Joe Marade
To: Don Weaver
Date: June 5, 1997
Subject: GW96 Well Monitoring Results For Norflurazon

Background

EHAP monitored one active ingredient on the Ground Water Protection List Monitoring during FY 1996-97. Norflurazon was monitored during August 1996. This was the first time that this chemical was investigated by EHAP.

Areas surveyed for well sampling were selected based on pesticide use reports for 1994. One well was selected per section. For each well sampled, two primary samples, two backup samples, and two field blank samples were collected. One primary sample was analyzed for norflurazon with a minimum detection level (MDL) of 0.1 parts per billion (ppb). The second primary sample was analyzed for atrazine, bromacil, simazine, diuron, prometon, prometryn, hexazinone, cyanazine, and metribuzin each with an MDL of 0.05 ppb. In addition, this sample was also analyzed for 2-amino-4-chloro-6-isopropylamino-s-triazine (DEA, deethylatrazine) and 2-amino-4-chloro-6-ethylamino-s-triazine (ACET) each with an MDL of 0.1 ppb.

Results

A total of 40 wells were sampled in seven counties for norflurazon (Table 1).

Table 1. Number of wells sampled for norflurazon during the FY 1996-97 Ground Water Protection List Monitoring study.

County	Number of Wells Sampled
Fresno	12
Kern	2
Madera	3
Merced	5
San Joaquin	4
Stanislaus	4
Tulare	10
Total	40

Norflurazon residues were verified in one well each in Fresno and Tulare Counties (Table 2). Overall, eighteen of the forty wells had one or more pesticide residues detected during this survey.

Table 2. A summary of the results by county and chemical for wells sampled during the FY 1996-97 Ground Water Protection List Monitoring study.

County	Number of Wells With Verified Detections Of:						
	One or more residues	Norflurazon	Simazine	Diuron	Bromacil	Hexazinone	ACET
Fresno	9	1	8	4	2	0	6
Kern	0	0	0	0	0	0	0
Madera	0	0	0	0	0	0	0
Merced	0	0	0	0	0	0	0
San Joaquin	1	0	0	0	0	0	1
Stanislaus	1	0	0	0	0	1	0
Tulare	7	1	7	5	4	0	5
Total	18	2	15	9	6	1	12

None of the wells contained residues of atrazine, prometon, prometryn, cyanazine, metribuzin, or DEA.

Individual well results are provided in Table 3 (Attachment).

Table 3. Well results for the 1996-97 Ground Water Protection List monitoring for norflurazon in Fresno (County 10), Kern (15), Madera (20), Merced (24), San Joaquin (39), Stanislaus (50), and Tulare (54) Counties.

T/R-S[a]	County-Location	Concentration (ppb)[b]											
		Norflurazon	Atrazine	Simazine	Diuron	Prometon	Bromacil	Prometryn	Hexazinone	Cyanazine	Metribuzin	DEA[c]	ACET[d]
15S/24E-18	10-01	ND[e]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
14S/23E-26	10-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
14S/23E-28	10-03	0.24 0.29	ND	0.21	0.15	ND	ND	ND	ND	ND	ND	ND	0.66
13S/22E-35	10-04	ND	ND	0.070	ND	ND	ND	ND	ND	ND	ND	ND	ND
14S/22E-18	10-05	ND	ND	0.17	ND	ND	ND	ND	ND	ND	ND	ND	0.36
15S/22E-06	10-06	ND	ND	0.08	0.13	ND	ND	ND	ND	ND	ND	ND	0.21
15S/22E-16	10-07	ND	ND	0.11	ND	ND	ND	ND	ND	ND	ND	ND	ND
14S/24E-34	10-08	ND	ND	0.27	0.67	ND	1.10	ND	ND	ND	ND	ND	0.98
15S/23E-34	10-09	ND	ND	0.062	ND	ND	ND	ND	ND	ND	ND	ND	ND
15S/24E-26	10-10	ND	ND	0.10	0.29	ND	0.13	ND	ND	ND	ND	ND	0.41
13S/18E-12	10-11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.20
16S/23E-08	10-12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
27S/26E-32	15-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
25S/26E-31	15-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table 3 continued.

T/R-S[a]	County-Location	Concentration (ppb)[b]											
		Norflurazon	Atrazine	Simazine	Diuron	Prometon	Bromacil	Prometryn	Hexazinone	Cyanazine	Metribuzin	DEA[c]	ACET[d]
12S/17E-36	20-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
09S/16E-24	20-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
10S/17E-17	20-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
09S/16E-06	24-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
06S/13E-30	24-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
05S/13E-17	24-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
05S/13E-22	24-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
05S/12E-12	24-05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
04N/06E-02	39-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
03S/07E-07	39-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.57
02S/08E-15	39-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
01S/07E-08	39-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
03S/10E-33	50-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
04S/09E-19	50-02	ND	ND	ND	ND	ND	ND	ND	0.27 0.22	ND	ND	ND	ND

Table 3 continued.

T/R-S[a]	County-Location	Concentration (ppb)[b]											
		Norflurazon	Atrazine	Simazine	Diuron	Prometon	Bromacil	Prometryn	Hexazinone	Cyanazine	Metribuzin	DEA[c]	ACET[d]
05S/10E-18	50-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
04S/12E-22	50-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
17S/26E-26	54-01	ND	ND	0.21	1.10	ND	ND	ND	ND	ND	ND	ND	ND
19S/26E-01	54-02	ND	ND	0.20	0.46	ND	1.7	ND	ND	ND	ND	ND	0.69
19S/26E-22	54-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
20S/26E-02	54-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
21S/27E-05	54-05	0.32 0.30	ND	0.27	1.00	ND	2.10	ND	ND	ND	ND	ND	0.49
16S/24E-22	54-06	ND	ND	0.22	1.50	ND	0.94	ND	ND	ND	ND	ND	1.30
16S/24E-13	54-07	ND	ND	0.062	0.94	ND	2.60	ND	ND	ND	ND	ND	0.41
16S/24E-03	54-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
17S/23E-22	54-09	ND	ND	0.091	ND	ND	ND	ND	ND	ND	ND	ND	0.56
16S/23E-03	54-10	ND	ND	0.071	ND	ND	ND	ND	ND	ND	ND	ND	ND

a. T/R-S = Township / Range - Section.
b. ppb = parts per billion.
c. 2-amino-4-chloro-6-isopropylamino-s-triazine (deethylatrazine).
d. 2-amino-4-chloro-6-ethylamino-s-triazine (deisopropylatrazine or deethylsimazine).
e. None detected at the minimum detection limit of 0.1 ppb for norflurazon, DEA, or ACET and 0.05 ppb for all other chemicals.