Dimethyl Tetrachloroterephthalate (DCPA) Pesticide Management Plan

Idaho State Department of Agriculture

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Introduction

The Idaho State Department of Agriculture (ISDA) monitors ground water from approximately 300 domestic wells around the state of Idaho each year for 110 different pesticides. From 2001 to 2006, ISDA detected the general use product dimethyl tetrachloroterephthalate (DCPA) in varying concentrations in 12.6% of the total wells tested for pesticides. A ground water standard for DCPA under IDAPA 02.03.01.150.01.a does not exist. Therefore, ISDA is adopting the Environmental Protection Agency Lifetime Health Advisory (HAL) of 70 µg/L as the reference point for DCPA, consistent with IDAPA 02.03.01.150.01.b. Ground water samples collected from a domestic well located in Owyhee County have consistently had elevated concentrations of DCPA. In 2005, the concentration of DCPA within this well exceeded the Lifetime Health Advisory (HAL) set by the EPA. Subsequent quarterly monitoring in 2006 resulted in elevated DCPA concentrations, however, the concentrations did not exceed the health standard. In response to the elevated DCPA detections, consistent with IDAPA 02.03.01 *Rules Governing Pesticide Management Plans for Ground Water Protection*, ISDA is creating DCPA chemical specific rules and this accompanying DCPA Pesticide Management Plan (PMP). In addition to voluntary measures, this DCPA PMP contains mandatory restrictions of the use of DCPA, recordkeeping requirements, and education of applicators within the area of restriction in Owyhee County. These restrictions will be adopted directly into IDAPA 02.03.01 and will be enforceable under IDAPA 02.03.01.050.02.

This DCPA PMP emphasizes prevention of ground water risks by managing DCPA use in a way that reduces or eliminates the leaching of pesticides to ground water, particularly in vulnerable areas.

Statement of Philosophy and Goals

The goal of the DCPA PMP is to determine actions to prevent DCPA contamination that are based on beneficial uses and vulnerability that address applicable aspects of the DCPA use, and to take actions to prevent or minimize further presence of DCPA in ground water and to provide protection for the present and projected future beneficial use of the ground water in accordance with IDAPA 02.03.01.100.01. The goal of the DCPA PMP correlates with the goal of the Idaho Ground Water Quality Council (1992) to prevent unreasonable adverse effects to human health and the environment through the protection of ground water and interconnected surface water. The DCPA PMP will be consistent with this goal and will, therefore, emphasize the protection of human health and the environment in addition to beneficial uses of all water. The result of the DCPA PMP is to decrease the ground water DCPA concentration in the DCPA area of restriction and to prevent ground water DCPA concentrations from increasing in other areas of Idaho. To help accomplish this, the DCPA PMP will address DCPA use and ground water protection in a way that will help reduce the DCPA concentration in ground water that has been impacted by the chemical as well as maintain and protect the existing high quality of the state's ground water in areas with no historic DCPA detections in the ground water. The DCPA PMP will focus on the prevention of ground water

contamination from DCPA, since clean up of contaminated ground water may be impractical for both technical and financial reasons.

Roles and Responsibilities and Legal Authority

The State of Idaho has the central role in developing and implementing the DCPA PMP. ISDA is the lead agency in this process. IDAPA 02.03.01 *Rules Governing Pesticide Management Plans for Ground Water Protection* gives ISDA authority to respond to detections in Idaho's ground water. To successfully meet the challenges of the DCPA PMP, ISDA will be coordinating with other state and federal agencies. Each agency will have unique roles in the implementation of the DCPA PMP. Agency coordination and cooperation is essential for effective, efficient, and economical implementation. In addition, involvement from the agricultural community is essential for the DCPA PMP to be successful. Coordination with agencies and the agricultural community will be accomplished through the PMP Advisory Committee.

The number of agencies involved with pesticide management, ground water protection, agricultural management, and the implementation of the DCPA PMP are numerous. ISDA legal authorities and mandates for this protection program come from the EPA and the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) which EPA administers. ISDA has the authority to implement FIFRA through a cooperative working agreement with EPA. Within the Division of Agricultural Resources, ISDA is charged with the registration of pesticide products, education and licensing of applicators, ground water protection from pesticides, and enforcement to ensure that pesticides are properly used. ISDA has obligations to prevent contamination of ground water from agricultural chemicals and agricultural activities statutorily through FIFRA, Idaho Pesticide and Chemigation Law (Title 22, Chapter 34, Idaho Code), and the Idaho Ground Water Rule. Additional authority for ISDA's role in ground water protection comes from the ISDA cooperative agreement with the EPA to enforce the provisions of FIFRA and through joint implementation of the Idaho Ground Water Quality Plan (Ground Water Quality Council, 1992) and the Agricultural Ground Water Quality Protection Program for Idaho (Ground Water Quality Council, 1996).

Chemical Information

DCPA is a chlorinated terephthalic acid ester that is used as a general use product pre-emergence herbicide to control annual grasses and some annual broad-leaved weeds in turf, ornamentals, strawberries, certain vegetables, beans, and cotton (EPA, 2006[2]). Some uses, particularly on vegetable crops, were voluntarily terminated by the registrant in response to the EPA concerns regarding the contamination of ground water with DCPA (EPA, 2006[2]). DCPA was originally registered under FIFRA in 1958 for use on turf grasses for the selective preemergence control of crabgrass and other assorted weeds (EPA, 1998).

The molecular formula of DCPA is $C_{10}H_6Cl_4O_4$ and the chemical structure is presented in Figure 1.

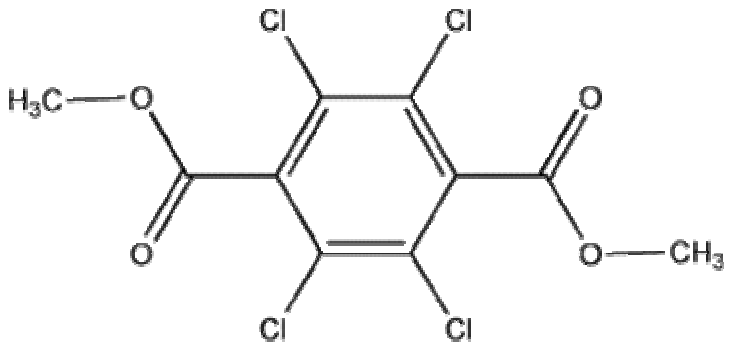

Figure 1. Chemical structure of DCPA (from Pesticide Action Network, 2007).

A summary of DCPA chemical and physical properties is presented in Table 1.

Table 1. Chemical and physical properties of DCPA (from AMVAC, 2007).

Chemical Name:	dimethyl tetrachloroterephthalate	
Molecular Formula:	$C_{10}H_6Cl_4O_4$	
Molecular Weight	332.0	
Melting Range:	156°C	
Vapor Pressure:	0.21 mPa (25°C)	
Decomposition Temperature:	360–370°C as determined by differential thermal gravimetric analysis	
Physical State:	Crystalline solid	
Color:	Off-white to gray powder	
Taste:	Tasteless	
Odor:	Odorless/slightly aromatic	
Stability:	Thermally stable under normal temperatures of storage. Stable to ultraviolet radiation.	
Corrosivity:	None	
Solubility at 25°C:	Solvent	g/Kg
	Acetone	100
	Benzene	250
	Xylene	140
	Water	0.0005

Two products are currently registered in Idaho with DCPA as the active ingredient: Dacthal Flowable Herbicide (EPA registration number 5481-487; Idaho registration number 64103) and Dacthal W-75 Herbicide (EPA registration number 5481-490; Idaho registration number 61421).

Environmental Fate

There is virtually no chemical degradation of DCPA in water with a pH ranging from 5.0 to 9.0 (AMVAC, 2007). The breakdown of DCPA is due to the action of sunlight and the half-life in surface water is generally less than three days in the presence of sunlight (AMVAC, 2007).

The half-life of DCPA is from 14 to 100 days in most soils (EXTOXNET, 1996). The factors that influence the degradation of DCPA in the soil are soil moisture, soil

temperature and soil microbial activity (AMVAC, 2007). DCPA undergoes a two-step degradation process resulting in the breakdown products monomethyl tetrachloroterephthalate (acid ester) and tetrachloroterephthalate (diacid or TPA) (AMVAC, 2007). Little breakdown of DCPA occurs below a soil temperature of 50°F due to low levels of microbial activity (AMVAC, 2007).

Toxicological Information

The HAL for DCPA is 70 μg/L. The HAL is an EPA determined concentration in drinking water that is not expected to cause any adverse noncarcinogenic effects for a lifetime of exposure. The HAL is based on exposure of a 70 kg adult consuming 2 liters of water a day. The HAL for DCPA was determined based on chronic and subchronic studies that demonstrated DCPA can affect the lungs, liver, and thyroid in rats and the liver in mice (EPA, 2006[2]).

Unless otherwise noted, the following bulleted toxicological information is from EXTOXNET (1996):

- **Acute toxicity:** The compound has a very low toxicity to mammals. The LD50 values for DCPA in rats range from greater than 3000 mg/kg to 12,500 mg/kg. DCPA in rabbits and beagle dogs has an LD50 of greater than 10,000 mg/kg. The dermal LD50 in rabbits is greater than 2000 mg/kg. DCPA is not a skin sensitizer. It is a mild eye irritant. The inhalation LC50 (4 hour) is greater than 5.7 mg/L for rats.
- **Chronic toxicity:** A 3 mg dose in a rabbit eye produced mild irritation, which disappeared in 24 hours. Dogs given high doses of 800 mg/kg/day for a month showed some adverse effects in the liver. In longer-term studies with rats (90 days), similar doses (about 750 mg/kg/day) caused no adverse effects. In a two year study with rats, a dose of around 50 mg/kg/day was responsible for changes in the adrenal weights of the females and in the kidney weights of the males.
- **Reproductive effects:** Rats fed high doses of DCPA (500 mg/kg/day) showed no changes in fertility, gestation, live births, or lactation. The study was conducted over one full generation. These data suggest that the compound does not cause reproductive effects.
- **Teratogenic effects:** Available data indicate that DCPA is not teratogenic. Pregnant rabbits fed moderate doses (up to 300 mg/kg) of DCPA on days 8 to 16 of gestation showed no skeletal or organ abnormalities in the offspring.
- **Mutagenic effects:** No mutagenicity was seen in a number of tests, including mutation frequency and activity, cytogenetic tests, DNA repair, and dominant lethal tests. This evidence indicates that DCPA is not mutagenic.
- **Carcinogenic effects:** No carcinogenic effects were noted in rats in a two year study where diets contained up to 500 mg/kg/day of DCPA. However, the 2006 Edition of the Drinking Water Standards and Health Advisories lists DCPA as a possible human carcinogen (EPA, 2006[1]). Studies have shown that DCPA has induced thyroid tumors in male and female rats, liver tumors in female rats, and liver tumors in female mice (EPA, 2006[2]).

- **Organ toxicity:** Long-term studies in test animals have indicated the liver and adrenal glands as target organs.
- **Fate in humans and animals:** Much of the compound that is ingested is not absorbed. Cows excreted nearly all of a small dose of DCPA within 5 days, and dogs absorbed only small amounts (3%) of the compound. The remaining amount was eliminated within 4 days. When dairy cows were fed diets with up to 200 mg/L of DCPA for 24 days, 0.26 mg/L of the compound or its metabolites were found in milk, while 30 to 90 mg/L for 9 or 23 days resulted in residues of 0.036 mg/L and 0.066 mg/L in milk. Residues in other tissues were generally less than 1 mg/L.

Ground Water Detections

From 2001 to 2006, ISDA sampled 1,307 domestic wells across the state of Idaho for various pesticides, including DCPA. DCPA was detected in varying concentrations in 165 wells, or 12.6% of the wells tested. All ground water samples were collected following ISDA established protocols (on file at the ISDA Boise office) and all DCPA detections were scientifically validated by the analytical laboratory performing the analysis. The locations of the detections are shown in Figure 2.

IDAPA 02.03.01 *Rules Governing Pesticide Management Plans for Ground Water Protection* breaks the pesticide detections into the following detection levels:

Level 1: Detection above the detection limit to less than 20% of Reference Point.
Level 2: Detection at 20% to less than 50% of Reference Point.
Level 3: Detection at 50% to less than 100% of Reference Point.
Level 4: Detection at or greater than 100% of Reference Point.

From 2001 to 2006, 136 wells have had a Level 1 DCPA detection, 23 wells have had a Level 2 DCPA detection, five wells have had a Level 3 detection, and one well had a Level 4 detection (Figure 2). The Level 3 and 4 detections occurred near the Homedale area in Owyhee County. Level 2 detections of DCPA were found in wells near Homedale, along with four wells located in Ada County near Eagle, three wells located in Washington County near Weiser, and one well located in Minidoka County near Rupert. The Level 2 detections in Ada, Washington, and Minidoka Counties occurred during 2001. ISDA resampled all of these wells for DCPA in the following years. The wells in Ada County were tested for DCPA in 2006. Two wells had DCPA concentrations that dropped to Level 1. The two other wells were not sampled, one well was abandoned and the other well is an irrigation well that was not turned on during the sampling period. The three wells located in Washington County were sampled for DCPA in 2002. Two of the wells had DCPA concentrations that dropped to Level 1, and one well had no DCPA detected in the sample. The well located in Minidoka County was sampled in 2004 and no DCPA was detected in the sample.

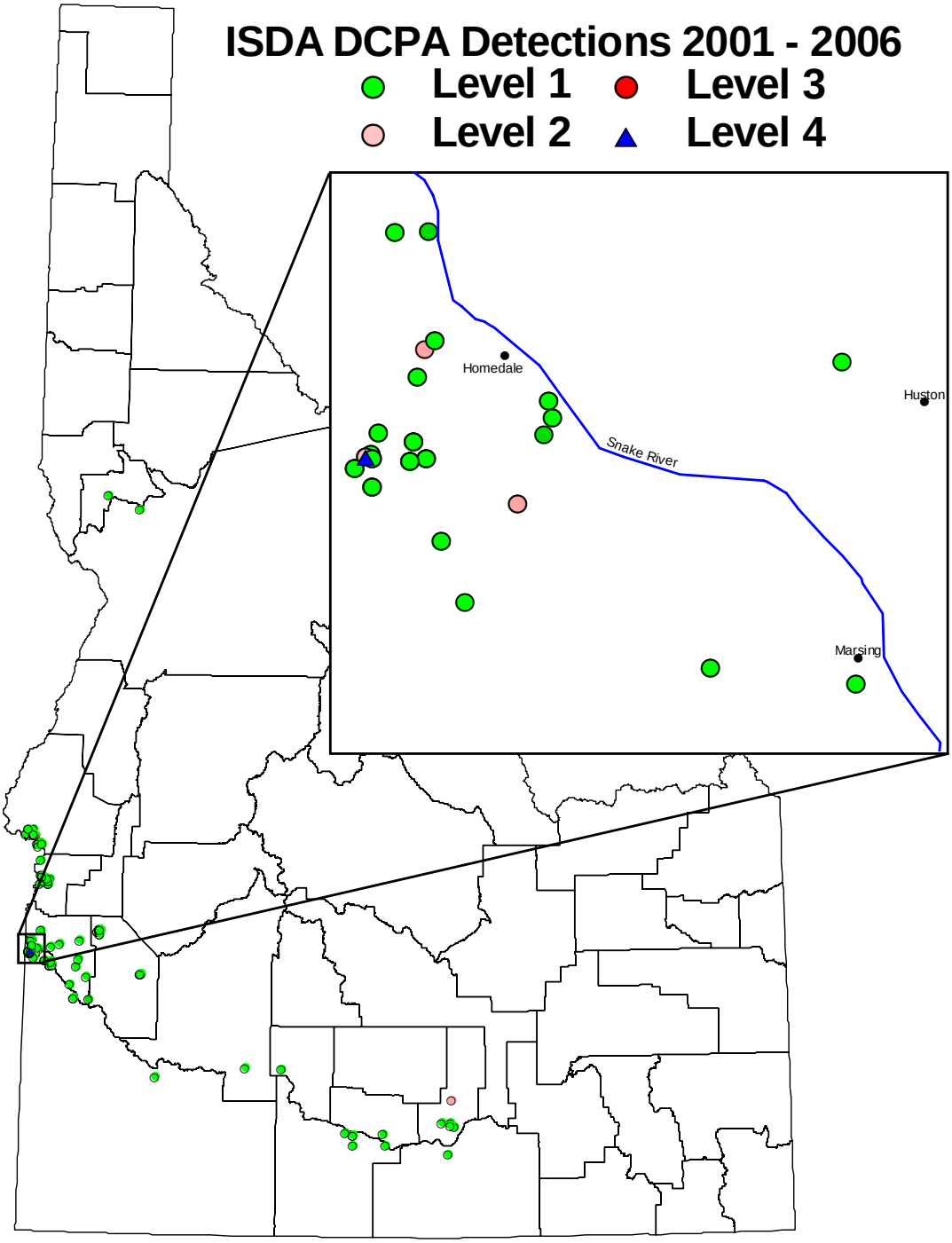

Figure 2. Statewide DCPA detections from 2001 to 2006.

DCPA Area of Restriction

The numerous scientifically validated detections of DCPA in the ground water within Owyhee County coupled with no ISDA records of any DCPA spills, back siphoning

events, or any other point sources, indicate the source of the DCPA ground water contamination is from application of DCPA in accordance with the label. In accordance with IDAPA 02.03.01.050.01.a and 02.03.01.200.03.b, a DCPA area of restriction is established where DCPA detections have been at Level 3 concentrations.

The DCPA area of restriction that is subject to the DCPA PMP is the area south of Homedale located in Owyhee County. It is the area designated as Township 03 North, Range 05 West, Sections 18 and 19; and Township 03 North, Range 06 West, Sections 13 and 24. This is shown in Figure 3.

The determination of the boundaries of the area of restriction is based on the DCPA detections in the area, the hydrogeology of the aquifer, physical characteristics of DCPA, and the pesticide use.

DCPA Detections

ISDA sampled thirteen wells quarterly for DCPA during 2006. Table 2 presents the data from the quarterly sampling. Figure 3 presents the most recent DCPA sampling results from November 2006. The ground water flow in the DCPA area of restriction is generally to the north-northeast, towards the Snake River. This is seen in Figure 3, with the time of travel flow path of ground water flowing to well 3100101, which had the Level 4 DCPA detection.

Table 2. DCPA sampling results from ISDA 2006 quarterly monitoring.

Sample Date	No. of wells with Non-detect	No. of wells with Level 1 detections	No. of wells with Level 2 detections	No. of wells with Level 3 detections	No. of wells with Level 4 detections
February 2006	5	6	1	1	0
May 2006	5	6	0	2	0
August 2006	6	5	2	0	0
November 2006	6	5	1	1	0

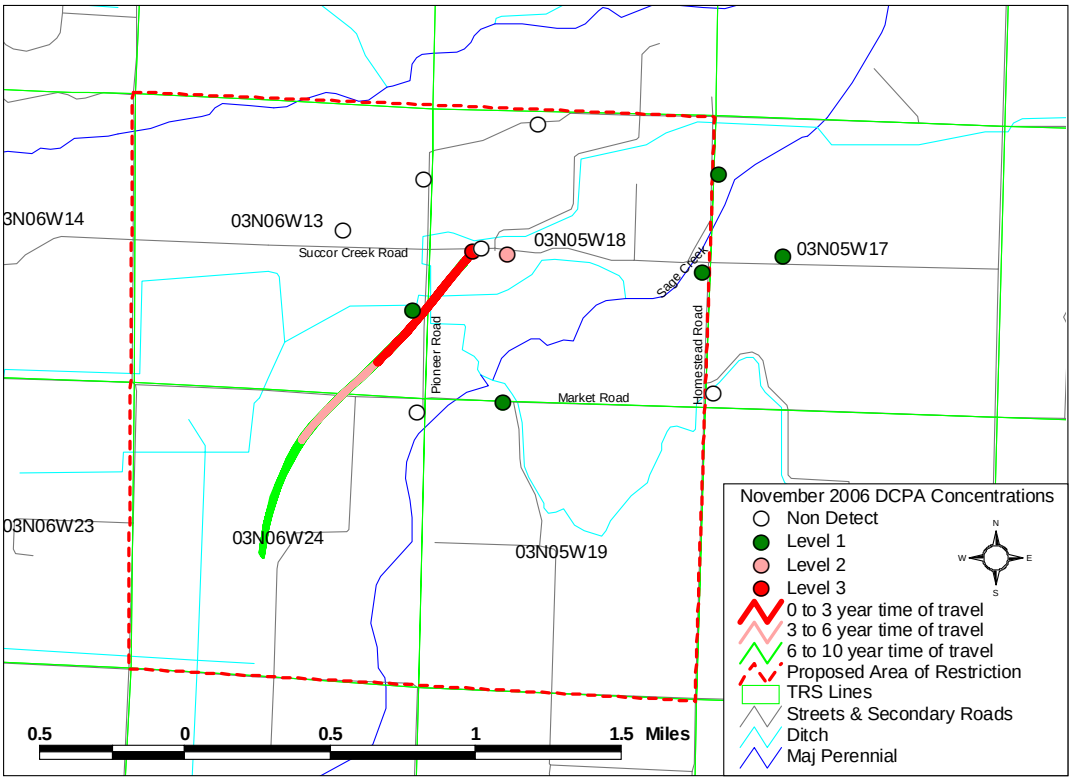

Figure 3. DCPA area of restriction, November 2006 DCPA ground water concentrations, and time of travel for well 3100101.

Hydrogeology

Sediments underlying the DCPA area of restriction predominantly are classified within the Idaho Group geologic formation (U.S. Geological Survey, 2000). Sources of these sediments are believed to originate from prehistoric Lake Idaho and from more recent deposition from the Snake River. A characteristic "blue clay" is found on well drillers' reports from the Idaho Department of Water Resources (IDWR) for many of the wells in the regional area. These blue clays are part of the Glenns Ferry Formation (Othberg, 1994) and their low permeability characteristics can produce confined aquifer conditions. The blue clay layer recorded on well logs regionally start at a depth of 26 feet below ground surface (bgs) to 190 feet bgs. The thickness of the clay layer in the well logs observed regionally ranged from five to 500 feet. In the DCPA area of restriction, well logs indicate the top of blue clay layer is found approximately 35 to 50 feet bgs and ranges in continuous thickness from approximately 230 to 500 feet. Several wells within the DCPA area of restriction have a clay layer that ranges from 70 to 154 feet thick that overlies a sandy blue clay layer that is typically five to 15 feet thick. Beneath the sandy blue clay, another thick blue clay layer is present, ranging in thickness from 120 to 350 feet. The sandy blue clay layer that breaks up the blue clay is generally found at depths of 120 to 195 feet bgs in the DCPA area of restriction. Ground water used for domestic purposes in the DCPA area of restriction appears to come from two sources: (1) a shallow system within coarse grained sands and gravels and (2) a deeper system within a characteristic sandy blue clay that is separated from the shallow system by a blue-colored

clay of varying thickness. Well logs indicate that most of the elevated concentrations of DCPA are found within the shallow system. Aquifer conditions appear to vary from unconfined to confined at different locations and different depths. Well drillers' reports of wells monitored as part of this project indicate shallow ground water within sands and gravels to be less than 50 feet below land surface. Well driller report data indicate the deep system is found at varying depths, generally less than 300 feet. Static water levels are typically less than 60 feet. General regional ground water movement appears to be toward the Snake River, an area of probable ground water discharge (Carlson et al., 2001). However, local shallow ground water flow direction may be influenced by nearby Sage Creek and Succor Creek, as seen in Figure 3.

The combination of the locations of DCPA detections, ground water flow direction, and local geology were factors that helped to determine boundaries for the DCPA area of restriction.

DCPA Restrictions

The following DCPA restrictions must be followed in the DCPA area of restriction.

Restriction	Description
DCPA Rotation	DCPA may not be used on the same field within four years of a previous DCPA application. The rotation program will decrease the likelihood of DCPA build up in the soil profile that could leach to ground water within the DCPA area of restriction. In addition, rotational programs help decrease the occurrence of pesticide resistant pests.
Reduced DCPA Rate and Combination	Within the DCPA area of restriction, the maximum application rate for DCPA must be the lowest rate on the label according to the appropriate soil type. The lower rate of DCPA will slow down weed growth. For sufficient weed control, another herbicide will need to be used as a follow-up. The lower DCPA rate will result in less DCPA applied to the DCPA area of restriction. This lower rate will help decrease the leaching of DCPA to the ground water.

DCPA Voluntary BMPs

Prevention of DCPA contamination of ground water is the primary focus of the DCPA PMP. ISDA encourages pesticide applicators, in and outside of the DCPA area of restriction, to voluntarily adopt following BMPs:

Management Practice	Description
Idaho NRCS Conservation Practice Standard, Pest Management Code 595.	In accordance with IDAPA 02.03.01 *Rules Governing Pesticide Management Plans for Ground Water Protection* pesticide applicators are encouraged to use the Idaho NRCS Conservation Practice Standard, Pest Management Code 595. A copy of the 595 Standard can be found at http://efotg.nrcs.usda.gov/references/public/ID/595.pdf.
Irrigation Water Management	DCPA can be moved through the soil by both rain and irrigation so it is important to consider irrigation water management practices which minimize water movement below the root zone. The ability of soils to hold water affects their ability to retain pesticides and nutrients. Most of the soils in the DCPA area of restriction have a moderate permeability and a low to moderately low organic matter content and are susceptible to leaching DCPA through the soil. If more water is applied than is used by the crop, water will move below the root zone which can leach DCPA below the root zone where it becomes both an economic loss and a potential pollutant of ground water. Excessive irrigation and rainfall can also promote population build-up of some pests such as various weeds (Noling at al., 2006). To avoid premature leaching from the root zone, DCPA should not be followed by excessive irrigation. Given the sandy, permeable nature of the soils and low soil organic matter content, irrigation schedules based on soil moisture deficits are likely to improve pest control and response to treatment by maximizing retention of DCPA in the appropriate soil zone and prevent leaching of DCPA into the ground water. Irrigation water management practices rely upon the use of accounting methods (rain gauge, daily crop water use estimations, and a soil water balance worksheet) and/or the use of soil water sensors (e.g. tensiometers, piezometers, soil probes, etc.) for determining when and how much irrigation water to apply during any single application. When a water sensor reaches a predetermined

	point of soil water depletion, irrigation will be scheduled. A deeper water sensor can be monitored to verify that no water moves below the root zone. The predetermined point of soil water depletion will be cumulatively based on daily depletion of available soil water throughout the soil profile and of crop water needs. It is important to recognize that it is total volume of irrigation water, and not necessarily duration or irrigation run time of the sprinklers which is important in driving the movement of chemicals through the soil profile (Noling et al., 2006). The length of time to irrigate will depend on the water-holding capacity of the soil and the amount of water depleted from the soil and application rate (Noling et al., 2006). Sprinkler application rates (volume) are therefore very important in determining how long to irrigate. Careful planning and management of irrigation can improve DCPA efficacy and reduce the potential for ground water contamination.
Reduction of Soil Erosion	DCPA can be transported off site by soil erosion, which could lead to leaching of DCPA into the ground water. Several options are available to reduce soil erosion from the fields including: 1) planting a cover crop at the end of the fields to reduce soil erosion by keeping the soil covered during high rainfall periods when it would normally be bare; and 2) use PAM to control soil erosion resulting from furrow irrigation.
DCPA Banding and Sprinkler Irrigation	Total pesticide use can be reduced by applying relatively narrow bands of chemical, rather than broadcasting over the entire field. Instead of applying DCPA to the entire row, DCPA is applied in a band near to the plant. This application method should be used in fields that are irrigated with sprinklers. Weeds can be controlled between rows by mechanical cultivation and herbicide use can be reduced to bands directly over the crop row. Crop scouting and Integrated Pest Management (IPM) are strongly recommended complements to pesticide banding in order to improve pest control. A three year study conducted in Iowa on two fields of corn and one of soybeans monitored the effect of different atrazine treatments on yields and atrazine concentrations in tile-drainage water. Over the three year period, corn acreage with banded treatments produced equal or slightly higher yields than acreage receiving broadcast herbicides

	(Baker, 1988). Analysis of water samples for atrazine residues in water beneath herbicide-treated areas revealed that, during this three year period, atrazine was detected more often and at higher concentrations in the areas where atrazine was broadcast (Baker, 1988). Banding of herbicides means that farmers have to rely more extensively on mechanical tillage and cultivation to control weeds. This will reduce the amount of pesticide used compared to broadcast applications. Banding may require an extra cultivation and slightly more management, but it does not involve sophisticated equipment or a large investment by modifying existing application and tillage equipment. A weed control program that bands herbicide over the row at planting with subsequent timely cultivation(s) can effectively manage weeds in row crops and reduce the per acre use of preemergence herbicides by 60% and almost totally eliminate the need for postemergence herbicides (Waldron, 2007).
Integrated Pest Management	Integrated pest management (IPM) is an ecological based strategy that uses an array of complementary methods: natural predators and parasites, pest-resistant varieties, cultural practices, biological controls, habitat manipulation, and various physical techniques. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. IPM focuses on long-term prevention of pests or their damage. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment. ***Extension IPM*** *programs* at the University of Idaho (U of I) were established in the early 1970's. The statewide mission is to help citizens of Idaho manage pests in ways that minimize threats to human health and environmental quality while maximizing the profitability of pest control action. The U of I Extension program is currently developing an IPM for onions. Contact the Idaho Pest Management Center at 364-4046 for more information.

Education

ISDA will develop in coordination with appropriate parties and approve a DCPA training program that all users must attend prior to using DCPA in the DCPA area of restriction.

ISDA will coordinate with appropriate parties to assist with the training program. The training will be a minimum of two hours. The DCPA user must have completed the ISDA approved DCPA training no earlier than two years prior to the DCPA application date. The training program will include:

1. Laws and regulations governing pesticide use and management, including Title 22 – Agriculture and Horticulture Statute, and IDAPA 02.03 – Pesticide and Chemigation Rules;
2. DCPA restrictions as identified in this document;
3. Voluntary DCPA BMPs as identified this document;
4. Physical and chemical characteristics of dacthal including toxicological and health effects information;
5. Hydrogeology of the area of pesticide restriction; and
6. Other topics as deemed appropriate by ISDA.

In addition to the DCPA training program that will be developed for the DCPA area of restriction, ISDA will continue to participate in pesticide recertification workshops statewide and educate applicators about voluntary BMPs that help to reduce the leaching of pesticides, such as DCPA. ISDA will emphasis DCPA voluntary BMPs in areas that have had historic DCPA detections in the ground water.

Applicator Licensing

DCPA is a general use product, which means DCPA can be purchased and applied without a pesticide license. The exception to this is if the applicator is applying DCPA while acting as a professional applicator. In this situation, the applicator would need a Professional Applicator License.

Recordkeeping

Any person using DCPA within the DCPA area of restriction must maintain records for a period of three (3) years, ready to be inspected, duplicated, or submitted when requested by the Director pertaining to the use of DCPA. The records shall be kept in a location designated by the user of DCPA and maintained in accordance with Title 22, Chapter 34, Idaho Code, and IDAPA 02.03.03.150.02, "Rules Governing Pesticide and Chemigation Use and Application". These recordkeeping requirements include:

1. The name and address of the owner or operator of each property treated
2. The specific crop, animal, or property treated
3. The location by the address, general legal description (township, range, and section) or latitude/ longitude of the specific crop, animal, or property treated
4. The size or amount of specific crop, animal, or property treated
5. The trade name or brand name of the pesticide applied
6. The total amount of pesticide applied
7. The dilution applied or rate of application
8. The EPA registration number of the pesticide applied

9. The date of application
10. The time of day when the pesticide is applied
11. The approximate wind velocity
12. The approximate wind direction
13. The full name of the person recommending the pesticide application
14. The full name of the professional applicator applying the pesticide
15. The license number of the professional applicator applying the pesticide
16. Worker protection information exchange, if required by the worker protection standard, prior to pesticide application, shall be documented by: date of contact, time of contact, name of grower or operator

Accurate recordkeeping allows for better purchasing decisions if records are kept of past field application rates and their effectiveness. In addition, recordkeeping of DCPA use is essential to determine if DCPA detections in the ground water are the result of current or historic uses. Here are examples of benefits to recording and maintaining accurate pesticide-use records from Aerts et al. (2006):

1. Pesticide Management - Producers can use records of pesticide treatments and results to analyze the effectiveness of past pesticide applications and determine the best pesticide management program to deal with current problems. Records also provide a documentation system for determining crop replant, rotation and pre-harvest intervals, and forage, feed and grazing restrictions.
2. Integrated Pest Management. Pesticide recordkeeping is a major tool of IPM. Recordkeeping of different application rates, products, techniques, and growing conditions enables an applicator to increase profits through better pesticide use planning.
3. Improper Application Safeguard. Records are the best safeguard if a producer is accused of an improper application that causes drift, personal injury, or potential water quality impairment.

The OnePlan IPM Planner has a recordkeeping tool that could be used for DCPA recordkeeping. It is available by contacting the Idaho Association of Soil Conservation Districts (IASCD).

Monitoring

Ground water monitoring within the DCPA area of restriction will be conducted by ISDA in accordance with Subsections 200 and 300 of IDAPA 02.03.01 *Rules Governing Pesticide Management Plans for Ground Water Protection*. Thirteen wells within the DCPA area of restriction (shown in Figure 3) will be tested annually for pesticides, including DCPA. All sampling will follow ISDA established protocols (on file at ISDA main office) for handling, storage, and shipping.

In accordance with Subsection 410 of IDAPA 02.03.01 *Rules Governing Pesticide Management Plans for Ground Water Protection* the data from the monitoring will be used to determine when the DCPA area of restriction should be repealed.

ISDA will continue to implement the Regional Agrichemical Ground Water Monitoring Program, and sample approximately 200 to 300 domestic wells across the state for pesticides, including DCPA, each year. ISDA will respond to any DCPA detection in the ground water in accordance with Subsection 200 of IDAPA 02.03.01 *Rules Governing Pesticide Management Plans for Ground Water Protection.*

Enforcement

Any person who violates or fails to comply with any provision of IDAPA 02.03.01 *Rules Governing Pesticide Management Plans for Ground Water Protection* or this DCPA PMP shall be subject to penalties listed under Section 22-3423, Idaho Code.

Review

ISDA will review this DCPA PMP every two years to determine if the requirements contained in the plan need to be modified based on new scientific data and information in accordance with IDAPA 02.03.01.101.02. ISDA will notify licensed pesticide applicators, dealers, and residents within the DCPA area of pesticide restriction, and the public in general regarding any proposed revisions to the DCPA PMP.

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