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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
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OFFICE OF  
PREVENTION, PESTICIDES  
& TOXIC SUBSTANCES

**MEMORANDUM**

**SUBJECT:** Section 18 - Specific Exemption Requests for Use of Chlorpyrifos to Control the Russian Wheat Aphid in Wheat in Colorado, Nebraska, New Mexico, Texas, and Wyoming; and in Wheat and Barley in Montana -- ACTION MEMORANDUM -- (92-CO-02, 92-MT-03, 92-NE-03, 92-NM-03, 92-TX-12, & 92-WY-01)

**FROM:** Lawrence Culleen, Acting Director  
Registration Division

**TO:** Douglas D. Campt, Director  
Office of Pesticide Programs

**I. APPLICANTS' REQUESTS**

**APPLICANTS:** Colorado Department of Agriculture  
Montana Department of Agriculture  
Nebraska Department of Agriculture  
New Mexico Department of Agriculture  
Texas Department of Agriculture  
Wyoming Department of Agriculture

**CHEMICAL:** Chlorpyrifos [*O,O*-diethyl *O*-(3,5,6-trichloro-2-pyridyl) phosphorothioate]

**PRODUCT:** Lorsban 4E, EPA Reg. No. 464-448, Dow Chemical Company, and Lorsban 4E, EPA Reg. No. 62719-23, DowElanco

**SITE:** Wheat, and  
Barley (in MT only)

**PEST:** Russian Wheat Aphid (*Diuraphis noxia* (Mordvilko))

**USE PATTERN:**

- Colorado:** A single aerial or ground application, at a maximum rate of 0.5 lb. a.i. per acre; one application per crop growing season; 28-day PHI, and 14-day grazing restriction.
- Montana:** Maximum of two aerial or ground applications per crop growing season, at a maximum rate of 0.5 lb. a.i. per acre; 28-day PHI, and 14-day grazing restriction.
- Nebraska:** Maximum of two aerial or ground applications per crop growing season, at a maximum rate of 0.5 lb. a.i. per acre; 28-day PHI, and 14-day grazing restriction.
- New Mexico:** Maximum of two aerial or ground applications, at a maximum rate of 0.5 lb. a.i. per acre; 28-day PHI, and 14-day grazing restriction.
- Texas:** Maximum of two applications per crop growing season, with either aerial, ground, or sprinkler irrigation (chemigation) equipment, at a maximum rate of 0.50 lb. a.i. per acre; 28 day PHI, and 14 day grazing restriction.
- Wyoming:** Maximum of two aerial or ground applications per crop growing season, at a maximum rate of 0.5 lb. a.i. per acre; 21 day PHI and 14 day grazing restriction.

**ACREAGE:**

CO:	500,000 acres
MT:	250,000 acres of wheat 150,000 acres of barley
NE:	100,000 acres
NM:	115,000 acres
TX:	500,000 acres
WY:	217,000 acres

**REQUESTED USE SEASON:**

CO:	March 1 - December 31, 1992
MT:	May 1 - November 1, 1992 (use season past)
NE:	April 15 - November 30, 1992
NM:	February 1 - May 30, 1992 (use season past)
TX:	March 1 - May 31, 1992 (use season past)
WY:	April 15 - December 1, 1992

**EMERGENCY and REGISTERED ALTERNATIVES:** Damage from the Russian Wheat Aphid (RWA) has been observed in the field from emergence in the fall through early grain ripening. Damage symptoms are caused by a toxin that the aphid injects into the plant while feeding which impairs production of chlorophyll. Symptoms in wheat include stunting, purpling, white streaking, tightly rolled leaves, trapped awns, and killed heads. Heavily infested plants appear flattened with spreading crowns and tillers that lie parallel to the ground. Damage usually appears first in the field borders as small round patches. If left untreated, these patches can increase in size and number and may eventually encompass an entire field.

There are four registered insecticides presently labeled for control of the RWA: parathion, methyl parathion, disulfoton, and dimethoate. The mammalian toxicity of the first three is high. On the fourth, dimethoate, mammalian toxicity is moderate. The Applicants also state that the effectiveness of these pesticides is erratic and that dimethoate and parathion are not as effective as they were in the past. Dimethoate also lacks systemic action, particularly in plants stressed by the aphid. Of the four alternatives, disulfoton has been used most often, principally because of the need to control the aphid in the cooler temperatures. However, none of the available alternatives allow grazing, whereas pasturing newly planted winter wheat, and newly harvested wheat fields is a common practice throughout the west.

## **ECONOMICS**

**Colorado:** The Applicant claims that the economic impact of the RWA on wheat in Colorado for 1992 could reach over \$13 million.

**Montana:** The Applicant estimates that, based upon an average loss of 30%, state gross revenues could decline by \$10.5 million.

**Nebraska:** Based on the proposed use area of 100,000 acres requiring treatment for RWA, the Applicant claims that total losses could reach \$545,000 without the use of chlorpyrifos.

**New Mexico:** The Applicant claims that average losses could reach over \$53 per acre, which would translate to losses of over \$7.9 million statewide.

**Texas:** The Applicant claims that with over 1 million acres of wheat infested with the RWA, losses to producers could reach \$57 million.

**Wyoming:** Assuming a loss of 16%, the Applicant claims that estimated losses in revenue could reach nearly \$3.7 million.

## II. BACKGROUND

Chlorpyrifos is currently registered for a variety of uses, including food and non-food crops, domestic (household) uses (indoor and outdoor), aquatic uses, and greenhouse food and non-food uses. Chlorpyrifos is registered on such widely-grown crops as corn, alfalfa, cotton, sorghum, soybeans, peanuts, and various vegetable crops. There are seven tolerances that have been pending for several years. These tolerances are apricots, fruiting vegetables, grapes, lettuce, stone fruits, tomatoes, and wheat.

Previous §18 action regarding this use is summarized in the following table:

	CA	CO	KS	MT	NE	NM	OK	OR	SD	TX	WA	WY
1988: Denied		X										
1989: Granted Withdrawn		X	X	X	X	X	X			X	X	X
1990: Granted Withdrawn	X	X	X	X	X	X	X	X	X	X	X	X
1991: Granted Crisis	X	X		X		X				X		X
1992: Requested Crisis		X X		X X	X X	X X				X X		X X

In 1989 this exemption was requested by 9 states and granted to 8 (Kansas requested but failed to provide sufficient grounds for claiming significant economic loss); in 1990 it was requested by 12 states and granted to 11 (Montana requested, but withdrew due to a concurrent request for esfenvalerate (Asana®) for the same use).

The requests were first granted in 1989 due to the following: (1) the registered alternative of choice, dimethoate, was unavailable in sufficient quantities to meet the demands of users; and (2) an economic emergency would occur with use of the remaining registered alternatives, since none of these allow grazing of treated areas (a common practice in newly planted wheat) and the growers would incur the additional cost of purchasing feed for their cattle.

Subsequent to the issuance of these 1989 exemptions, a telegram was sent to the states which were granted exemptions for this use, advising them that progress toward registration would be a serious consideration in deciding whether future specific exemption requests for this use would be approved. The correspondence also reminded the states of the Agency concerns regarding the high anticipated residue contribution (ARC) to dietary exposure, and the chemical's high toxicity to aquatic organisms. The

telegram concluded by advising the states that the Agency was

"...not inclined to authorize any future exemptions for this use unless you can demonstrate that the magnitude of the emergency is such that it clearly outweighs potential risks to man and the environment. Prior to future submissions, you should address these issues to the fullest extent possible."

In 1990 and 1991, requests for this use were again granted. Although sufficient quantities of the alternative, dimethoate, existed, the Applicants stated that the effectiveness of dimethoate for controlling the RWA was erratic at best, and that it also lacked systemic action, particularly in plants that had already been stressed by the RWA.

In September of 1991, the Agency considered issuing a conditional registration for the use of chlorpyrifos on wheat. However, the Agency decided that, in accordance with the chlorpyrifos Registration Standard, no significant new outdoor uses for chlorpyrifos should be approved until the outstanding ecological data are submitted and evaluated. Furthermore, there are concerns regarding the theoretical dietary exposure, which exceeds the Reference Dose (RfD) for two population subgroups (this is discussed in further detail below).

In February, 1992, a briefing was held for the Director of OPP, to discuss the options available to the Agency for dealing with potential §18 emergency exemption requests for this use for the upcoming growing season. The Agency's Biological and Economic Analysis Division (BEAD) was consulted for input as to further information which could be requested from the states to better evaluate the situation. Additionally, the Agency's Environmental Fate and Effects Division (EFED) was consulted for input regarding environmental risk-reduction measures and restrictions which could be imposed upon the states requesting this use, if authorized, in 1992.

The result of this briefing was a decision that the states who had requested this use in the past should be sent correspondence before they came in with their requests, outlining the recommendations from these two divisions. As per BEAD recommendation, additional information, regarding non-chemical control research and development of resistant grain varieties, was requested, to accompany the requests from the states. The states were also advised of the proposed risk-reduction measures, and asked for comment on their feasibility and implementation. By the time that the correspondence was received by the states, and they had time to review it, the Russian Wheat Aphid season was already beginning. Therefore, after consulting with ERMUS staff, the requesting states found it necessary to declare a crisis for this use, before the details of the proposed risk-reduction measures could be addressed. However, the states did provide additional information, requested as per BEAD recommendations. Further details of these recommendations are discussed below, under "Agency Evaluation".

**REREGISTRATION AND SPECIAL REVIEW CONSIDERATIONS:** Chlorpyrifos is a list "A" chemical. A Registration Standard was issued for chlorpyrifos in September 1984. The standard states that the Agency has determined that it should continue to allow registration of chlorpyrifos. The standard also states that neither chlorpyrifos nor its major metabolite 3,5,6-trichloro-2-pyridinol (TCP) have been shown to be neurotoxic, oncogenic, teratogenic, or mutagenic in studies reviewed at that time. Although chlorpyrifos has been deemed extremely toxic to fish, birds, and other wildlife, and the Agency was concerned about human exposure from dietary and non-dietary sources, the Agency did not initiate a Special Review at that time because sufficient data did not exist to support such action. The standard stated that the most appropriate regulatory action is to move expeditiously to fill data gaps. The toxicology database is complete. The standard defers discussion on endangered species to the "Cluster Approach" which was being developed at that time. The Cluster Approach, which was issued by the Agency under PR Notice 87-5 has since been delayed.

A Second Round Review (SRR) was completed June 1989. The Agency's position concerning new uses as stated in the SRR, is that the Agency will not approve any new outdoor uses for chlorpyrifos that will significantly increase the existing exposure to non-target terrestrial and aquatic organisms. This rationale is based on the potential adverse effects to avian and aquatic species. The comment period closed October 1989. Comments have been received and reviewed. A decision to issue the Re-registration Eligibility Document (RED), has not yet been made. A data-call-in (DCI) was issued in September of 1991.

**PROGRESS TOWARD REGISTRATION:** An application for registration of chlorpyrifos on wheat was first submitted by the Registrant in 1983, and revised in 1986.

In September of 1992, the Registrant submitted a new application for conditional registration of wheat, which greatly limits the use pattern from that originally proposed. It would only allow use in 16 states, and is only for use for the target pests aphids and grasshoppers. Additionally, the maximum rate per application is limited to 0.5 lb.a.i. per acre (originally had proposed 1 lb. a.i. per acre). The proposed labelling also imposes buffer zones for applications near aquatic systems, and the Registrant has submitted extensive data in support of these buffer zones. Buffer zones proposed include 30 ft. for ground application, and various amounts for aerial, depending upon factors such as wind speed and droplet size of the spray. This package is currently undergoing scientific review in the Environmental Fate and Effects Division. The Product Manager has requested an expedited review and hopes to make a decision regarding this application prior to the 1993 use season.

With respect to the tolerance petition for chlorpyrifos on wheat, one issue which needed resolution was the inflated theoretical maximum residue contribution (TMRC) to the dietary exposure (338% of the RfD). Included in the June 1989 SRR was a calculation of the anticipated residue contribution (ARC) from chlorpyrifos. Based upon

the ARC, which takes into account anticipated residues and percent crop treated where possible, the percent of the RfD utilized for chlorpyrifos was estimated at 141%.

In an effort to reduce the ARC for chlorpyrifos, the Registrant, DowElanco, submitted a petition to the Agency proposing to remove TCP, the major metabolite of chlorpyrifos from the tolerance expression for several commodities including meat and milk. The estimated dietary exposure contribution from red meat and milk represents approximately 90% of the total dietary exposure from chlorpyrifos for the overall U.S. population. After review of the petition, the Registrant was informed that the petition was deficient and that additional meat and milk residue data for the direct animal treatment use, reflecting a 3-day pre-slaughter interval, must be submitted.

Rather than submitting meat and milk residue data from the direct animal treatment use, DowElanco decided to cancel the direct animal treatment products. The only animal treatment products for chlorpyrifos that now remain are the ear-tag products for livestock. DowElanco has submitted residue studies for the chlorpyrifos ear-tag products which are being reviewed by the Agency's Chemistry Branch. Currently DowElanco has a submission in review to estimate the number of animals that can be treated with existing stocks of the canceled direct animal treatment products. This estimate will be factored into the Agency's Dietary Risk Exposure System (DRES) analysis.

### III. EPA EVALUATION

**BIOLOGICAL AND ECONOMIC ANALYSIS:** In 1990, the Agency's Biological and Economic Analysis Division (BEAD), reviewed requests for this use and concluded that, given the serious nature of the RWA, and the need for an effective insecticide to forestall resistance to existing systemic pesticides the use of chlorpyrifos is reasonable from both a biological and an economic point of view. Although a number of pesticides are listed for foliar treatment (parathion, methyl parathion, dimethoate, and carbofuran), only the systemic, disulfoton was recommended.

According to data submitted by the requesting states, dimethoate and disulfoton, as well as chlorpyrifos, have shown promise in controlling RWA; other insecticides which have been used in the past (such as parathion and malathion), lack the persistence required to effectively control RWA. However, dimethoate and disulfoton have limitations which make them undesirable for control of RWA. Dimethoate is reported to provide erratic control in the cooler conditions which often prevail when RWA must be controlled, and also imposes a 60-day grazing restriction. Disulfoton is reported to be ineffective when plants are under drought stress, since it is not properly translocated throughout the plant; drought conditions are common in many of the western states. Disulfoton use also precludes grazing. Comparative efficacy tests including dimethoate, disulfoton, and chlorpyrifos, submitted from the requesting states, showed a clear trend for chlorpyrifos to be more effective than dimethoate or disulfoton. However, states



pointed out that dimethoate and disulfoton are still used where conditions permit their effective application, to forestall the development of RWA resistance to chlorpyrifos, and parathion or other short-residual compounds are used when residual activity is not required, (i.e. late in the season).

In preparation for the briefing for the OPP Director, to discuss Agency options for dealing with 1992 §18 requests for this use, BEAD was asked for input as to what additional information could be requested to better evaluate this situation. BEAD suggested that the states be required to submit data on their progress in developing resistant wheat and barley varieties and a biological control program for the RWA. A general description of non-chemical control research and demonstration projects and specific information in the following areas was suggested:

number and types of resistant varieties; expected dates of varietal releases; locations and dates of parasite releases; yield data from fields with and without releases of natural enemies and ability of indigenous or introduced natural enemies to control the RWA.

Additionally, BEAD recommended that an economic threshold of RWA be determined, which could be used as a guideline to trigger treatment with chlorpyrifos under §18. Several of the requesting states had included such threshold levels in past §18 applications.

The states' responses to the request for additional information, and BEAD's evaluation of this information, are summarized below:

State, federal, international, and private organizations are cooperating to develop successful IPM programs for RWA based on non-chemical controls. More than 150 species of natural enemies which attack RWA have been imported from 20 different countries, and introduced into the U.S. Additionally, dozens of native entomophages which attack RWA have been identified. Over the next few years, populations of introduced and native predators and parasitoids will be monitored to determine which combinations (if any) may be useful to control RWA.

One factor which interferes with effective biocontrol is that action (economic) thresholds are so low that insecticides must be applied before populations of entomophages can have substantial impact on RWA infestations. (States which have established economic thresholds typically recommend treatment when 10% of the plants are infested.) This threshold cannot be increased because low infestations of RWA are capable of substantial economic damage on susceptible hosts such as wheat and barley.

If grain varieties can be developed which are moderately tolerant of RWA infestation, control by natural enemies will be much more successful. The first resistant wheat variety is scheduled for release in 1994. It is a variety of hard red winter wheat

adapted to parts of CO, WY, and NE. At least 5 resistant varieties adapted for different temperature/moisture regimes will be required for each type of small grain. Sources of resistance have been identified for all types of small grains, but it is unlikely that other resistant varieties will be released as quickly as the resistant variety of wheat.

Cultural controls can help limit RWA infestations, but they cannot provide adequate control alone. Seeding date studies have shown that later planting in the fall generally results in reduced RWA infestation, but this method is limited by other production factors. Later seeding produces plants with lower winter hardiness and allows growers less time for fall grazing. Controlling volunteer grains which emerge before the planted crop also helps minimize the size of the invading RWA population. Finally, small grain varieties which are well-adapted to local climatic conditions have the greatest tolerance of RWA infestation. In some areas, the relatively unsusceptible triticale has replaced barley grown for animal feed.

In their requests, or in subsequent personal communications, all of the states projected substantial yield losses if available alternatives were used, but data which were provided did not conclusively demonstrate these losses. However, BEAD concluded that the projected yield losses were consistent with submitted information that confirmed that dimethoate and disulfoton were less effective than chlorpyrifos. Additionally, the losses projected by the different states were comparable with one another and with loss projections from past seasons.

BEAD concluded that, according to the yield loss estimations given by the states, their estimated net revenues would be expected to fall outside of their respective historical ranges, and this would constitute a significant economic impact for small grain producers in the requesting states. BEAD also reiterated that if this use is requested again in the future, the states must submit the past five years of complete economic information including: number of acres harvested, yield per acre, target and/or market price per unit, gross revenue per acre, variable cost of production per acre, and the net revenue per acre.

In summary, BEAD concluded that the states requesting this emergency exemption have clearly demonstrated their effort and progress toward non-chemical controls of RWA, and that without the use of chlorpyrifos, RWA would likely cause substantial yield losses in the requesting states.

**RESIDUE CHEMISTRY REVIEW:** The Agency's Chemistry Branch reviewed a similar request last year and concluded that residues of chlorpyrifos, and its metabolite, 3,5,6-trichloro-2-pyridinol (TCP) are not likely to exceed: 0.6 ppm in the grain; 5 ppm in the straw; 3 ppm in the forage; 2 ppm in the milling fractions (except flour); and 0.5 ppm in flour, of wheat and barley, as a result of two applications at a rate of 0.5 lbs. a.i. per acre per growing season. Secondary residues of chlorpyrifos and its metabolite will not exceed currently established tolerances for: meat, fat, and meat by-products of cattle,

goats, horses, sheep, hogs, and poultry (including turkey); eggs; and milk fat. Analytical methodology and a reference standard are available.

Although the Agency's Toxicology Branch has agreed that the chlorpyrifos tolerances should not include the TCP metabolite, the tolerance expressions have not yet been officially changed. Therefore, the levels given above include the TCP metabolite.

**Note:** Craven Laboratories was not involved in the development of data used by the Chemistry Branch to estimate food/feed residues likely to occur as a result of this use.

**TOXICOLOGY AND EXPOSURE ASSESSMENT:** The Agency's Toxicology Branch has previously reviewed similar §18 requests (for other pests), and has indicated that the toxicology data base is complete. The Reference Dose (RfD), based on a 20-day oral cholinesterase inhibition study with a NOEL of 0.03 mg/kg/day, and an uncertainty factor of 10, is calculated to be 0.003 mg/kg body weight/day. Based on a dietary risk assessment, reflecting tolerance revisions to exclude the TCP degradate, and tolerance/residue revisions to exclude the dermal use on cattle, as well as anticipated residues and percent crop treated where possible, the Anticipated Residue Contribution (ARC) for the 3 major population subgroups are as follows:

Population Subgroup	ARC (mg/kg/day)	%Rfd Utilized
Overall U.S. Population	0.001412	47
Non-Nursing Infants	0.003419	114
Children, aged 1-6 years	0.003101	103

However, these changes in tolerance expression have not yet been formally made. Assuming enforcement-level residues, and that 100% of the wheat crop in the U.S. will be treated as per this §18 use pattern, the action will increase the percent of the RfD utilized by approximately 4%.

**ECOLOGICAL EFFECTS AND ENVIRONMENTAL FATE REVIEW:** The Agency's Ecological Effects Branch (EEB) has reviewed this use in the past, and concluded that use of chlorpyrifos on wheat will result in adverse acute and chronic effects to birds, fish, and aquatic invertebrates. Some adverse effects to mammals may occur; however, mortality is unlikely. Additionally, endangered species, including birds, fish, aquatic invertebrates, and insects may be impacted by use of chlorpyrifos on wheat.

In preparation for the briefing for the OPP Director, to discuss Agency options for dealing with 1992 §18 requests for this use, EEB was asked to suggest possible

ecological risk-mitigating measures that may be imposed by the Agency in the future, if §18 use of chlorpyrifos on wheat and small grains were granted.

EEB suggested that the following risk-reduction measures be considered:

- 1 - Limit applications to ground application only (in order to reduce possible exposure of aquatic organisms);
- 2 - Limit rate of application to 0.5 lb. a.i. per acre, and number of applications to one;
- 3 - Restrict timing of applications to mid-July, in order to minimize possible impacts on various species of birds which may be more susceptible at other times due to breeding, nesting, and migratory activities;
- 4 - Require incident and residue monitoring programs, in order to help address both aquatic and terrestrial effects of use of chlorpyrifos on small grains, with specific requirements as set forth by EEB, such as enlisting the aid of scouts from outside of the state agricultural agencies, and including active searches for dead birds and fish;
- 5 - Require a statement on the §18 labeling requiring immediate reporting by phone of all field-kill incidents directly to the Registration Division, as well as follow-up written notification;
- 6 - Disallow use of chlorpyrifos on small grains in bird migration corridors and prairie breeding grounds of migratory birds, in the states of Minnesota, Montana, North Dakota, and South Dakota.

EEB pointed out that while the above-listed precautions will not guarantee substantial reduction of risk, they may help to reduce risk. EEB stressed a strong concern for use of this chemical in migratory flyways, and strongly encouraged caution when sanctioning use of chlorpyrifos in areas of heavy waterfowl usage.

As stated above, by the time that Agency correspondence could be sent to the states outlining the risk-reduction measures, the Russian Wheat Aphid season was already occurring, and the states found it necessary to utilize crisis exemptions for this use. Thus, the details of the proposed risk-reduction measures could not be addressed in time for this year's use season. However, the states were informed that the risk-reduction measures were being considered, and a good deal of feedback regarding the proposed measures was received from the states. In general, the states felt that many of the restrictions would be impractical, given the various circumstances of the RWA situation. Some of the states also expressed concern over the Agency's suggestion that parties other than the agricultural agencies be involved in bird- and fish-kill incident

monitoring programs. These states felt that the Agency was implying that the state agricultural agencies are somehow inadequate to conduct such monitoring.

RD also asked BEAD to comment on the practicality of these measures. A summary of the state feedback, and BEAD comments are given below:

**1 - Limit to ground application only:**

The states feel that this restriction is impractical, for the following reasons:

(1) There are not enough ground rigs available to treat the infested acreages; (2) Due to irrigation or wet weather conditions, the fields are often too muddy to allow application by ground equipment; (3) It would not be possible to cover the area quickly enough to control the infestations; and (4) In some of the states, there are no aquatic habitats in the proposed treatment areas, and so aerial applications would not pose any more of a threat to non-target organisms than ground. BEAD confirmed this opinion, for the above reasons, and also stated that it is estimated that less than 10% of growers currently possess the type of ground application equipment which would be necessary, and so a majority of wheat growers would lose access to the §18 use. BEAD also pointed out that larger wheat growers tend to be more mechanized, and thus a disproportionately larger number of small wheat growers would not have access to chlorpyrifos if this §18 use were limited to ground application.

EEB acknowledged that this risk reduction measure is intended to protect aquatic ecosystems, and suggested that this restriction could be imposed only within  $\frac{1}{4}$  mile of water bodies of concern: natural streams (excludes irrigation canals and ditches), rivers, public lakes and ponds, and any water body containing Federally listed threatened or endangered species.

As stated above, chlorpyrifos is currently being used in the requesting states under the §18 provisions of crisis exemptions, and the timing of the Agency correspondence regarding these restrictions was such that it was impossible to adequately address these risk reduction strategies in time for this year's use season. However, RD staff recommends that the states be informed that this restriction (no application by air within  $\frac{1}{4}$  mile of water bodies of concern) will be imposed if this use is requested in the future. RD further recommends that the states be informed that buffer zones for ground applications around water bodies of concern of 100 ft. will be imposed, for future uses under §18. This is in accordance with ground application buffer zones proposed and currently in use by some of the states, and will provide consistency in buffer zones required. Additionally, the other various application buffer zones around aquatic habitats, for protection of endangered and threatened species, as proposed in the individual state requests, would also continue to be imposed. Some of the requesting states are already imposing buffer zones which meet or exceed the  $\frac{1}{4}$  mile buffer zone for aerial applications. These buffer zones are further described below.

**2 - Limit rate of application to 0.5 lb. a.i. / acre, and number of applications to one:**

As stated above under "Use Pattern", the rate requested by the states is already limited to a maximum of 0.5 lb. a.i. per acre. The states have requested up to 2 applications per season. Since it is costly to apply pesticides, growers will naturally use only one application if possible. However, the states wish to retain the option of a second application, if RWA infestations warrant it. BEAD also confirmed this position, stating that, due to the low profit margin of most small grains, growers cannot justify more than one application of any type of insecticide, and thus limiting this use to one application would not be of particular consequence. RD staff recommends that the proposed use patterns remain as requested, and the economics involved will limit the number of applications. According to the states, due to the cost of pesticide applications, a second application would be made only where deemed absolutely necessary.

**3 - Restrict timing of applications to mid-July:**

The states and BEAD responded that restricting applications of chlorpyrifos to mid-July would prevent virtually all use of chlorpyrifos for the purpose for which it was intended. The primary "season" during which chlorpyrifos and its alternatives are used for RWA control is prior to mid-July. The vast majority of wheat is harvested prior to this time, and prohibiting insecticide use until this time would make applying for an emergency exemption pointless. RD staff recommends that this restriction not be imposed, as it is obviously not feasible.

**4 - Require incident and residue monitoring programs, with specific requirements, such as enlisting the aid of scouts from outside of the state agricultural agencies to conduct such monitoring:**

The states expressed a great deal of concern over this suggestion. Many of the states considered it insulting to the integrity of the state agricultural agencies that EPA should suggest that outside parties be used to help in monitoring activities. The states also pointed out that their agricultural agencies take the responsibility for the enforcement of FIFRA and other state pesticide laws seriously, and discharge these responsibilities in an impartial and fair manner. The state agricultural agencies feel that if they can be trusted to enforce FIFRA, then by the same token they can provide fair and adequate monitoring of §18 use, including incident reporting and residue monitoring. The states also raised the question of the additional cost involved in enlisting and training such aid, and pointed out that their budgetary constraints would prohibit such further expenses.

Unfortunately, this suggestion seemed to alarm and offend many of the state agencies, and was certainly not intended to do so. In the past, the Agency has stated in correspondence authorizing this use that the state agencies are "...required to monitor treated fields for avian mortality." Although the Agency has always stated that it should "...be immediately informed of any adverse effects resulting from..." the use of a chemical under §18, this additional statement regarding avian mortality was intended to encourage the states to put additional effort into monitoring for such effects. Further specifics of such monitoring was left up to the states to determine. In communicating with the states regarding this year's requests, it seemed that most, if not all, of the states were not conducting any monitoring for adverse effects, outside of the minimum which would normally be conducted for a §18 use. This stipulation would require the states to conduct active searches for dead fish and birds, after treatment, and immediately after each runoff (i.e. rainfall) event within 2 weeks of treatment. EEB has suggested that the EPA's "Guidance Document for Conducting Terrestrial Field Studies" (EPA# 540-09-88-109) be consulted for guidance in conducting monitoring for adverse effects to birds. A similar document for monitoring for adverse aquatic effects is not yet available; however, much of the information in the guidance for terrestrial field studies may also be useful in conducting aquatic monitoring.

In suggesting that aid be enlisted from agencies outside of the state agricultural departments, EEB was making a suggestion based on a recognized and logical division of the responsibility within the states. It was not meant to imply that the state agricultural agencies do not care about wildlife, are dishonest, or do not have staff with personal knowledge of fish and wildlife. This suggestion was made on the assumption that the expertise necessary to design and conduct such carcass monitoring (including knowledge of where fish and wildlife occur, and their habits) is usually found within the state fish and game, rather than the agricultural, departments. Such monitoring would be expected to be a cooperative effort between the two state agencies, with the fish and game personnel participating only where their expertise is required. The details of such a cooperative effort would be left up to the individual states.

Another reason for this suggestion, is that in the past when state agricultural agencies have been pressed to do ecological monitoring, many have indicated to EEB that they did not have the necessary expertise. Furthermore, for many of the state agricultural agencies, there is no indication that they have established protocols to perform such carcass monitoring. If such protocols exist, EEB suggests that they be provided to the Agency for review in future requests.

In regard to the residue monitoring, EEB assumes that it is reasonable to expect that this would be within the area of expertise of staff of the state agricultural agencies. Residue monitoring would involve sampling several water bodies adjacent to treated areas according to the following protocol: sampling should begin the day after treatment, and continue on day 3 and day 7, and weekly thereafter for 4 weeks; special sampling should be done the day after any rainfall event resulting in runoff from the

treated area into the sampled body of water.

RD staff recommends that both a bird and fish carcass monitoring, and residue monitoring programs be required of the states if this use is granted in the future. The carcass monitoring should make every attempt to follow guidelines set forth in "Guidance Document for Conducting Terrestrial Field Studies" (EPA# 540-09-88-109). Alternately, if state agricultural agencies have such monitoring protocols already in place, these should be provided to the Agency along with future requests for this use.

- 5 - **Require a statement on the §18 labeling requiring immediate reporting by phone of all field-kill incidents directly to the Registration Division, as well as follow-up written notification:**

The states did not actually object to this restriction; however, several questioned the usefulness of such action. Some of the states felt that this was redundant, since all §18s are granted with the stipulation that any adverse effects resulting from the §18 use must be immediately reported to the Agency. However, the Agency has included this restriction in the past for certain §18s, and RD staff feel that it is prudent to include such a statement, which may, in fact, encourage more immediate response from growers in the field if adverse effects are noted. RD staff recommends that this requirement be imposed if this §18 use is allowed in the future.

- 6 - **Disallow use of chlorpyrifos on small grains in bird migration corridors and prairie breeding grounds of migratory birds, in the states of Minnesota, Montana, North Dakota, and South Dakota:**

Currently the RWA does not occur in Minnesota or North Dakota, so this restriction would not immediately affect these states. South Dakota has requested this use in the past, and although they did not experience infestations warranting this use for the 1992 season, it is possible that SD may again request this use in the future. Montana has requested this use under §18 in the past, and for the 1992 season, so it is the only state which would presently be affected by this restriction. BEAD has commented on this suggestion, pointing out that, based upon RWA dispersal patterns, it is probably only a matter of time before this pest becomes established in North Dakota, and perhaps Minnesota as well. Should RWA expand its range into additional states, it is reasonable to expect that emergency situations similar to those in the requesting states are likely to occur. The use of chlorpyrifos was necessary to prevent severe economic losses in Montana and South Dakota, and it is almost certain that similar requests will be made by these and other states that are, or will be, experiencing RWA outbreaks. Montana has objected to this restriction, stating that such a restriction would virtually eliminate 90% of the grain-growing area of the state from the treatment for RWA. Montana believes that the establishment and enforcement of appropriate buffer zones around aquatic areas would provide adequate protection to nesting waterfowl. Therefore, RD staff feels it appropriate to temper this restriction somewhat, if these states make this



request in the future. RD staff recommends that along with the residue monitoring program proposed above, buffer zone restrictions as set forth in the state applications, and as imposed in the past, be required. Additionally, if this use is requested and granted in the future, applications by air will not be allowed within  $\frac{1}{4}$  mile of water bodies of concern, as described under #1, above. The residue monitoring results should provide information which will help determine whether the buffer zones currently being observed are adequate. Such buffer zones are further elaborated upon in the following paragraphs.

#### **Colorado:**

Two previous Fish and Wildlife biological opinions for the use of Lorsban on alfalfa and soybeans in Colorado indicated jeopardy to sixteen species of endangered/threatened fish. A "may effect" situation in Colorado may be avoided by not allowing use in areas where there is a possibility of run-off or drift entering critical waters. Colorado has stated that its wheat fields are situated far from rivers and streams. However, to reduce possibilities of exposure of aquatic ecosystems, it is recommended that buffer zone restrictions be imposed as has been in the past (100 feet from all established waterways). Furthermore, in order to protect threatened and/or endangered species, Colorado has proposed the following restrictions in their application and has indicated that these restrictions were imposed for this use under crisis notification. Applications may not be made within 1 mile of the Colorado River in Delta and Mesa counties; 1 mile of Horse Creek Reservoir in Otero, Bent, and Kiowa Counties; 1 mile of Upper Queens or Nee Noshe Reservoir in Kiowa County; 1 mile of Cheraw Reservoir in Otero County;  $\frac{1}{4}$  mile by air or 100 yards by ground, of Big Sandy Creek and El Paso Creek in Elbert County;  $\frac{1}{4}$  mile by air or 100 yards by ground, of North Rush Creek and South Rush Creek in Lincoln County; or within  $\frac{1}{4}$  mile by air or 100 yards by ground in Prowers County, Range 46 West, Township 22 South, southwest corner of Section 21.

#### **Montana:**

To protect aquatic organisms as well as threatened and endangered species, Montana has indicated that the following restrictions were imposed in their crisis exemption: Lorsban® will not be applied within 200 feet of all established waterways; and  $\frac{1}{4}$  mile setback from the Missouri River, Milk River, and Fort Peck Reservoir in Valley County. A  $\frac{1}{4}$  mile buffer zone is required from any bald eagle nesting site.

#### **Nebraska:**

Nebraska has indicated that a 100-foot setback from all established waterways (creeks, rivers, ponds, lakes, marshes, reservoirs) both public and private, was imposed in the issuing of their crisis exemption for this use, and is proposed in their specific exemption application as well. In past reviews of this request, EEB has not indicated

that a "may effect" situation will occur with respect to threatened or endangered species in the counties of Nebraska where chlorpyrifos will be applied.

**New Mexico:**

Although there are several endangered/threatened species within the counties of proposed treatment, New Mexico has informed the Agency that wheat fields are not near habitats of these species, or the species are not in the area when application will occur. New Mexico has further informed the Agency that there are no aquatic habitats found within the treatment area, and thus, application buffer zones would not be necessary.

**Texas:**

Because of toxicity to aquatic organisms, the potential exists for a "may effect" situation to occur for certain species in Texas. Therefore, the state has specified those counties in which appropriate buffer zones must be observed. Texas has incorporated additional restrictions in their crisis exemption, as suggested by the USFWS. The USFWS believes that these additional restrictions will minimize jeopardy to the identified endangered and threatened species.

**Wyoming:**

In past reviews of this request, EEB has not indicated that a "may effect" situation will occur with respect to threatened or endangered species in the counties of Wyoming where chlorpyrifos will be applied. However, to reduce the risk of surface water contamination, Wyoming has imposed a 150-foot "setback" (non-treatable zone) around all established waterways.

It should be noted that the registered alternatives are also highly toxic to wildlife. For past requests, EEB compared the avian toxicity of chlorpyrifos with disulfoton, dimethoate, parathion, and methyl parathion. They concluded that parathion (ethyl) is substantially more toxic to birds on an acute oral basis. Furthermore, ethyl parathion is responsible for dozens of known bird kills. The other four pesticides are essentially the same toxicologically. The following table presents the alternatives, the lowest avian acute LD<sub>50</sub> value, and indicates whether bird kills have been reported for each.

<u>Pesticide</u>	<u>Lowest LD<sub>50</sub> (mg/kg)</u>	<u>Bird Kills Reported</u>
Ethyl Parathion	0.125	Many
Dimethoate	5.4	None
Chlorpyrifos	5.62	Two
Disulfoton	6.54	One
Methyl Parathion	6.6	None

States which were issued emergency exemptions for this use in 1990 and 1991 were also instructed to monitor treated areas for associated avian mortality. Of the final reports from 1990 and 1991 exemptions issued for this use, all report that no adverse environmental effects (including avian mortality) were noted or reported.

In spite of deficiencies which still exist in the data base, sufficient information has been submitted to demonstrate that chlorpyrifos is unlikely to leach to groundwater in measurable quantities under most typical use scenarios. Although moderately persistent in the environment, chlorpyrifos is relatively immobile. The TCP degradate, however, appears to be mobile and moderately persistent in soil. The Agency cannot complete evaluation of the environmental fate characteristics of chlorpyrifos until additional studies are submitted and reviewed on chlorpyrifos (to include characterization of its major degradate TCP).

#### **IV. RECOMMENDATION**

I recommend that the specific exemptions for the use of chlorpyrifos to control the Russian Wheat Aphid on wheat in Colorado, Nebraska, and Wyoming be authorized. I recommend that the specific exemptions for the use of chlorpyrifos to control RWA on wheat in New Mexico and Texas, and on wheat and barley in Montana, be withdrawn, as the use season has passed. I further recommend that New Mexico, Texas, and Montana, and other appropriate agencies, be advised of expected maximum residue levels, for enforcement purposes; and that these states be advised of the Agency's findings regarding the emergency situation. This recommendation is based on the following:

1. BEAD concluded that the states requesting this emergency exemption have clearly demonstrated their effort and progress toward non-chemical controls of RWA, and that without the use of chlorpyrifos, RWA would likely cause substantial yield losses in the requesting states. An emergency condition exists in that the registered alternatives do not provide adequate control of the pest.
2. Chemistry has previously reviewed this use pattern on wheat and concluded that residues of chlorpyrifos, and its metabolite, 3,5,6-trichloro-2-pyridinol (TCP) are not likely to exceed 0.6 ppm in the grain, 5 ppm in the straw, and 3 ppm in the forage and 2 ppm in the milling fractions of wheat (except flour, flour would contain 0.1 ppm chlorpyrifos residues) as a result of two applications at a rate of 0.5 lbs. a.i. per acre per growing season. Secondary residues of chlorpyrifos and its metabolite will not exceed currently established tolerances of 2.0 ppm for the meat, fat, and meat by-products of cattle; 1.0 ppm for the meat, fat, and meat by-products of goats, horses, and sheep; 0.5 ppm for the meat, fat, and meat by-products of hogs and poultry (including turkey); 0.1 ppm for eggs; and 0.5 for milk fat, representing 0.02 ppm in whole milk. Analytical methodology and a reference standard are available.

3. HED has previously reviewed this use, and concluded that the toxicology database is complete, and supports this use under §18. Assuming enforcement-level residues, and that 100% of the wheat crop in the U.S. will be treated as per this §18 use pattern, the action will increase the percent of the RfD utilized by approximately 4%.
4. The proposed use should not present a hazard to endangered species. The requesting states have incorporated various buffer zone restrictions to mitigate hazard to endangered and/or threatened species, as well as aquatic organisms. Birds may be killed where chlorpyrifos is used and breeding waterfowl may be indirectly affected through loss of food supply, but direct chronic toxicity is not expected. This use may also result in acute and chronic effects to aquatic invertebrates, and possibly acute effects to fish. The registered alternatives, however, are at least as hazardous or more hazardous to wildlife. Furthermore, the additional requirements for reporting incidents and residue monitoring, if imposed in the future, should help to better define the risk and possible adverse effects. Additionally, the states are currently advised to conduct incident monitoring for bird kills.
5. An application for registration of chlorpyrifos on wheat, and the supporting tolerance petition, were first submitted to the Agency in 1983. This registration has been held up due to dietary exposure concerns (exceeded RfD) and ecological risk concerns, and the Agency's policy that no significant new uses of chlorpyrifos will be registered until these concerns are resolved. The Registrant has made great headway in resolving the dietary exposure concerns, and within the last year submitted a revised application for conditional registration which greatly limits the use of chlorpyrifos, and includes risk-mitigating measures.

I further recommend that the requesting states be advised of the ecological risk-reduction measures as discussed above, that will be imposed if this use is requested and granted again in the future.

Approve: \_\_\_\_\_

Disapprove: \_\_\_\_\_

Date: \_\_\_\_\_