



R.E.D. FACTS

Mepiquat Chloride

Pesticide Reregistration

All pesticides sold or distributed in the United States must be registered by EPA, based on scientific studies showing that they can be used without posing unreasonable risks to people or the environment. Because of advances in scientific knowledge, the law requires that pesticides which were first registered before November 1, 1984, be reregistered to ensure that they meet today's more stringent standards.

In evaluating pesticides for reregistration, EPA obtains and reviews a complete set of studies from pesticide producers, describing the human health and environmental effects of each pesticide. As required by the Food Quality Protection Act (FQPA) of 1996, the review process must consider the potential for increased susceptibility of infants and children to the toxic effects of pesticide residue. In establishing or reassessing tolerances (maximum residue limits in food), FQPA requires the Agency to consider available information on aggregate exposures to pesticide residues, including all anticipated dietary exposures and other exposures for which there is reliable information, as well as the potential for cumulative effects from a pesticide and other compounds with a common mechanism of toxicity. The Agency develops any mitigation measures or regulatory controls needed to effectively reduce each pesticide's risks. EPA then reregisters pesticides that can be used without posing unreasonable risks to human health or the environment.

When a pesticide is eligible for reregistration, EPA explains the basis for its decision in a Reregistration Eligibility Decision (RED) document. This fact sheet summarizes the information in the RED document for reregistration case 2375, mepiquat chloride.

Use Profile

Mepiquat chloride is a plant growth regulator used exclusively on cotton. It is intended to increase yield by inhibiting gibberellic acid synthesis. Registered product formulations include soluble concentrate/liquid (SC/L) and dry flowable (DF) forms. It is applied aerially or using ground boom equipment. Application rates are limited to 0.044 lb/application/acre and seasonally to 0.132 lb/acre. Overuse of mepiquat chloride is likely to overly inhibit plant growth. Other crops must be planted at least 75 days after the last application.

Regulatory History

Mepiquat chloride was first registered as a pesticide in the U.S. in 1980. There are currently nine products registered to three companies. The two subsequent registrants entered the market after the original patent expired. The April 1991 and January 1994 Data Call-Ins (DCIs) required additional human health, ecotoxicity, and environmental fate data. In October 1995, a DCI covering agricultural workers was issued covering about 200 chemicals, including mepiquat chloride.

Human Health Assessment

Toxicity

In studies using laboratory animals, mepiquat chloride generally has been shown to be of low acute toxicity. Although it is moderately toxic by the oral route and has been placed in Toxicity Category II (moderately toxic) for this effect, for all other acute effects it was either slightly toxic or practically non-toxic. Testing indicated that mepiquat chloride is of low chronic toxicity and that it is negative for mutagenic effects.

Dietary Exposure

People may be exposed to residues of mepiquat chloride through the diet. Tolerances have been established for cottonseed, cotton forage, and for animal commodities including milk and eggs, and the fat, meat and meat byproducts of cattle, hog, poultry, sheep, goat and horse byproducts (please see 40 CFR §180.384). EPA has reassessed the mepiquat chloride tolerances and found that all of those except for milk, eggs, and poultry fat, meat and meat byproducts are acceptable. The established tolerances for milk, eggs, and poultry fat, meat and meat byproducts must be revoked because no significant residues are expected in these commodities. A new tolerance must be proposed for cotton gin byproducts. The established tolerance for cottonseed meal (please see 40 CFR §186.2275(a)) is proposed for revocation. Residues in this commodity will be covered by the existing cottonseed tolerance.

EPA has assessed the dietary risk posed by mepiquat chloride. The Theoretical Maximum Residue Contribution (TRMC) for the overall U.S. population represents less than 1% of the Reference Dose (RfD), or amount believed not to cause adverse effects if consumed daily over a 70-year lifetime. This assessment also applies to non-nursing infants less than one year old, as well as all other potentially exposed subgroups. This low fraction of the allowable RfD is considered to be an acceptable dietary exposure risk.

Occupational and Residential Exposure

Exposure to homeowners is not expected since there are no residential uses. Based on current use patterns, handlers (mixers, loaders, and applicators) may be exposed to mepiquat chloride during and after normal agricultural use. Both ground and aerial application methods were considered. Since all dermal and inhalation Margins of Exposure (MOEs) were greater than 10,000, greatly exceeding the action level of 100, the

Agency did not identify any effects for which there was concern. Therefore, the personal protective equipment (PPE) required for early entry is the minimum PPE required under the Worker Protection Standard (WPS): coveralls, chemical resistant gloves, socks and shoes.

Human Risk Assessment

Mepiquat chloride generally is of low acute toxicity and has been classified in Group E (no evidence of carcinogenicity for humans). Although mepiquat chloride is registered for feed uses, dietary exposure to mepiquat chloride residues in foods is extremely low, as is the cancer risk posed to the general population.

Also of low concern is the risk posed to mepiquat chloride handlers, consisting of mixers/loaders/applicators, and field workers who come into contact with treated foliage following application of this pesticide. Exposure and risk to workers was estimated to be low based on the chemical's low toxicity and low usage rate. The Re-entry Interval (REI) is currently the minimum set by the WPS of 12 hours with minimal early-entry PPE. Registrants wishing to apply for a 4-hour REI may do so by satisfying the associated epidemiological and end-use product toxicity data requirements.

Food Quality Protection Act Considerations

The FQPA of 1996 amended the FFDCFA by setting a new safety standard for the establishment of tolerances and directs EPA to consider available information concerning the susceptibility of infants and children to pesticide residues in food. Based on the review of available data and the absence of incident or epidemiological data for mepiquat chloride, an additional safety factor for the protection of infants and children is not necessary. The Act also requires EPA to consider aggregate exposure to the pesticide residue, including all anticipated dietary exposure and other exposures for which there is reliable information, as well as cumulative effects from the pesticide and other substances that have a common mechanism of toxicity. For mepiquat chloride, aggregate exposure risks are not considered significant since it has not been found in drinking water and non-dietary exposures are not expected. In assessing the potential risk from cumulative effects of mepiquat chloride with other pesticides and substances, only difenzoquat appears to have a common mode/mechanism of toxicity, namely similar neurotoxic effects. The Agency has concluded that the cumulative effects from the combined dietary exposure to mepiquat chloride and difenzoquat would be virtually nil. Based on these conclusions, the Agency considers the tolerances in the RED to be reassessed with regard to FQPA requirements.

Environmental Assessment

Environmental Fate

Mepiquat chloride is stable to hydrolysis and photolysis. Soil and aqueous photolysis are not routes of dissipation. Under aerobic conditions,

mepiquat chloride appears to degrade rapidly to CO₂. Under anaerobic conditions, it appears stable. Based on study results, mepiquat chloride is considered to be relatively non-mobile, and is not expected to accumulate in fish. Since the other metabolites also degrade rapidly to CO₂, parent mepiquat chloride is the only residue of concern. There have been no mepiquat chloride detections reported in monitoring wells and it is considered to have limited potential for groundwater contamination. Although there is potential for contamination of surface water because of the low usage rate and its rapid degradation, significant surface water migration is not expected.

Ecological Effects

Mepiquat chloride is practically non-toxic to birds on an acute oral and subacute dietary basis. Mepiquat chloride is moderately toxic to small mammals at high concentrations. It is practically non-toxic to honey bees on an acute contact basis and to freshwater, estuarine and marine fish and aquatic invertebrates on an acute basis. Adverse chronic effects to aquatic organisms are also not expected. Mepiquat chloride is slightly to practically nontoxic to estuarine and marine invertebrates on an acute basis, and chronic effects are not expected. The Agency does not expect significant effects on nontarget terrestrial plant seedling emergence, vegetative vigor, or nontarget aquatic plant toxicity.

Ecological Effects Risk Assessment

Based on the overall low toxicity of mepiquat chloride, its low usage rate, and its rapid aerobic degradation, no risks to animals or non-target plants or endangered species were identified.

Risk Mitigation

The Agency is requiring that all end use product labeling be amended consistent with the basic producer labels including entry restrictions, application restrictions, and user safety requirements and recommendations. Also in conjunction with the Agency's efforts to develop the best spray drift management practices, the Agency is requiring interim measures that must be placed on product label/labeling as specified in the RED.

Additional Data Required

EPA has required field residue data for cotton gin byproducts and a tolerance must be proposed for this commodity when adequate data have been submitted and evaluated. Although a replacement rabbit teratogenicity study must still be submitted, the generic data base supporting the reregistration of mepiquat chloride is substantially complete.

The Agency is requiring product-specific data including product chemistry and acute toxicity studies, revised Confidential Statements of Formula (CSFs), and revised labeling for reregistration.

Product Labeling Changes Required

All mepiquat chloride end-use products must comply with EPA's current pesticide product labeling requirements and the following requirements.

Labeling Requirements for Manufacturing-Use Products

To remain in compliance with FIFRA, manufacturing use product (MP) labeling must be revised to comply with all current EPA regulations, PR Notices and applicable policies. The MP labeling must bear the following statement under Directions for Use:

"Only for formulation into an [fill blank with Insecticide, Herbicide or the applicable term which describes the type of pesticide use(s)] for the following use(s) [fill blank only with those uses that are being supported by MP registrant."

An MP registrant may, at his/her discretion, add one of the following statements to an MP label under "Directions for Use" to permit the reformulation of the product for a specific use or all additional uses supported by a formulator or user group:

"This product may be used to formulate products for specific use(s) not listed on the MP label if the formulator, user group, or grower has complied with U.S. EPA submission requirements regarding support of such use(s)."

"This product may be used to formulate products for any additional use(s) not listed on the MP label if the formulator, user group, or grower has complied with U.S. EPA submission requirements regarding support of such use(s)."

Labeling Requirements for End-Use Products

When end-use product DCIs are developed (e.g., at issuance of the RED), the Agency will require that all end-use product labels (e.g., MAI labels, SLNs, and products subject to the generic data exemption) be amended such that they are consistent with the basic producer labels.

PPE/Engineering Control Requirements for Pesticide Handlers:

For sole-active-ingredient end-use products that contain mepiquat chloride, the handler personal protective equipment requirements set forth in the RED must be incorporated on all mepiquat chloride product labels. Any conflicting PPE requirements on current labeling must be removed. There are currently no multiple-active-ingredient end-use products that contain mepiquat chloride.

Actual End-use Product PPE Requirements: PPE for handlers is to be established based on the acute toxicity of each end-use product, using the instructions in PR Notice 93-7. The personal protective equipment must be

placed on the end-use product labeling in the location specified in PR Notice 93-7 and the format and language of the PPE requirements must be the same as is specified in that PR Notice.

a. Entry Restrictions

For sole-active-ingredient end-use products that contain mepiquat chloride, product labels must be revised to adopt the entry restrictions set forth in this section. Any conflicting entry restrictions on current labeling must be removed. There are currently no multiple-active-ingredient end-use products that contain mepiquat chloride.

The REI and early-entry PPE must be inserted into the standardized REI and early-entry PPE statements required by Supplement Three of PR Notice 93-7.

Restricted-entry interval: A 12-hour restricted entry interval (REI) is required for uses within the scope of the WPS (see tests in PR Notices 93-7 and 93-11) on all end-use products.

Early-entry personal protective equipment (PPE): The PPE required for early entry is:

- coveralls,
- chemical-resistant gloves, and
- shoes plus socks.

Other Label Requirements

The Agency is requiring the following labeling statements to be located on all end-use products containing mepiquat chloride:

i. Application Restrictions

"Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application."

"Do not plant another crop within 75 days after last treatment."

ii. User Safety Requirements

"Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry."

iii. User Safety Recommendations

"Users should wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet."

"Users should remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing."

"Users should remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing."

iv. Spray Drift Labeling

The following language must be placed on the label each product that can be applied aerially:

"Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment-and-weather-related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions."

The following drift management requirements must be followed to avoid off-target drift movement from aerial applications to agricultural field crops. These requirements do not apply to forestry applications, public health uses or to applications using dry formulations.

- The distance of the outer most nozzles on the boom must not exceed 3/4 the length of the wingspan or rotor.

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- Nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees.

Where states have more stringent regulations, they should be observed.

The applicator should be familiar with and take into account the information covered in the Aerial Drift Reduction Advisory Information.

The following aerial drift reduction advisory information must be contained in the product labeling:

[This section is advisory in nature and does not supersede the mandatory label requirements.]

INFORMATION ON DROPLET SIZE: The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see Wind, Temperature and Humidity, and Temperature Inversions).

CONTROLLING DROPLET SIZE:

- Volume - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- Pressure - Do not exceed the nozzle manufacturer's recommended pressures. For many nozzle types lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- Number of nozzles - Use the minimum number of nozzles that provide uniform coverage.
- Nozzle Orientation - Orienting nozzles so that the spray is released parallel to the airstream produces larger droplets than

other orientations and is the recommended practice. Significant deflection from horizontal will reduce droplet size and increase drift potential.

- **Nozzle Type** - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift.

BOOM LENGTH: For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.

APPLICATION HEIGHT: Applications should not be made at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces exposure of droplets to evaporation and wind.

SWATH ADJUSTMENT: When applications are made with a crosswind, the swath will be displaced downward. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distance should increase, with increasing drift potential (higher wind, smaller drops, etc.)

WIND: Drift potential is lowest between wind speeds of 2-10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given speed. Application should be avoided below 2 mph due to variable wind direction and high inversion potential. **NOTE:** Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

TEMPERATURE AND HUMIDITY: When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

TEMPERATURE INVERSIONS: Applications should not occur during a temperature inversion because drift potential is

high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

SENSITIVE AREAS: The pesticide should only be applied when the potential for drift to adjacent sensitive areas (e.g. residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g. when wind is blowing away from the sensitive areas).

Regulatory Conclusion

The use of currently registered products containing mepiquat chloride in accordance with approved labeling will not pose unreasonable risks or adverse effects to humans or the environment. Therefore, all uses of these products are eligible for reregistration.

Mepiquat chloride products will be reregistered once the required product-specific data, revised Confidential Statements of Formula, and revised labeling are received and accepted by EPA.

For More Information

EPA is requesting public comments on the Reregistration Eligibility Decision (RED) document for mepiquat chloride during a 60-day time period, as announced in a Notice of Availability published in the Federal Register. To obtain a copy of the RED document or to submit written comments, please contact the Pesticide Docket, Public Response and Program Resources Branch, Field Operations Division (7506C), Office of Pesticide Programs (OPP), US EPA, Washington, DC 20460, telephone 703-305-5805.

Electronic copies of the RED and this fact sheet can be downloaded from the Pesticide Special Review and Reregistration Information System at 703-308-7224. They also are available on the Internet using ftp on *FTP.EPA.GOV*, or using WWW (World Wide Web) on *WWW.EPA.GOV*.

Printed copies of the RED and fact sheet can be obtained from EPA's National Center for Environmental Publications and Information (EPA/NCEPI), PO Box 42419, Cincinnati, OH 45242-0419, telephone 513-489-8190, fax 513-489-8695.

Following the comment period, the mepiquat chloride RED document also will be available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161, telephone 703-487-4650.

For more information about EPA's pesticide reregistration program, the mepiquat chloride RED, or reregistration of individual products containing mepiquat chloride, please contact the Special Review and Reregistration Division (7508W), OPP, US EPA, Washington, DC 20460, telephone 703-308-8000.

For information about the health effects of pesticides, or for assistance in recognizing and managing pesticide poisoning symptoms, please contact the National Pesticides Telecommunications Network (NPTN). Call toll-free 1-800-858-7378, between 9:30 am and 7:30 pm Eastern Standard Time, Monday through Friday.

