

US EPA ARCHIVE DOCUMENT

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SHAUGHNESSEY NO.

21
REVIEW NO.

EEB BRANCH REVIEW

DATE: IN 2/5/85 OUT 3/28/85

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PETITION OR EXP. PERMIT NO. 5F3188
DATE OF SUBMISSION 11/21/84
DATE RECEIVED BY HED 1/29/85
RD REQUESTED COMPLETION DATE 4/9/85
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RD ACTION CODE/TYPE OF REVIEW 335/Amendment

TYPE PRODUCT(S): I, D, H, F, N, R, S Herbicide

DATA ACCESSION NO(S). _____

PRODUCT MANAGER NO. R. Taylor (25)

PRODUCT NAME(S) Paraquat

COMPANY NAME Chevron Chemical Company

SUBMISSION PURPOSE Proposed Registration of Rice Use

SHAUGHNESSEY NO. _____ CHEMICAL, & FORMULATION _____ 8 A.I. _____

ECOLOGICAL EFFECTS BRANCH REVIEW

Paraquat CL

100 Submission Purpose and Label Information

To add rice preplant or preemergence for kill of emerged annual broadleaf weeds and grasses and for top kill and suppression of perennials prior to flooding (California only).

1-2 qts. per sprayed acre (0.5 to 1.0 lb ai/A).

Aerial application - 5 to 10 gals. water per acre.*

Ground application - Use 20-60 gals. diluted spray per acre.*

*Add ORTHO X-77 SPREADER (Non-ionic) at 8.0 oz. per 100 gallons of dilute spray.

Apply when the weeds and grasses are succulent and growth is from 1" to 6" high. Apply prior to flooding rice.

101 Hazard Assessment

Paraquat is a nonselective contact herbicide and dessicant which rapidly (within hours) kills all green plant growth to which it is applied. It was registered for use in this country in the 1960's by the U.S. Department of Agriculture, EPA's predecessor in pesticide regulation.

Registered uses for paraquat include:

- preemergence weed control in various vegetable crops
- noncrop weed control
- weed control in orchards and vineyards
- weed control in reduced tillage operations
- harvest aid for soybeans, sugarcane, sunflowers, and cotton

All formulations but one (0.276% pressurized liquids for home use) are classified restricted.

Paraquat is applied to fallow rice fields already under current noncrop weed control registration.

Based on environmental fate data available to us at the present time, paraquat can be classified as a persistent pesticide because it binds rapidly and completely to soil clay minerals and to a lesser extent with soil organic matter; in its bound state in soil it is not readily subjected to photochemical, microbial, or chemical degradation and it is not readily metabolized by plants.

The primary mechanism by which paraquat becomes unavailable is adsorption to soil containing expanding clay minerals such as montmorillonite. Biological and chemical degradation do not contribute appreciably to its dissipation. The adsorption of paraquat to soil is highly dependent upon the type of clay mineral present.

Paraquat adsorbed to soils high in montmorillonite clay content may be deposited as sediment in ponds, lakes and streams following sheet erosion from treated areas. Paraquat may persist in bottom sediments for considerable periods of time. At present, the data available are not sufficient to demonstrate that paraquat will not desorb from sediment after prolonged exposure in the aquatic environment and thereby present a potential hazard to aquatic organisms. Additionally, information should be obtained on the possible translocation of paraquat from bottom sediments by rooted aquatic plants.

Bioaccumulation of paraquat, per se, does not appear to represent a problem. Low residues were found in fish and shellfish tissues. Anodonta had a maximum bioaccumulation ratio of about 3X.

There are two concerns EEB has with Paraquat. First, although acute toxicity is of concern to terrestrial wildlife, we are more concerned with the subacute effects. There is evidence that contact, particularly with freshly sprayed foliage, causes severe lingual necroses in certain mammals and a subsequent inability or unwillingness to eat. The stomachs of some dead animals were found to be empty. Several incidents in Britain and France following the spraying of paraquat on a variety of sites (mostly grasses) have been recorded. Paraquat residues were detected in gut and urine samples. Second, there is evidence to show that following direct application paraquat can cause a reduction in avian egg hatchability.

Believing that only certain sites of application represent potentially serious exposure opportunities, the Agency evaluated the registered uses of paraquat during 1980 to 1982.

Certain noncrop sites (rights-of-way, including highways, dividers and medians, railroads, and electric utility) and one pasture site (east of the Cascade and Sierra Nevada Mountains and west of the Rocky Mountains) presented the potential for significant wildlife exposure. The Agency and the registrant agreed that voluntary cancellation of those sites would reduce the risk to wildlife, and they have been deleted from paraquat labels.

Paraquat would not normally be expected to present a hazard to fish at expected rates up to 1.0 lb ai/A. Available acute toxicity data demonstrate that paraquat is slightly toxic to certain species of fish. This is based on a 96-hour LC₅₀ of 13 (8.5-19) ppm using the 29.1% paraquat dichloride. Initial exposure of fish to paraquat, based on direct application to water 6 inches deep at a maximum rate of 1.0 lb ai/A, would be expected to approximate 0.734 ppm. This results in at least a 2-fold margin of safety (based on 1/10 the LC₅₀).

Paraquat is moderately toxic to freshwater invertebrates. The Daphnia 48-hour LC₅₀ of 1.2 ppm (92.3% paraquat) and 4.0 ppm (29% paraquat) indicates that initial expected residues up to 0.734 ppm would be within the restrictive classification range for certain aquatic invertebrates.

Treatment of ponds has resulted in some acute toxicity to aquatic organisms (in some instances probably resulting from deoxygenation of the water), but the studies were not good enough to adequately determine the effects.

Use of rice fields by air-breathing animals is expected to be minimal at the time paraquat is to be applied, prior to flooding. Regarding aquatic organisms, paraquat will be bound-up in soil and will not be bio-available upon flooding. Subsequent off-target movement should be minimal and below acute action levels.

103. Conclusions

The use of paraquat pre-flood to rice in California only, will not pose any significant additional adverse effects to nontarget organisms.

Unless it can be shown that information on persistence and desorption of paraquat in California soils obviate the need, chronic fish and invertebrate studies should be provided for the Paraquat Registration Standard.

Estuarine and marine organism testing is usually required for rice use. However, since use is intended for California only, and the immediate rice drainage areas are freshwater, these data are not required. In the event paraquat is registered for rice in other states, estuarine/marine organism testing may be needed.

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4/2/85

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061601
Shaughnessey Number

Initiated: April 2, 1985
by R.R. Stevens

EEB Chemical Profile

Paraquat

100 Fish and Wildlife Toxicology

100.1 Minimum Requirements

100.1.1 Avian Acute Oral LD50

<u>Species</u>	<u>Test Material</u>	<u>Results</u> (mg/kg)	<u>Category</u>	<u>Reference</u>
Bobwhite	93.3%	176 (144-213)	Deferred	Beavers, 1979
Mallard	24%	199 (144-276)	Supplemental	Hudson, et al. (1979)
		6001 (424-848)	Supplemental	Ibid

1 acute percutaneous LD50

100.1.2 Avian Dietary LC50

<u>Species</u>	<u>Test Material</u>	^{sol} <u>Results</u> (ppm)	<u>Category</u>	<u>Reference</u>
Bobwhite	29.1	981 (784-1213)	Core	Heath, et al. 1975
Mallard	29.1	4048 (3432-4886)	Core	Ibid

100.1.3 Fish Acute LC50

<u>Species</u>	<u>Test Material</u>	<u>Results</u> (ppm)	<u>Category</u>	<u>Reference</u>
Channel catfish	42%	>100	Supp	Johnson and Finley, 1980
Bluegill	29%	13 (8.5-19)	Supp	Ibid
Rainbow	29%	15 (11-19)	Supp	Ibid

100.1.4 Aquatic Invertebrate LC50

<u>Species</u>	<u>Test Material</u>	<u>Results (ppm)</u>	<u>Category</u>	<u>Reference</u>
Daphnid	29%	4.0 (2.7-6.0)	Supp	Johnson and Finley, 1980
Daphnid	92.3%	1.2 (0.67-2.2)	Deferred	Chevron Chemical Co., 1978

Wildlife and Aquatic Organism Data Requirements 158.145 EPA Reg. No. 239-2460
 Product: ORTHO Paraquat Concentrate 3
 Date Submitted to EPA: 09/21/84

Guideline Ref. No.	Data Requirement	Test Substance	DATA CITATION			Data Status
			Title and Accession Number	Submitter	Submission Date	

Avian & Mammalian Testing

71-1 Avian oral LD50 PAI* Acute Oral LD50-Bobwhite Quail, Paraquat Dichloride Technical Salt. Wildlife International 10/8/78. S-1543. 241819, Chevron Chemical Company 2/06/80

Ep** Acute Oral and Percutaneous Toxicity of Pesticides to Mallards: Correlations with Mammalian Toxicity Data Hudson, R.M., et al. Toxicol. Appl. Pharmacol. 47:451-460 (1979), 252083 Chevron Chemical Company 12/05/83

71-2 Avian dietary LC50 EP** Comparative Dietary Toxicities of Pesticides to Birds. Heath, R.G., et al. USDI. Wildlife Np. 152. 2/72. 232724. Chevron Chemical Company 12/13/77

71-3 Wild mammal toxicity - - - - - Not Required 158.145 (Footnote 2)

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			Title and Accession Number	Submitter		
71-4	Avian reproduction	TGAI	Assessment of Diet Homogeneity/Stability in Gamebird Breeder Ration. Paraquat Technical (SX-1305). Final Report. S-1951. Wildlife International. October 7, 1981. 248133.	Chevron Chemical Company	8/06/82	-
		TGAI	Addendum to above study entitled "Assessment of Diet Homogeneity and Stability of Paraquat Technical (SX-1305) in Gamebird Ration." Chevron Chemical Company. 8/24/81. S-1951. 248133.	Chevron Chemical Company	8/06/82	-
		TGAI	Subacute Feeding-Reproduction Screening Bioassay. Bobwhite Quail. Paraquat Technical (SX-1305). Final Report. Wildlife International. 10/30/81. S-1994. 248133.	Chevron Chemical Company	8/06/82	-
		TGAI	Addendum to above study entitled "Addendum to Subacute Pilot Feeding Study in Bobwhite Quail with Paraquat Technical (SX-1305), Chevron Chemical Company. 6/2/82. S-1994. 248133.	Chevron Chemical Company	8/06/82	-

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Wildlife and Aquatic Organism Data Requirements 158.145

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Guideline Ref. No.	Data Requirement	Test Substance	Title and Accession Number	Submitter	Submission Date	Data Status
	Avian reproduction (Continued)	TGAI	One-Generation Reproduction-Bobwhite Quail. Parquat Technical (SX-1305). Final Report. Wildlife International. 7/27/82. 248133.	Chevron Chemical Company	8/06/82	-
		TGAI	Addendum to above report entitled "Addendum to One-Generation Reproduction Study in Bobwhite Quail with Parquat Technical (SX-1305)." Chevron Chemical Company. 6/16/82. S-2071. 248133.	Chevron Chemical Company	8/06/83	-
		TGAI	One-Generation Reproduction-Mallard Duck. Parquat Technical (SX-1305). Final Report. Wildlife International. 7/27/82. 248133.	Chevron Chemical Company	8/06/82	-
		TGAI	Addendum to above report entitled "Addendum to One-Generation Reproduction Study in Mallard Ducks with Parquat Technical (SX-1305)." Chevron Chemical Company. 6/25/82. S-2072. 248133.	Chevron Chemical Company	8/06/82	-
71-5	Simulated & actual field testing - mammals and birds	-	-	-	-	Not Required 158.145 (Footnote 2)

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Wildlife and Aquatic Organism Data Requirements 158.145 EPA Reg. No. 239-2460
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Aquatic Organism Testing

72-1	Freshwater fish LC50	TGAI	Handbook of Acute Toxicity of Chemicals to Fish and Aquatic Invertebrates. W.W.Johnson and M.T.Finley. USDI. FWS. Resource Publication 137 (1980), 252083	Chevron Chemical Company	12/05/83	-
		Ep**	Diquat and Paraquat: Residues in Water and Toxicity to Fish and Other Aquatic Fauna. ICI Report No. PP/E/303. 10/64. 090542.	Chevron Chemical Company	4/04/66	-
		Ep**	Fish Toxicity Studies. Wisconsin, Louisiana, Alabama. Chevron Chemical Company. 090542.	Chevron Chemical Company	4/04/66	-
		Not Specified	Butler, P.A. (1965). Commercial Fishery Investigations: In Effects of Pesticides, on Fish and Wildlife, 1964 Research Findings of the Fish and Wildlife Service. U.S. Fish Wildlife Service Circular 225, pp. 65-77. 098334.	Chevron Chemical Company	6/08/79	-

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Guideline Ref. No.	Data Requirement	Test Substance	DATA CITATION		Submission Date	Data Status	
			Accession Number	Title and Submitter			
72-1	Freshwater fish LC50 (Continued)	Not specified		Davis, J.T. and J.S. Hughes (1963). Further observations on the toxicity of Commercial Herbicides to Bluegill Sunfish. Proc. Southern Weed Conf. 16:337-340. 098334.	Chevron Chemical Company	6/08/79	
		TGAI		J.M. Lawrence, H.H. Funderburk, R.D. Blackburn and P.G. Beasley (1965). The Status of Diquat and Paraquat as Aquatic Herbicides. Proc. 16th Ann. Conf., Southeast Assoc. Game Fish Comm., Charleston, So. Carolina, pp. 247-257. 098334.	Chevron Chemical Company	6/08/79	
		Ep**		Sanders, H.O. Pesticide Toxicities to Tadpoles of the Western Chorus Frog <i>Pseudacris triseriata</i> and Fowler's Toad <i>Bufo woodhousii</i> Fowleri. Copeia 2:246-251 (1970). 098334.	Chevron Chemical Company	6/08/79	
72-2	Acute LC50 freshwater invertebrates	PAI*		"48-Hour Acute Aquatic Toxicity of Paraquat Dichloride (SC-957) to First Stage Nymph Water Fleas (<i>Daphnia magna</i> Straus)." Chevron Chemical Company. 8/25/78. S-1220. 235419.	Chevron Chemical Company	9/12/78	

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Wildlife and Aquatic Organism Data Requirements 158.145

Guideline Ref. No.	Data Requirement	Test Substance	DATA CITATION		Submission Date	Data Status
			Title and Accession Number	Submitter		
72-2	Acute LC50 freshwater invertebrates (Continued)	TGAI	Crosby, D.G. and Tucker, R.K. (1966). Toxicity of Aquatic Herbicides to <u>Daphnia magna</u> . Science 54:289-291. 098334.	Chevron Chemical Company	6/08/79	-
		Not Specified	Sanders, H.O. and Cope, O.B. (1966). Toxicities of Several Pesticides to Two Species of Cladocerans. Trans. Amer. Fish Soc. 95:165-169. 098334.	Chevron Chemical Company	6/08/79	-
		Not Specified	H.O. Sanders (January 1969). Toxicity of Pesticides to the Crustacean <u>Gammarus lacustris</u> . Technical Paper No. 25. Bureau of Fisheries and Wildlife, U.S. Department of Interior, Washington, D.C., 098334.	Chevron Chemical Company	6/08/79	-
		Ep**	Moss, J.I. (1978). Toxicity of Selected Chemicals to the Fairy Shrimp, <u>Streptocephalus seali</u> , under Laboratory and Field Conditions. Progressive Fish Culturist 40(4):158-160. 098334.	Chevron Chemical Company	6/08/79	-

Wildlife and Aquatic Organism Data Requirements 158.145

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Guideline Ref. No.	Data Requirement	Test Substance	DATA CITATION			Submission Date	Data Status
			Title and Accession Number	Submitter			
72-2	Acute LC50 freshwater invertebrates (Continued)	EP**	Sanders, H.O. and Cope, O.B. (1968). The Relative Toxicities of Several Pesticides to Naiads of Three Species of Stoneflies. Limnol. Oceanogr. 13(1):112-117. 098334.	Chevron Chemical Company		6/08/79	Not Required 158.145 (Footnote 4, 5)
72-3	Acute LC50 estuarine & marine organisms	-					Not Required 158.145 (Footnote 6)
72-4	Fish early life stage & Aquatic invertebrate	-					Not Required (158.145) (Footnote 5)
72-5	Fish: Life-cycle	-					Not Required 158.145 (Footnote 6)
72-6	Aquatic organism	PAIRA	Kinetics of 14C-Paraquat in a Model Aquatic Ecosystem. Bio-nomics. 2/74. 091760, 180002.	Chevron Chemical Company		10/08/74	Not Required 158.145 (Footnote 2)

Wildlife and Aquatic Organism Data Requirements 158.145

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			Title and Accession Number	Submitter	Submission Date	
72-7	Simulated or actual field testing aquatic organisms	-	-	-	-	Not Required 158.145 (Footnote 8)

** The EP (PARAQUAT CL) contains 21.08% cation. The EP is prepared by [redacted] Therefore, the toxicology data developed with the EP are adequate to support registration at the MP.

*** The PAI is 100% Paraquat dichloride salt. It is prepared [redacted] at concentrations equivalent to the MP/TGAI, is similar to the MP/TGAI. Therefore, the toxicology data developed with the PAI are adequate to support registration of the MP.

MANUFACTURING PROCESS INFORMATION IS NOT INCLUDED

Montarget Insect Data Requirements 158.155

EPA Reg. No. 239-2460
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			Title and Accession Number	Submitter	Submission Date	
<u>Montarget insect testing</u>						
<u>aquatic insects</u>						
141-1	Honey bee acute contact LD50	EP*	Toxicity of Pesticides and Other Agricultural Chemicals to Honey Bees. Laboratory Studies. E.L. Atkins, et al. UC. Ag. Exten. 9/73, 252084	Chevron Chemical Company	12/05/83	-
		EP*	Protecting Honey Bees from Pesticides. Atkins, E.L. et al. U. of Cal. Division of Ag. Sci. Leaflet 2883. 9/77, 252084	Chevron Chemical Company	12/05/83	-
		EP*	Effect of Pesticides on Apiculture. Atkins, E.L., et al. from 1971 Annual Report, Dept. of Entomology, University of California, Riverside. 093671.	Chevron Chemical Company	4/25/73	-
		EP*	Toxicity of Some Herbicidal Sprays to Honey Bees. Moffett, J.O. et al. J. Econ. Entomol. 65:32-36 (1972), 252084	Chevron Chemical Company	12/05/83	-

141-2 Honey bee - toxicity of residues on foliage

Not Required
 158.155
 (Footnotes 1, 2)

Montarget Insect Data Requirements 158.155

EPA Reg. No. 239-2460
 Product: ORTHO Parquat
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Guideline Ref. No.	Data Requirement	Test Substance	DATA CITATION			Data Status
			Accession Number	Title and	Submission Date	
141-3	Wild bees important in alfalfa pollination - toxicity of residues on foliage	-	-	-	-	Not Required 158.155 (Footnote 3)
141-4	Honey bee subacute feeding study (reserved)	-	-	-	-	Not Required 158.155 (Reserved)
141-5	Field testing for pollinators	-	-	-	-	Not Required 158.155 (Footnote 4)
<u>Montarget insect testing aquatic insects</u>						
141-2	Acute toxicity to aquatic insects (reserved)	-	-	-	-	Not Required 158.155 (Reserved)
				Sanders, M.O. and Cope, O.B. (1968). The Relative Toxicities of Several Pesticides to Naiads of Three Species of Stoneflies. Limnol. Oceanogr. 13:112-117. 098334.	6/08/79	Not Required 158.155 (Reserved)
142-1	Aquatic insect life-cycle study (reserved)	-	-	-	-	Not Required 158.155 (Reserved)
142-3	Simulated or actual field testing for aquatic insects (reserved)	-	-	-	-	Not Required 158.155 (Reserved)

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Non-target Insect Data Requirements 158.155

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Non target insect testing
predators & parasites
 (reserved)

143-1
 thru
 143-3

Not Required
 158.155
 (Reserved)

The EP (PARAQUAT CL) contains 21.08t cation. The EP is prepared by [redacted]. Therefore, the toxicology data developed with the EP are adequate to support registration of the MP.

MANUFACTURING PROCESS INFORMATION IS NOT INCLUDED

Montarget Insect Data Requirements 158.155

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Guideline Ref. No.	Data Requirement	Test Substance	DATA CITATION			Data Status
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Montarget insect testing aquatic insects

141-1	Honey bee acute contact LD50	Ep*	Toxicity of Pesticides and Other Agricultural Chemicals to Honey Bees. Laboratory Studies. E.L. Atkins, et al. UC. Ag. Exten. 9/73, 252084	Chevron Chemical Company	12/05/83	-
		Ep*	Protecting Honey Bees from Pesticides. Atkins, E.L. et al. U. of Cal. Division of Ag. Sci. Leaflet 2883. 9/77, 252084	Chevron Chemical Company	12/05/83	-
		Ep*	Effect of Pesticides on Apiculture. Atkins, E.L., et al from 1971 Annual Report, Dept. of Entomology, University of California, Riverside. 093671.	Chevron Chemical Company	4/25/73	-
		Ep*	Toxicity of Some Herbicidal Sprays to Honey Bees. Moffett, J.O. et al. J. Econ. Entomol. 65:32-36 (1972), 252084	Chevron Chemical Company	12/05/83	-

141-2 Honey bee - toxicity of residues on foliage

Not Required
158.155
(Footnotes 1, 2)

Montarget Insect Data Requirements 158.155

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Guideline Ref. No.	Data Requirement	Test Substance	DATA CITATION			Data Status
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141-3	Wild bees important in alfalfa pollination - toxicity of residues on foliage	-	-	-	-	Not Required 158.155 (Footnote 3)
141-4	Honey bee subacute feeding study (reserved)	-	-	-	-	Not Required 158.155 (Reserved)
141-5	Field testing for pollinators	-	-	-	-	Not Required 158.155 (Footnote 4)
<u>Montarget insect testing aquatic insects</u>						
141-2	Acute toxicity to aquatic insects (reserved)	Ep*	Sanders, M.O. and Cope, O.B. (1968). The Relative Toxicities of Several Pesticides to Naiads of Three Species of Stoneflies. Limnol. Oceanogr. 13:112-117. 098334.			6/08/79 Not Required 158.155 (Reserved)
142-1	Aquatic insect life-cycle study (reserved)	-	-	-	-	Not Required 158.155 (Reserved)
142-3	Simulated or actual field testing for aquatic insects (reserved)	-	-	-	-	Not Required 158.155 (Reserved)

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Non-target Insect Data Requirements 158.155

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Non target insect testing
Predators & parasites
 (reserved)

143-1
 thru
 143-3

- - - - -
 Not Required
 158.155
 (Reserved)

MANUFACTURING PROCESS INFORMATION IS NOT INCLUDED

The EP (PARAQUAT CL) contains 21.08% cation. The EP is prepared by [redacted] therefore, the toxicology data developed with the EP are adequate to support registration of the MP.

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