Primary Evaluator: Danette Drew, Chemist
Reregistration Branch 3
Health Effects Division
Date: 5/25/04

Approved by: Catherine Eiden, Branch Chief
Reregistration Branch 3
Health Effects Division
Date: 5/26/04

This DER was originally prepared under contract by Dynamac Corporation (20440 Century Boulevard, Suite 100; Germantown, MD 20874; submitted 04/05/2004). The DER has been reviewed by the HED and revised to reflect current OPP policies.

STUDY REPORT:

46151702 de Weerd, J. (2003) Residue Analytical Method Validation for Chlorpropham in Potato Peel and Pulp, Potato Chips, and Potato Flakes. Study Number: DCLGLP03-001. Unpublished study submitted by PIN/NIP, Inc. 64 p.

EXECUTIVE SUMMARY:

Pin/Nip, Inc. has submitted validation data to support an HPLC/UV method for the quantitation of chlorpropham residues in potato commodities. This method was used to determine residues of chlorpropham in/on potato peel and pulp, and potato chip and flake samples from the crop field trial and processing studies submitted in conjunction with DP Barcodes D297631, D297632, and D297635 (refer to the DERs for MRIDs 46151701 and 46151703).

Briefly, whole potatoes are first washed with water to remove soil and debris, then peeled. Peel, pulp, chip, and flake samples are blended with a reagent grade alcohol (90-91% ethanol denatured with 5% isopropyl alcohol and 4-5% methanol; 100% or 80% in water), warmed to 50 °C for 30 minutes in a water bath, and shaken for 20 minutes at ambient temperatures. The extract is filtered for HPLC/UV analysis. The reported limit of quantitation (LOQ) is 0.05 µg/mL of final extract volume. Based on study reviewer calculations, this corresponds to an LOQ of ~0.27 ppm for peel, ~0.03 ppm for pulp, 0.08 ppm for chips, and 0.15 ppm for flakes.

Method validation data for the HPLC/UV method demonstrated adequate method recoveries for chlorpropham from whole potatoes fortified at 2 and 20 ppm, and from chips and flakes fortified at 0.5 and 2 ppm, using an extraction solvent of either 100% or 80% reagent alcohol. No method validation data were reported for the stated method LOQ. In addition, although separate analyses were conducted for potato peel and pulp, separate validation data were not provided for these commodities. The registrant should note for future submissions that HED prefers validation data for each commodity as analyzed.

Based on the available method validation, HED concludes that the submitted HPLC/UV method is adequate for the determination of residues of chlorpropham in potatoes and potato processed commodities, in the range of the fortification levels used for method validation.

Pin/Nip does not have the regulatory burden of supplying an enforcement method as there are currently validated and published methods available for tolerance enforcement, such as the FDA multiresidue methods. Therefore, method radiovalidation, confirmatory method and independent laboratory validation are not required.

STUDY/WAIVER ACCEPTABILITY/DEFICIENCIES/CLARIFICATIONS:

Under the conditions and parameters used in the study, the analytical method residue data are classified as scientifically acceptable. Because no validation data were provided at the stated LOQ, HED concludes that the HPLC/UV method is adequate for data collection purposes in the range of 2 ppm (Lower Limit of Method Validation) to20 ppm for whole potatoes and 0.5 ppm (LLMV) to 2 ppm for potato chips and flakes.

COMPLIANCE:

Signed and dated GLP, Quality Assurance and Data Confidentiality statements were provided. No deviations from regulatory requirements were reported which would have an impact on the validity of the study.

A. BACKGROUND INFORMATION

Chlorpropham is a plant growth regulator used to inhibit sprout formation on stored potatoes. The Chlorpropham RED was issued 10/96, and the Report of FQPA Tolerance Reassessment Progress and Interim Risk Management Decision (TRED) for chlorpropham was issued 9/02. Chlorpropham is formulated as an emulsifiable concentrate (EC) or ready-to-use solution (RTU).

TABLE A.1. Chlorpropham Nomenclature.

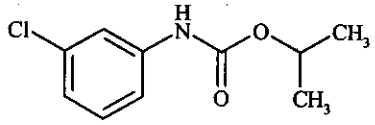
Compound	
Common name	chlorpropham
Company experimental name	N/A
IUPAC name	isopropyl 3-chlorocarbanilate
CAS name	1-methylethyl (3-chlorophenyl)carbamate
CAS registry number	101-21-3

TABLE A.1. Chlorpropham Nomenclature.	
End-use product (EP)	9.709 lb/gal RTU (Pin Nip 98.6% Chlorpropham, Aerosol Grade - Potato Sprout Inhibitor; EPA Reg. No. 65726-3) 2 lb/gal EC (Pin Nip 2 EC, Emulsifiable Concentrate - Potato Sprout Inhibitor; EPA Reg. No. 72790-1)

TABLE A.2. Physicochemical Properties of Technical Grade Chlorpropham.		
Parameter	Value	Reference
Melting point/range	38-40 °C	Chlorpropham RED, 10/96
pH	5.62-5.66	Chlorpropham RED, 10/96
Density	1.17 g/cm^3	Chlorpropham RED, 10/96
Water solubility	89 ppm (25 °C)	Chlorpropham RED, 10/96
Solvent solubility	soluble in ethyl and isopropyl alcohols, ketones, and aromatic solvents	Chlorpropham RED, 10/96
Vapor pressure	2.46 x 10^{-2} Pa at 25 °C	Chlorpropham RED, 10/96
Dissociation constant, pK_a	13.8 in 19% ethanol/water (v/v) at 20 °C	Chlorpropham RED, 10/96
Octanol/water partition coefficient, Log(K_{ow})	3.47 at 25 °C	Chlorpropham RED, 10/96
UV/visible absorption spectrum	not available	

B. MATERIALS AND METHODS

B.1. Data-Gathering Method

A single data-gathering method was used in the crop field trial (postharvest treatment study) and processing studies associated with DP Barcodes D297631, D297632, and D297635. The HPLC/UV method was used to quantitate residues of chlorpropham in/on potato peel and pulp, and processed potato chips and flakes.

B.1.1. Principle of the Method:

Briefly, whole potatoes are first washed with water to remove soil and debris, then peeled. Peel, pulp, chip, and flake samples are blended with a reagent grade alcohol. The extract is filtered for HPLC/UV analysis. Residues in whole potatoes are calculated by summing the residues quantitated in the potato peel and pulp and dividing by the whole potato weight.

TABLE B.1.1. Summary Parameters for the Analytical Method Used for the Quantitation of Residues of Chlorpropham in Potato Commodities.	
Method ID	HPLC/UV method (Study DCLGLP03-001)
Analytes	Chlorpropham
Matrices	Potato matrices including peel, pulp, chips, and flakes
Extraction solvent/technique	Whole potatoes are separated into peel and pulp for separate extraction/analyses. Samples of peel, pulp, chips, and flakes are extracted with either a 100% or 80% reagent alcohol solution (90-91% ethanol denatured with 5% isopropyl alcohol and 4-5% methanol), warmed to 50 °C for 30 minutes and shaken for 20 minutes at ambient temperatures.

TABLE B.1.1. Summary Parameters for the Analytical Method Used for the Quantitation of Residues of Chlorpropham in Potato Commodities.	
Cleanup strategies	The extract is filtered prior to analysis.
Instrument/Detector	HPLC utilizing a C18 column, a UV detector (240 nm), and an isocratic mobile phase of acetonitrile:water:glacial acetic acid:10 N sodium hydroxide (2000:2000:3:4.5, v:v:v:v; pH 6.6-6.8).
Standardization method	Calibration curve of external standards 0.1-80 µg/mL, using linear regression analysis.
Stability of std solutions	Standard stock solutions (~100 mg/mL and ~100 µg/mL) in reagent alcohol were typically stored for ~1 month at ambient conditions, and were reported to expire after one year.
Retention time	Chlorpropham: ~10.5 minutes based on representative chromatograms

B.2. Enforcement Method

Not applicable to this submission. Pin/Nip does not have the regulatory burden of supplying an enforcement method as there are currently validated and published methods available for tolerance enforcement, such as the FDA multiresidue methods.

C. RESULTS AND DISCUSSION

C.1. Data-Gathering Methods

Pin/Nip has submitted data from a method validation study for the HPLC data collection method. Untreated potato tubers (Russet Burbank variety) used in the validation study were obtained from a storage facility in Osgood, ID, which typically stores 2,700,000 lb of potatoes. Potato chips were processed from these samples by the analytical laboratory (DiChlor Research Laboratory; Meridian, ID). Potato flake samples used in this study were processed by Englar Food Laboratories, Inc. (Moses Lake, WA) from untreated potatoes obtained by Englar Laboratories from ID and MT. Unfortified samples bore quantifiable residues of chlorpropham, at 0.05-0.13 ppm for whole potatoes, 0.04-0.07 ppm for chips, and 0.08-0.23 ppm for flakes. The registrant stated that these residues were due to inherent residues in the storage facilities from prior seasons' treatments. Method validation recoveries were corrected for residues in the unfortified samples.

Whole potato samples were fortified with chlorpropham by trickling a chlorpropham solution onto the outer peel of the whole potato, then the whole potato was separated into peel and pulp for analysis. Samples of chips and flakes were fortified directly with chlorpropham.

In addition to method validation, chlorpropham verification standards ranging 1-40 µg/mL were analyzed after every 5-10 samples to confirm the accuracy of the method. Deviation from the expected concentration of chlorpropham in the verification standards ranged 0.2-8.5% (average of 3.1%), with two outliers at 19.6-55.3%.

TABLE C.1.1. Recovery Results from Method Validation of Potato Matrices using the Data-Gathering Analytical Method.[1]

Matrix	Spiking Level (ppm)	100% Reagent Alcohol Extraction		80% Reagent Alcohol Extraction	
		Recoveries Obtained	Mean Recovery ± SD (CV)	Recoveries Obtained	Mean Recovery ± SD (CV)
Potato, tuber[2]	2	83, 85, 86, 86, 89, 91, 92, 97, 97, 103,	91 ± 6 (7)	78, 81, 82, 84, 87, 93, 93, 94, 96, 99	89 ± 7 (8)
	20	84, 89, 95, 95, 95, 96, 96, 97, 99, 100	95 ± 5 (5)	79, 82, 84, 86, 88, 96, 97, 97, 97, 99	91 ± 7 (8)
Potato, chips	0.5	94, 96, 97, 98, 99, 99, 102, 106, 113, 117	102 ± 8 (8)	73, 73, 76, 76, 86, 86, 89, 89, 93, 96	84 ± 9 (10)
	2.0	94, 94, 94, 101, 102, 103, 103, 106, 108, 111	102 ± 6 (6)	81, 84, 88, 89, 91, 92, 92, 94, 97, 101	91 ± 6 (6)
Potato, flakes	0.5	85, 91, 91, 91, 91, 97, 97, 97, 103, 109	95 ± 7 (7)	87, 87, 93, 93, 93, 93, 93, 99, 99, 99	94 ± 4 (5)
	2.0	84, 86, 87, 87, 92, 92, 93, 93, 93, 98	91 ± 4 (5)	91, 92, 97, 98, 98, 100, 101, 103, 106, 107	99 ± 5 (5)

[1] Standards were prepared in reagent alcohol. Recoveries were corrected for the average residue observed in the untreated sample prior to fortification: 0.05-0.13 ppm in/on whole potatoes, 0.04-0.07 ppm in chips, and 0.08-0.23 ppm in flakes.
[2] Residues were separately quantitated in peel and pulp, and residues in whole potatoes were calculated by the registrant by summing the total residues in the peel and pulp (in µg) and dividing by the whole potato weight (in g). Separate recoveries for peel and pulp were not presented because the whole potato was fortified.

Adequate recoveries were obtained from whole potatoes fortified at 2 and 20 ppm, and from chips and flakes fortified at 0.5 and 2 ppm, using an extraction solvent of either 100% or 80% reagent alcohol. No validation data were provided for samples fortified at the method LOQ. We note that the concurrent method validation data submitted in conjunction with the associated potato field trial and processing study (refer to the DERs for MRID 46151701 and 46151703) reflect fortification in the same manner and at the same fortification levels as the method validation study.

The registrant should note for future submissions that HED prefers validation data for each commodity as analyzed. Because this method specifies that peel and pulp be analyzed separately, separate validation data should have been provided for peel and pulp, bracketing the expected residues levels in each commodity.

We note that the registrant reported the LOQ in terms of µg/mL of final extract volume and not in terms of ppm. Based on the extraction volumes and sample weights used in the study, the LOQ is 0.08 ppm in chips and 0.15 ppm in flakes. For whole potato samples, the method specifies that entire potato sample be analyzed; therefore, there is no standard sample weight identified for analysis. Based on the weights reported in the study, approximately 25 g of peel and 180 g of pulp are analyzed. Therefore, the LOQs for peel and pulp are ~0.27 ppm and ~0.03 ppm, respectively.

TABLE C.1.2. Characteristics for the Data-Gathering Analytical Method Used for the Quantitation of Chlorpropham in Potato Commodities.	
Method ID	HPLC/UV method (Study DCLGLP03-001)
Analytes	Chlorpropham
Matrices	Potato matrices including peel, pulp, chips, and flakes
Equipment ID	Varian ProStar HPLC; Chrompack Microsorb-MV 100 C18 column; Varian ProStar 310 UV detector
Limit of quantitation (LOQ)	0.05 µg/mL for all potato matrices (<20% deviation from theoretical concentration or 10x the noise level); corresponds to ~0.03 ppm for pulp, ~0.27 ppm for peel, 0.08 ppm for chips, and 0.15 ppm for flakes.
Limit of detection (LOD)	Actual value not reported; set at 3x the noise level of the HPLC system
Accuracy/Precision	Percent recoveries and coefficients of variance (CVs) indicate acceptable accuracy/precision for residues of chlorpropham in whole potato tubers at 2 and 20 ppm, and in chips and flakes at 0.5 and 2 ppm. Recovery ranges (and CVs) were 83-103% (6) in/on whole potatoes, 94-117% (6) in chips, and 84-109% (7) in flakes extracted with 100% reagent alcohol; and 78-99% (8) in/on whole potatoes, 73-101% (9) in chips, and 87-107% (6) in flakes extracted with 80% reagent alcohol. See Table C.1.1 above.
Reliability of the Method/ [ILV]	An independent laboratory method validation was not conducted .
Linearity	A representative calibration curve demonstrated adequate linearity (r^2 of 0.9998) for standard concentrations ranging 0.1-80 µg/mL; the method specifies that the linearity standards must have a correlation coefficient $\geq$0.99.
Specificity	No representative chromatograms for control samples were provided, but peaks in the representative sample chromatograms were well defined and symmetrical. We note that "untreated" samples used for controls had low levels of chlorpropham, resulting from inherent residues in the storage facility from prior seasons' treatments; these residues are typical in most storage facilities. Therefore, method validation recoveries were corrected for residues in the control samples.

C.2. Enforcement Method

Not applicable to this submission.

C.3. Independent Laboratory Validation

Not applicable to this submission.

D. CONCLUSION

Adequate method validation data have been submitted for the HPLC/UV data collection method for the determination of residues of chlorpropham in potato tubers fortified at 2 and 20 ppm, and processed potato chips and flakes fortified at 0.5 and 2 ppm. In addition, in conjunction with the submitted crop field trial and processing studies associated with DP Barcodes D297631, D297632, and D297635, concurrent method recovery data have been submitted for potato tubers, chips, and flakes.

The petitioner is not proposing the HPLC method for enforcement. Pin/Nip does not have the regulatory burden of supplying an enforcement method as there are currently validated and published methods available for tolerance enforcement, such as the FDA multiresidue methods.

E. REFERENCES

None.

F. DOCUMENT TRACKING

RDI: C. Eiden (5/26/04)
Petition Number(s): Not applicable
DP Barcode(s): D297632
PC Code: 018301

cc: Anthony Britton (SRRD), Michael Goodis (SRRD)

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