Data Evaluation Report on the terrestrial field dissipation of iodomethane

PMRA Submission Number {.....} EPA MRID Number 45593711

Data Requirement: PMRA Data Code:
EPA DP Barcode: D280800
OECD Data Point:
EPA Guideline: 164-1

Test material: TM-425

End Use Product name: Not specified **Concentration of a.i.:** 99.7%
Formulation type: None; technical material

Active ingredient

Test material:
Common name: Iodomethane.
Chemical name
IUPAC:
CAS name: Iodomethane.
CAS No: 174-88-4.
Synonyms: Methyl iodide.
TM-425.
SMILES string: CI

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Company Code:
Active Code:
Use Site Category:
EPA PC Code: 000011

CITATION: Baker, F.C., Nelson, M.D., Bolda, M., Hiler, R. 2002. Terrestrial field dissipation of iodomethane (TM-425) in California and Florida bareground soils. Unpublished study performed by PTRL West, Inc., Hercules, CA; Plant Sciences, Inc., Watsonville, CA; and Research Options, Inc., Winter Garden, FL; and submitted by Arvesta Corporation of San Francisco, CA. PTRL Project No. 892W. PTRL Report No. 892W-1. Study initiated May 30, 2000 and completed on January 18, 2002.

EXECUTIVE SUMMARY:

Soil dissipation/accumulation of iodomethane (TM-425) under US field conditions was conducted in California and Florida (ecoregions were not reported). Pesticide application was via tarped shallow shank broadcast flat fume injection at the California site and was via tarped raised bed injection at the Florida site. The experiment was carried out in accordance with the US EPA Pesticide Assessment Guidelines Subdivision N, 164-1 and in compliance with the US EPA FIFRA (40 CFR, Part 160) GLP standard. Iodomethane was injected once into the bare soil at 263 kg a.i./ha and immediately covered with polyethylene tarpaulin. The application rate at the Florida site is based on the width of the tarped raised beds, not the overall acreage. Rainfall was supplemented with irrigation to reach the 30-year average rainfall. The control plots were >61 m away from the treated plot at each field site.

Due to the mode of application and volatile nature of iodomethane, the application rate was not verified using application monitors. Instead, the cylinder of test substance was weighed before, during, and after application. Based on the weight of iodomethane applied per pass, the actual application rates were 107.2% and 110.13% of the target rate for the California and Florida test plots, respectively. Field spiking of the samples was done by fortifying control soil from each test site with iodomethane in ethyl acetate at 0.05, 0.5 and 50.0 ppm. At the California site, the mean recovery of iodomethane at 0.05, 0.50 and 50 ppm was 46.7%, 42.9% and 48.0%, respectively. At the Florida site, the mean recovery of iodomethane at 0.05, 0.50 and 50 ppm was 89.7%, 65.2% and 60.9%, respectively.

At the California site, soil samples were taken at 0, 0.3, 1, 1.3, 2, 3, 4, 8, 15, 28, and 57 days following application to a depth of 183 cm. At the Florida site, soil samples were taken at 0, 0.3, 1, 2, 3, 5, 7, 14, 29, 59 and 90 days following application to a depth of 122 cm. Soil samples were extracted by shaking with chilled ethyl acetate and anhydrous sodium sulfate, and the extracts were removed for analysis by GC-ECD. The LOQ was 0.0025 ppm and the LOD was 0.0001 µg/mL.

At the California site, the total measured zero-time concentration (all soil depths) was 7.727 mg a.i./kg soil, which is 6.3% of the applied rate. Iodomethane dissipated from a maximum concentration of 7.040 mg a.i./kg at 8 hours (0-15 cm depth) to 0.570 mg a.i./kg by day 3 and 0.001 mg a.i./kg by 57 days. Iodomethane was distributed throughout the soil profile.

Under field conditions at the California site, the registrant-calculated half-life of iodomethane in soil was 4.8 days. At the end of the 57-day period, the total carryover of residues of iodomethane was 0.0008% of the applied.

At the Florida site, the total measured zero-time concentration (all soil depths) was 20.03 mg a.i./kg soil, which is 36.9% of the applied rate. Iodomethane dissipated from a maximum of 12.290 mg a.i./kg at day 0 (0-15 cm depth) to 1.168 mg a.i./kg by day 5, and was not detected at day 90, the final sampling interval. Iodomethane was distributed throughout the soil profile.

Under field conditions at the Florida site, the registrant-calculated half-life of iodomethane in soil was 5.0 days. At the end of the 90-day period, the total carryover of residues of iodomethane was 0% of the applied.

The major route of dissipation of iodomethane under terrestrial field conditions at the California and Florida test sites is volatilization. The total mass of iodomethane lost from the soil was 58.4% and 82.4% of the applied from the California and Florida test sites, respectively, following the first 9-10 days posttreatment.

RESULTS SYNOPSIS

Location/soil type: Watsonville, California/Fort Meade loamy fine sand
Half-life: 4.8 days
Major transformation products detected: None
Dissipation routes: Volatilization

Location/soil type: Dover, Florida/Elder sandy loam
Half-life: 5.0 days
Major transformation products detected: None
Dissipation routes: Volatilization

Study Acceptability: This study is classified acceptable and satisfies the guideline requirement for a terrestrial field dissipation study.

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study was conducted according to U.S. EPA Pesticide Assessment Guidelines Subdivision N, 164-1. The study did not deviate from the guidelines.

COMPLIANCE: The study was conducted in compliance with U.S. EPA FIFRA (40 CFR Part 160) Good Laboratory Practice standards. Signed and dated GLP Compliance, No Data Confidentiality and Quality Assurance statements were provided.

A. MATERIALS:

1. Test Material TM-425

Chemical Structure: H_3CI

Description: Technical material

Storage conditions of test chemicals: Room temperature (both sites).

Physico-chemical properties of iodomethane.

Parameter	Values	Comments
Molecular weight	141.94 g/Mol	
Water solubility	14.2 mg/mL at 25°C	MRID 45593705
Specific gravity	2.8 at 20°C	Material Safety Data Sheet
Vapor pressure/volatility	398 mm Hg @ 20 °C	
Henry's law K_H	0.22	MRID 45593705
UV absorption	Maximum (2.5 absorbance units) at *ca.* 200 nm, with a smaller peak (0.25 au) at *ca.* 250 nm	MRID 45593706
pK_a	Not reported.	
Octanol/Water partition coefficient (log K_{ow})	1.51-1.69	International Occupational Safety and Health Information Centre
Melting point	-66.5°C	International Occupational Safety and Health Information Centre
Boiling point	42.4°C	
Stability of compound at room temperature, if provided	Not reported.	

Vapor pressure data were obtained from Appendix AK, p. 926 of the study report.

2. Test site: The test sites were located in California and Florida (p. 25). The California test site was located in Watsonville, Santa Cruz County, an area of significant commercial production of strawberries, one of the proposed target crops for the product (p. 27). The Florida test site was located in Dover, Hillsborough County, an area of significant commercial production of tomatoes and strawberries, two of the proposed target crops for the product (p. 31). The pesticide history was either unknown (Florida test site) or not reported (California test site).

Table 1: Geographic location, site description and climatic data at the study site(s).

Details		**California**	**Florida**
Geographic coordinates	Latitude	Not available	Not available
	Longitude	Not available	Not available
	Province/State	Santa Cruz County, CA	Hillsborough County, FL
	Country	US	US
	Ecoregion	Not available	Not available
Slope Gradient		0-1%	0.5%
Depth to ground water (m)		> 3.0	> 1.8
Distance from weather station used for climatic measurements		On-site	4 miles
Indicate whether the meterological conditions before starting or during the study were within 30 year normal levels (Yes/No). If no, provide details.		Yes	Yes
Other details, if any		None	None

Data were obtained from pp. 27, 31, and 50-51; Appendix B, pp. 272 and 288, in the study report.

Table 2: Site usage and management history for the previous three years.

Use	Year	California	Florida
Crops grown	Previous year	Artichokes, potatoes	Unknown
	2 years previous	Not provided	Unknown
	3 years previous	Not provided	Unknown
Pesticides used	Previous year	Not provided	Unknown
	2 years previous	Not provided	Unknown
	3 years previous	Not provided	Unknown
Fertilizers used	Previous year	Not available	Not available
	2 years previous	Not available	Not available
	3 years previous	Not available	Not available
Cultivation methods, if provided (eg., Tillage)	Previous year	Not available	Not available
	2 years previous	Not available	Not available
	3 years previous	Not available	Not available
Other details, if any	Previous year	None	None
	2 years previous	None	None
	3 years previous	None	None

Data obtained from Appendix B, pp. 271 and 286, in the study report.

3. Soils:

Table 3: Properties of the soil from California.

Property	Depth (cm)											
	0-15	**15-30**	**30-45**	**45-61**	**61-76**	**76-91**	**91-107**	**107-122**	**122-137**	**137-152**	**152-168**	**168-183**
Textural classification	Loam			Silt Loam		Loam		Silt Loam	Loam			
% sand	41.6	43.6	39.6	29.6	21.6	33.6	35.6	25.6	37.6	37.6	33.6	43.6
% silt	36.0	34.0	40.0	52.0	52.0	42.0	44.0	54.0	42.0	44.0	48.0	38.0
% clay	22.4	22.4	20.4	18.4	26.4	24.4	20.4	20.4	20.4	18.4	18.4	18.4
pH (1:1 soil:water or other)	6.4	6.6	6.6	6.7	6.7	6.8	6.9	6.9	6.8	7.1	7.0	7.1
Total organic matter (%)	2.25	2.25	1.54	1.59	1.32	1.32	1.04	1.26	1.43	0.82	0.77	0.88
CEC (meq/100 g)	18.10	17.41	18.05	20.44	20.85	18.90	17.10	19.24	17.74	16.84	16.98	16.34
Bulk density (g/cm^3)	1.43	1.44	1.32	1.32	1.30	1.38	1.40	1.34	1.43	1.39	1.40	1.46
Moisture at 1/3 atm (%)	25.12	30.51	25.14	22.86	24.01	25.10	29.94	32.52	28.97	23.02	24.96	23.68
Taxonomic classification (e.g., ferro-humic podzol)	Fort Meade loamy fine sand, siliceous, hyperthermic Humic Psammentic Dystrudepts											
Soil mapping unit	Not provided											
Others	Not provided											

Data were obtained from Appendix B, Table 1, pp. 269-270 of the study report. The taxonomic classification was obtained from the NRCS.

Table 4: Properties of the soil from Florida

Property	Depth (cm)											
	0-15	**15-30**	**30-45**	**45-61**	**61-76**	**76-91**	**91-107**	**107-122**	**122-137**	**137-152**	**152-168**	**168-183**
Textural classification	Loamy sand	Sand		Loamy sand		Sand						
% sand	88.0	88.0	88.0	88.0	88.0	90.0	90.0	92.0	92.0	90.0	90.0	90.0
% silt	6.0	8.0	8.0	6.0	6.0	8.0	6.0	6.0	4.0	6.0	6.0	6.0
% clay	6.0	4.0	4.0	6.0	6.0	2.0	4.0	2.0	4.0	4.0	4.0	4.0
pH (1:1 soil:water or other)	7.0	6.4	5.8	5.2	5.2	5.2	5.4	5.1	5.1	5.3	5.4	5.4
Total organic matter (%)	2.02	1.97	1.53	1.20	1.04	0.55	0.38	0.27	0.38	0.38	0.33	0.05
CEC (meq/100 g)	4.97	4.86	3.87	3.41	2.79	2.00	1.33	1.69	1.91	1.71	1.62	1.34
Bulk density (g/cm3)	1.64	1.60	1.61	1.60	1.62	1.63	1.65	1.64	1.63	1.62	1.70	1.67
Moisture at 1/3 atm (%)	5.39	5.73	5.53	5.09	5.04	4.15	4.00	3.64	3.60	4.38	3.90	3.96
Taxonomic classification (e.g., ferro-humic podzol)	Elder sandy loam, coarse-loamy, mixed, superactive, thermic Cumulic Haploxerolls											
Soil mapping unit	Not provided											
Others	Not provided											

Data obtained from Appendix B, Table 1, pp. 284-285 in the study report. The taxonomic classification was obtained from the NRCS.

B. EXPERIMENTAL DESIGN:

1. Experimental design:

Table 5: Experimental design.

Details		**California**	**Florida**
Duration of study		57 days	90 days
Uncropped (bare) or cropped		Bare	Bare
Control used (Yes/No)		Yes	Yes
No. of replications	Controls	1	1
	Treatments	3	3
Plot size (L x W m)	Control	6.1 x 7.6 m	48.8 x 1.8 m
	Treatment	61 x 8.9 m	61 x 8.7 m
Distance between control plot and treated plot		124.4 m	61 m
Distance between treated plots		3 m	Not specified
Application rate(s) used (g a.i/ha)		263402 g a.i/ha	263402 g a.i./ha
Was the maximum label rate per ha used in study? (Yes/No)		Not provided	Not provided
Number of applications		1	1
Application Date(s) (dd mm yyyy)		24/07/2000	07/01/2001
For multiple applications, application rate at Day 0 and at each application time (mg a.i./kg soil)		122.8 mg a.i./kg soil, reviewer calculated based on a soil depth of 15 cm and a bulk density of 1.43 g/cm^3	54.2 mg a.i./kg soil, reviewer calculated based on a soil depth of 30 cm and a bulk density of 1.62 g/cm^3
Application method (eg., spraying, broadcast etc.)		Tarped, broadcast flat-fume shallow shank injection	Tarped, raised bed-shank injection
Type of spray equipment, if used		Tractor-mounted	Tractor-mounted
Total volume of spray solution applied/plot **OR** total amount broadcasted/plot		114.5 lb	60.6 lb
Identification and volume of carrier (e.g., water), if used		N/A	N/A
Name and concentration of co-solvents, adjuvants and/or surfactants, if used		None	None

Details		California	Florida
Indicate whether the following monthly reports were submitted: Average minimum and maximum precipitation Average minimum and maximum air temperature Average minimum and maximum soil temperature Average annual frost-free periods		Yes - daily, weekly and monthly total Yes Yes - average only No	Yes - daily and monthly total Yes Yes - average No
Indicate whether the Pan evaporation data were submitted		No	No
Meteorological conditions during application	Cloud cover	Not available	Not available
	Temperature (°C)	15°C (average)	9.81°C (average)
	Humidity	34% (average)	72.10% (average)
	Sunlight (hr)	Not available	Not available
Pesticides used during study: name of product/a.i concentration: amount applied: application method:		None	None
Supplemental irrigation used (Yes/No) If yes, provide the following details: No. of irrigation: Interval between irrigation: Amount of water added each time: Method of irrigation:		Yes, via overhead sprinkler. The test plots received a total 7.24 inches from irrigation during the months of August and September 2000.	No
Indicate whether water received through rainfall + irrigation equals the 30 year average rainfall (Yes/No)		Yes	Yes
Were the application concentrations verified? (Briefly describe in Section 2, if used)		Yes	Yes
Were field spikes used? (Briefly describe in Section 3, if used)		Yes	Yes
Good agricultural practices followed (Yes or No)		Yes	Yes
Indicate if any abnormal climatic events occurred during the study (eg., drought, heavy rainfall, flooding, storm etc.)		None	None

Details	California	Florida
If cropped plots are used, provide the following details: Plant - Common name/variety: Details of planting: Crop maintenance (eg., fertilizers used):	Not applicable	Not applicable
Volatilization included in the study (Yes/No) (if included, describe in Section 4)	Yes	Yes
Leaching included in the study (Yes/No) (if included, describe in Section 5)	Yes	Yes
Run off included in the study (Yes/No) (if included, describe in Section 6)	No	No

Data were obtained from pp. 26-32, 50 and Appendix B, pp. 267-274, 282-289, and 302-308 of the study report.

2. Application Verification: Due to the mode of application and volatile nature of the test substance, the application rate was not verified using application monitors. The cylinder of test substance was weighed before, during, and after application to determine that an acceptable rate was applied to the test plots (p. 28).

3. Field Spiking: Samples (10 g) of sieved (1 mm) control soil collected from each test site were fortified with 100 µL of one of three solutions of iodomethane in ethyl acetate, resulting in five fortified samples each at 0.05, 0.5 and 50.0 ppm (Appendix B, pp. 278 and 291-292). In addition, 5 blind spike fortification samples and 5 trip spike samples were prepared. The fortified samples were prepared 40 days prior to application at the California test site and 25 days following application at the Florida test site, and were shipped to the lab on the same day (Appendix B, pp. 316 and 324).

4. Volatilization: A volatility study was conducted in parallel with the field study at both sites (p. 26). On-site measurements of iodomethane air concentration were collected from eight sampling locations surrounding the treated plot and one upwind location for 22 days posttreatment at the California site and for 14 days posttreatment at the Florida site (Appendix C, pp. 340, 343-344; Figures 1-2, pp. 355-356). The flux rate of iodomethane was estimated using the Industrial Source Complex (ISC) air dispersion model (Appendix C, pp. 341-342). Complete details of the volatility study are provided in MRID 45593710.

5. Leaching: At the California test site, soil cores were collected to a depth of 61 cm at 0, 0.3, 1, 1.3, 2, and 3 days posttreatment, to a depth of 122 cm at 4, 8, and 57 days posttreatment, and to a depth of 183 cm at 15 and 28 days posttreatment (Appendix B, pp. 310-314). At the Florida test site, soil cores were collected to a depth of 122 cm at 0, 0.3, 1, 2, 3, 5, 7, 14, 29, 59 and 90 days posttreatment (Appendix B, pp. 318-323). In addition to the soil cores, buried soil samples were collected at the Florida site during the study (pp. 34-35). The buried soil samples were contained in steel mesh cylinders (6 x 2 inch diameter) that were buried to a depth of 1 foot (10 cylinders) or 5-6 feet (15 cylinders) one week before application of the test substance. Five of the

1 foot buried cylinders were removed at 0 and 1 day posttreatment and three of the 5-6 foot cylinders were removed at 0, 0.3, 1, 2, and 8 days posttreatment.

6. Run off: Run off was not studied.

7. Supplementary Study: A storage stability study was conducted for iodomethane in soil at both sites (p. 46). Triplicate control soil samples from the California and Florida sites were fortified with iodomethane at 0.05 and 50 ppm (p. 58). The California soil was stored for 1, 3, 7, and 30 days and the Florida soil was stored for 3, 7, and 35 days.

8. Sampling:

Table 6: Soil sampling.

Details	**California**	**Florida**
Method of sampling (random or systematic)	Random	Random
Sampling intervals	-10, 0, 0.3, 1, 1.3, 2, 3, 4, 8, 15, 28, and 57 days posttreatment	-2, 0, 0.3, 1, 2, 3, 5, 7, 14, 29, 59, and 90 days posttreatment
Method of soil collection (eg., cores)	Cores	Cores
Sampling depth	61 cm (0-3 day samples), 122 cm (4, 8, and 57 day samples) or 183 cm (15 and 28 day samples)	122 cm (all samples)
Number of cores collected per plot	5 per treated replicate plot (15 total) with the exception of day 4 samples (1 per replicate)	5 per treated replicate plot (15 total) with the exception of day 1 samples (6 total; due to rainfall)
Number of segments per core	Four-twelve	Seven
Length of soil segments	15 cm	15 cm
Core diameter (Provide details if more than one width)	2.54 cm (0-3 day samples), not specified (4 day samples), or 5.7 cm (0-15 cm depth) and 4.4 cm (lower depth) (8-57 day samples)	5.7 cm (0-30 cm depth) and 5.1 cm (30-122 cm depth)
Method of sample processing, if any	Composited by depth and replicate, and homogenized prior to analysis	Composited by depth and replicate, and homogenized prior to analysis
Storage conditions	Frozen	Frozen
Storage length (days)	0-3 days	1-11 days

Data obtained from pp. 29-30, 33-35, Tables I-IV, pp. 68-75, Appendix B, pp. 274-277, 289-291, 309-324, of the study report.

9. Analytical Procedures: Soil samples were homogenized (if not done on-site) by pulverizing with a rubber mallet and hammer and analyzed for iodomethane (p. 41). Soil samples (10 g) were extracted by shaking for 30 minutes with 20 mL of chilled ethyl acetate and approximately 10 grams of anhydrous sodium sulfate (p. 42). After shaking, the jar was placed on dry ice and the soil was allowed to settle while the jar chilled. Once chilled, portions of the extract were removed for analysis by GC-ECD. The GC was a Hewlett Packard 5890 series II or 6890 with ECD detector and the GC column was a J&W Scientific GS-GasPro column (p. 43). The detector gas used was nitrogen or 95% argon/5% methane. The temperature program used was 5 minute hold at 80° C, 30° C per minute to 200° C, 1 minute hold at 200° C, 50° C per minute to 260° C, and 8 minute hold at 260° C. The LOQ was 0.0025 ppm and the LOD was 0.0001 µg/mL (p. 48).

Soil samples (10 g) analyzed for iodide (7-8, 14-15, and 28-29 day samples) were extracted by shaking for 60 minutes with 20 mL of double distilled iodide demand free water, settled and centrifuged (pp. 43-44). Aliquots of extract were removed and iodide was measured using a Model 9653 Iodide Electrode (ATI Orion) attached to an Accumet Model 25 pH/ion meter.

II. RESULTS AND DISCUSSION

1. APPLICATION MONITORS: The weight of iodomethane applied per pass ranged from -7.3 to 26.4% of target at the California site and from 9.04 to 14.49% of target at the Florida site (Appendix B, Table 4, pp. 274 and 289). The actual application rates were 251.96 lb/A (107.2% of target) and 258.80 lb/A (110.13% of target) for the California and Florida test plots, respectively.

2. RECOVERY FROM FIELD SPIKES: Samples from the California site were extracted after 1 day of storage (p. 57). The mean recovery of iodomethane at 0.05, 0.50 and 50 ppm was 46.7%, 42.9% (excluding two outliers) and 48.0%, respectively, and the mean recovery of the blind spike and the trip spike was 34.4% and 42.2%, respectively (Table XXVIII, p. 112). The study authors concluded that the relatively low recovery was not a deficiency of the analytical method (recovery of samples fortified at the time of analysis was 92.3%), but was a result of loss due to volatility and/or decomposition on extended contact with the soil (even when chilled) (p. 58). Samples from the Florida site were extracted after 3 days of storage (p. 57). The mean recovery of iodomethane at 0.05, 0.50 and 50 ppm was 89.7%, 65.2% and 60.9%, respectively, and the mean recovery of the blind spike and the trip spike was 58.3% and 60.1%, respectively (Table XXIX, p. 113). The study authors conclude that the improved transport stability of iodomethane in the Florida soil may be related to relatively low organic matter in the loamy sand (1.04-2.02% in the 0-76 cm soil depth) compared to the California loamy sand (1.32-2.25% in the 0-76 cm soil depth) (p. 58).

3. MASS ACCOUNTING: The study authors calculated a mass balance for the California site, based on the estimated flux from the volatility study and maximum iodide levels (pp. 59-60). The volatility study estimated that 58.4% of the iodomethane was emitted from the field over the first nine days. The averaged maximum iodide levels (day 15, 0-61 cm soil depth) accounted for approximately 2.6% of the registrant-calculated theoretical iodomethane concentration of 33 ppm

for the same depth of soil. Thus, the total recovery based on flux and maximum soil iodide was 61.0%

The study authors calculated a mass balance at the Florida site based on the estimated flux at day 0 plus the percent of theoretical maximum iodomethane residues observed in the 0-61 cm soil cores at day 1, corrected for average transport stability recovery of 66.8% (pp. 60-61). The estimated flux for day 0 was 48.6%. The average iodomethane residues on day 1 were 7.508 ppm, and after correcting for losses during transport, the corrected iodomethane residues on day 1 were 11.2 ppm, which was 37.7% of the registrant-calculated theoretical iodomethane concentration of 29.7 ppm for the same depth of soil. Thus, the total recovery based on flux at day 0 and iodomethane residues in the 0-61 cm soil depth at day 1 was 86.3%.

Table 7. Concentration of Iodomethane residues expressed as mg/kg soil, in the California bare-ground plot.

Compound	Soil depth (cm)	Sampling times (days)										
		0	0.3	1	1.3	2	3	4 *	8**	15	28	57
Iodomethane	0-15	4.431	7.040	2.377	3.582	1.023	0.570	2.119	0.045	0.011	0.003	0.001
	15-30	2.473	3.806	3.480	4.157	2.738	1.335	1.664	0.378	0.048	0.011	0.002
	30-45	0.579	0.298	0.585	0.615	0.731	0.358	2.677	0.376	0.036	0.017	0.001
	45-61	0.244	0.246	0.063	0.109	0.146	0.085	1.072	0.122	0.004	0.001	0.000
	61-76	NA	NA	NA	NA	NA	NA	0.769	0.041	0.001	0.001	0.000
	76-91	NA	NA	NA	NA	NA	NA	0.403	0.038	0.001	0.000	0.000
	91-107	NA	NA	NA	NA	NA	NA	0.256	0.013	0.000	0.000	0.000
	107-122	NA	NA	NA	NA	NA	NA	0.442	0.011	0.001	0.000	0.000
	122-137	NA	NA	NA	NA	NA	NA	NA	NA	0.001	0.000	NA
	137-152	NA	NA	NA	NA	NA	NA	NA	NA	0.000	0.000	NA
	152-168	NA	NA	NA	NA	NA	NA	NA	NA	0.000	0.000	NA
	168-183	NA	NA	NA	NA	NA	NA	NA	NA	0.000	0.000	NA

Compound	Soil depth (cm)	Sampling times (days)										
		0	0.3	1	1.3	2	3	4 *	8**	15	28	57
Iodide +	0-15								1.59	2.32	0.08	
	15-30								0.61	0.86	0.11	
	30-45								0.18	0.19	0.11	
	45-61								0.02	0.04	0.02	
	61-76								0.01	0.01	0.01	
	76-91								0.01	0.01	0.01	
	91-107								0.01	<0.01	0.01	
	107-122								0.01	<0.01	0.01	
	122-137								NA	0.03	0.01	
	137-152								NA	0.01	0.01	
	152-168								NA	0.01	0.01	
	168-183								NA	0.02	0.01	

Data were obtained from Tables VI-XVII, pp. 77-92 and Table XXXII, p. 118 of the study report.
Reported values are registrant-calculated averages of three replicates with the exception of the day 4 sampling interval.
Total extractable residues, total nonextractable residues and total recovery were not determined for any sampling depths.
* Day 4 samples were taken from 3 corners of the plot so that the tractor did not damage the tarpaulin. Each soil layer is composed of a single composite sample obtained from combining the three cores taken from the three corners (p. 53).
+ Iodide was analyzed only on days 8, 15, and 28 posttreatment.
NA - core only taken to 61 cm on days 0, 1, 2 and 3 and to 122 cm on days 4, 8, and 57.
** Tarpaulin removed on day 7.

Table 8. Concentration of Iodomethane residues expressed as mg/kg soil, in the Florida bare-ground plot.

Compound	Soil depth (cm)	Sampling times (days)											
		0	0.3	1	2	3	5	7	8	14	29	59	90
Iodomethane	0-30	12.290	10.527	5.913	3.249	2.550	1.168	0.539	NA	0.154	0.009	0.001	0.000
	30-45	5.171	10.785	9.746	3.553	4.520	2.553	1.648	NA	0.457	0.072	0.008	0.000
	45-61	2.082	6.040	8.461	4.344	3.658	2.987	1.376	NA	0.840	0.103	0.000	0.000
	61-76	0.414	2.060	4.162	2.405	2.501	1.264	1.015	NA	0.604	0.135	0.000	0.000
	76-91	0.059	0.434	1.218	1.343	1.123	0.643	0.613	NA	0.907	0.079	0.000	0.000
	91-107	0.012	0.137	0.124	0.396	0.375	0.207	0.269	NA	0.184	0.034	0.002	0.000
	107-122	0.002	0.026	0.036	0.076	0.065	0.102	0.059	NA	0.209	0.007	0.000	0.000
	30*	0.324		3.991									
	152-183 *	0.003	0.015	0.057	0.029				0.022				
Iodide+	0-30							0.72		1.70	0.36		
	30-45							0.11		0.11	0.06		
	45-61							0.04		0.06	0.01		
	61-76							0.01		0.04	<0.01		
	76-91							<0.01		0.02	<0.01		
	91-107							<0.01		0.02	<0.01		
	107-122							<0.01		0.01	<0.01		

Data were obtained from Tables XVIII-XXV, pp. 93-107 and Table XXXIII, p. 119, of the study report.
Reported values are registrant-calculated averages of three replicates.
Total extractable residues, total nonextractable residues and total recovery were not determined for any sampling depths.
NA - No soil core samples collected on day 8 posttreatment.
+ Iodide was analyzed only on days 7, 14, and 29 posttreatment.
* Results from buried soil samples.

4. PARENT COMPOUND: At the California site, the total measured zero-time concentration (for all soil depths) was 7.727 mg a.i./kg which is 6.3% of the applied rate (reviewer-calculated based on a theoretical concentration of 122.8 mg a.i./kg in the 0-15 cm soil depth) (Table VI, p. 77). Iodomethane was a maximum concentration of 7.040 mg a.i./kg at 8 hours, decreased to 0.570 mg a.i./kg by day 3, and was 0.001 mg a.i./kg in the 0-15 cm soil depth at day 57, the final sampling interval. Maximum iodomethane concentrations were 4.157 mg a.i./kg (1.3 days) in the 15-30 cm soil depth, 2.677 mg a.i./kg (4 days) in the 30-45 cm soil depth, 1.072 mg a.i./kg (4 days) in the 45-61 cm soil depth, 0.769 mg a.i./kg (4 days) in the 61-76 cm soil depth, 0.403 mg a.i./kg (4 days) in the 76-91 cm soil depth, 0.256 mg a.i./kg (4 days) in the 91-107 cm soil depth, and 0.442 mg a.i./kg (4 days) in the 107-122 cm soil depth (Tables VII-XIII, pp. 79-88). Corresponding concentrations at the end of the study period were ≤ 0.002 mg a.i./kg. The concentration of iodomethane below 122 cm was negligible at 15 and 28 days posttreatment (Tables XIV-XVII, pp. 89-92).

The registrant-calculated half-life of iodomethane in soil under terrestrial field conditions was 4.8 days ($r^2 = 0.887$; p. 64, Figure 11, p. 131), based on the 0-61 cm soil depth.

At the Florida site, the total measured zero-time concentration (all soil depths) was 20.03 mg a.i./kg which is 36.9% of the applied rate (reviewer-calculated based on a theoretical concentration of 54.2 mg a.i./kg in the 0-30 cm soil depth) (Table XVIII, p. 93). Iodomethane decreased from a maximum of 12.290 mg a.i./kg to 1.168 mg a.i./kg by day 5, and was not detected at day 90, the final sampling interval. Maximum iodomethane concentrations were 10.785 mg a.i./kg (0.3 days) in the 30-45 cm soil depth, 8.461 mg a.i./kg (1 day) in the 45-61 cm soil depth, 4.162 mg a.i./kg (1 day) in the 61-76 cm soil depth, 1.343 mg a.i./kg (2 days) in the 76-91 cm soil depth, 0.396 mg a.i./kg (2 days) in the 91-107 cm soil depth, and 0.209 mg a.i./kg (14 days) in the 107-122 cm soil depth (Tables XIX-XXIV, pp. 95-106). Iodomethane was not detected at the end of the study period (90 days). Soil core samples were not collected below 122 cm.

The registrant-calculated half-life of iodomethane in soil under terrestrial field conditions was 5.0 days ($r^2 = 0.9623$; p. 64, Figure 12, p. 132), based on the 0-61 cm soil depth.

5. TRANSFORMATION PRODUCTS: The only transformation product analyzed for, iodide, did not exceed approximately 3% of the applied at either site (Tables XXXII-XXXIII, pp. 118-119). Only test samples collected at 7-8, 14-15, and 28-29 days posttreatment were analyzed for iodide.

Tale 9: Chemical names and CAS numbers for the transformation products of TM-425.

Applicant's Code Name	CAS Number	CAS and/or IUPAC Chemical Name(s)	Chemical formula	Molecular weight	SMILES string
		Iodide			

6. EXTRACTABLE AND NON-EXTRACTABLE RESIDUES: Non-extractable residues were not measured.

Table 10: Dissipation routes of iodomethane under field conditions.

Route of dissipation	% of applied amount (at the end of study period)	
	California site	**Florida site**
Accumulation (residues) in soil/ carry over	0.0008%	0%
Transformation (% of transformation products)	0%	0%
Leaching, if measured	Up to 122 cm	Up to at least 183 cm
Volatilization, if measured	Not measured past 9 days	Not measured past 10 days
Plant uptake, if measured	N/A	N/A
Run off, if measured	Not measured	Not measured
Total		

7. VOLATILIZATION: At the California site, the flux rate for day 0, 1, and 2 following application was estimated as 36%, 9.6% and 5.0% of the application amount, respectively (Appendix C, Table 6, p. 364). At the Florida site, the flux rate for day 0, 1, and 2 following application was estimated as 48.6%, 4.6% and 5.7% of the application amount, respectively (Appendix C, Table 8, p. 366). The study authors stated that the day 1 estimate at the Florida site was biased low due to rainfall during the measurement period. The total mass of iodomethane lost from the soil was 58.4% and 82.4% of the applied from the California and Florida sites, respectively, following the first 9-10 days posttreatment.

8. PLANT UPTAKE: N/A

9. LEACHING: At the California test plot, iodomethane was not detected below 122 cm at concentrations above 0.001 mg/kg soil (Tables VI-XVII, pp. 77-92). At the Florida test plot, iodomethane was detected in all soil depths analyzed (through 122 cm) and in soil buried 152-183 cm (5-6 feet) (Tables XVIII-XXV, pp. 93-107).

10. RUN OFF: Run off was not studied.

11. RESIDUE CARRYOVER: The DT90 value was not calculated for either test plot. After 57 days following application, 0.0008% of the applied iodomethane was detected in the California test plot. In the Florida test plot, 0% of the applied iodomethane was detected after 90 days following application. Iodomethane has no potential to carryover into the following season (Tables VI-XXVI, pp. 77-106).

12. SUPPLEMENTARY STUDY RESULTS: Mean corrected recoveries from the California storage stability study soil samples fortified with 0.05 ppm were 54.5%, 68.5%, 58.0% and 34.7% for storage times of 1, 3, 7, and 30 days, respectively (Table XXX, pp. 114-115). For soil

samples fortified with 50 ppm, the corrected recoveries for the same storage times were 54.9%, 64.7%, 45.7% and 48.2%.

Mean corrected recoveries from the Florida soil storage stability study soil samples fortified with 0.05 ppm for storage times of 3, 7, and 35 days were 82.9%, 68.2% and 60.1%, respectively, and for soil samples fortified with 50 ppm, the corrected recoveries were 89.2%, 73.1%, and 51.6% for the same storage times (Table XXXI, pp. 116-117).

III. STUDY DEFICIENCIES: No deficiencies were noted.

IV. REVIEWER'S COMMENTS:

1. The crop and pesticide history at the Florida trial site were unknown (p. 32). Subdivision N Guidelines require that the test site have no previous use history involving the test compound or closely related compound. Additionally, the study authors stated that the California test site, which had been cropped to artichokes then potatoes in the previous year, had not previously been treated with iodomethane and that the pesticide history for the prior five years was recorded (p. 27). However, the pesticide history was not reported.

2. The registrant-calculated half-lives of iodomethane in the bare-ground plots (4.8 days and 5.0 days, respectively, for the California and Florida sites) were comparable to the observed half-lives and the reviewer-calculated half-lives (4.5 and 4.2 days, respectively; r^2 values were 0.73 and 0.89, respectively). The reviewer-calculated half-lives were calculated using linear regression (all available data). The reviewer notes that the registrant-calculated half-lives were calculated based on the total residue concentration per sampling period (0-61 soil depths) and that the reviewer-calculated half-lives were calculated based on only the 0-15 cm soil depth for the California site and the 0-30 cm soil depth for the Florida site.

3. Evapotranspiration data were reported for each test location in place of pan evaporation data.

4. To confirm that the tarpaulin covering the plot was not a sink for iodomethane, tarpaulin extracts were analyzed from day 0 and day 6 from three subplots of an efficacy trial that were treated with iodomethane at the same target application rate of 235 lbs/acre (pp. 35, 45, and 62). The day 0 tarpaulin had 0.01% of the applied iodomethane and the day 6 had 0.00% of the applied iodomethane (Appendix AJ, pp. 908-910).

5. The study authors state that the volatile nature of iodomethane presents a challenge for recovery during harvesting, storage, and processing of soil (p. 59). They stated that the vast majority of the iodomethane vaporizes upwards through the tarpaulin and into the air, and that iodomethane undergoes breakdown by photolysis and undergoes reaction with soil to form iodide.

6. It was stated that a GC/ECD method was developed and validated for the detection of iodomethane in soil extract (p. 42). The average recovery of iodomethane for soil fortified at 0.0025 ppm, 0.005 ppm, 0.05 ppm, and 50.0 ppm was 100.8%, 107.6%, 97.5%, and 82.5%, respectively (pp. 18-19; Appendix E, pp. 441 and 444).

7. At the California site, the polyethylene tarpaulin was cut lengthwise at day 5 and was removed at day 7 (p. 50). Following removal, the plots were cultivated with chisel and roller ring according to normal practices. At the Florida site, a single row of planting holes was punched in the polyethylene tarpaulin down the center of the bed top at day 16, a typical practice for fresh market tomatoes (p. 51).

8. The buried soil samples collected at the Florida site from the 1 foot depth showed iodomethane concentrations much lower than the core samples (p. 56). The study authors suggest that this difference could be due to the fact that the buried samples were collected much quicker than the cored samples, before iodomethane had equilibrated in the soil. Alternatively, the difference may be due to the steel mesh casing used to collect the buried samples, which may slow down the penetration of iodomethane into the buried soil.

V. REFERENCES: The following references were cited in the study:

1. Degradation and Phase Partition of Methyl Iodide in Soil. J. Gan and S. R. Yates, *J. Agric. Food Chem.*, **44**:4001-4008, 1996.

2. Volatility of Iodomethane (TM-425) Under Field Conditions in California and Florida, Study 893W, F. C. Baker *et al.*, 2002.

3. Determination of Methyl Bromide Desorbed from Charcoal Tubes, Method 39.0, California Dept. of Food and Agriculture.

4. Leucocrystal Violet method; in Standard Methods for the Examination of Water and Wastewater (19th edition), Eaton, Clesceri and Greenberg. [See also; Black and Whittle, *J. Amer. Water Works Assoc.*, **59**, 471 (1967)].