# METHYL BROMIDE CRITICAL USE RENOMINATION FOR PREPLANT SOIL USE (OPEN FIELD OR PROTECTED ENVIRONMENT)

*** EXECUTIVE SUMMARY***

This request is only for California growers who cannot use the best available methyl bromide alternative, 1,3-dichloropropene, on sweet potato transplants because of the combined impact of a state prohibition on its use in January and the township cap on 1,3-D requiring an application factor of 1.9 in December and the cap being exceeded in November (Cal DPR. 2002). The soil for sweet potato slips is fumigated from November through January. Sweet potatoes are transplanted from plant propagules, called slips, which are transplanted between late April and late May. The majority of sweet potatoes are harvested in early November. They are a warm-season crop and are sensitive to even a light frost and must be planted and harvested during seasons where there is no chance of frost. Sweet potato production generally occurs in sandy to loamy sand soils since heavy soils affect yield and root quality.

Sweet potato growers have used methyl bromide for two purposes: fumigating transplants in a greenhouse-like setting and fumigating open fields planted with sweet potatoes. California sweet potato growers have transitioned away from using methyl bromide for open field pre-plant soil fumigation. In 2001 and 2002, California sweet potato producers used no methyl bromide on their open fields. Due to the recent price increases on methyl bromide, growers limited methyl bromide use to fumigating transplants. For open field use, they relied on 1,3 dichloropropene which has satisfactory efficacy in areas of sweet potato production where there is no greater than moderate pest pressures. However, because 1,3 dichloropropene is known to the State of California to cause cancer under state proposition 65, it is subject to township caps (the cap is the maximum amount that can be used within the boundary of a township) in California, as established by the California Department of Pesticide Regulation. One township is equal to an area of 93 square kilometers, or 930 hectares. In Merced County, there is an especially high concentration of crops that require fumigation, particularly sweet potatoes, almonds, nectarines, peaches, and grapes. Therefore, an open-field option other than 1,3 dichloropropene must be available to sweet potato growers when township caps are exceeded. Currently, methyl bromide is the only technically feasible option for sweet potato slips in this region.

## NOMINATING PARTY:
The United States of America

## NAME
USA CUN10 Soil Sweet Potato Slips Grown In Open Field

## BRIEF DESCRIPTIVE TITLE OF NOMINATION:
Methyl Bromide Critical Use Nomination for Preplant Soil Use for Sweet Potato Propagative Hot Beds Grown in Open Fields (Submitted in 2008 for 2010 Use Season)

## CROP NAME (OPEN FIELD OR PROTECTED):
Sweet Potato Slips Grown In Open Fields

## QUANTITY OF METHYL BROMIDE REQUESTED IN EACH YEAR OF NOMINATION:

**TABLE COVER SHEET: QUANTITY OF METHYL BROMIDE REQUESTED IN EACH YEAR OF NOMINATION**

| YEAR | NOMINATION AMOUNT (METRIC TONNES)* |
|---|---|
| **2010** | **18.144** |

*This amount includes methyl bromide needed for research.

## SUMMARY OF ANY SIGNIFICANT CHANGES SINCE SUBMISSION OF PREVIOUS NOMINATIONS:

None.

## REASON OR REASONS WHY ALTERNATIVES TO METHYL BROMIDE ARE NOT TECHNICALLY AND ECONOMICALLY FEASIBLE:

This request is for growers who cannot use 1, 3-dichloropropene because of: the California prohibition on its use in January and the township cap on 1,3-D requiring an application factor of 1.9 in December and the cap being exceeded in November (Cal DPR 2002). The primary alternative to the use of methyl bromide in the production of sweet potato transplant slips in California is 1,3-dichloropropene (1,3-D or Telone®) plus chloropicrin. The State of California, however, has established township caps regulating the maximum amount of 1,3-D that can be applied in any one year in a township. This regulation was implemented because under California law (proposition 65) 1,3-D (Telone®) is known to the State of California to cause cancer. These townships are 36 sq mi. areas (6 mi x 6 mi (approximately 930 hectares) where no more than 9,600 "adjusted" gallons of 1,3-D (36,340 liters; 90,050 lbs/ 40,846 kg) may be applied. Adjusted pounds are the actual pounds multiplied by an application factor that is a function of the method of application (deep or shallow shank) and the time of year. For example, a factor of 1.0 would be used if the method of application were deep (>18 inch) shank while a factor of 1.9 would be used in otherwise identical circumstances if shallow (>12 inch) shank was the application method (Trout 2001). The application factor increases for 1,3-D applications made during winter months.

In the early years of 1,3-D use, less than the maximum amount allowed was used in many of the townships. California gave townships credit for any cap allowance that was unused between 1995 and 2001, thereby allowing the maximum use in the township to be double[1] (and in some instances, more than double) for up to 6 years. This cap increase, however, is analogous to spending down accumulated savings—when the excess allowance is used, the maximum usage reverts to the original limit.

Growers of sweet potato slips face a difficult situation with the township caps because all of the fumigated areas fall within just four townships in Merced County. Merced county has already used up their 2x cap allowance, so they have already reverted to the lower 1,3-D use limit. Additional evidence that the 1,3-D cap will be exceeded in 2010 is that in 2002, and at least twice since then, the California Department of Pesticide Regulation (CDPR) gave a special allowance to one of the Merced county townships, where sweet potato was the primary fumigant use, to exceed their cap by 16,500 adjusted pounds during the 2001/2002 growing season. Similar allowances have been given several times since 2002 in Merced county (Segawa, personal communication 2007)

There are over 5,000 acres in sweet potato production, 131acres (plant bed) of which are fumigated with methyl bromide, and 4908ac (open field) treated with 1,3-D. When the banked allowance is expended this will leave 2,227 acres (or 44%) that cannot use 1,3-D that otherwise would have. In 2003, for example, the cap (without any bank) only allowed for 316,554 pounds of 1,3-D, while there was demand for 583,807 pounds.

*(Details on this page are requested under Decision Ex. I/4(7), for posting on the Ozone Secretariat website under Decision Ex. I/4(8).)*

*This form is to be used by holders of single-year exemptions to reapply for a subsequent year's exemption (for example, a Party holding a single-year exemption for 2005 and/or 2006 seeking further exemptions for 2007). It does not replace the format for requesting a critical-use exemption for the first time.*

*In assessing nominations submitted in this format, TEAP and MBTOC will also refer to the original nomination on which the Party's first-year exemption was approved, as well as any supplementary information provided by the Party in relation to that original nomination. As this earlier information is retained by MBTOC, a Party need not re-submit that earlier information.*

[1] The township cap was set so that a lifetime exposure at the maximum amount allowed would result in no more than one additional cancer per year per million exposed individuals. Given that the risk mitigation was the control of maximum lifetime exposure, rather than maximum daily or annual exposure, allowing townships to use their unused 'ceiling' (the township cap) in subsequent years until the total use in a township from 1995 to the present was equal to the sum of the maximum allowed each year form 1995 to the present, would not cause excessive risk.

## NOMINATING PARTY CONTACT DETAILS:


| | |
|---|---|
| Contact Person: | Hodayah Finman |
| Title: | Foreign Affairs Officer |
| Address: | Office of Environmental Policy<br>U.S. Department of State<br>2201 C Street, N.W. Room 2658<br>Washington, D.C. 20520<br>U.S.A. |
| Telephone: | (202) 647-1123 |
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Following the requirements of Decision IX/6 paragraph (a)(1) The United States of America has determined that the specific use detailed in this Critical Use Nomination is critical because the lack of availability of methyl bromide for this use would result in a significant market disruption. XX Yes ☐ No

_____ _____ _____

Signature Name Date

Title: _____

## CONTACT OR EXPERT(S) FOR FURTHER TECHNICAL DETAILS:


| | |
|---|---|
| Contact/Expert Person: | Richard Keigwin |
| Title: | Division Director |
| Address: | Biological and Economic Analysis Division<br>Office of Pesticide Programs<br>U.S. Environmental Protection Agency<br>1200 Pennsylvania Avenue, N.W. Mailcode 7503P<br>Washington, D.C. 20460<br>U.S.A. |
| Telephone: | (703) 308-8200 |
| Fax: | (703) 308-7042 |
| E-mail: | Keigwin.Richard@epa.gov |


## LIST OF DOCUMENTS SENT TO THE OZONE SECRETARIAT IN OFFICIAL NOMINATION PACKAGE:

| **1. PAPER DOCUMENTS:**<br>**Title of paper documents and appendices** | **No. of pages** | **Date sent to Ozone Secretariat** |
|---|---|---|
| USA CUN10 SOIL SWEET POATO SLIPS Open Field | | |
| | | |
| | | |
| | | |
| **2. ELECTRONIC COPIES OF ALL PAPER DOCUMENTS:**<br>***Title of each electronic file (for naming convention see notes above)** | **No. of kilobytes** | **Date sent to Ozone Secretariat** |
| USA CUN10 SOIL SWEET POTATO SLIPS Open Field | | |
| | | |
| | | |
| | | |

* Identical to paper documents

# *TABLE OF CONTENTS*

***Part A: INTRODUCTION*** ..... ***6***
Renomination Form Part G: CHANGES TO QUANTITY OF METHYL BROMIDE REQUESTED ..... 12
***Part B: CROP CHARACTERISTICS AND METHYL BROMIDE USE*** ..... ***13***
***Part C: TECHNICAL VALIDATION*** ..... ***17***
***Part D: EMISSION CONTROL*** ..... ***25***
***Part E: ECONOMIC ASSESSMENT*** ..... ***28***
***Part F: NATIONAL MANAGEMENT STRATEGY FOR PHASE-OUT OF THIS NOMINATED CRITICAL USE*** ..... ***29***
***Part G: CITATIONS*** ..... ***34***
***APPENDIX A: METHYL BROMIDE USAGE NEWER NUMBERICAL INDEX Extracted (BUNNIE)*** ..... ***35***

# *TABLE OF TABLES*

TABLE A 1: METHYL BROMIDE NOMINATED ..... 7
TABLE A 2: EXECUTIVE SUMMARY ..... 7
Table A 3: Proportion of Crops Grown Using Methyl Bromide ..... 9
Table A 4: Amount of Methyl Bromide Requested for Critical Use ..... 10
TABLE B 1. KEY DISEASES AND WEEDS ..... 13
TABLE B 2. CHARACTERISTICS OF CROPPING SYSTEM ..... 13
TABLE B 3. CHARACTERISTICS OF CLIMATE AND CROP SCHEDULE ..... 14
TABLE B 3 B. SHAFTER CALIFORNIA WEATHER DATA ..... 14
TABLE B 4. CALIFORNIA -HISTORIC PATTERN OF USE OF METHYL BROMIDE ..... 16
Table C 1: Reason for Alternatives Not Being Feasible ..... 17
Table C 2: Effectiveness of Alternatives – Nematodes ..... 18
Table C.3: Alternatives Yield Loss Data Summary ..... 19
Table C 4: Present Registration Status of Alternatives ..... 22
Table D 1 Techniques to Minimize Methyl Bromide Use and Emissions ..... 25

## Part A: INTRODUCTION
## Renomination Part A: SUMMARY INFORMATION

**1. (Renomination Form 1.) NOMINATING PARTY AND NAME:**
The United States of America
USA CUN10 SOIL Sweet Potato Propagative Hot Beds Grown in Open Field

**2. (Renomination Form 2.) DESCRIPTIVE TITLE OF NOMINATION:**
Methyl Bromide Critical Use Nomination for Preplant Soil Use for Sweet Potato Propagative Hot Beds Grown in Open Fields (Submitted in 2008 for 2010 Use Season)

**3. CROP AND SUMMARY OF CROP SYSTEM (***e.g. open field (including tunnels added after treatment), permanent glasshouses (enclosed), open ended polyhouses, others (describe)***):**

This request is for growers who cannot use 1,3-dichloropropene because of: the California prohibition on its use in January and the township cap on 1,3-D requiring an application factor of 1.9 in December and the cap being exceeded in November (Cal DPR. 2002). The soil for sweet potato slips is fumigated from November through January. Sweet potatoes are transplanted from plant propagules, called slips that are transplanted between late April and late May. The majority of sweet potatoes are harvested in early November. They are a warm-season crop and are sensitive to even a light frost and must be planted and harvested during seasons where there is no chance of frost. Sweet potato production generally occurs in sandy to loamy sand soils since heavy soils affect yield and root quality.

Sweet potato growers have used methyl bromide for two purposes: fumigating transplants in a greenhouse-like setting and fumigating open fields planted with sweet potatoes. California sweet potato growers have transitioned away from using methyl bromide for open field pre-plant soil fumigation. In 2001 and 2002, California sweet potato producers used no methyl bromide on their open fields. Due to the recent price increases on methyl bromide, growers limited methyl bromide use to fumigating transplants. For open field use, they relied on 1,3 dichloropropene which has satisfactory efficacy in areas of sweet potato production where there is no greater than moderate pest pressures. However, because 1,3 dichloropropene is known to the State of California to cause cancer under proposition 65, it is subject to township caps (the cap is the maximum amount that can be used within the boundary of a township) in California, as established by the California Department of Pesticide Regulation. One township is equal to an area of 93 square kilometers, or 930 hectares. In Merced County, there is an especially high concentration of crops that require fumigation, particularly sweet potatoes, almonds, nectarines, peaches, and grapes. Therefore, an open-field option other than 1,3 dichloropropene must be available to sweet potato growers when township caps are exceeded. The MBTOC list of alternatives for sweet potatoes is limited to fallow/crop rotation and flooding/water management.

California growers produce their transplants (slips) for propagation in open fields and initially cover plants with clear plastic row covers supported by hoops. Typically individual fields to be planted were either fallowed or planted to rye or sweet potatoes the previous season. The transplants (slips) must be watered during establishment and the low rainfall amounts and public

water restrictions that exist in the production areas make it imperative that fields are situated near private irrigation wells, which significantly limits the land available for growing transplants.

- According to California Dept. of Pesticide Regulations the use of 1, 3-dichloropropene applied as a mechanical soil injection (shank application) or drip application is prohibited in California by regulation during December and January. Therefore, there are no application methods available for use during part of the typical fumigation timing.

**4. AMOUNT OF METHYL BROMIDE NOMINATED (***give quantity requested (metric tonnes) and years of nomination***):**
**(Renomination Form 3.) YEAR FOR WHICH EXEMPTION SOUGHT:**

**TABLE A 1: QUANTITY OF METHYL BROMIDE REQUESTED IN EACH YEAR OF NOMINATION**

| YEAR | NOMINATION AMOUNT (METRIC TONNES)* |
|---|---|
| **2010** | **18.144** |

*This amount includes methyl bromide needed for research.

**(Renomination Form 4.) SUMMARY OF ANY SIGNIFICANT CHANGES SINCE SUBMISSION OF PREVIOUS NOMINATIONS** (e.g. changes to requested exemption quantities, successful trialling or commercialisation of alternatives, etc.)

None

**5. (i) BRIEF SUMMARY OF THE NEED FOR METHYL BROMIDE AS A CRITICAL USE** (e.g. no registered pesticides or alternative processes for the particular circumstance, plantback period too long, lack of accessibility to glasshouse, unusual pests)**:**

The US nomination is for growers who will be denied the use of 1,3-D plus chloropicrin as a result of 1,3-D township caps being met. Additionally, growers and crop specialists are uncertain of the pest control suitability of a 1,3-D plus chloropicrin product for pests other than nematodes, especially weeds.

**TABLE A 2: EXECUTIVE SUMMARY***

| Region | | Sweet Potato Council of California - Sweet Potato Slips | Sector Total or Average |
|---|---|---|---|
| EPA Preliminary Value | kgs | 18,144 | 18,144 |
| EPA Amount of All Adjustments | kgs | - | - |
| Most Likely Impact Value for Treated Area | kgs | 18,144 | 18,144 |
| | ha | 81 | 81 |
| | Rate | 224 | 224 |
| 2010 Total US Sector Nomination | | | 18,144 |

* *See Appendix A for a complete description of how the nominated amount was calculated.*

**(ii) STATE WHETHER THE USE COVERED BY A CERTIFICATION STANDARD. (Please provide a copy of the certification standard and give basis of standard (e.g. industry**

**standard, federal legislation etc.). Is methyl bromide-based treatment required exclusively to meet the standard or are alternative treatments permitted? Is there a minimum use rate for methyl bromide? Provide data which shows that alternatives can or cannot achieve disease tolerances or other measures that form the basis of the certification standard).**

This request is not used to meet a certification standard.

**6. SUMMARISE WHY KEY ALTERNATIVES ARE NOT FEASIBLE** (Summary should address why the two to three best identified alternatives are not suitable, < 200 words)**:**

This request is only for those growers who cannot use 1,3-dichloropropene due to regulatory constraints. Fumigation with 1,3-dichloropropene is prohibited in California during December and January. Sweet potato slips are typically fumigated from November through January in order to meet a market window. In addition, those growers who fumigate in November do not have 1, 3-dichloropropene available because the township cap has been exceeded by other crops that fumigate earlier in the year (see Trout 2006). The combination of 1, 3-dichlropropeme plus chloropicrin is highly rated for control of nematodes, certain diseases and some weed species. This is based upon years of grower experiences on other crops using the respective ingredients alone and in combinations. This combination still does not provide adequate control the key weed species present during this time of year [pigweed (*Chenopodium spp*.) and crabgrass (*Digitaria spp*.)] and may not control diseases not listed on chloropicrin labels.

The recent Federal registration of Iodomethane has not been used to adjust the amount of methyl bromide requested in this CUE. Although iodomethane has been registered at the federal level for the period of October 1, 2007 to October 1, 2008 only certain crops are included in this registration, specifically: Strawberry, Pepper, Tomato, Ornamentals, Nurseries, Trees and Vines.

At present state registrations are in place for 18 states, many of which do not request methyl bromide under the CUE process. These states are: Delaware, Georgia, Kentucky, Louisiana, Maine, Michigan, Mississippi, Missouri, New Mexico, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Tennessee, Texas, Utah, and Virginia. Neither Florida not California, the two states that are the major users of methyl bromide have registered iodomethane.

Given the limited crops, the time-limited Federal registration (it is valid for one year only, October 2007 to October 2008), and the lack of State registrations in the major methyl bromide-using States, EPA feels that it is appropriate not to include iodomethane as a methyl bromide substitute at this time.

In addition, several other factors work to limit the adoption of iodomethane as a replacement for methyl bromide in the short run. These range from more extensive regulatory constraints vis a vis methyl bromide to the normal process of technology adoption which is not instantaneous.

Like methyl bromide, iodomethane is a restricted use pesticide. In addition to pesticide applicator training, however, a license to apply iodomethane also requires company-provided training. Once training has been provided, iodomethane application must be under the direct (observed) supervision of these trained personnel. We do not believe that classes can be

organized and a sufficient number of individuals trained across registered uses so that large-scale adoption of iodomethane can occur in the short-run.

Iodomethane has other restrictions as well. Unlike the case with methyl bromide, the application area must be surrounded by a scalable buffer that increases in size as the field size and or the application rate increases. The buffer can be as much as 490 feet (150 meters) for a 40 acre (16 hectare) field. There are other restrictions as well. For example iodomethane cannot be used within 0.25 miles (over 400 meters) from a 'sensitive' occupied site such as a school or nursing home.

Furthermore, very few growers have experience using iodomethane. They will not have had experience selecting a dose and determining which cultural practices are necessary to obtain the best results for the iodomethane application. This will cause them to be reluctant to subject a significant portion of their crop to the experiment of iodomethane.

Although the company producing iodomethane does market other chemicals, it is the understanding of the USG that the company plans to develop a new distribution network. This network is not yet established and is yet another reason why growers may be reluctant to experiment with iodomethane in 2008.

Taking all of these factors into account, along with the limited time horizon of the registration, EPA believes that the appropriate method for addressing the registration of iodomethane is to reduce that amount of iodomethane allocated in the case that the registration is renewed and to adjust the reductions as other States register this compound.

This is the procedure followed for the 2008 allocation year.

**7. (i) PROPORTION OF CROP GROWN USING METHYL BROMIDE** *(provide local data as well as national figures. Crop should be defined carefully so that it refers specifically to that which uses or used methyl bromide. For instance processing tomato crops should be distinguished from round tomatoes destined for the fresh market)*:

**TABLE A 3: PROPORTION OF CROPS GROWN USING METHYL BROMIDE**

| REGION WHERE METHYL BROMIDE USE IS REQUESTED | TOTAL CROP AREA IN 2003 (HA) | PROPORTION OF TOTAL CROP AREA TREATED WITH METHYL BROMIDE IN 2003 (%) |
|---|---|---|
| Sweet Potato Council of California | Unknown | 100% |
| **National Total:** | **Unknown** | **Unknown** |

.

**(ii) IF PART OF THE CROP AREA IS TREATED WITH METHYL BROMIDE, INDICATE THE REASON WHY METHYL BROMIDE IS NOT USED IN THE OTHER AREA, AND IDENTIFY WHAT ALTERNATIVE STRATEGIES ARE USED TO CONTROL THE TARGET PATHOGENS AND WEEDS WITHOUT METHYL BROMIDE THERE.**

Organic sweet potato growers do not use methyl bromide, or any other fumigants, in their transplant beds. It has been observed that fewer and less vigorous transplants result. Since data are not available to address these options, the extent of these differences cannot be quantified. In

addition, in order to produce their crops, organic producers of sweet potatoes must use significant amounts of hand weeding. Current costs are not available. However, the State of California has recently acted to significantly restrict hand weeding and to mandate that hoes must be at least 4 feet (1.2 meters) in length. The new regulations allow only a few hours of hand weeding per day. This regulatory action effectively eliminated hand weeding for commercial scale operations; it is only feasible in situations such as organic production, where the scale of operation is small and where growers can command a premium price.

### (iii) WOULD IT BE FEASIBLE TO EXPAND THE USE OF THESE METHODS TO COVER AT LEAST PART OF THE CROP THAT HAS REQUESTED USE OF METHYL BROMIDE? WHAT CHANGES WOULD BE NECESSARY TO ENABLE THIS?

The 1, 3-D township cap limitation effectively limits the amount of 1,3-D that can be used on a sliding scale. This scale is a function of amount, method of fumigation, and time of year. To the extent that 1, 3-D or a 1, 3-D chloropicrin mixture can be used, it is being used. California growers prefer to use 1, 3-D when possible (where the key pests are controlled and where the township caps are not binding) as it is less costly than mixtures using methyl bromide. The US nomination is for growers who will be denied the use of 1,3-D alone or in combination with chloropicrin as a result of 1, 3-D township caps and regulations. Solarization is undergoing evaluation, however, it is not likely that solarization can completely replace fumigation. Land for sweet potato operation is often leased. Solarization can only take place during the same time period as cropping (the non-cropping season is not warm enough to allow soils to reach the temperatures necessary to kill key pests to the required soil depths.

## 8. AMOUNT OF METHYL BROMIDE REQUESTED FOR CRITICAL USE (*Duplicate table if a number of different methyl bromide formulations are being requested and/or the request is for more than one specified region*):

**TABLE A 4: AMOUNT OF METHYL BROMIDE REQUESTED FOR CRITICAL USE**

| **REGION** | SWEET POTATO COUNCIL OF CALIFORNIA |
|---|---|
| **YEAR OF EXEMPTION REQUEST** | **2010** |
| **QUANTITY** OF METHYL BROMIDE NOMINATED (METRIC TONNES) | See Appendix A |
| **TOTAL CROP AREA** TO BE TREATED WITH THE METHYL BROMIDE OR METHYL BROMIDE/PIC FORMULATION (HA) (NOTE: IGNORE REDUCTIONS FOR STRIP TREATMENT) | |
| METHYL BROMIDE USE: **BROADACRE OR STRIP/BED** TREATMENT? | Broadcast |
| **PROPORTION OF BROADACRE AREA** WHICH IS TREATED IN STRIPS; E.G. 0.54, 0.67 | 1.0 |
| **FORMULATION** (RATIO OF METHYL BROMIDE/PIC MIXTURE) TO BE USED FOR CALCULATION OF THE CUE E.G. 98:2, 50:50 | 57:43 |
| **APPLICATION RATE*** (KG/HA) FOR THE FORMULATION | See Appendix A |

| REGION | SWEET POTATO COUNCIL OF CALIFORNIA |
|---|---|
| YEAR OF EXEMPTION REQUEST | 2010 |
| DOSAGE RATE* ($G/M^2$) (I.E. ACTUAL RATE OF FORMULATION APPLIED TO THE AREA TREATED WITH METHYL BROMIDE/PIC ONLY) | |

* Give here actual rate per treated area (e.g. the area directly treated under film) not rate per total area of field.

## 9. SUMMARISE ASSUMPTIONS USED TO CALCULATE METHYL BROMIDE QUANTITY NOMINATED FOR EACH REGION *(include any available data on historical levels of use):*

The amount of methyl bromide nominated by the U.S. was calculated as follows:

- The percent of regional hectares in the applicant's request was divided by the total area planted in that crop in the region covered by the request. Values greater than 100 percent are due to the inclusion of additional varieties in the applicant's request that were not included in the USDA National Agricultural Statistics Service surveys of the crop.
- There was no double counting in this sector.
- Growth or increasing production (the amount of area requested by the applicant that is greater than that historically treated) was subtracted. The applicant that included growth in their request had the growth amount removed.
- Only the acreage experiencing one or more of the following impacts were included in the nominated amount: moderate to heavy key pest pressure, regulatory impacts, karst topographic features, buffer zones, unsuitable terrain, and cold soil temperatures.

## Renomination Form Part G: CHANGES TO QUANTITY OF METHYL BROMIDE REQUESTED

*This section seeks information on any changes to the Party's requested exemption quantity.*

**(Renomination Form 16.) CHANGES IN USAGE REQUIREMENTS**
*Provide information on the nature of changes in usage requirements, including whether it is a change in dosage rates, the number of hectares or cubic metres to which the methyl bromide is to be applied, and/or any other relevant factors causing the changes.*

There are no changes in usage requirements in this sector.

**(Renomination Form 17.) RESULTANT CHANGES TO REQUESTED EXEMPTION QUANTITIES**

| | |
|---|---|
| QUANTITY REQUESTED FOR PREVIOUS NOMINATION YEAR: | 18,144 kg |
| QUANTITY APPROVED BY PARTIES FOR PREVIOUS NOMINATION YEAR: | 18,144 kg |
| QUANTITY (KG) REQUIRED FOR YEAR TO WHICH THIS APPLICATION REFERS: | 18,144 kg |

## Part B: CROP CHARACTERISTICS AND METHYL BROMIDE USE

### 10. KEY DISEASES AND WEEDS FOR WHICH METHYL BROMIDE IS REQUESTED AND SPECIFIC REASON FOR THIS REQUEST IN EACH REGION (*List only those target weeds and pests for which methyl bromide is the only feasible alternative and for which CUE is being requested*):

**TABLE B 1. KEY DISEASES AND WEEDS**

| REGION WHERE METHYL BROMIDE USE IS REQUESTED | KEY DISEASE(S) AND WEED(S) TO SPECIES AND, IF KNOWN, TO LEVEL OF RACE | SPECIFIC REASONS WHY METHYL BROMIDE NEEDED (E.G. EFFECTIVE HERBICIDE AVAILABLE, BUT NOT REGISTERED FOR THIS CROP; MANDATORY REQUIREMENT TO MEET CERTIFICATION FOR DISEASE TOLERANCE; NO HOST RESISTANCE FOR A SPECIFIC RACE) |
|---|---|---|
| SWEET POTATO COUNCIL OF CALIFORNIA | **Root-knot nematodes** (*Meloidogyne incognita*) | Township caps will be reached and prevent use of the best available alternative Telone C-35. |
| | **Fungal Diseases**: Pox (*Streptomyces ipomea*); Scurf (*Monilochaetes* infuscans); Fusarium wilt (*Fusarium oxysporum*); Black rot (*Ceratocystis fimbriata)* | |
| | **Weeds**: pigweed (*Chenopodium spp.*); crabgrass (*Digitaria spp.*) | |
| | **Grubs** (*Scarabid* beetles) | |
| | **Wireworms** (*Limonius spp.*) | |

### 11. (i) CHARACTERISTICS OF CROPPING SYSTEM AND CLIMATE (Place major attention on the key characteristics that affect the uptake of alternatives):

**TABLE B 2. CHARACTERISTICS OF CROPPING SYSTEM**

| CHARACTERISTICS | REGION WHERE METHYL BROMIDE IS REQUESTED |
|---|---|
| | SWEET POTATO COUNCIL OF CALIFORNIA |
| **CROP TYPE**, E.G. TRANSPLANTS, BULBS, TREES OR CUTTINGS | Development of transplants (slips) from tubers |
| **ANNUAL OR PERENNIAL** CROP (STATE NUMBER OF YEARS BETWEEN REPLANTING) | Propagative beds are used annually |
| **TYPICAL CROP ROTATION** (IF ANY) AND USE OF METHYL BROMIDE FOR OTHER CROPS IN THE ROTATION (IF ANY) | Land used the previous year could have been fallow, rye, or sweet potatoes with many consecutive hotbed plantings possible. |
| **SOIL TYPES**: (SAND LOAM, CLAY, ETC.) | Light soil with 0-2% organic matter |
| **TYPICAL DATES OF PLANTING AND HARVEST** | Planting is done in Feb-Mar and harvest is Apr-June |
| **TYPICAL DATES OF METHYL BROMIDE FUMIGATION** | Fumigation is Feb-Jan |
| **FREQUENCY** OF METHYL BROMIDE FUMIGATION (E.G. EVERY TWO YEARS) | Annually |
| **TYPICAL SOIL TEMPERATURE** RANGE DURING METHYL BROMIDE FUMIGATION (E.G. 15-20°C) | 10-18.3°C |
| **OTHER RELEVANT FACTORS**: | No other relevant factors were |

| CHARACTERISTICS | REGION WHERE METHYL BROMIDE IS REQUESTED |
|---|---|
| | SWEET POTATO COUNCIL OF CALIFORNIA |
| | identified |

**TABLE B 3 A. CHARACTERISTICS OF CLIMATE AND CROP SCHEDULE**

| | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | JAN | FEB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLIMATIC ZONE | USDA climate zone 10b | | | | | | | | | | | |
| SOIL TEMP. *(°C)* | See Table B 3 B below | | | | | | | | | | | |
| RAINFALL *(mm)* | 300mm per year; private wells must be available to supplement the low rainfall rate | | | | | | | | | | | |
| OUTSIDE TEMP. *(°C)* | 19.1/ 4.6 | 21.3/ 6.1 | 26.8/ 10.1 | 30.4/ 12.6 | 33.2/ 15.1 | | | | 16.1/ 3.3 | 12/ 2.2 | 11.4/ 1.8 | 15/3. 1 |
| FUMIGATION SCHEDULE | | | | | | | | | **X** | **X** | **X** | |
| PLANT HOT BEDS | X | | | | | | | | | | | X |
| HARVEST SLIPS & PLANT FIELD BEDS | | X | X | X | X | | | | | | | |

**Footnote:** Air Temperature (°C) Madera County: High /Low 2000-2005 data

**TABLE B 3 B. SHAFTER CALIFORNIA WEATHER DATA**

| Month | Precip (inch) | Air Temp max ($^{o}$ F) | Air Temp min ($^{o}$ F) | Soil Temp max ($^{o}$ F) | Soil Temp min ($^{o}$ F) | Solar Radiation (Langley) |
|---|---|---|---|---|---|---|
| **January** | 0.05 | 57.1 | 37.3 | 51.1 | 49.6 | 187.1 |
| **February** | 0.05 | 63.2 | 40.2 | 53.5 | 51.6 | 279.1 |
| **March** | 0.04 | 69.5 | 44.2 | 58.4 | 56.1 | 406.8 |
| **April** | 0.01 | 76.5 | 46.5 | 63.7 | 60.6 | 543.4 |
| **May** | 0.01 | 83.8 | 52.4 | 70.3 | 67.0 | 634.6 |
| **June** | 0.00 | 89.8 | 57.3 | 75.7 | 72.3 | 692.2 |
| **July** | 0.00 | 94.0 | 61.5 | 80.1 | 76.8 | 683.1 |
| **August** | 0.00 | 94.4 | 61.0 | 80.5 | 77.3 | 622.5 |
| **September** | 0.00 | 90.6 | 56.0 | 76.2 | 73.4 | 513.8 |
| **October** | 0.01 | 82.1 | 48.3 | 69.5 | 67.0 | 386.5 |
| **November** | 0.02 | 67.2 | 39.3 | 60.3 | 58.4 | 257.8 |
| **December** | 0.03 | 56.8 | 34.6 | 52.9 | 51.3 | 183.5 |
| **Yearly** | 7.00 **Total** | 77.1 | 48.2 | 66.0 | 63.5 | 164422 **Total** |

**Footnote:**
**Precipitation (inch):** Daily total measured in a 20 cm (8 in) diameter gauge
**Air temperature (F):** Daily max/min measured at 1.5 m (4.92 ft).
**Soil temperature (F):** Daily max/min measured at a 15 cm (6 in) depth.
**Solar radiation (langley):** Daily global radiation measured by Licor pyranometer at 2 m (6.5 ft).
Available online at
http://www.ipm.ucdavis.edu/calludt.cgi/WXSTATIONAVG?MAP=kern.html&STN=SHAFTER.A

### (ii) INDICATE IF ANY OF THE ABOVE CHARACTERISTICS IN 11.(i) PREVENT THE UPTAKE OF ANY RELEVANT ALTERNATIVES?

Due to the low rainfall and water restrictions preventing the use of public water for crop irrigation prior to April, it is difficult to rotate land used for hotbeds because they need to be situated close to private water sources (e.g., wells).

## 12. HISTORIC PATTERN OF USE OF METHYL BROMIDE, AND/OR MIXTURES CONTAINING METHYL BROMIDE, FOR WHICH AN EXEMPTION IS REQUESTED

(*Add separate table for each major region specified in Question 8*):

**TABLE B 4. CALIFORNIA -HISTORIC PATTERN OF USE OF METHYL BROMIDE**

| **FOR AS MANY YEARS AS POSSIBLE AS SHOWN SPECIFY:** | **2001** | **2002** | **2003** | **2004** | **2005** | **2006** |
|---|---|---|---|---|---|---|
| **AREA TREATED** (HECTARES) | 71 | 81 | 121 | 42 | 48 | 59 |
| **RATIO** OF BROADACRE METHYL BROMIDE USE TO STRIP/BED USE | 100% Broadcast | | | | | |
| AMOUNT OF METHYL BROMIDE **ACTIVE INGREDIENT USED** (TOTAL KG) | 15,876 | 18,144 | 27,216 | 9,525 | 10,795 | 13,122 |
| **FORMULATIONS** OF METHYL BROMIDE. | 57:43 | 57:43 | 57:43 | 57:43 | 57:43 | 57:43 |
| **METHOD** BY WHICH METHYL BROMIDE APPLIED | Shanked to 45.7 cm depth & tarped | | | | | |
| **APPLICATION RATE** OF FORMULATIONS IN KG/HA* | 224 | 224 | 224 | 224 | 224 | 224 |
| ACTUAL **DOSAGE RATE** OF FORMULATIONS ($G/M^2$)* | 22.4 | 22.4 | 22.4 | 22.4 | 22.4 | 22.4 |

*For broadacre treatment application rate and dosage rate may be the same

## Part C: TECHNICAL VALIDATION
## Renomination Form Part D: REGISTRATION OF ALTERNATIVES

**13. REASON FOR ALTERNATIVES NOT BEING FEASIBLE** (Provide detailed information on a minimum of the best two or three alternatives as identified and evaluated by the Party, and summary response data where available for other alternatives (for assistance on potential alternatives refer to MBTOC Assessment reports, available at *http://www.unep.org/ozone/teap/MBTOC* , other published literature on methyl bromide alternatives and Ozone Secretariat alternatives when available):

**TABLE C 1: REASON FOR ALTERNATIVES NOT BEING FEASIBLE**

| NAME OF ALTERNATIVE | TECHNICAL AND REGULATORY* REASONS FOR THE ALTERNATIVE NOT BEING FEASIBLE OR AVAILABLE |
|---|---|
| **CHEMICAL ALTERNATIVES** | |
| 1,3-D | Recommended by crop specialists principally for control of nematodes; township caps; not permitted to be used in January; 1.9 application factor applied against use cap when used in December |
| Metam-sodium | Recommended by crop specialists for general control of diseases, weeds and nematodes; chemical frequently cited as providing inconsistent efficacy; sprinkler and flood applications methods are generally considered the most consistently effective methods of application since the chemical is distributed more effectively in the soil with these methods; sprinkler applications require a 500' (152 meter) untreated buffer where occupied structures are present |
| Chloropicrin | Recommended by crop specialists principally for control of fungal diseases on various crops |
| **NON CHEMICAL ALTERNATIVES** | |
| Fallowing/Crop rotation | Low rainfall and water restrictions limit freedom to rotate the land because hot bed sites must be near private irrigation sources; since most land is leased fallowing is not considered a viable option for many growers because it is an expense only option and does not provide any income |
| Solarization | Needs to be evaluated in the future to determine if it has any utility; since most land is leased solarization is not considered a viable option for many growers because it is an expense only option and does not provide any income |
| **COMBINATION OF ALTERNATIVES** | |
| 1,3-D plus chloropicrin | Recommended for control of nematodes and certain diseases; weed control generally found to be unacceptable therefore an additional option for controlling weeds may be necessary |

Add more rows if necessary

* Regulatory reasons include local restrictions (e.g. occupational health and safety, local environmental regulations) and lack of registration.

** Citations should be recorded by a number only, to indicate citations listed in Question 22.

## 14. LIST AND DISCUSS WHY REGISTERED PESTICIDES AND HERBICIDES ARE CONSIDERED NOT EFFECTIVE AS TECHNICAL ALTERNATIVES TO METHYL BROMIDE (*Provide information on a minimum of two best alternatives and summary response data where available for other alternatives)*:

The work by Stoddard (2002) did not evaluate the impact of plant pathogens but it does demonstrate that nematodes cannot be effectively controlled with the alternatives and shows that the overall impact of nematodes and plant pathogens can cause yield losses can be as high as 18 to 48%

**TABLE C 2: EFFECTIVENESS OF ALTERNATIVES – NEMATODES**

| Treatment* | Rate (kg ai/ha) | Root Knot Nematode (#/250 ml soil) | Yield (kg/ha) | Yield as % of MBr |
|---|---|---|---|---|
| Control | 0 | 925 ns | 15142 | 53% |
| Metam sodium | 356 | 963 | 23520 | 82% |
| Ethoprop | 9.9 | 1350 | 14963 | 52% |
| MBr | 224 | 375 | 28806 | 100% |

Stoddard, 2002

*Yield per plot, methyl bromide and metham sodium were significantly better than the other two. There were no significant differences between nematode counts.

## 15. STATE RELATIVE EFFECTIVENESS OF RELEVANT ALTERNATIVES COMPARED TO METHYL BROMIDE FOR THE SPECIFIC KEY TARGET PESTS AND WEEDS FOR WHICH IT IS BEING REQUESTED (*Use the same regions as in Section 10 and provide a separate table for each target pest or disease for which methyl bromide is considered critical. Provide information in relation to a minimum of the best two or three alternatives.*):

The Sweet Potato Council of California supports university research and collaborates extensively with the University of California Cooperative Extension Program in Merced County. As the sweet potato industry is small, it is often difficult to obtain funding for alternatives, but the Council has strong future research plans to further evaluate the use of cover crops (i.e., radish, vetch, and barley) in conjunction with 1,3 dichloropropene, Vapam (metam-sodium), and Mocap (ethoprop).

Furthermore, the University of California Cooperative Extension and the USDA Agricultural Research Service are actively engaged in numerous research projects evaluating both chemical fumigants and cropping systems. Researchers have found that brassica (including both wild and domestic plants such as mustard, kale, cabbage, rapeseed, turnips, and radishes) residues, when incorporated into the soil, reduce the incidence of several disease pathogens, including *Pythium*, *Rhizoctonia*, *Verticillium*, and root knot nematodes. Additional research that could be undertaken, contingent on funding, would be: (1) research on the prospect of lowering 1,3 dichloropropene use rates when used in conjunction with non-host cover crops; and (2) Use of non-host cover crops/fallowing in conjunction with the other registered alternatives, such as

ethoprop, metam-sodium, and aldicarb. The new nematode-resistant potato Bienville will also be available in limited amounts and will be tested in several fields.

Resistance to Diseases and Nematodes in Vegetable Crops (April 2001-April 2003)
This study will describe the nature, genetics, and mechanisms of host-resistance to major pathogens and root-knot nematodes that attack vegetable crops in particular regions. Durable, resistant cultivars and environmentally compatible management practices that reliably reduce disease losses and pesticide use will be developed. Resistance to root-knot nematodes is a critical component of this study. In addition, the USDA will cooperate with public plant breeders and seed companies to facilitate use of identified resistance and markers in development of resistant cultivars of vegetable crops.

The California Sweet Potato Council and the University of California Extension service did not conduct research for sweet potato hotbeds. However, there is one research trial on nematicides conducted by the Merced County, California Cooperative Extensive Service (Stoddard, 2002). These data were generated because pest control in sweet potato may be difficult due to township caps restricting the use of 1,3-D. The initial results from one study suggest that ethoprop and 1,3-D had similar nematode control. The study author indicated, however, that this result might have been due to a block effect (i.e., due to the location in the field) as opposed to the effect of the nematicides. Also, the author noted that this result is from only one year of data and that previous research showed marginal nematode control with ethoprop (see Table C 3 below). In general, the USG does not regard one trial with one year of data sufficiently robust as to serve as a basis for transition projections.

**CALIFORNIA – TABLE C.3: ALTERNATIVES YIELD LOSS DATA SUMMARY** .

| ALTERNATIVE | LIST TYPE OF PEST | RANGE OF YIELD LOSS | **BEST ESTIMATE OF YIELD LOSS** |
|---|---|---|---|
| Metam sodium | Nematodes | High | 18% |
| 1,3-D/chloropicrin | Nematodes | 0% | unknown |
| OVERALL LOSS ESTIMATE FOR ALL ALTERNATIVES TO PESTS | | | **18%** |

Yield loss estimates for 1, 3-D plus chloropicrin were not provided due to the lack of data from hotbeds. But, 1,3-D/chloropicrin mixtures would be assumed to provide nematode control comparable to methyl bromide/chloropicrin mixtures.

A small trial performed in 2006 in Merced County showed that chloropicrin did not provide satisfactory weed control unless combined with 1,3-D (Stoddard personal communication 2007). Further fumigation research is needed to investigate the impacts of multiple years without chemical fumigation.

Beginning in the summer of 2007, a project has been approved by the USDA with the objective of evaluating alternatives to methyl bromide for sweetpotato slips. The project includes 1,3-D, chloropicrin, and metam-sodium combinations, as well as solarization, compared to methyl bromide. Additionally, main treatment plots will be split at bedding to compare chemical and variety combinations that may be viable alternatives to straight chemical fumigation. Two fungicides (dicloran, thiabendazole), herbicides (napropamide, flumioxazine), and varieties

(Beauregard, Golden Sweet) will be compared simultaneously. Nematodes, weed control, plant stand production, disease incidence (if present), and effects on field production will be measured or observed.

## 16. ARE THERE ANY OTHER POTENTIAL ALTERNATIVES UNDER DEVELOPMENT THAT THE PARTY IS AWARE OF WHICH ARE BEING CONSIDERED TO REPLACE METHYL BROMIDE? (*If so, please specify*):

Methyl iodide is generally considered to be a suitable alternative for all soil uses; so far methyl iodide only has a pending registration for uses on strawberries, peppers, tomatoes and ornamentals.
Until a chemical is registered, and only after efficacy against key pests is demonstrated in repeated trials at commercial scales, does the USG consider that a chemical or technology is a bona fide replacement for methyl bromide.

**Iodomethane (methyl iodide)**: Was granted a one year federal registration in October 2007 for several crops, but **not** for sweet potato.

**Propargyl bromide**: Under proprietary development for future registration submission.

**Sodium azide**: Under proprietary development for future registration submission.

**Furfural**: registered for greenhouse ornamentals only. Under proprietary development for other registration submission.

**DMDS** (dimethyl disulfide): Under proprietary development for future registration submission.

**Muscador albus Strain QST 20779.** Registered but not commercially available formulation.

## 17. (i) ARE THERE TECHNOLOGIES BEING USED TO PRODUCE THE CROP WITHOUT METHYL BROMIDE? (e.g. soilless systems, plug plants, containerised plants. State proportion of crop already grown in such systems nationally and if any constraints exist to adoption of these systems to replace methyl bromide use. State whether such technologies could replace a proportion of proposed methyl bromide use):

A small percentage of growers are able to use new land each year to qualify as organic growers; limited feedback from one of these growers indicates that the lack of pesticides has resulted in a decrease in the number of plants produced per acre, an increase in plant size variability and a significant weed problem that requires hand weeding. As discussed (above), California has recently moved to severely restrict hand weeding and weeding with hoes of less than 4 feet (1,2 meters) in length. These restrictions effectively render hand weeding an option only for small operations where the grower can command a premium price for the product, such as organic production. A second difficulty is that because of water restrictions during certain crucial months, hotbed growing areas must be located near wells so as not to rely on irrigation from public water sources

**(ii) IF SOILLESS SYSTEMS ARE CONSIDERED FEASIBLE, STATE PROPORTION OF CROP BEING PRODUCED IN SOILLESS SYSTEMS WITHIN REGION APPLYING FOR THE NOMINATION AND NATIONALLY:**

Soilless systems are not currently technically or economically feasible for hotbed production of sweet potato slips.

**(iii) WHY ARE SOILESS SYSTEMS NOT A SUITABLE ALTERNATIVE TO PRODUCE THE CROP IN THE NOMINATION?**

Sweet potatoes are a fairly low value crop and the costs of soil less production render this alternative not economically feasible even if it were considered technically feasible, which, at this point, it is not

*Progress in registration of a product will often be beyond the control of an individual exemption holder as the registration process may be undertaken by the manufacturer or supplier of the product. The speed with which registration applications are processed also can falls outside the exemption holder's control, resting with the nominating Party. Consequently, this section requests the nominating Party to report on any efforts it has taken to assist the registration process, but noting that the scope for expediting registration will vary from Party to Party.*

**(Renomination Form 11.) PROGRESS IN REGISTRATION**

*Where the original nomination identified that an alternative's registration was pending, but it was anticipated that one would be subsequently registered, provide information on progress with its registration. Where applicable, include any efforts by the Party to "fast track" or otherwise assist the registration of the alternative.*

USG endeavors to identify methyl bromide alternatives in order to move them forward in the registration queue. However USG has no legal authority to compel registrations; it can only act on registrations requested by private entities. The timely submission of data to support a registration decision is at the sole discretion of the registrant.

**TABLE C 4: PRESENT REGISTRATION STATUS OF ALTERNATIVES**

| ALTERNATIVE | PRESENT REGISTRATION STATUS | REGISTRATION BEING CONSIDERED? (Y/N) | DATE OF POSSIBLE REGISTRATION: |
|---|---|---|---|
| Sodium azide | No registration package has been received | No | Unknown |
| Propargyl bromide | No registration package has been received | No | Unknown |
| Iodomethane | Registered in U.S. on tomatoes, peppers, strawberries, turf, stone fruit, and ornamental crops | Yes, but not for sweet potato transplant slips | Unknown |
| Furfural | Not registered. Registration package has been received. | Yes | Unknown |
| *Muscadore albus* Strain QST 20799 | Registration package has been received. | Yes | Registered but not yet for sale in the U.S. |

**Flumioxazin**

Flumioxazin (Chateau SM™) has received a federal registration and a California registration in late 2005 (Cal DPR 20005). Flumioxazin is primarily a broadleaf herbicide that provides some annual grass suppression. However, it will not provide broad-spectrum, season-long weed control without a tankmix partner, planned sequential application, or mechanical cultivation.

**Halosulfuron-methyl**

In December 2002, halosulfuron-methyl (Sandea®) was registered for weed control (including nutsedge) in tomatoes, peppers, eggplant, and cucurbits, but **not** for sweet potatoes. Halosulfuron-methyl has some selectivity on sweet potato and research is being conducted with this product. Halosulfuron-methyl has a number of other limitations which may affect its widespread adoption even if it were to be registered on this crop, including: (1) phytotoxicity with moderate rainfall immediately after application; (2) cool temperatures, (3) susceptible varieties, and (4) plant back restrictions.

**S-metolachlor**

S-metolachlor has some selectivity on sweet potatoes and research is being conducted. However, it is not registered on the crop in California. Further, it does not provide commercially acceptable weed control in plasticulture systems.

**Rimsulfuron**

Not registered for use on sweet potatoes in California.

## (Renomination Form 12.) DELAYS IN REGISTRATION

*Where significant delays or obstacles have been encountered to the anticipated registration of an alternative, the exemption holder should identify the scope for any new/alternative efforts that could be undertaken to maintain the momentum of transition efforts, and identify a time frame for undertaking such efforts.*

USG has no legal authority to compel registrations; it can only act on registrations requested by private entities. The timely submission of data to support a registration decision is at the sole discretion of the registrant. Please see table above for additional detail.

**(Renomination Form 13.) DEREGISTRATION OF ALTERNATIVES**

*Describe new regulatory constraints that limit the availability of alternatives. For example, changes in buffer zones, new township caps, new safety requirements (affecting costs and feasibility), and new environmental restrictions such as to protect ground water or other natural resources. Where a potential alternative identified in the original nomination's transition plan has subsequently been deregistered, the nominating Party would report the deregistration, including reasons for it. The nominating Party would also report on the deregistration's impact (if any) on the exemption holder's transition plan and on the proposed new or alternative efforts that will be undertaken by the exemption holder to maintain the momentum of transition efforts.*

Six fumigants are undergoing a review of risks and benefits at present. A likely outcome of this review will be the imposition of additional restriction on the use of some or all of these chemicals. This process will not lead to proposed restrictions until 2008, at which point the process to modify labels will start. This process can take several years to complete. It is not possible to forecast the outcome of the soil fumigant analysis at this time.

An additional complication in forecasting changes in the registration of alternatives is that under the US federal system individual states may impose restrictions above those imposed at the Federal level. Examples of these additional restrictions include the township caps on Telone® in California and the "SLN" (Special Local Needs) restrictions on the same chemical in 31 Florida counties.

In addition, the California Department of Pesticide Regulation (DPR) in 2007 has imposed use restrictions and water seal requirements on all soil fumigants to reduce their contributions to volatile organic compounds (VOCs) as part of the efforts to meet the Federal Clean Air Standards for ground level ozone. According to Mr. Randy Segawa of the CDPR, the main outcome of the State Implementaion Plan (SIP) for VOCs, developed by CDPR in 2007, was the regulation to reduce VOC emissions from field fumigations. This regulation includes requirements for use of methyl bromide, chloropicrin, 1,3-D, metam, dazomet, and sodium tetrathiocarbonate. The regulation achieves VOC reductions in two ways: changing application methods, and establishing fumigant emission limits.

Beginning in 2008, this regulation requires applicators to use certain "low-emission" application methods within 'ozone non-attainment' areas during May through October. The San Joaquin Valley, where sweet potatoes are grown, is one of the non-attainment areas affected.
If a certain emissions trigger is met, fumigant limits go into effect. San Joaquin Valley is almost certain to meet this trigger in 2009. The fumigant limit applies to the entire non-attainment area during May to October. DPR enforces the fumigant limit using allowances issued to growers. It is likely that fumigated acreage will be reduced beginning in 2009, but USG is not able to estimate what the reduction might be. The reduction will be proportional for all growers and crops. That is, everybody will be reduced the same percentage amount.

It should also be noted in the context of the California SIP that there is still ongoing litigation regarding the needed fumigant reductions in Ventura county. There are also major uncertainties as to exactly what the fumigant reductions will look in 2010 and beyond in all non-attainment areas, due to possible actions (as yet undeveloped) by EPA's air program.

## Part D: EMISSION CONTROL
## Renomination Form Part E: IMPLEMENTATION OF MBTOC/TEAP RECOMMENDATIONS

### 18. TECHNIQUES THAT HAVE AND WILL BE USED TO MINIMISE METHYL BROMIDE USE AND EMISSIONS IN THE PARTICULAR USE (*State % adoption or describe change*):

**TABLE D 1: TECHNIQUES TO MINIMIZE METHYL BROMIDE USE AND EMISSIONS**

| TECHNIQUE OR STEP TAKEN | VIF OR HIGH BARRIER FILMS | METHYL BROMIDE DOSAGE REDUCTION | INCREASED % CHLOROPICRIN IN METHYL BROMIDE FORMULATION | LESS FREQUENT APPLICATION | DEEP INJECTION |
|---|---|---|---|---|---|
| **WHAT USE/EMISSION REDUCTION METHODS ARE PRESENTLY ADOPTED?** | High barrier films | No recent change in application rate | No recent change in formulation | No reported change | Not feasible. With deep injection the fumigant is delivered below the root zone where the heaviest pest infestation is located. |
| **WHAT FURTHER USE/EMISSION REDUCTION STEPS WILL BE TAKEN FOR THE METHYL BROMIDE USED FOR CRITICAL USES?** | No future changes reported | No future changes reported | No future changes reported | No future changes reported | Not applicable |
| **OTHER MEASURES** *(please describe)* | Elimination of field production areas from CUE | Growers will use 1,3-D/ chloropicrin in hotbeds, if available | No future changes reported | No future changes reported | Not applicable |

### 19. IF METHYL BROMIDE EMISSION REDUCTION TECHNIQUES ARE NOT BEING USED, OR ARE NOT PLANNED FOR THE CIRCUMSTANCES OF THE NOMINATION, STATE REASONS:

Techniques to minimize emission include the use of low-permeability films, the application of water seals, and the "top dressing" application of fertilizer. In California, however, there is a performance standard for films that require a minimum level of permeability to methyl bromide to protect workers so low barrier films cannot be used with methyl bromide.

The application of water seals is dependent on the availability of adequate supplies of water and a lack of restrictions on water use as well as irrigation systems that will allow the application of

sufficient quantities of water to effect the seal. As discussed above, the availability of adequate water supplies is a problem in California.

*The Methyl Bromide Technical Options Committee and the Technology and Economic Assessment Panel may recommended that a Party explore and, where appropriate, implement alternative systems for deployment of alternatives or reduction of methyl bromide emissions.*

*Where the exemptions granted by a previous Meeting of the Parties included conditions (for example, where the Parties approved a reduced quantity for a nomination), the exemption holder should report on progress in exploring or implementing recommendations.*

*Information on any trialling or other exploration of particular alternatives identified in TEAP recommendations should be addressed in Part C.*

**(Renomination Form 14.) USE/EMISSION MINIMISATION MEASURES**

*Where a condition requested the testing of an alternative or adoption of an emission or use minimisation measure, information is needed on the status of efforts to implement the recommendation. Information should also be provided on any resultant decrease in the exemption quantity arising if the recommendations have been successfully implemented. Information is required on what actions are being, or will be, undertaken to address any delays or obstacles that have prevented implementation.*

In accordance with the criteria of the critical use exemption, each party is required to describe ways in which it strives to minimize use and emissions of methyl bromide. The use of methyl bromide in the growing of tomato in the United States is minimized in several ways. First, because of its toxicity, methyl bromide has, for the last 40 years, been regulated as a restricted use pesticide in the United States. As a consequence, methyl bromide can only be used by certified applicators who are trained at handling these hazardous pesticides. In practice, this means that methyl bromide is applied by a limited number of very experienced applicators with the knowledge and expertise to minimize dosage to the lowest level possible to achieve the needed results. In keeping with both local requirements to avoid "drift" of methyl bromide into inhabited areas, as well as to preserve methyl bromide and keep related emissions to the lowest level possible, methyl bromide application for tomatoes is most often machine injected into soil to specific depths.

As methyl bromide has become more scarce, users in the United States have, where possible, experimented with different mixes of methyl bromide and chloropicrin. Specifically, in the early 1990s, methyl bromide was typically sold and used in methyl bromide mixtures made up of 98% methyl bromide and 2% chloropicrin, with the chloropicrin being included solely to give the chemical a smell enabling those in the area to be alerted if there was a risk. However, with the outset of very significant controls on methyl bromide, users have been experimenting with significant increases in the level of chloropicrin and reductions in the level of methyl bromide. While these new mixtures have generally been effective at controlling target pests, at low to moderate levels of infestation, it must be stressed that the long term efficacy of these mixtures is unknown.

Tarpaulin (high density polyethylene) is also used to minimize use and emissions of methyl bromide. In addition, cultural practices are utilized by tomato growers.

Reduced methyl bromide concentrations in mixtures, cultural practices, and the extensive use of tarpaulins to cover land treated with methyl bromide has resulted in reduced emissions and an application rate that we believe is among the lowest in the world for the uses described in this nomination.

USDA has several grant programs that support research into overcoming obstacles that have prevented the implementation of methyl bromide alternatives. In addition, USEPA and USDA jointly fund an annual meeting on methyl bromide alternatives. At this year's meeting (held in November in San Diego, California) sessions were held to assess and prioritize research needs and to develop a use/emission minimization agenda for methyl bromide alternatives research.

Additional specific measures are provided in Table D 1.

## Part E: ECONOMIC ASSESSMENT
## Renomination Form Part F: ECONOMIC ASSESSMENT

**20. (Renomination Form 15.) ECONOMIC INFEASIBILITY OF ALTERNATIVES – METHODOLOGY** *(MBTOC will assess economic infeasibility based on the methodology submitted by the nominating Party. Partial budget analysis showing per hectare gross and net returns for methyl bromide and the next best alternatives is a widely accepted approach. Analysis should be supported by discussions identifying what costs and revenues change and why. The following measures may be useful descriptors of the economic outcome using methyl bromide or alternatives. Parties may identify additional measures. Regardless of the measures used by the methodology, it is important to state why the Party has concluded that a particular level of the measure demonstrates a lack of economic feasibility):*

The following measures or indicators may be used as a guide for providing such a description:

(a) The purchase cost per kilogram of methyl bromide and of the alternative;
(b) Gross and net revenue with and without methyl bromide, and with the next best alternative;
(c) Percentage change in gross revenues if alternatives are used;
(d) Absolute losses per hectare relative to methyl bromide if alternatives are used;
(e) Losses per kilogram of methyl bromide requested if alternatives are used;
(f) Losses as a percentage of net cash revenue if alternatives are used;
(g) Percentage change in profit margin if alternatives are used.

An economic analysis was not done for this sector because most of the losses cannot be quantified. This CUN only applies to areas where townships do not permit the use of 1,3-D. In such areas there are no technically and economically feasible alternatives and losses could be as high as 18% (Stoddard, 2002). Sweet potato transplants (slips) that survive are not likely to be as healthy and could lead to yield losses in the production fields. In addition to direct yield losses, additional (possible) sources of loss include:

- Delayed planting due to use of alternatives
- Fallow
- Additional use of herbicides
- Losses due to weeds, insects and diseases resulting in smaller, less attractive produce (quality loss)

## Part F: NATIONAL MANAGEMENT STRATEGY FOR PHASE-OUT OF THIS NOMINATED CRITICAL USE
## Renomination Form Part B: TRANSITION PLANS

*Provision of a National Management Strategy for Phase-out of Methyl Bromide is a requirement under Decision Ex. I/4(3) for nominations after 2005. The time schedule for this Plan is different than for CUNs. Parties may wish to submit Section 21 separately to the nomination.*

**21. DESCRIBE MANAGEMENT STRATEGIES THAT ARE IN PLACE OR PROPOSED TO PHASE OUT THE USE OF METHYL BROMIDE FOR THE NOMINATED CRITICAL USE, INCLUDING:**

1. *Measures to avoid any increase in methyl bromide consumption except for unforeseen circumstances;*
2. *Measures to encourage the use of alternatives through the use of expedited procedures, where possible, to develop, register and deploy technically and economically feasible alternatives;*
3. *Provision of information on the potential market penetration of newly deployed alternatives and alternatives which may be used in the near future, to bring forward the time when it is estimated that methyl bromide consumption for the nominated use can be reduced and/or ultimately eliminated;*
4. *Promotion of the implementation of measures which ensure that any emissions of methyl bromide are minimized;*
5. *Actions to show how the management strategy will be implemented to promote the phase-out of uses of methyl bromide as soon as technically and economically feasible alternatives are available, in particular describing the steps which the Party is taking in regard to subparagraph (b) (iii) of paragraph 1 of Decision IX/6 in respect of research programmes in non-Article 5 Parties and the adoption of alternatives by Article 5 Parties.*

These issues are discussed in the US Management Plan for Methyl Bromide, submitted previously.

## Renomination Form Part C: TRANSITION ACTIONS

*Responses should be consistent with information set out in the applicant's previously-approved nominations regarding their transition plans, and provide an update of progress in the implementation of those plans.*

*In developing recommendations on exemption nominations submitted in 2003 and 2004, the Technology and Economic Assessment Panel in some cases recommended that a Party should explore the use of particular alternatives not identified in a nomination' transition plans. Where the Party has subsequently taken steps to explore use of those alternatives, information should also be provided in this section on those steps taken.*

*Questions 5 - 9 should be completed where applicable to the nomination. Where a question is not applicable to the nomination, write "N/A".*

**(Renomination Form 6.) TRIALS OF ALTERNATIVES**
*Where available, attach copies of trial reports. Where possible, trials should be comparative, showing performance of alternative(s) against a methyl bromide-based standard*

**(i) DESCRIPTION AND IMPLEMENTATION STATUS:**

Many research projects are ongoing and considerable funding is being used in this effort. Beginning in the summer of 2007, a project has been approved by the USDA with the objective of evaluating alternatives to methyl bromide for sweet potato slips (Stoddard, personal communication 2007). The project includes 1,3-D, chloropicrin, and metam-sodium combinations, as well as solarization, compared to methyl bromide. Additionally, main treatment plots will be split at bedding to compare chemical and variety combinations that may be viable alternatives to straight chemical fumigation. Two fungicides (dicloran, thiabendazole), herbicides (napropamide, flumioxazine), and varieties (Beauregard, Golden Sweet) will be compared simultaneously. Nematodes, weed control, plant stand production, disease incidence (if present), and effects on field production will be measured or observed. See also question 15 above.

**(ii) OUTCOMES OF TRIALS: (***Include any available data on outcomes from trials that are still underway. Where applicable, complete the table included at Appendix I identifying comparative disease ratings and yields with the use of methyl bromide formulations and alternatives*. )

See question 15 above. Many research projects are ongoing and considerable funding is being used in this effort

**(iii) IMPACT ON CRITICAL USE NOMINATION/REQUIRED QUANTITIES:** *(For example, provide advice on any reductions to the required quantity resulting from successful results of trials.)*

Sweetpotato slip production faces regulatory restrictions on methyl bromide alternatives, as discussed in previous sections. During the preparation of this nomination the USG has accounted

for all identifiable means to reduce the request. Specifically, approximately 15 million kilograms of methyl bromide were requested by methyl bromide users across all sectors. USG carefully scrutinized requests and made subtractions to ensure that no growth, double counting, inappropriate use rates on a treated hectare basis was incorporated into the final request. Use when the requestor qualified under some other provision (QPS, for example) was also removed and appropriate transition given yields obtained by alternatives and the associated cost differentials were factored in. As a result of all these changes, the USG is requesting roughly 1/3 of that amount.

The USG feels that no additional reduction in methyl bromide quantities is necessary, given the significant adjustments described above. See also Appendix A.

### (iv) ACTIONS TO ADDRESS ANY DELAYS/OBSTACLES IN CONDUCTING OR FINALISING TRIALS:

The USG has the ability to authorize Experimental Use Permits (EUPs) for large scale field trials for methyl bromide alternatives, as has been done for methyl iodide. A recent change has been to allow the EUP for methyl iodide without the previously required destruction of the crop, thus encouraging more growers to participate in field trials. As with other activities connected with registration of a pesticide, the USG has no legal authority either to compel a registrant to seek an EUP or to require growers to participate.

As noted in our previous nomination, the USG provides a great deal of funding and other support for agricultural research, and in particular, for research into alternatives for methyl bromide. This support takes the form of direct research conducted by the Agricultural Research Service (ARS) of USDA, through grants by ARS and CSREES, by IR-4, the national USDA-funded project that facilitates research needed to support registration of pesticides for specialty crop vegetables, fruits and ornamentals, through funding of conferences such as MBAO, and through the land grant university system

## (Renomination Form 7.) TECHNOLOGY TRANSFER, SCALE-UP, REGULATORY APPROVAL FOR ALTERNATIVES

The USDA maintains an extensive technology transfer system, the Agricultural Extension Service. This Service is comprised of researchers at land grant universities and county extension agents in addition to private pest management consultants. In addition to these sources of assistance for technology transfer, there are trade organizations and grower groups, some of which are purely voluntary but most with some element of institutional compulsion, that exist to conduct research, provide marketing assistance, and to disseminate “best practices”. The California Strawberry Commission is one example of such a grower group.

### (i) DESCRIPTION AND IMPLEMENTATION STATUS:

See above

### (ii) OUTCOMES ACHIEVED TO DATE FROM TECHNOLOGY TRANSFER, SCALE-UP, REGULATORY APPROVAL:

These issues are discussed in the US Management Plan for Methyl Bromide, submitted previously.

**(iii) IMPACT ON CRITICAL USE NOMINATION/REQUIRED QUANTITIES:** (*For example, provide advice on any reductions to the required quantity resulting from successful progress in technology transfer, scale-up, and/or regulatory approval*.)

The USG feels that no additional change in methyl bromide quantity requested is necessary. The U.S. nomination for this sector reflects the commitment by this sector and the U.S. to reduce Methyl bromide use to only the most critical needs. See Appendix A.

**(iv) ACTIONS TO ADDRESS ANY DELAYS/OBSTACLES:**

See above.

**(Renomination Form 8.) COMMERCIAL SCALE-UP/DEPLOYMENT, MARKET PENETRATION OF ALTERNATIVES**

**(i) DESCRIPTION AND IMPLEMENTATION STATUS:**

These issues are discussed in the US Management Plan for Methyl Bromide, submitted previously.

**(ii) IMPACT ON CRITICAL USE NOMINATION/REQUIRED QUANTITIES:** (*For example, provide advice on any reductions to the required quantity resulting from successful commercial scale-up/deployment and/or market penetration*.)

The USG feels that no additional change in methyl bromide quantity requested is necessary. The U.S. nomination for this sector reflects the commitment by this sector and the U.S. to reduce Methyl bromide use to only the most critical needs. See Appendix A.

**(iii) ACTIONS TO ADDRESS ANY DELAYS/OBSTACLES:**

See above.

Ongoing field trials require results to be validated for commercial application. Therefore, some period of time after publication of field trials is needed for commercial testing and implementation.

USG endeavors to identify methyl bromide alternatives to move them forward in the registration queue. However USG has no legal authority to compel registrations; it can only act on registrations requested by private entities. The timely submission of data to support a registration decision is at the sole discretion of the registrant.

The USDA maintains an extensive technology transfer system, the Agricultural Extension Service. This Service is comprised of researchers at land grant universities and county extension agents in addition to private pest management consultants. In addition to these sources of assistance for technology transfer, there are trade organizations and grower groups, some of

which are purely voluntary but most with some element of institutional compulsion, that exist to conduct research, provide marketing assistance, and to disseminate "best practices". The California Strawberry Commission is one example of such a grower group.

**(Renomination Form 9.) CHANGES TO TRANSITION PROGRAM**

*If the transition program outlined in the Party's original nomination has been changed, provide information on the nature of those changes and the reasons for them. Where the changes are significant, attach a full description of the revised transition program.*

See Appendix A

**(Renomination Form 10.) OTHER BROADER TRANSITION ACTIVITIES**

*Provide information in this section on any other transitional activities that are not addressed elsewhere. This section provides a nominating Party with the opportunity to report, where applicable, on any additional activities which it may have undertaken to encourage a transition, but need not be restricted to the circumstances and activities of the individual nomination. Without prescribing specific activities that a nominating Party should address, and noting that individual Parties are best placed to identify the most appropriate approach to achieve a swift transition in their own circumstances, such activities could include market incentives, financial support to exemption holders, labelling, product prohibitions, public awareness and information campaigns, etc.*

These issues are discussed in the US Management Plan for Methyl Bromide, submitted previously.

## Part G: CITATIONS


CDFA (California Department of Food and Agriculture). 2002. Recommended permit conditions for using 1,3-dichloropropene fumigants. September 12, 2002. Available online at http://www.cdpr.ca.gov/docs/enfcmpli/penfltrs/penf2002/2002atch/attach37.pdf

CDFA (California Department of Food and Agriculture). 2005. Notice of Proposed and Final Decisions and Directors Findings . December 2005. Available online at http://www.cdpr.ca.gov/docs/nod/2005-50.htm

Crop Production - Acreage - Supplement (PCP-BB). Crop production - Acreage 6-28-02. National Agricultural Statistics Service (NASS), Agricultural Statistics Board, USDA. Retrieved January 21, 2003 <http://usda.mannlib.cornell.edu/reports/nassr/field/pcp-bba/acrg0602.pdf>

Stoddard, C.S. 2002. Research Progress Report: Fumigation and cover crop trial on sweet potatoes. University of California Cooperative Extension Service, Merced County.

Sweetpotato Tips." Sweetpotato Tips Spring 2002.University of California Cooperative Extension. Retrieved January 21, 2003 <http://ucce.ucdavis.edu/files/filelibrary/1529/2234.pdf>

Weir, Bill L. Fumigation and Cover Crop Trial. Sweet Potato 2000 Research Progress Report University of California Cooperative Extension Merced County. pp. 21~23 2000.

Weir, Bill. Sweetpotato Research Trials: 2001 Research Progress Report" Sweet Potato Progress Report 2001 Retrieved January 21, 2003

Trout, Tom. 2001. Impact of township caps on Telone use in California. The Pink Sheet, published by the California Strawberry Commission, 01(9), 4 pp.

Trout, T. 2005. Impact of township caps on telone use in California. Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reductions, 2005. http://www.mbao.org/2005/05Proceedings/127TroutT%20mb-pest-use-telone-rpt05-mbao.pdf

# Appendix A: Methyl Bromide Usage Newer Numerical Index Extracted (BUNNIE)

| 2010 Methyl Bromide Usage Newer Numerical Index - BUNNIE | | | | Sweet Potato Slips | |
|---|---|---|---|---|---|
| January 16, 2008 | Region | | Sweet Potato Council of California - Sweet Potato Slips | Sector Total or Average | Notes |
| Dichotomous Variables | Strip or Bed Treatment? | | Flat Fumigation | | |
| | Currently Use Alternatives? | | No | | |
| | Tarps / Deep Injection Used? | | Tarps | | |
| | Pest-free Cert Requirements? | | No | | |
| Other Issues | Frequency of Treatment (x/ yr) | | 1x/year | | * |
| | QPS Removed? | | Yes | | |
| Most Likely Combined Impacts (%) | Florida Telone Restrictions (%) | | 0% | | |
| | 100 ft Buffer Zones (%) | | 0% | | |
| | Key Pest Distribution (%) | | 0% | | |
| | Regulatory Issues (%) | | 100% | | |
| | Unsuitable Terrain (%) | | 0% | | |
| | Cold Soil Temperature (%) | | 0% | | |
| | **Total Combined Impacts (%)** | | **100%** | | |
| Most Likely Baseline Transition | (%) Able to Transition | | 0% | | |
| | Minimum # of Years Required | | 0 | | |
| | **(%) Able to Transition / Year** | | **0%** | | |
| **EPA Adjusted Use Rate (kg/ha)** | | | **224** | | |
| EPA Adjusted Strip Dosage Rate (g/m2) | | | 22 | | |
| 2010 Requested Usage | *Amount - Pounds* | *Pounds* | *40,000* | *40,000* | |
| | *Area - Acres* | *Pounds* | *200* | *200* | |
| | *Rate (lb/A)* | *Pounds* | *200.00* | *200* | |
| | **Amount - Kilograms** | Metric | **18,144** | **18,144** | |
| | Treated Area - Hectares | Metric | 81 | 81 | |
| | Rate (kg/ha) | Metric | 224 | 224 | |
| **EPA Preliminary Value** | | **kgs** | **18,144** | **18,144** | |
| EPA Baseline Adjusted Value has been adjusted for: | | | MBTOC Adjustments, QPS, Double Counting, Growth, Use Rate/Strip Treatment, Miscellaneous, and Combined Impacts | | |
| EPA Baseline Adjusted Value | | kgs | 18,144 | 18,144 | |
| EPA Transition Amount | | kgs | - | - | |
| **EPA Amount of All Adjustments** | | kgs | **-** | **-** | |
| **Most Likely Impact Value for Treated Area** | | kgs | **18,144** | **18,144** | |
| | | ha | **81** | **81** | |
| | | Rate | **224** | **224** | |
| **Sector Research Amount (kgs)** | | **-** | **2010 Total US Sector Nomination** | **18,144** | |
| 1 Pound = | 0.453592 | kgs | 1 Acre = | 0.404686 | ha |