**To:** Bennett, Tate[Bennett.Tate@epa.gov]
**From:** Scott Herndon
**Sent:** Tue 5/30/2017 4:37:40 PM
**Subject:** RE: Sugarbeets

Tate,

My folks asked me what product EPA and Syngenta think will work. Is that something that you can share with me?

Thanks again!

Scott Herndon

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

202-595-0786

**From:** Bennett, Tate [mailto:Bennett.Tate@epa.gov]
**Sent:** Friday, May 26, 2017 9:44 AM
**To:** Scott Herndon <sherndon@americansugarbeet.org>
**Subject:** Re: Sugarbeets

Received. No problem!

On May 26, 2017, at 9:06 AM, Scott Herndon <sherndon@americansugarbeet.org> wrote:

Tate,

I'm not sure if my first response went through because my phone spazzed out and I got error

messages.

I want to sincerely thank you for the update and for keeping me in the loop! Sorry for the delayed response. I slipped out of town for the long weekend.

Thanks again!

Scott

Sent from my iPhone

On May 25, 2017, at 10:15 AM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:

**From:** Beck, Nancy
**Sent:** Wednesday, May 24, 2017 6:47 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>
**Subject:** Sugarbeets

Got an update today, in case you get inquiries:

While some believe that clorothalonil is the only option, EPA is continuing to work with Syngenta (which is part of the chlorothalonil coalition) as both EPA and Syngenta think there are other registered products that could do the trick. Thus we continue to talk with states about the use of these alternatives.

**********

Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator

Office of Chemical Safety and Pollution Prevention

P: 202-564-1273

M: Ex. 6 - Personal Privacy

beck.nancy@epa.gov

**To:** Bennett, Tate[Bennett.Tate@epa.gov]
**From:** Scott Herndon
**Sent:** Fri 5/26/2017 1:05:38 PM
**Subject:** Re: Sugarbeets

Tate,

I'm not sure if my first response went through because my phone spazzed out and I got error messages.

I want to sincerely thank you for the update and for keeping me in the loop! Sorry for the delayed response. I slipped out of town for the long weekend.

Thanks again!

Scott

Sent from my iPhone

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**Sent:** Wednesday, May 24, 2017 6:47 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>
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Got an update today, in case you get inquiries:

While some believe that clorothalonil is the only option, EPA is continuing to work with Syngenta (which is part of the chlorothalonil coalition) as both EPA and Syngenta think there are other registered products that could do the trick. Thus we continue to talk with states about the use of these alternatives.

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Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator

Office of Chemical Safety and Pollution Prevention

P: 202-564-1273

M: Ex. 6 - Personal Privacy

beck.nancy@epa.gov

**To:** Beck, Nancy[Beck.Nancy@epa.gov]
**Cc:** Bennett, Tate[Bennett.Tate@epa.gov]; Palich, Christian[palich.christian@epa.gov]; Cassie Bladow[Cassie.Bladow@beetsugar.org]; Graham, Amy[graham.amy@epa.gov]
**From:** Scott Herndon
**Sent:** Tue 6/6/2017 11:20:34 AM
**Subject:** Re: Section 18

Dr. Beck,

Thank you so much for the information and the help!

Have a great day.

Best,

Scott

Sent from my iPhone

On Jun 5, 2017, at 4:10 PM, Beck, Nancy <Beck.Nancy@epa.gov> wrote:

Scott,

My understanding is that some toxicology data is still being developed. We'll have to see these data to understand what the future will look like for chlorothalonil.

Regarding alternatives, below is what we are looking at:

1. cyprodinil + difenoconazole
2. difenoconazole + benzovindiflupyr
3. fluazinam

Nancy

---

Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator, OCSPP

P: 202-564-1273

M: Ex. 6 - Personal Privacy

beck.nancy@epa.gov

**From:** Scott Herndon [mailto:sherndon@americansugarbeet.org]
**Sent:** Monday, June 5, 2017 12:44 PM
**To:** Beck, Nancy <Beck.Nancy@epa.gov>
**Cc:** Bennett, Tate <Bennett.Tate@epa.gov>; Palich, Christian <palich.christian@epa.gov>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
**Subject:** RE: Section 18

Dr. Beck,

I'd like to thank you and everyone else involved in this again for all of your work!

Do you have any sense yet of the likelihood of chlorothalonil being approved for use on sugarbeets for the 2018 season? Or is it more likely that it won't be fully approved until the 2019 season? I'm trying to get a sense of the path forward on this.

Also, has any progress been made on identifying workable alternatives to chlorothalonil for this season? I know there was some hope for workable solutions from registered products. I'd love to share the specific alternatives with our folks, if possible.

Thanks again for all of your help and time!

Best,

Scott

**Scott Herndon**

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

**From:** Beck, Nancy [mailto:Beck.Nancy@epa.gov]
**Sent:** Friday, May 12, 2017 6:36 PM
**To:** Scott Herndon <sherndon@americansugarbeet.org>
**Cc:** Bennett, Tate <Bennett.Tate@epa.gov>; Palich, Christian <palich.christian@epa.gov>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
**Subject:** RE: Section 18

Scott,

Below is the latest. Long story short, we are currently working with state and Extension Service experts to explore and identify possible alternatives as we evaluate the request. We have had similar situations like this and have been able to work cooperatively to find alternative approaches in emergency situations. Our staff is meeting internally with extension experts and trying to schedule a meeting with the sugar beet states for next week.

Regarding the data needs, below is what I've learned. However, I would encourage you to keep in mind that the work noted above to identify possible alternative approaches with the states is what will likely be most helpful to your group because it does take time to run through the full risk evaluation process.

Summary:

North Dakota and Minnesota submitted to the agency emergency exemption requests for the subject uses in late March and early April, 2017, respectively, but chorothalonil has outstanding data requirements most of which concern the need for a subchronic inhalation study, which precludes the agency from being able to make the required aggregate risk safety finding.

More specifically, the Chlorothalonil Scoping Document of March, 2012, developed to support the opening of the docket for registration review, indicates that in our most recent risk assessment (2010),

- MOEs for short and intermediate-term occupational handler inhalation exposures exceed HED's LOC (MOE ≤1000). For mixing/loading liquids for aerial, chemigation, and groundboom applications, MOEs range from 42 to 180.

- MOEs for short-term residential handler exposure exceeded HED's LOC (MOE=1000). For mixing/loading/applying liquids with a brush or sprayer MOEs range from 52 to 220.

Because there is no inhalation study of appropriate length available to assess short- and intermediate-term exposures, HED relied upon an acute study (in which no NOAEL was achieved) to assess short- and intermediate-term exposure. Additional UFs were applied for both the lack of an NOAEL and the lack of a subchronic inhalation study.

In response to this risk assessment, the registrant withdrew the new use applications that triggered the need for this risk assessment.

In March 2013, after OMB review, we issued the Registration Review data call-in. Nearly 25 studies were identified is being needed to support the registration review. Most pertinent to this situation is the need for a 90-day subchronic inhalation study, but we identified a number of other missing studies across human exposure, animal tox, environmental fate, and ecological effects. Sipcam Agro, the registrant for the requested product under section 18, was a recipient of the DCI and a copy of the DCI has been posted in the registration

review public docket since July 2013.

We have been working with the consortium of chlorothalonil registrants to build a record for an upcoming FIFRA SAP peer review meeting on the use of in vitro studies and CFD/MMAD models for deriving points of departure and uncertainty factors. This would be the first time that EPA derived a point of departure from an in vitro study. We are targeting late 2017 or early 2018 for that SAP meeting.

---

So as you can see this process takes time. Given all that and the need for the emergency use, as I noted above, we are reaching out to the states and to the land grant universities to explore other control options for this fungal pest that we might be able to make available under section 18. The point Rick was trying to make in his testimony is that the earlier engagement we have with the states on potential control tools, the less likely that we will find ourselves in a situation mere days before the use needs to occur of having to scramble to find an alternative. This is an approach that we use with IR-4 (Interregional Risk Project 4) ; they don't conduct research on chemicals where we don't think we'll be able to make the FFDCA safety finding. That way, their packages move rather quickly through the review process.

Please let me know if you have any questions.

Regards,

Nancy

---

Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator, OCSPP

P: 202-564-1273

M: Ex. 6 - Personal Privacy

beck.nancy@epa.gov

**From:** Scott Herndon [mailto:sherndon@americansugarbeet.org]

**Sent:** Friday, May 12, 2017 4:10 PM
**To:** Beck, Nancy <Beck.Nancy@epa.gov>
**Cc:** Bennett, Tate <Bennett.Tate@epa.gov>; Palich, Christian <palich.christian@epa.gov>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
**Subject:** Re: Section 18

Thanks so much!

Scott

Sent from my iPhone

On May 11, 2017, at 6:30 PM, Beck, Nancy <Beck.Nancy@epa.gov> wrote:

Scott,

I will work with my staff to get you some answers.

Regards,

Nancy

---

Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator, OCSPP

P: 202-564-1273

M: Ex. 6 - Personal Privacy

beck.nancy@epa.gov

**From:** Scott Herndon [mailto:sherndon@americansugarbeet.org]
**Sent:** Thursday, May 11, 2017 12:38 PM

**To:** Bennett, Tate <Bennett.Tate@epa.gov>; Beck, Nancy <Beck.Nancy@epa.gov>
**Cc:** Palich, Christian <palich.christian@epa.gov>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
**Subject:** RE: Section 18

Christian and Amy, it was nice meeting you!

I have listened to the hearing about 20 times now so that I could transcribe the Section 18 comments verbatim for our growers. I've pasted them below for you as well. When you are able, do you mind telling me what data is missing, if any? I've heard that it is the vapor data that is missing but have alternatively heard that it is the residue data that is missing. I want to make sure that our folks have or can provide all necessary data. I've also attached the relevant contacts for this issue.

Thanks so much again!

My transcript of Section 18 comments from today's hearing below:

**Senator Stabenow:**

"Thank you Mr. Chairman and thank you to both of our witnesses. Mr. Keigwin, I first want to thank you personally for your engagement with Michigan State University and our Michigan hop growers that created the gift that we just gave to the Chairman to facilitate Section 18 exemptions under FIFRA. Most recently I've heard from Michigan sugar beet growers about emergency use needs under Section 18 as well. What steps can be taken by growers, states, manufacturers and the EPA to make this Section 18 process more efficient so that growers facing unexpected risk can get needed crop insurance tools in a timely manner?"

**Mr. Rick Keigwin, Acting Director, Office of Pesticide Programs, EPA**

"Thank you, Senator, and I've had the great fortune of meeting with Michigan growers on a number of occasions. Your growers sponsor an annual tour to help educate EPA employees about Michigan agriculture and what farmers do to help grow our crops so thank you for that. In terms of Section 18s, we have a pretty solid record of completing our decision making for most Section 18 emergency exemptions in less

than 50 days but there are times and I think this situation with the sugar beet ones, the growers, that came to your attention highlights the need for early engagement between EPA, the Michigan Department of Agriculture and the grower community and the land-grand universities. Knowing early on what tools a grower might need to address an emerging pest situation. It is hard when at the end of the process, or right when they need to apply the product, for EPA to say, 'wait, hold on, we might have a problem' so one process efficiency would probably be for us to have earlier engagement, maybe even before the state submits their Section 18 request to see if there might be any issues with that particular chemical and to the extent to which there are we could work collaboratively with cooperative extension and with the state to maybe find some alternatives that we could move through the process more quickly to address the emerging pest management."

**Scott Herndon**

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

**From:** Bennett, Tate [mailto:Bennett.Tate@epa.gov]
**Sent:** Wednesday, May 10, 2017 10:21 PM
**To:** Beck, Nancy <Beck.Nancy@epa.gov>
**Cc:** Palich, Christian <palich.christian@epa.gov>; Scott Herndon <sherndon@americansugarbeet.org>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
**Subject:** Re: Section 18

Scott- Christian and Amy will be at the hearing tomorrow with Rick. Were you

planning to be there?

On May 10, 2017, at 10:05 PM, Beck, Nancy <Beck.Nancy@epa.gov> wrote:

This is bizarre. On our call when we discussed reaching out to Stabenow, Rick clearly stated that he would state that believed his staff spoke prematurely and that they were looking at all the options.

Rick seems like such a straight shooter this just isn't adding up. Are we sure that Rick was the only one that spoke w Stabenows office and there wasn't some other call with his staffer?

I can check w Sven as he would have been on the call.

Nancy B. Beck, Ph.D., DABT
Deputy Assistant Administrator, OCSPP
P: 202-564-1273
M: Ex. 6 - Personal Privacy
Beck.Nancy@epa.gov

On May 10, 2017, at 9:27 PM, Palich, Christian <palich.christian@epa.gov> wrote:

I sat in on that call for a minute but was pulled away to another meeting, ill follow up with career staff in the morning to see a status.

I'll defer to Nancy on how to handle this more technical response.

Thanks so much for the heads up Scott.

Christian R. Palich

Deputy Associate Administrator

Congressional & Intergovernmental Relations

Ex. 6 - Personal Privacy

Sent from my iPhone

On May 10, 2017, at 9:15 PM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:

> Thank you for the heads up. Looping in Nancy as it relates to the imminent hearing tomorrow. We probably need to give some messaging instructions on this so he doesn't tie our hands "on the record." Thoughts?
>
> On May 10, 2017, at 9:10 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:
>
>> Tate,
>>
>> I wanted to give you a heads up that Senator Stabenow's Ag. Committee staff spoke with EPA career staff this afternoon. The EPA staff don't believe that they have any room on this issue and still believe there is a data gap. From what Stabenow's staff relayed to me, EPA staff characterized the Section 18 component as relatively straightforward under FIFRA but the Food Drug and Cosmetic Act (FDCA) requirements for residues and granting tolerances are very strict. Under Section 18, the cost benefit analysis can weigh the economic harm, etc. I asked them to triple check with EPA that they were looking at the data SipCam submitted on Friday and they said they would (attached).
>>
>> Also, they may bring this up at the Senate Agriculture hearing tomorrow with the Director of Pesticide Programs. We did not ask them to do this but I also don't think that I can ask them not to do it. I just wanted to give you a heads up so you all wouldn't be caught off guard. Hearing info here: https://www.agriculture.senate.gov/hearings/pesticide-registration-under-the-federal-insecticide-fungicide-and-rodenticide-act-providing-stakeholders-with-certainty-through-the-pesticide-registration-improvement-act
>>
>> Thanks again!

Scott

Scott Herndon

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

202-595-0786

**From:** Cassie Bladow [mailto:Cassie.Bladow@beetsugar.org]
**Sent:** Tuesday, May 09, 2017 4:43 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>; Scott Herndon <sherndon@americansugarbeet.org>
**Subject:** RE: Section 18

Thank you, Tate! Really appreciate your help!

**From:** Bennett, Tate [mailto:Bennett.Tate@epa.gov]
**Sent:** Tuesday, May 9, 2017 4:37 PM
**To:** Scott Herndon <sherndon@americansugarbeet.org>
**Cc:** Cassie Bladow <Cassie.Bladow@beetsugar.org>
**Subject:** RE: Section 18

FYI we are on it.

Interesting. I'm not confident her management is aware of these conversations. Will find out.

_____
Nancy B. Beck, Ph.D., DABT
Deputy Assistant Administrator, OCSPP

P: 202-564-1273
M: Ex. 6 - Personal Privacy
Beck.Nancy@epa.gov

**From:** Scott Herndon [mailto:sherndon@americansugarbeet.org]
**Sent:** Tuesday, May 9, 2017 4:09 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>
**Cc:** Cassie Bladow <Cassie.Bladow@beetsugar.org>
**Subject:** RE: Section 18

Tate,

I've looped Cassie back in and wanted to give you both an update. Dr. Mohamed Khan with NDSU had a conversation with Andrea Conrath at EPA (her contact information is below) this morning about the new data that was supplied by SipCam. Dr. Khan prepared the Section 18 applications that were requested by the ND and MN Departments of Agriculture. He also prepared the application that we expect the Michigan Department of Agriculture to file soon.

In his email to me he stated "I spoke to Andrea today at EPA. Unfortunately, she does not believe the new tolerance data submitted will help. Seems they are looking for some data for some other studies." I have been unable to determine what additional data they need and have asked Dr. Khan if that was relayed to him but have not yet heard back.

<image001.jpg>

Thanks!

Scott Herndon

Director of Biotechnology and Regulatory Affairs

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

-----Original Message-----
From: Scott Herndon
Sent: Monday, May 8, 2017 5:43 PM
To: 'Bennett, Tate' <Bennett.Tate@epa.gov>
Subject: RE: Section 18

SipCam has state registrations for Cercos (brand name) in Michigan, North Dakota, Minnesota.

North Dakota expires in 12/31/2017

Michigan expires in 6/30/2017

Minnesota expires 12/31/2017

SipCam will renew all of them

Scott Herndon

Director of Biotechnology and Regulatory Affairs American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

-----Original Message-----

From: Bennett, Tate [mailto:Bennett.Tate@epa.gov]

Sent: Monday, May 8, 2017 5:33 PM

To: Scott Herndon <sherndon@americansugarbeet.org>

Subject: Re: Section 18

Do these states currently have permits? What is the exact date of expiration?

> On May 8, 2017, at 5:20 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:

>

> Tate,

>

> Apologies for the delay! I am now back at my computer and have put together a short backgrounder as well as relevant industry contacts.

>

> I have also attached the correspondence from EPA to the ND and MN Departments of Agriculture asking them to withdraw their request.

>

> In addition, I have attached a cover letter that SipCam submitted to EPA on Friday, May 5th with additional data.

>

> Thanks so much for your help and please don't hesitate to email or call if you have any questions.

>

> Have a great evening!

>

> Scott

>

> Scott Herndon

> Director of Biotechnology and Regulatory Affairs American Sugarbeet

> Growers Association

> 1155 15th Street NW #1100

> Washington, DC 20005

> 202-595-0786

> Ex. 6 - Personal Privacy (cell)

>

> -----Original Message-----

> From: Bennett, Tate [mailto:Bennett.Tate@epa.gov]

> Sent: Monday, May 8, 2017 3:34 PM

> To: Scott Herndon <sherndon@americansugarbeet.org>

> Cc: Cassie Bladow <Cassie.Bladow@beetsugar.org>

> Subject: Re: Section 18

>

> Thanks!

>

>> On May 8, 2017, at 3:32 PM, Scott Herndon
<sherndon@americansugarbeet.org> wrote:

>>

>> Tate,

>>

>> I have all of the information in my office but am on the Hill
right now. I'll send everything to you this evening.

>>

>> Thanks so much!

>>

>> Scott

>>

>> Sent from my iPhone

>>

>>> On May 8, 2017, at 3:13 PM, Bennett, Tate
<Bennett.Tate@epa.gov> wrote:

>>>

>>> Hey Scott- do you have any summaries/background papers?

>>>

>>>> On May 8, 2017, at 2:47 PM, Cassie Bladow
<Cassie.Bladow@beetsugar.org> wrote:

>>>>

>>>> Tate,

>>>>

>>>> Thank you for taking the time to chat this morning. As we discussed, I am looping Scott Herndon who works for the American Sugarbeet Growers Association into the conversation since he has done a lot of work on this issue and will be able to provide you with background and answer any questions you have.

>>>>

>>>> We really appreciate your guidance helping us move this along, especially given our tight timeline.

>>>>

>>>> Thanks again!

>>>> Cassie

>>>>

> <Section 18 for Chlorothalonil Contacts.docx> <Chlorothalonil

> Background.docx>

> <2017-05-05 Chlorothalonil Tech- Echo 500 Sugarbeet Tol Pet-Label

> Amend-C....pdf> <EPA email to ND and MN Departments of

> Agriculture.docx>

<2017-05-05 Chlorothalonil Tech- Echo 500 Sugarbeet Tol Pet-Label Amend-C....pdf>

**To:** Beck, Nancy[Beck.Nancy@epa.gov]
**Cc:** Bennett, Tate[Bennett.Tate@epa.gov]; Palich, Christian[palich.christian@epa.gov]; Cassie Bladow[Cassie.Bladow@beetsugar.org]; Graham, Amy[graham.amy@epa.gov]
**From:** Scott Herndon
**Sent:** Mon 6/5/2017 4:43:56 PM
**Subject:** RE: Section 18

Dr. Beck,

I'd like to thank you and everyone else involved in this again for all of your work!

Do you have any sense yet of the likelihood of chlorothalonil being approved for use on sugarbeets for the 2018 season? Or is it more likely that it won't be fully approved until the 2019 season? I'm trying to get a sense of the path forward on this.

Also, has any progress been made on identifying workable alternatives to chlorothalonil for this season? I know there was some hope for workable solutions from registered products. I'd love to share the specific alternatives with our folks, if possible.

Thanks again for all of your help and time!

Best,

Scott

**Scott Herndon**

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

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**Sent:** Friday, May 12, 2017 6:36 PM
**To:** Scott Herndon <sherndon@americansugarbeet.org>
**Cc:** Bennett, Tate <Bennett.Tate@epa.gov>; Palich, Christian <palich.christian@epa.gov>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
**Subject:** RE: Section 18

Scott,

Below is the latest. Long story short, we are currently working with state and Extension Service experts to explore and identify possible alternatives as we evaluate the request. We have had similar situations like this and have been able to work cooperatively to find alternative approaches in emergency situations. Our staff is meeting internally with extension experts and trying to schedule a meeting with the sugar beet states for next week.

Regarding the data needs, below is what I've learned. However, I would encourage you to keep in mind that the work noted above to identify possible alternative approaches with the states is what will likely be most helpful to your group because it does take time to run through the full risk evaluation process.

Summary:

North Dakota and Minnesota submitted to the agency emergency exemption requests for the subject uses in late March and early April, 2017, respectively, but chorothalonil has outstanding data requirements most of which concern the need for a subchronic inhalation study, which precludes the agency from being able to make the required aggregate risk safety finding.

More specifically, the Chlorothalonil Scoping Document of March, 2012, developed to support the opening of the docket for registration review, indicates that in our most recent risk assessment (2010),

- MOEs for short and intermediate-term occupational handler inhalation exposures exceed HED's LOC (MOE ≤1000). For mixing/loading liquids for aerial, chemigation, and groundboom applications, MOEs range from 42 to 180.

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In response to this risk assessment, the registrant withdrew the new use applications that triggered the need for this risk assessment.

In March 2013, after OMB review, we issued the Registration Review data call-in. Nearly 25 studies were identified is being needed to support the registration review. Most pertinent to this situation is the need for a 90-day subchronic inhalation study, but we identified a number of other missing studies across human exposure, animal tox, environmental fate, and ecological effects. Sipcam Agro, the registrant for the requested product under section 18, was a recipient of the DCI and a copy of the DCI has been posted in the registration review public docket since July 2013.

We have been working with the consortium of chlorothalonil registrants to build a record for an upcoming FIFRA SAP peer review meeting on the use of in vitro studies and CFD/MMAD models for deriving points of departure and uncertainty factors. This would be the first time that EPA derived a point of departure from an in vitro study. We are targeting late 2017 or early 2018 for that SAP meeting.

---

So as you can see this process takes time. Given all that and the need for the emergency use, as I

noted above, we are reaching out to the states and to the land grant universities to explore other control options for this fungal pest that we might be able to make available under section 18. The point Rick was trying to make in his testimony is that the earlier engagement we have with the states on potential control tools, the less likely that we will find ourselves in a situation mere days before the use needs to occur of having to scramble to find an alternative. This is an approach that we use with IR-4 (Interregional Risk Project 4) ; they don't conduct research on chemicals where we don't think we'll be able to make the FFDCA safety finding. That way, their packages move rather quickly through the review process.

Please let me know if you have any questions.

Regards,

Nancy

---

Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator, OCSPP

P: 202-564-1273

M: Ex. 6 - Personal Privacy

beck.nancy@epa.gov

**From:** Scott Herndon [mailto:sherndon@americansugarbeet.org]
**Sent:** Friday, May 12, 2017 4:10 PM
**To:** Beck, Nancy <Beck.Nancy@epa.gov>
**Cc:** Bennett, Tate <Bennett.Tate@epa.gov>; Palich, Christian <palich.christian@epa.gov>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
**Subject:** Re: Section 18

Thanks so much!

Scott

Sent from my iPhone

On May 11, 2017, at 6:30 PM, Beck, Nancy <Beck.Nancy@epa.gov> wrote:

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Regards,

Nancy

---

Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator, OCSPP

P: 202-564-1273

M: Ex. 6 - Personal Privacy

beck.nancy@epa.gov

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**Sent:** Thursday, May 11, 2017 12:38 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>; Beck, Nancy <Beck.Nancy@epa.gov>
**Cc:** Palich, Christian <palich.christian@epa.gov>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
**Subject:** RE: Section 18

Christian and Amy, it was nice meeting you!

I have listened to the hearing about 20 times now so that I could transcribe the Section 18 comments verbatim for our growers. I've pasted them below for you as well. When you are able, do you mind telling me what data is missing, if any? I've heard that it is the vapor

data that is missing but have alternatively heard that it is the residue data that is missing. I want to make sure that our folks have or can provide all necessary data. I've also attached the relevant contacts for this issue.

Thanks so much again!

My transcript of Section 18 comments from today's hearing below:

**Senator Stabenow:**

"Thank you Mr. Chairman and thank you to both of our witnesses. Mr. Keigwin, I first want to thank you personally for your engagement with Michigan State University and our Michigan hop growers that created the gift that we just gave to the Chairman to facilitate Section 18 exemptions under FIFRA. Most recently I've heard from Michigan sugar beet growers about emergency use needs under Section 18 as well. What steps can be taken by growers, states, manufacturers and the EPA to make this Section 18 process more efficient so that growers facing unexpected risk can get needed crop insurance tools in a timely manner?"

**Mr. Rick Keigwin, Acting Director, Office of Pesticide Programs, EPA**

"Thank you, Senator, and I've had the great fortune of meeting with Michigan growers on a number of occasions. Your growers sponsor an annual tour to help educate EPA employees about Michigan agriculture and what farmers do to help grow our crops so thank you for that. In terms of Section 18s, we have a pretty solid record of completing our decision making for most Section 18 emergency exemptions in less than 50 days but there are times and I think this situation with the sugar beet ones, the growers, that came to your attention highlights the need for early engagement between EPA, the Michigan Department of Agriculture and the grower community and the land-grand universities. Knowing early on what tools a grower might need to address an emerging pest situation. It is hard when at the end of the process, or right when they need to apply the product, for EPA to say, 'wait, hold on, we might have a problem' so one process efficiency would probably be for us to have earlier engagement, maybe even before the state submits their Section 18 request to see if there might be any issues with that particular chemical and to the extent to which there are we could work collaboratively with cooperative extension and with the state to maybe find some alternatives that we could move through the process more quickly to address the emerging pest management."

**Scott Herndon**

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

**From:** Bennett, Tate [mailto:Bennett.Tate@epa.gov]
**Sent:** Wednesday, May 10, 2017 10:21 PM
**To:** Beck, Nancy <Beck.Nancy@epa.gov>
**Cc:** Palich, Christian <palich.christian@epa.gov>; Scott Herndon <sherndon@americansugarbeet.org>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
**Subject:** Re: Section 18

Scott- Christian and Amy will be at the hearing tomorrow with Rick. Were you planning to be there?

On May 10, 2017, at 10:05 PM, Beck, Nancy <Beck.Nancy@epa.gov> wrote:

> This is bizarre. On our call when we discussed reaching out to Stabenow, Rick clearly stated that he would state that believed his staff spoke prematurely and that they were looking at all the options.
>
> Rick seems like such a straight shooter this just isn't adding up. Are we sure that Rick was the only one that spoke w Stabenows office and there wasn't some other call with his staffer?
>
> I can check w Sven as he would have been on the call.
>
> _____

Nancy B. Beck, Ph.D., DABT
Deputy Assistant Administrator, OCSPP
P: 202-564-1273
M: Ex. 6 - Personal Privacy
Beck.Nancy@epa.gov

On May 10, 2017, at 9:27 PM, Palich, Christian <palich.christian@epa.gov> wrote:

I sat in on that call for a minute but was pulled away to another meeting, ill follow up with career staff in the morning to see a status.

I'll defer to Nancy on how to handle this more technical response.

Thanks so much for the heads up Scott.

Christian R. Palich

Deputy Associate Administrator

Congressional & Intergovernmental Relations

Ex. 6 - Personal Privacy

Sent from my iPhone

On May 10, 2017, at 9:15 PM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:

Thank you for the heads up. Looping in Nancy as it relates to the imminent hearing tomorrow. We probably need to give some messaging instructions on this so he doesn't tie our hands "on the record." Thoughts?

On May 10, 2017, at 9:10 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:

Tate,

I wanted to give you a heads up that Senator Stabenow's Ag. Committee staff spoke with EPA career staff this afternoon. The EPA staff don't believe that they have any room on this issue and still believe there is a data gap. From what Stabenow's staff relayed to me, EPA staff characterized the Section 18 component as relatively straightforward under FIFRA but the Food Drug and Cosmetic Act (FDCA) requirements for residues and granting tolerances are very strict. Under Section 18, the cost benefit analysis can weigh the economic harm, etc. I asked them to triple check with EPA that they were looking at the data SipCam submitted on Friday and they said they would (attached).

Also, they may bring this up at the Senate Agriculture hearing tomorrow with the Director of Pesticide Programs. We did not ask them to do this but I also don't think that I can ask them not to do it. I just wanted to give you a heads up so you all wouldn't be caught off guard. Hearing info here: https://www.agriculture.senate.gov/hearings/pesticide-registration-under-the-federal-insecticide-fungicide-and-rodenticide-act-providing-stakeholders-with-certainty-through-the-pesticide-registration-improvement-act

Thanks again!

Scott

Scott Herndon

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

202-595-0786

**From:** Cassie Bladow [mailto:Cassie.Bladow@beetsugar.org]
**Sent:** Tuesday, May 09, 2017 4:43 PM

**To:** Bennett, Tate <Bennett.Tate@epa.gov>; Scott Herndon <sherndon@americansugarbeet.org>
**Subject:** RE: Section 18

Thank you, Tate! Really appreciate your help!

**From:** Bennett, Tate [mailto:Bennett.Tate@epa.gov]
**Sent:** Tuesday, May 9, 2017 4:37 PM
**To:** Scott Herndon <sherndon@americansugarbeet.org>
**Cc:** Cassie Bladow <Cassie.Bladow@beetsugar.org>
**Subject:** RE: Section 18

FYI we are on it.

Interesting. I'm not confident her management is aware of these conversations. Will find out.

Nancy B. Beck, Ph.D., DABT
Deputy Assistant Administrator, OCSPP
P: 202-564-1273
M: Ex. 6 - Personal Privacy
Beck.Nancy@epa.gov

**From:** Scott Herndon [mailto:sherndon@americansugarbeet.org]
**Sent:** Tuesday, May 9, 2017 4:09 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>
**Cc:** Cassie Bladow <Cassie.Bladow@beetsugar.org>
**Subject:** RE: Section 18

Tate,

I've looped Cassie back in and wanted to give you both an update. Dr. Mohamed Khan with NDSU had a conversation with Andrea Conrath at EPA (her contact information is below) this morning about the new data that was supplied by SipCam. Dr. Khan prepared the Section 18 applications that were requested by the ND and MN Departments of Agriculture. He also prepared the application that we expect the Michigan Department of Agriculture to file soon.

In his email to me he stated "I spoke to Andrea today at EPA. Unfortunately, she does not believe the new tolerance data submitted will help. Seems they are looking for some data for some other studies." I have been unable to determine what additional data they need and have asked Dr. Khan if that was relayed to him but have not yet heard back.

<image001.jpg>

Thanks!

Scott Herndon

Director of Biotechnology and Regulatory Affairs

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

-----Original Message-----
From: Scott Herndon
Sent: Monday, May 8, 2017 5:43 PM
To: 'Bennett, Tate' <Bennett.Tate@epa.gov>
Subject: RE: Section 18

SipCam has state registrations for Cercos (brand name) in Michigan, North Dakota, Minnesota.

North Dakota expires in 12/31/2017

Michigan expires in 6/30/2017

Minnesota expires 12/31/2017

SipCam will renew all of them

Scott Herndon

Director of Biotechnology and Regulatory Affairs American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

-----Original Message-----

From: Bennett, Tate [mailto:Bennett.Tate@epa.gov]

Sent: Monday, May 8, 2017 5:33 PM

To: Scott Herndon <sherndon@americansugarbeet.org>

Subject: Re: Section 18

Do these states currently have permits? What is the exact date of expiration?

> On May 8, 2017, at 5:20 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:

>

> Tate,

>

> Apologies for the delay! I am now back at my computer and have put together a short backgrounder as well as relevant industry contacts.

>

> I have also attached the correspondence from EPA to the ND and MN Departments of Agriculture asking them to withdraw their request.

>

> In addition, I have attached a cover letter that SipCam submitted to EPA on Friday, May 5th with additional data.

>

> Thanks so much for your help and please don't hesitate to email or call if you have any questions.

>

> Have a great evening!

>

> Scott

>

> Scott Herndon

> Director of Biotechnology and Regulatory Affairs American Sugarbeet

> Growers Association

> 1155 15th Street NW #1100

> Washington, DC 20005

> 202-595-0786

> Ex. 6 - Personal Privacy (cell)

>

> -----Original Message-----

> From: Bennett, Tate [mailto:Bennett.Tate@epa.gov]

> Sent: Monday, May 8, 2017 3:34 PM

> To: Scott Herndon <sherndon@americansugarbeet.org>

> Cc: Cassie Bladow <Cassie.Bladow@beetsugar.org>

> Subject: Re: Section 18

>

> Thanks!

>

>> On May 8, 2017, at 3:32 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:

>>

>> Tate,

>>

>> I have all of the information in my office but am on the Hill right now. I'll send everything to you this evening.

>>

>> Thanks so much!

>>

>> Scott

>>

>> Sent from my iPhone

>>

>>> On May 8, 2017, at 3:13 PM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:

>>>

>>> Hey Scott- do you have any summaries/background papers?

>>>

>>>> On May 8, 2017, at 2:47 PM, Cassie Bladow <Cassie.Bladow@beetsugar.org> wrote:

>>>>

>>>> Tate,

>>>>

>>>> Thank you for taking the time to chat this morning. As we discussed, I am looping Scott Herndon who works for the American Sugarbeet Growers Association into the conversation since he has done a lot of work on this issue and will be able to provide you with background and answer any questions you have.

>>>>

>>>> We really appreciate your guidance helping us move this along, especially given our tight timeline.

>>>>

>>>> Thanks again!

>>>> Cassie

>>>>

> <Section 18 for Chlorothalonil Contacts.docx> <Chlorothalonil

> Background.docx>

> <2017-05-05 Chlorothalonil Tech- Echo 500 Sugarbeet Tol Pet-Label

> Amend-C....pdf> <EPA email to ND and MN Departments of

> Agriculture.docx>

<2017-05-05 Chlorothalonil Tech- Echo 500 Sugarbeet Tol Pet-Label
Amend-C....pdf>

**To:** Bennett, Tate[Bennett.Tate@epa.gov]
**From:** Scott Herndon
**Sent:** Wed 5/31/2017 12:21:23 PM
**Subject:** RE: Sugarbeets

Great! I'll stay tuned…

Thanks!

**Scott Herndon**

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

**From:** Bennett, Tate [mailto:Bennett.Tate@epa.gov]
**Sent:** Wednesday, May 31, 2017 7:56 AM
**To:** Scott Herndon <sherndon@americansugarbeet.org>
**Subject:** Re: Sugarbeets

Might have an update later today.

On May 30, 2017, at 12:38 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:

Tate,

My folks asked me what product EPA and Syngenta think will work. Is that something that you can share with me?

Thanks again!

Scott Herndon

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

202-595-0786

**From:** Bennett, Tate [mailto:Bennett.Tate@epa.gov]
**Sent:** Friday, May 26, 2017 9:44 AM
**To:** Scott Herndon <sherndon@americansugarbeet.org>
**Subject:** Re: Sugarbeets

Received. No problem!

On May 26, 2017, at 9:06 AM, Scott Herndon <sherndon@americansugarbeet.org> wrote:

> Tate,
>
> I'm not sure if my first response went through because my phone spazzed out and I got error messages.
>
> I want to sincerely thank you for the update and for keeping me in the loop! Sorry for the delayed response. I slipped out of town for the long weekend.
>
> Thanks again!

Scott

Sent from my iPhone

On May 25, 2017, at 10:15 AM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:

**From:** Beck, Nancy
**Sent:** Wednesday, May 24, 2017 6:47 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>
**Subject:** Sugarbeets

Got an update today, in case you get inquiries:

While some believe that clorothalonil is the only option, EPA is continuing to work with Syngenta (which is part of the chlorothalonil coalition) as both EPA and Syngenta think there are other registered products that could do the trick. Thus we continue to talk with states about the use of these alternatives.

**********

Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator

Office of Chemical Safety and Pollution Prevention

P: 202-564-1273

M: Ex. 6 - Personal Privacy

beck.nancy@epa.gov

**To:** Bennett, Tate[Bennett.Tate@epa.gov]
**From:** Scott Herndon
**Sent:** Mon 5/22/2017 6:50:42 PM
**Subject:** RE: Running into another meeting

Tate,

I certainly don't want to harass you but wanted to check in to see if there is any news.

Thanks!

Scott

Scott Herndon
Director of Biotechnology and Regulatory Affairs
American Sugarbeet Growers Association
1155 15th Street NW #1100
Washington, DC 20005
202-595-0786

-----Original Message-----
From: Bennett, Tate [mailto:Bennett.Tate@epa.gov]
Sent: Friday, May 19, 2017 6:47 PM
To: Scott Herndon <sherndon@americansugarbeet.org>
Subject: Re: Running into another meeting

No news today. The governor was happy we are scrambling to help. Check back on Monday?

> On May 19, 2017, at 8:27 AM, Scott Herndon <sherndon@americansugarbeet.org> wrote:
>
> Tate,
>
> If you are able to give me an update on the Section 18 that would be great. I'd be curious to hear how the meeting with Goehring went too. My impression is that it doesn't look good but if there is a ray of hope that would be awesome. Is there anything else that I can do?
>
> Thanks so much for all of your help with this!
>
> Scott
>
> Scott Herndon
> Director of Biotechnology and Regulatory Affairs American Sugarbeet
> Growers Association
> 1155 15th Street NW #1100
> Washington, DC 20005
> 202-595-0786
>
> -----Original Message-----
> From: Bennett, Tate [mailto:Bennett.Tate@epa.gov]
> Sent: Thursday, May 18, 2017 2:14 PM
> To: Scott Herndon <sherndon@americansugarbeet.org>
> Subject: Re: Running into another meeting
>
> False alarm. Just had a historical ? Pre commissioner goehring meeting
>
>> On May 18, 2017, at 2:09 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:

>>
>> I'm free now Ex. 6 - Personal Privacy
>>
>> Sent from my iPhone
>>
>>> On May 18, 2017, at 1:01 PM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:
>>>
>>> No worries
>>>
>>>> On May 18, 2017, at 12:54 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:
>>>>
>>>> Probably will take over an hour but I can call you ASAP when leave
>>>> a mess
>>>>
>>>> Sent from my iPhone

**To:** Bennett, Tate[Bennett.Tate@epa.gov]
**From:** Scott Herndon
**Sent:** Sat 5/20/2017 12:31:09 AM
**Subject:** Re: Running into another meeting

Thanks! Have a great weekend and I'll check back on Monday.

We really appreciate all the help!

Scott

Sent from my iPhone

> On May 19, 2017, at 6:46 PM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:
>
> No news today. The governor was happy we are scrambling to help. Check back on Monday?
>
>> On May 19, 2017, at 8:27 AM, Scott Herndon <sherndon@americansugarbeet.org> wrote:
>>
>> Tate,
>>
>> If you are able to give me an update on the Section 18 that would be great. I'd be curious to hear how the meeting with Goehring went too. My impression is that it doesn't look good but if there is a ray of hope that would be awesome. Is there anything else that I can do?
>>
>> Thanks so much for all of your help with this!
>>
>> Scott
>>
>> Scott Herndon
>> Director of Biotechnology and Regulatory Affairs
>> American Sugarbeet Growers Association
>> 1155 15th Street NW #1100
>> Washington, DC 20005
>> 202-595-0786
>>
>> -----Original Message-----
>> From: Bennett, Tate [mailto:Bennett.Tate@epa.gov]
>> Sent: Thursday, May 18, 2017 2:14 PM
>> To: Scott Herndon <sherndon@americansugarbeet.org>
>> Subject: Re: Running into another meeting
>>
>> False alarm. Just had a historical ? Pre commissioner goehring meeting
>>
>>> On May 18, 2017, at 2:09 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:
>>>
>>> I'm free now Ex. 6 - Personal Privacy
>>>
>>> Sent from my iPhone
>>>
>>>> On May 18, 2017, at 1:01 PM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:
>>>>
>>>> No worries
>>>>
>>>>> On May 18, 2017, at 12:54 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:
>>>>>

>>>>> Probably will take over an hour but I can call you ASAP when leave a mess
>>>>>
>>>>> Sent from my iPhone

**To:** Bennett, Tate[Bennett.Tate@epa.gov]
**From:** Scott Herndon
**Sent:** Fri 5/19/2017 12:26:29 PM
**Subject:** RE: Running into another meeting

Tate,

If you are able to give me an update on the Section 18 that would be great. I'd be curious to hear how the meeting with Goehring went too. My impression is that it doesn't look good but if there is a ray of hope that would be awesome. Is there anything else that I can do?

Thanks so much for all of your help with this!

Scott

Scott Herndon
Director of Biotechnology and Regulatory Affairs
American Sugarbeet Growers Association
1155 15th Street NW #1100
Washington, DC 20005
202-595-0786

-----Original Message-----
From: Bennett, Tate [mailto:Bennett.Tate@epa.gov]
Sent: Thursday, May 18, 2017 2:14 PM
To: Scott Herndon <sherndon@americansugarbeet.org>
Subject: Re: Running into another meeting

False alarm. Just had a historical ? Pre commissioner goehring meeting

> On May 18, 2017, at 2:09 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:
>
> I'm free now Ex. 6 - Personal Privacy
>
> Sent from my iPhone
>
>> On May 18, 2017, at 1:01 PM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:
>>
>> No worries
>>
>>> On May 18, 2017, at 12:54 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:
>>>
>>> Probably will take over an hour but I can call you ASAP when leave a mess
>>>
>>> Sent from my iPhone

**To:** Bennett, Tate[Bennett.Tate@epa.gov]
**From:** Scott Herndon
**Sent:** Thur 5/18/2017 4:42:31 PM
**Subject:** Re: Fungicides - potentially for use in sugarbeets

Yes. My cell number is Ex. 6 - Personal Privacy

Sent from my iPhone

On May 18, 2017, at 12:18 PM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:

Can I give you a quick buzz.

**From:** Scott Herndon [mailto:sherndon@americansugarbeet.org]
**Sent:** Thursday, May 18, 2017 10:47 AM
**To:** Beck, Nancy <Beck.Nancy@epa.gov>
**Cc:** Graham, Amy <graham.amy@epa.gov>; Palich, Christian <palich.christian@epa.gov>; Bennett, Tate <Bennett.Tate@epa.gov>; Cassie Bladow <Cassie.Bladow@beetsugar.org>
**Subject:** FW: Fungicides - potentially for use in sugarbeets

Dr. Beck,

I am forwarding this email from Dr. Kahn to Andrea Conrath in case is helpful.

Thanks again for your attention to this issue!

Scott

**Scott Herndon**

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

**From:** Khan, Mohamed [mailto:mohamed.khan@ndsu.edu]
**Sent:** Thursday, May 18, 2017 10:19 AM
**To:** 'Conrath, Andrea B' <Conrath.Andrea@epa.gov>
**Cc:** Scott Herndon <sherndon@americansugarbeet.org>; 'dmaatz@rrvsga.com' <dmaatz@rrvsga.com>; 'Sunseri, Matthew (MDA)' <matthew.sunseri@state.mn.us>; 'jdsauter@nd.gov' <jdsauter@nd.gov>; 'ray.vandriessche@michigansugar.com' <IMCEAINVALID-ray+2Evandriessche+40michigansugar+2Ecom@namprd08.prod.outlook.com>; 'Pratt, David' <David.Pratt@Michigansugar.com>; 'verhougstraeteb@michigan.gov' <verhougstraeteb@michigan.gov>; 'Tyler Grove' <TGrove@crystalsugar.com>
**Subject:** RE: Fungicides - potentially for use in sugarbeets

Hello Andrea:

I have put together a few pictures on slides/comments which I hope will make it easy to understand why I do not recommend using several products for controlling CLS although they are labeled for use on sugarbeet.

I have continued checking with colleagues worldwide who are working with sugarbeet and unfortunately there is no other new chemistry that is effective against CLS, thus our request for chlorothalonil. I am also attaching a paper which demonstrates that *C. beticola* has developed resistance not only to QoI fungicides, but also to the benzimidazoles and DMI (triazoles) fungicides. It should be noted that in 2016, 14.4% of our isolates tested were resistant to TPTH + a DMI + Topsin + Headline and 24.4% of our isolates tested were resistant to triazoles (tetraconazole, difenoconazole+propiconazole, prothioconazole) (Secor et al. 2017. Sensitivity of Cercospora beticola to foliar fungicides in 2016. 2016 Sugarbeet Research and Extension Reports. 47:154-162). We are trying to manage fungicide resistance so that we can have the triazoles as a major tool for the future and to use other MOAs to target and significantly reduce the QoI resistant *C. beticola* population so that we can make the QoI fungicides effective again as we did for TPTH in the 2000s.

Once again, thanks for helping us in the past and I hope help will be forthcoming again before it is too late for the economic survival of the sugarbeet industry.

Regards,

Mohamed.

Mohamed F. R. Khan, Ph.D

Professor & Extension Sugarbeet Specialist

Plant Pathology Department

**NORTH DAKOTA STATE UNIVERSITY AND**

**UNIVERSITY OF MINNESOTA**

Walster Hall, Room 227

Dept. 7160, PO Box 6050

Fargo ND 58108-6050

phone: 701-231-8596

mobile phone: Ex. 6 - Personal Privacy

fax: 701-231-6186

mohamed.khan@ndsu.edu

www.ndsu.edu

<image001.gif>

**From:** Conrath, Andrea B [mailto:Conrath.Andrea@epa.gov]
**Sent:** Tuesday, May 16, 2017 4:06 PM
**To:** Matthew Sunseri (matthew.sunseri@state.mn.us) <matthew.sunseri@state.mn.us>; Brian Verhougstraete <verhougstraeteb@michigan.gov>; Sauter, Jerry D. <jdsauter@nd.gov>
**Cc:** Khan, Mohamed <mohamed.khan@ndsu.edu>; Johnson, Marion <Johnson.Marion@epa.gov>; Maignan, Tawanda <Maignan.Tawanda@epa.gov>
**Subject:** Fungicides - potentially for use in sugarbeets
**Importance:** High

Hello all –

Thank you for making time to discuss the exemption request with us today on such short notice. We will be sharing the evaluation from our Biological and Economic Analysis Division (BEAD) when it is finalized, probably next week. This should help clarify the areas of question with respect to meeting the criteria mandated to determine whether an emergency exemption may be warranted.

In the meantime, I wanted to share with you a short list of fungicides that our pathologist identified as potentially being options to explore for Cercospora management in sugarbeets. Please share with the other researcher if appropriate, since I didn't catch their name on our phone call.

Research from NY for Cercospora leaf spot on table beets (http://www.hort.cornell.edu/expo/proceedings/2016/ProcessingVegetables.Diversity%20and%20fungal%20r) looking for possible treatments (not necessarily registered). They had good results in trials with a few products that were tested:

1. cyprodinil + difenoconazole (pre-mix product, difenoconazole is already labeled for sugar beet),

2. difenoconazole + benzovindiflupyr (a Group 7 fungicide) [sugar beet currently has a pre-mix Group 7, fluxapyroxad + Group 11 pyraclostrobin, which has resistance),

3. fluazinam

Mancozeb provided good results as well (although lack of efficacy is claimed for CLS in sugarbeet).

Regards,

Andrea

<image002.jpg>

_001311A_00000038

# Andrea B. Conrath

Biologist, Emergency Response Team
Registration Division – Office of Pesticide Programs
United States Environmental Protection Agency
Phone: 703.308.9356 Fax: 703.605.0781
conrath.andrea@epa.gov

Office & Courier
S-7235, One Potomac Yard
2777 Crystal Drive
Arlington, VA 22202

Mailing Address
USEPA – OPP (7505P)
1200 Pennsylvania Ave NW
Washington, DC 20004


Visit http://www.EPA.gov/pesticides/regulating/section18_training

ED_001311A_00000039

**To:** Beck, Nancy[Beck.Nancy@epa.gov]
**Cc:** Graham, Amy[graham.amy@epa.gov]; Palich, Christian[palich.christian@epa.gov]; Bennett, Tate[Bennett.Tate@epa.gov]; Cassie Bladow[Cassie.Bladow@beetsugar.org]
**From:** Scott Herndon
**Sent:** Thur 5/18/2017 2:47:03 PM
**Subject:** FW: Fungicides - potentially for use in sugarbeets
2017 CLS on sugarbeet situation in USA.pdf
2017 Molecular and experimental evidence of multi-resistance of Cercospora beticola field populations to MBC DMI and QoI fungicides.pdf

Dr. Beck,

I am forwarding this email from Dr. Kahn to Andrea Conrath in case is helpful.

Thanks again for your attention to this issue!

Scott

**Scott Herndon**

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

**From:** Khan, Mohamed [mailto:mohamed.khan@ndsu.edu]
**Sent:** Thursday, May 18, 2017 10:19 AM
**To:** 'Conrath, Andrea B' <Conrath.Andrea@epa.gov>
**Cc:** Scott Herndon <sherndon@americansugarbeet.org>; 'dmaatz@rrvsga.com' <dmaatz@rrvsga.com>; 'Sunseri, Matthew (MDA)' <matthew.sunseri@state.mn.us>; 'jdsauter@nd.gov' <jdsauter@nd.gov>; 'ray.vandriessche@michigansugar.com' <IMCEAINVALID-

ray+2Evandriessche+40michigansugar+2Ecom@namprd08.prod.outlook.com>; 'Pratt, David' <David.Pratt@Michigansugar.com>; 'verhougstraeteb@michigan.gov' <verhougstraeteb@michigan.gov>; 'Tyler Grove' <TGrove@crystalsugar.com>
**Subject:** RE: Fungicides - potentially for use in sugarbeets

Hello Andrea:

I have put together a few pictures on slides/comments which I hope will make it easy to understand why I do not recommend using several products for controlling CLS although they are labeled for use on sugarbeet.

I have continued checking with colleagues worldwide who are working with sugarbeet and unfortunately there is no other new chemistry that is effective against CLS, thus our request for chlorothalonil. I am also attaching a paper which demonstrates that *C. beticola* has developed resistance not only to QoI fungicides, but also to the benzimidazoles and DMI (triazoles) fungicides. It should be noted that in 2016, 14.4% of our isolates tested were resistant to TPTH + a DMI + Topsin + Headline and 24.4% of our isolates tested were resistant to triazoles (tetraconazole, difenoconazole+propiconazole, prothioconazole) (Secor et al. 2017. Sensitivity of Cercospora beticola to foliar fungicides in 2016. 2016 Sugarbeet Research and Extension Reports. 47:154-162). We are trying to manage fungicide resistance so that we can have the triazoles as a major tool for the future and to use other MOAs to target and significantly reduce the QoI resistant *C. beticola* population so that we can make the QoI fungicides effective again as we did for TPTH in the 2000s.

Once again, thanks for helping us in the past and I hope help will be forthcoming again before it is too late for the economic survival of the sugarbeet industry.

Regards,

Mohamed.

Mohamed F. R. Khan, Ph.D

Professor & Extension Sugarbeet Specialist

Plant Pathology Department

**NORTH DAKOTA STATE UNIVERSITY AND**

**UNIVERSITY OF MINNESOTA**

Walster Hall, Room 227

Dept. 7160, PO Box 6050

Fargo ND 58108-6050

phone: 701-231-8596

mobile phone: Ex. 6 - Personal Privacy

fax: 701-231-6186

mohamed.khan@ndsu.edu

www.ndsu.edu

NDSU NORTH DAKOTA STATE UNIVERSITY

**From:** Conrath, Andrea B [mailto:Conrath.Andrea@epa.gov]
**Sent:** Tuesday, May 16, 2017 4:06 PM
**To:** Matthew Sunseri (matthew.sunseri@state.mn.us) <matthew.sunseri@state.mn.us>; Brian Verhougstraete <verhougstraeteb@michigan.gov>; Sauter, Jerry D. <jdsauter@nd.gov>
**Cc:** Khan, Mohamed <mohamed.khan@ndsu.edu>; Johnson, Marion <Johnson.Marion@epa.gov>; Maignan, Tawanda <Maignan.Tawanda@epa.gov>
**Subject:** Fungicides - potentially for use in sugarbeets
**Importance:** High

Hello all –

Thank you for making time to discuss the exemption request with us today on such short notice. We will be sharing the evaluation from our Biological and Economic Analysis Division (BEAD) when it is finalized, probably next week. This should help clarify the areas of question with respect to meeting the criteria mandated to determine whether an emergency exemption may be warranted.

In the meantime, I wanted to share with you a short list of fungicides that our pathologist identified as potentially being options to explore for Cercospora management in sugarbeets. Please share with the other researcher if appropriate, since I didn't catch their name on our phone call.

Research from NY for Cercospora leaf spot on table beets (http://www.hort.cornell.edu/expo/proceedings/2016/ProcessingVegetables.Diversity%20and%20fungal%20resi ) looking for possible treatments (not necessarily registered). They had good results in trials with a few products that were tested:

1. cyprodinil + difenoconazole (pre-mix product, difenoconazole is already labeled for sugar beet),
2. difenoconazole + benzovindiflupyr (a Group 7 fungicide) [sugar beet currently has a pre-mix Group 7, fluxapyroxad + Group 11 pyraclostrobin, which has resistance),
3. fluazinam

Mancozeb provided good results as well (although lack of efficacy is claimed for CLS in sugarbeet).

Regards,

Andrea

*Andrea B. Conrath*
Biologist, Emergency Response Team
Registration Division ~ Office of Pesticide Programs
United States Environmental Protection Agency
Phone: 703.308.9356 Fax: 703.605.0781
conrath.andrea@epa.gov

Office & Courier:
S-7235, One Potomac Yard
2777 Crystal Drive
Arlington, VA 22202

Mailing Address:
USEPA – OPP (7505P)
1200 Pennsylvania Ave NW
Washington, DC 20004

*Visit http://www.EPA.gov/pesticides/regulating/section18_training*

# Information provided by Mohamed Khan, Professor and Extension Sugarbeet Specialist at North Dakota State University and University of Minnesota

- **Pictures to show most fungicides do not control our Cercospora population which has resistance to several modes of action (MOA), but especially QoI.**
- **A mixture of TPTH (Tin) and a triazole will provide effective CLS control but we need a different MOA to be used in a mixture to rotate with the triazole mixture to control CLS and eliminate spores that have developed resistance to our other fungicides.**
- **Additional information to clarify payment for beets and gross return.**
- **Slides from a collaborative effort to prevent or delay *C. beticola* developing multiple resistance to QoI and triazoles (DMI) in the US by working with colleagues in countries (Serbia, Italy, Greece, Austria) where the sugarbeet industry has been decimated or severely impacted economically because of multiple resistance issues.**
- **Please feel free to contact me at** Ex. 6 - Personal Privacy **or Mohamed.khan@ndsu.edu**

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Non-treated
Inoculated
Check

Proline/
TPTH/
Headline

Prior to 2015, most of our fungicides used in mixtures and in rotation (1-3 Applications) provided effective control of CLS (Sensitive to fungicides)

TPTH+Topsin/
Inspire/
Headline

Minerva Duo/
TPTH/
Headline

**$548 to $668 more per acre using fungicide treatments**

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# Effect of Fungicides at Controlling Cercospora Leaf Spot (CLS) on Sugarbeet-2017

The triazoles and TPTH were the most effective fungicides at controlling CLS. However, control was not as effective as in previous years because the pathogen is developing resistance or has developed resistance to the different modes of action (MOA) used. We need another chemistry that is effective on CLS and will delay (or prevent further) resistance of *C. beticola* to the triazoles.

Chlorothalonil is the only product which will work in our situation base on its usage at controlling Cercospora pathogens on peanuts (Georgia) and on sugarbeet in Serbia, Italy and Greece. We will use mixtures of different (MOA) and in a rotation to control CLS. We may need 6 to 7 fungicide applications especially in our southern production areas in 2017 because of the high inoculum pressure from the 2016 crop.

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Information on Slides based on 2017 Field Research in Foxhome, MN (with QoI Resistant *C. beticola – fungus which causes the leaf disease*)

- **Pictures were taken on August 30, 2016.**
- **Site was inoculated with *Cercospora beticola* resistant to QoI (strobilurins such as Headline) fungicides.**
- **Three applications (4 for the biological, *Bacillus mycoides*) starting at first symptoms.**
- **Please note disease became much more severe by the time the plots were harvested on September 28.**
- **6 row plots with middle-4 rows treated.**

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# Non-treated Check 2016 –
# *Cercospora beticola* Resistant to QoIs

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# *C. beticola* Resistant to QoI
# Priaxor [Qoi+SDHI] (3x)

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# Fluxapyroxad - SDHI Fungicide (3x)

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# Manzate (3x)

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# Topsin (Benzimidazole) (3x)

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# Triphenyl tin hydroxide (TPTH)(3x)

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# Badge SC (Copper) (3x)

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# *Bacillus mycoides* (4x)

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# Eminent – Triazole (3x)

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# Inspire XT – Triazole (3x)

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# Proline + NIS – Triazole (3x)

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# Efficacy of Fungicides at Controlling *Cercospora beticola* Resistant to QoI Fungicides

| *Treatments @ 14 d* | *CLS (1-10)* | *t/A* | *S%* | *RSA (kg/ha)* |
|---|---|---|---|---|
| Nontreated Check | 10.0 | 26.1 | 11.1 | 4785 |
| Priaxor (QoI + SDHI) | 10.0 | 27.7 | 12.2 | 5772 |
| Fluxapyroxad (SDHI) | 10.0 | 26.4 | 11.0 | 5035 |
| Topsin (Benzimidazole) | 10.0 | 25.3 | 11.6 | 4971 |
| TPTH (Fentin hydroxide) | 8.8 | 30.2 | 12.7 | 6615 |
| Badge – (Copper) | 10.0 | 29.3 | 11.6 | 5755 |
| *Bacillus mycoides (Microbial)* | 10.0 | 26.8 | 11.2 | 5015 |
| Eminent (Triazole - tetraconazole) | 9.3 | 31.1 | 12.5 | 6661 |
| Inspire XT (Triazole – difenoconazole+prop.) | 8.8 | 31.8 | 12.0 | 6396 |
| Proline + NIS (Triazole - prothioconazole) | 8.0 | 32.8 | 12.9 | 7309 |
| *LSD (0.05)* | *0.6* | *2.9* | *0.8* | *787* |

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**Use of the Mixture TPTH + Proline (triazole) was the only solution to controlling *C. beticola* resistant to QoI and developing resistance to triazoles.**

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# Non-Treated Check

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# Chlorothalonil mixed with TPTH and used in rotation with a triazole

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**Kevin Etzler's Field with 5 Fungicide Applications in 2016 – each acre will have <u>1 trillion spores</u>. We had over 400,000 acres producing this level of inoculum so even with 25% survival rate, we have a population resistant to several fungicides that can easily lead to an epidemic if not effectively controlled early in the 2017 season.**

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# Price per ton of beet

- The price per ton of beet ($38/ton) was highest at American Crystal since they had the lowest amount of CLS severity. They are the most northern of the 3 coops and inoculum move from south to north.
- Minn-Dak, south of American Crystal, severely impacted by CLS, had a $30/ton initial estimate. As of yesterday, because of slow an inefficient processing, the price went down to $28/ton.
- Southern Minnesota also had very severe CLS and had a price of $34.74/ton.
- Michigan with severe CLS had a price of $27.85/ton.
- The highest price per ton of beet ($68-75/ton) was in 2012 because of the high sugar content of that crop.
- The current low payment for beet is as a result of CLS significantly reducing our ability to extract sucrose and not by any trade issue.

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# CLS resulted in a 27.7% reduction in recoverable sucrose at Southern Minnesota in 2016.

**Economic data to indicate significant economic loss for Southern Minnesota Beet Sugar Cooperative (SMBSC) in 2016**

| Year | Yield – tons/acre | % Sucrose | Recoverable sucrose - lbs/acre | % Change in Recoverable sucrose |
|---|---|---|---|---|
| 2016 Routine* | 31.84 | 17.08 | 10,188 | - |
| 2016 Non - routine** | 27.80 | 14.74 | 7,361 | -27.7 |

*Estimated yield, sucrose concentration and recoverable sucrose based on laboratory analysis of root samples harvested in July before CLS became an epidemic.
**Harvested tonnage and sucrose concentration from samples collected during harvest. Growers aver age six fungicide applications at SMBSC

**Yield and Revenue for Southern Minnesota Beet Sugar Cooperative in 2017**

| Option | Yield, (tons/acre) | % Sucrose | Price ($/ton) | Gross Revenue ($ /acre) | % Change in Yield (tons/acre) | % Change in Recov - erable sucrose | % Change in Gross Revenue |
|---|---|---|---|---|---|---|---|
| 2017 Routine * | 31 | 16.9 | $47.00 | $1,457.00 | -22.6 | -34.7 | -42. 8 |
| 2017 Non - Routine | 24 | 14.7 | $34.74 | $833.76 | - | - | - |

*Potential yield and price for high sucrose content sugar from sugarbeet with no severe CLS problem using currently available fungicides in 2017.
**Potential significant reduction in tonnage and decrease in sugar content as a result of the high overwintering fungicide resistant *C. beticola* population present and non -availability of effective fungicides. Beet price will be lower which will result in significant reduction in gross revenue for growers.

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# Minn-Dak's payment was reduced to $28/ton (from $30/ton) which will mean a 34% reduction in gross revenue in 2016 compared to the average of the previous 4-years, or by 40% compared to the projected revenue based on crop estimate in July, 2016.

| Year | Weight Yield Tons/Acre | % Sucrose Yield | Price($) /Ton | Gross Revenue |
|---|---|---|---|---|
| 2012 | 26.7 | 19.08 | 75.17 | 2,007.03 |
| 2013 | 25.38 | 16.37 | 45.53 | 1,155.55 |
| 2014 | 21.99 | 17.29 | 42.78 | 940.70 |
| 2015 | 26.53 | 17.71 | 42.78 | 1,134.95 |
| Four Year Average | 25.15 | 17.61 | 51.66 | 1309.56 |
| 2016 | 28.94 | 15.72 | 30.00 | 868.20 |

Root Sample Data
Yield data and sucrose content are estimated yearly in July by collecting root samples before any disease is present and then roots are collected and analyzed after harvest and yield and sucrose content data are compared. In 2016 at pre-disease sampling sucrose content was at 17.5% and yield was estimated to be 32.4 tons/acre. Because of uncontrolled resistant-CLS, sucrose content decreased to 15.7% at harvest. This meant a $12.00 price per ton decrease and an overall loss of $491.88 (36.2%) gross revenue per acre.

| Year | Weight Yield (tons/acre) | % Sucrose | Price ($/ton) | Gross Revenue ($/acre) | %Change in Gross Revenue |
|---|---|---|---|---|---|
| 2016 Baseline * | 32.4 | 17.5 | $42.00 | $1360.08 | - |
| 2016 Emergency** | 28.94 | 15.7 | $ 30.00 | $868.20 | -36.2 |

*Estimated yield, sucrose concentration and recoverable sucrose based on laboratory analysis of root samples harvested in early July before CLS became an epidemic.
**Harvested tonnage and sucrose concentration from samples collected during harvest.

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# CLS in Serbia 2015 – Non-treated Check
# PS: Cercospora resistant to QoI and Triazoles

Courtesy of Dr Nenad Trkulja
Institute for Plant Protection and Environment, Belgrade, Serbia

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# Trifloxystrobin (QoI) (4x)

# Trifloxystrobin (QoI)/Cyproconazole (Triazole) (4x)

# Chlorothalonil (Chloronitrile) (4x)

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# Chlorothalonil + Difenoconazole + Thiophanate methyl (4x)

Non-Treated Check (Disease Severity > 90%)

24.10.2016.

Trifloxystrobin (4x)
24.10.2016.

Chlorothalonil (4x)
24.10.2016.

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# Chlorothalonil + Difenoconazole 07.09.2016.

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# *Molecular and experimental evidence of multi-resistance of* Cercospora beticola *field populations to MBC, DMI and QoI fungicides*

**Nenad R. Trkulja, Anja G. Milosavljević, Milana S. Mitrović, Jelena B. Jović, Ivo T. Toševski, Mohamed F. R. Khan & Gary A. Secor**

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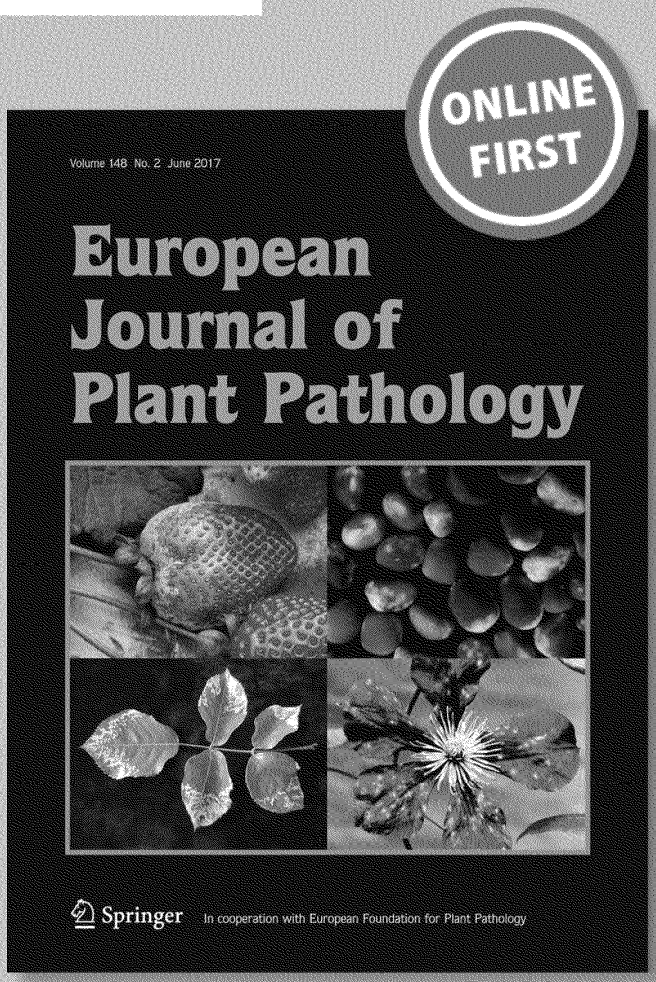


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Eur J Plant Pathol
DOI 10.1007/s10658-017-1239-0

# Molecular and experimental evidence of multi-resistance of Cercospora beticola field populations to MBC, DMI and QoI fungicides

Nenad R. Trkulja & Anja G. Milosavljević & Milana S. Mitrović & Jelena B. Jović & Ivo T. Toševski & Mohamed F. R. Khan & Gary A. Secor

Accepted: 19 April 2017
# Koninklijke Nederlandse Planteziektenkundige Vereniging 2017

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Published online: 06 May 2017

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**To:** Beck, Nancy[Beck.Nancy@epa.gov]; Bennett, Tate[Bennett.Tate@epa.gov]; Graham, Amy[graham.amy@epa.gov]; Palich, Christian[palich.christian@epa.gov]; Cassie Bladow[Cassie.Bladow@beetsugar.org]
**Cc:** Peterson Laura USWS[laura.peterson@syngenta.com]; Janis McFarland (janis.mcfarland@syngenta.com)[janis.mcfarland@syngenta.com]
**From:** Scott Herndon
**Sent:** Wed 5/17/2017 11:33:29 AM
**Subject:** Section 18 for Chlorothalonil

Dr. Beck,

I would like to connect you with Laura Peterson and Janis McFarland who work for Syngenta. The American Sugarbeet Growers Association had a great call with Janis and Laura and their team yesterday about the Section 18 requests from MN, MI and ND and their desire to be helpful.

On behalf of our 10,000 family farmers in all 11 producing states, we sincerely appreciate all the help from EPA and Syngenta with this crisis!

Thanks again!

My cell is Ex. 6 - Personal Privacy

**Scott Herndon**

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

**To:** Beck, Nancy[Beck.Nancy@epa.gov]
**Cc:** Bennett, Tate[Bennett.Tate@epa.gov]; Palich, Christian[palich.christian@epa.gov]; Cassie Bladow[Cassie.Bladow@beetsugar.org]; Graham, Amy[graham.amy@epa.gov]
**From:** Scott Herndon
**Sent:** Wed 5/17/2017 11:22:13 AM
**Subject:** RE: Section 18

Excellent news about the call with OPP! So glad to hear that!

Thanks again for all the help!


**Scott Herndon**

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786


**From:** Beck, Nancy [mailto:Beck.Nancy@epa.gov]
**Sent:** Tuesday, May 16, 2017 9:03 PM
**To:** Scott Herndon <sherndon@americansugarbeet.org>
**Cc:** Bennett, Tate <Bennett.Tate@epa.gov>; Palich, Christian <palich.christian@epa.gov>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
**Subject:** RE: Section 18

Scott,

I'm happy to be part of the chain. I believe OPP staff had a very productive and helpful call with Syngenta today.

Regards,

Nancy

---

Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator, OCSPP

P: 202-564-1273

M: Ex. 6 - Personal Privacy

beck.nancy@epa.gov

**From:** Scott Herndon [mailto:sherndon@americansugarbeet.org]
**Sent:** Tuesday, May 16, 2017 9:54 AM
**To:** Beck, Nancy <Beck.Nancy@epa.gov>
**Cc:** Bennett, Tate <Bennett.Tate@epa.gov>; Palich, Christian <palich.christian@epa.gov>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
**Subject:** RE: Section 18

Dr. Beck,

I just got off the phone with a bunch of folks from Syngenta. They want to be helpful on this issue and may have some data that you need. Would it be ok for me to link you and Tate, and everyone on this email, in a new introductory email? I wanted to get Syngenta's OK before doing so and they said that would be great.

I know you all are devoting a ton of resources to this and I want to make sure that the right folks are connected.

Thanks so much!

Scott

**Scott Herndon**

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

**From:** Beck, Nancy [mailto:Beck.Nancy@epa.gov]
**Sent:** Friday, May 12, 2017 6:36 PM
**To:** Scott Herndon <sherndon@americansugarbeet.org>
**Cc:** Bennett, Tate <Bennett.Tate@epa.gov>; Palich, Christian <palich.christian@epa.gov>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
**Subject:** RE: Section 18

Scott,

Below is the latest. Long story short, we are currently working with state and Extension Service experts to explore and identify possible alternatives as we evaluate the request. We have had similar situations like this and have been able to work cooperatively to find alternative approaches in emergency situations. Our staff is meeting internally with extension experts and trying to schedule a meeting with the sugar beet states for next week.

Regarding the data needs, below is what I've learned. However, I would encourage you to keep in mind that the work noted above to identify possible alternative approaches with the states is what will likely be most helpful to your group because it does take time to run through the full risk evaluation process.

Summary:

North Dakota and Minnesota submitted to the agency emergency exemption requests for the subject uses in late March and early April, 2017, respectively, but chorothalonil has outstanding data requirements most of which concern the need for a subchronic inhalation study, which precludes the agency from being able to make the required aggregate risk safety finding.

More specifically, the Chlorothalonil Scoping Document of March, 2012, developed to support the opening of the docket for registration review, indicates that in our most recent risk assessment (2010),

- MOEs for short and intermediate-term occupational handler inhalation exposures exceed HED's LOC (MOE ≤1000). For mixing/loading liquids for aerial, chemigation, and groundboom applications, MOEs range from 42 to 180.

- MOEs for short-term residential handler exposure exceeded HED's LOC (MOE=1000). For mixing/loading/applying liquids with a brush or sprayer MOEs range from 52 to 220.

Because there is no inhalation study of appropriate length available to assess short- and intermediate-term exposures, HED relied upon an acute study (in which no NOAEL was achieved) to assess short- and intermediate-term exposure. Additional UFs were applied for both the lack of an NOAEL and the lack of a subchronic inhalation study.

In response to this risk assessment, the registrant withdrew the new use applications that triggered the need for this risk assessment.

In March 2013, after OMB review, we issued the Registration Review data call-in. Nearly 25 studies were identified is being needed to support the registration review. Most pertinent to this situation is the need for a 90-day subchronic inhalation study, but we identified a number of other missing studies across human exposure, animal tox, environmental fate, and ecological effects. Sipcam Agro, the registrant for the requested product under section 18, was a recipient of the DCI and a copy of the DCI has been posted in the registration review public docket since July 2013.

We have been working with the consortium of chlorothalonil registrants to build a record for an upcoming FIFRA SAP peer review meeting on the use of in vitro studies and CFD/MMAD models for deriving points of departure and uncertainty factors. This would be the first time that EPA derived a point of departure from an in vitro study. We are targeting late 2017 or early 2018 for that SAP meeting.

---

So as you can see this process takes time. Given all that and the need for the emergency use, as I noted above, we are reaching out to the states and to the land grant universities to explore other control options for this fungal pest that we might be able to make available under section 18. The point Rick was trying to make in his testimony is that the earlier engagement we have with the states on potential control tools, the less likely that we will find ourselves in a situation mere days before the use needs to occur of having to scramble to find an alternative. This is an approach that we use with IR-4 (Interregional Risk Project 4) ; they don't conduct research on chemicals where we don't think we'll be able to make the FFDCA safety finding. That way, their packages move rather quickly through the review process.

Please let me know if you have any questions.

Regards,

Nancy

---

Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator, OCSPP

P: 202-564-1273

M: Ex. 6 - Personal Privacy

beck.nancy@epa.gov

**From:** Scott Herndon [mailto:sherndon@americansugarbeet.org]
**Sent:** Friday, May 12, 2017 4:10 PM
**To:** Beck, Nancy <Beck.Nancy@epa.gov>
**Cc:** Bennett, Tate <Bennett.Tate@epa.gov>; Palich, Christian <palich.christian@epa.gov>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
**Subject:** Re: Section 18

Thanks so much!

Scott

Sent from my iPhone

On May 11, 2017, at 6:30 PM, Beck, Nancy <Beck.Nancy@epa.gov> wrote:

Scott,

I will work with my staff to get you some answers.

Regards,

Nancy

---

Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator, OCSPP

P: 202-564-1273

M: Ex. 6 - Personal Privacy

beck.nancy@epa.gov

**From:** Scott Herndon [mailto:sherndon@americansugarbeet.org]
**Sent:** Thursday, May 11, 2017 12:38 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>; Beck, Nancy <Beck.Nancy@epa.gov>
**Cc:** Palich, Christian <palich.christian@epa.gov>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
**Subject:** RE: Section 18

Christian and Amy, it was nice meeting you!

I have listened to the hearing about 20 times now so that I could transcribe the Section 18 comments verbatim for our growers. I've pasted them below for you as well. When you are able, do you mind telling me what data is missing, if any? I've heard that it is the vapor data that is missing but have alternatively heard that it is the residue data that is missing. I want to make sure that our folks have or can provide all necessary data. I've also attached the relevant contacts for this issue.

Thanks so much again!

My transcript of Section 18 comments from today's hearing below:

**Senator Stabenow:**

"Thank you Mr. Chairman and thank you to both of our witnesses. Mr. Keigwin, I first want to thank you personally for your engagement with Michigan State University and our Michigan hop growers that created the gift that we just gave to the Chairman to facilitate Section 18 exemptions under FIFRA. Most recently I've heard from Michigan sugar beet growers about emergency use needs under Section 18 as well. What steps can be taken by growers, states, manufacturers and the EPA to make this Section 18 process more efficient so that growers facing unexpected risk can get needed crop insurance tools in a timely manner?"

**Mr. Rick Keigwin, Acting Director, Office of Pesticide Programs, EPA**

"Thank you, Senator, and I've had the great fortune of meeting with Michigan growers on a number of occasions. Your growers sponsor an annual tour to help educate EPA employees about Michigan agriculture and what farmers do to help grow our crops so thank you for that. In terms of Section 18s, we have a pretty solid record of completing our decision making for most Section 18 emergency exemptions in less than 50 days but there are times and I think this situation with the sugar beet ones, the growers, that came to your attention highlights the need for early engagement between EPA, the Michigan Department of Agriculture and the grower community and the land-grand universities. Knowing early on what tools a grower might need to address an emerging pest situation. It is hard when at the end of the process, or right when they need to apply the product, for EPA to say, 'wait, hold

on, we might have a problem' so one process efficiency would probably be for us to have earlier engagement, maybe even before the state submits their Section 18 request to see if there might be any issues with that particular chemical and to the extent to which there are we could work collaboratively with cooperative extension and with the state to maybe find some alternatives that we could move through the process more quickly to address the emerging pest management."

**Scott Herndon**

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

**From:** Bennett, Tate [mailto:Bennett.Tate@epa.gov]
**Sent:** Wednesday, May 10, 2017 10:21 PM

**To:** Beck, Nancy <Beck.Nancy@epa.gov>
**Cc:** Palich, Christian <palich.christian@epa.gov>; Scott Herndon <sherndon@americansugarbeet.org>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
**Subject:** Re: Section 18

Scott- Christian and Amy will be at the hearing tomorrow with Rick. Were you planning to be there?

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stated that he would state that believed his staff spoke prematurely and that they were looking at all the options.

Rick seems like such a straight shooter this just isn't adding up. Are we sure that Rick was the only one that spoke w Stabenows office and there wasn't some other call with his staffer?

I can check w Sven as he would have been on the call.

Nancy B. Beck, Ph.D., DABT
Deputy Assistant Administrator, OCSPP
P: 202-564-1273
M: Ex. 6 - Personal Privacy
Beck.Nancy@epa.gov

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Thanks so much for the heads up Scott.

Christian R. Palich

Deputy Associate Administrator

Congressional & Intergovernmental Relations

Ex. 6 - Personal Privacy

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Thanks again!

Scott

Scott Herndon

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

202-595-0786

**From:** Cassie Bladow [mailto:Cassie.Bladow@beetsugar.org]
**Sent:** Tuesday, May 09, 2017 4:43 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>; Scott Herndon <sherndon@americansugarbeet.org>
**Subject:** RE: Section 18

Thank you, Tate! Really appreciate your help!

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<image001.jpg>

Thanks!

Scott Herndon

Director of Biotechnology and Regulatory Affairs

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

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To: 'Bennett, Tate' <Bennett.Tate@epa.gov>
Subject: RE: Section 18

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North Dakota expires in 12/31/2017

Michigan expires in 6/30/2017

Minnesota expires 12/31/2017

SipCam will renew all of them

Scott Herndon

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1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

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> Thanks so much for your help and please don't hesitate to email or call if you have any questions.

>

> Have a great evening!

>

> Scott

>

> Scott Herndon

> Director of Biotechnology and Regulatory Affairs American Sugarbeet

> Growers Association

> 1155 15th Street NW #1100

> Washington, DC 20005

> 202-595-0786

> Ex. 6 - Personal Privacy cell)

>

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>>>> We really appreciate your guidance helping us move this along, especially given our tight timeline.

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>>>> Thanks again!

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> <Section 18 for Chlorothalonil Contacts.docx> <Chlorothalonil

> Background.docx>

> <2017-05-05 Chlorothalonil Tech- Echo 500 Sugarbeet Tol Pet-Label

> Amend-C....pdf> <EPA email to ND and MN Departments of

> Agriculture.docx>

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**To:** Beck, Nancy[Beck.Nancy@epa.gov]
**Cc:** Bennett, Tate[Bennett.Tate@epa.gov]; Palich, Christian[palich.christian@epa.gov]; Cassie Bladow[Cassie.Bladow@beetsugar.org]; Graham, Amy[graham.amy@epa.gov]
**From:** Scott Herndon
**Sent:** Tue 5/16/2017 1:54:07 PM
**Subject:** RE: Section 18

Dr. Beck,

I just got off the phone with a bunch of folks from Syngenta. They want to be helpful on this issue and may have some data that you need. Would it be ok for me to link you and Tate, and everyone on this email, in a new introductory email? I wanted to get Syngenta's OK before doing so and they said that would be great.

I know you all are devoting a ton of resources to this and I want to make sure that the right folks are connected.

Thanks so much!

Scott

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*Director of Biotechnology and Regulatory Affairs*

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1155 15th Street NW #1100

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**From:** Beck, Nancy [mailto:Beck.Nancy@epa.gov]

**Sent:** Friday, May 12, 2017 6:36 PM
**To:** Scott Herndon <sherndon@americansugarbeet.org>
**Cc:** Bennett, Tate <Bennett.Tate@epa.gov>; Palich, Christian <palich.christian@epa.gov>; Cassie Bladow <Cassie.Bladow@beetsugar.org>; Graham, Amy <graham.amy@epa.gov>
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Scott,

Below is the latest. Long story short, we are currently working with state and Extension Service experts to explore and identify possible alternatives as we evaluate the request. We have had similar situations like this and have been able to work cooperatively to find alternative approaches in emergency situations. Our staff is meeting internally with extension experts and trying to schedule a meeting with the sugar beet states for next week.

Regarding the data needs, below is what I've learned. However, I would encourage you to keep in mind that the work noted above to identify possible alternative approaches with the states is what will likely be most helpful to your group because it does take time to run through the full risk evaluation process.

Summary:

North Dakota and Minnesota submitted to the agency emergency exemption requests for the subject uses in late March and early April, 2017, respectively, but chorothalonil has outstanding data requirements most of which concern the need for a subchronic inhalation study, which precludes the agency from being able to make the required aggregate risk safety finding.

More specifically, the Chlorothalonil Scoping Document of March, 2012, developed to support the opening of the docket for registration review, indicates that in our most recent risk assessment (2010),

- MOEs for short and intermediate-term occupational handler inhalation exposures exceed HED's LOC (MOE ≤1000). For mixing/loading liquids for aerial, chemigation, and groundboom applications, MOEs range from 42 to 180.

- MOEs for short-term residential handler exposure exceeded HED's LOC (MOE=1000). For mixing/loading/applying liquids with a brush or sprayer MOEs range from 52 to 220.

Because there is no inhalation study of appropriate length available to assess short- and intermediate-term exposures, HED relied upon an acute study (in which no NOAEL was achieved) to assess short- and intermediate-term exposure. Additional UFs were applied for both the lack of an NOAEL and the lack of a subchronic inhalation study.

In response to this risk assessment, the registrant withdrew the new use applications that triggered the need for this risk assessment.

In March 2013, after OMB review, we issued the Registration Review data call-in. Nearly 25 studies were identified is being needed to support the registration review. Most pertinent to this situation is the need for a 90-day subchronic inhalation study, but we identified a number of other missing studies across human exposure, animal tox, environmental fate, and ecological effects. Sipcam Agro, the registrant for the requested product under section 18, was a recipient of the DCI and a copy of the DCI has been posted in the registration review public docket since July 2013.

We have been working with the consortium of chlorothalonil registrants to build a record for an upcoming FIFRA SAP peer review meeting on the use of in vitro studies and CFD/MMAD models for deriving points of departure and uncertainty factors. This would be the first time that EPA derived a point of departure from an in vitro study. We are targeting late 2017 or early 2018 for that SAP meeting.

---

So as you can see this process takes time. Given all that and the need for the emergency use, as I noted above, we are reaching out to the states and to the land grant universities to explore other control options for this fungal pest that we might be able to make available under section 18. The point Rick was trying to make in his testimony is that the earlier engagement we have with the states on potential control tools, the less likely that we will find ourselves in a situation mere days before the use needs to occur of having to scramble to find an alternative. This is an approach that we use with IR-4 (Interregional Risk Project 4) ; they don't conduct research on chemicals where we don't think we'll be able to make the FFDCA safety finding. That way, their packages move rather quickly through the review process.

Please let me know if you have any questions.

Regards,

Nancy

---

Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator, OCSPP

P: 202-564-1273

M: Ex. 6 - Personal Privacy

beck.nancy@epa.gov

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Thanks so much!

Scott

Sent from my iPhone

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Scott,

I will work with my staff to get you some answers.

Regards,

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---

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beck.nancy@epa.gov

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**Sent:** Thursday, May 11, 2017 12:38 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>; Beck, Nancy <Beck.Nancy@epa.gov>
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> Scott Herndon

> Director of Biotechnology and Regulatory Affairs American Sugarbeet

> Growers Association

> 1155 15th Street NW #1100

> Washington, DC 20005

> 202-595-0786

> Ex. 6 - Personal Privacy (cell)

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> Amend-C....pdf> <EPA email to ND and MN Departments of

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<2017-05-05 Chlorothalonil Tech- Echo 500 Sugarbeet Tol Pet-Label
Amend-C....pdf>

**To:** Beck, Nancy[Beck.Nancy@epa.gov]
**Cc:** Bennett, Tate[Bennett.Tate@epa.gov]; Palich, Christian[palich.christian@epa.gov]; Cassie Bladow[Cassie.Bladow@beetsugar.org]; Graham, Amy[graham.amy@epa.gov]
**From:** Scott Herndon
**Sent:** Fri 5/12/2017 11:18:49 PM
**Subject:** Re: Section 18

Nancy,

This is incredibly helpful information and it is evident that you all are devoting a LOT of resources to help our industry! Thank you! Thank you! Thank you!

I'll bring our folks up to speed!

Have a great weekend!

Scott

Sent from my iPhone

On May 12, 2017, at 6:35 PM, Beck, Nancy <Beck.Nancy@epa.gov> wrote:

Scott,

Below is the latest. Long story short, we are currently working with state and Extension Service experts to explore and identify possible alternatives as we evaluate the request. We have had similar situations like this and have been able to work cooperatively to find alternative approaches in emergency situations. Our staff is meeting internally with extension experts and trying to schedule a meeting with the sugar beet states for next week.

Regarding the data needs, below is what I've learned. However, I would encourage you to keep in mind that the work noted above to identify possible alternative approaches with the states is what will likely be most helpful to your group because it does take time to run through the full risk evaluation process.

Summary:

North Dakota and Minnesota submitted to the agency emergency exemption requests for the subject uses in late March and early April, 2017, respectively, but chorothalonil has outstanding data requirements most of which concern the need for a subchronic inhalation study, which precludes the agency from being able to make the required aggregate risk

safety finding.

More specifically, the Chlorothalonil Scoping Document of March, 2012, developed to support the opening of the docket for registration review, indicates that in our most recent risk assessment (2010),

•□□□□□□□□ MOEs for short and intermediate-term occupational handler inhalation exposures exceed HED's LOC (MOE ≤1000). For mixing/loading liquids for aerial, chemigation, and groundboom applications, MOEs range from 42 to 180.

•□□□□□□□□ MOEs for short-term residential handler exposure exceeded HED's LOC (MOE=1000). For mixing/loading/applying liquids with a brush or sprayer MOEs range from 52 to 220.

Because there is no inhalation study of appropriate length available to assess short- and intermediate-term exposures, HED relied upon an acute study (in which no NOAEL was achieved) to assess short- and intermediate-term exposure. Additional UFs were applied for both the lack of an NOAEL and the lack of a subchronic inhalation study.

In response to this risk assessment, the registrant withdrew the new use applications that triggered the need for this risk assessment.

In March 2013, after OMB review, we issued the Registration Review data call-in. Nearly 25 studies were identified is being needed to support the registration review. Most pertinent to this situation is the need for a 90-day subchronic inhalation study, but we identified a number of other missing studies across human exposure, animal tox, environmental fate, and ecological effects. Sipcam Agro, the registrant for the requested product under section 18, was a recipient of the DCI and a copy of the DCI has been posted in the registration review public docket since July 2013.

We have been working with the consortium of chlorothalonil registrants to build a record for an upcoming FIFRA SAP peer review meeting on the use of in vitro studies and CFD/MMAD models for deriving points of departure and uncertainty factors. This would be the first time that EPA derived a point of departure from an in vitro study. We are

targeting late 2017 or early 2018 for that SAP meeting.

---

So as you can see this process takes time. Given all that and the need for the emergency use, as I noted above, we are reaching out to the states and to the land grant universities to explore other control options for this fungal pest that we might be able to make available under section 18. The point Rick was trying to make in his testimony is that the earlier engagement we have with the states on potential control tools, the less likely that we will find ourselves in a situation mere days before the use needs to occur of having to scramble to find an alternative. This is an approach that we use with IR-4 (Interregional Risk Project 4) ; they don't conduct research on chemicals where we don't think we'll be able to make the FFDCA safety finding. That way, their packages move rather quickly through the review process.

Please let me know if you have any questions.

Regards,

Nancy

---

Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator, OCSPP

P: 202-564-1273

M: Ex. 6 - Personal Privacy

beck.nancy@epa.gov

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Thanks so much again!

My transcript of Section 18 comments from today's hearing below:

**Senator Stabenow:**

"Thank you Mr. Chairman and thank you to both of our witnesses. Mr. Keigwin, I first want to thank you personally for your engagement with Michigan State University and our Michigan hop growers that created the gift that we just gave to the Chairman to facilitate Section 18 exemptions under FIFRA. Most recently I've heard from Michigan sugar beet growers about emergency use needs under Section 18 as well. What steps can be taken by growers, states, manufacturers and the EPA to make this Section 18 process more efficient so that growers facing unexpected risk can get needed crop insurance tools in a timely manner?"

**Mr. Rick Keigwin, Acting Director, Office of Pesticide Programs, EPA**

"Thank you, Senator, and I've had the great fortune of meeting with Michigan growers on a number of occasions. Your growers sponsor an annual tour to help educate EPA employees about Michigan agriculture and what farmers do to help grow our crops so thank you for that. In terms of Section 18s, we have a pretty solid record of completing our decision making for most Section 18 emergency exemptions in less than 50 days but there are times and I think this situation with the sugar beet ones, the growers, that came to your attention highlights the need for early engagement between EPA, the Michigan Department of Agriculture and the grower community and the land-grand universities. Knowing early on what tools a grower might need to address an emerging pest situation. It is hard when at the end of the process, or right when they need to apply the product, for EPA to say, 'wait, hold on, we might have a problem' so one process efficiency would probably be for us to have earlier engagement, maybe even before the state submits their Section 18 request to see if there might be any

issues with that particular chemical and to the extent to which there are we could work collaboratively with cooperative extension and with the state to maybe find some alternatives that we could move through the process more quickly to address the emerging pest management."

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*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

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M Ex. 6 - Personal Privacy
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> Christian R. Palich
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>
> Congressional & Intergovernmental Relations
>
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Also, they may bring this up at the Senate Agriculture hearing tomorrow with the Director of Pesticide Programs. We did not ask them to do this but I also don't think that I can ask them not to do it. I just wanted to give you a heads up so you all wouldn't be caught off guard. Hearing info here: https://www.agriculture.senate.gov/hearings/pesticide-registration-under-the-federal-insecticide-fungicide-and-rodenticide-act-providing-stakeholders-with-certainty-through-the-pesticide-registration-improvement-act

Thanks again!

Scott

Scott Herndon

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

202-595-0786

**From:** Cassie Bladow [mailto:Cassie.Bladow@beetsugar.org]
**Sent:** Tuesday, May 09, 2017 4:43 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>; Scott Herndon <sherndon@americansugarbeet.org>
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**From:** Scott Herndon [mailto:sherndon@americansugarbeet.org]
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**To:** Bennett, Tate <Bennett.Tate@epa.gov>
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In his email to me he stated "I spoke to Andrea today at EPA. Unfortunately, she does not believe the new tolerance data submitted will help. Seems they are looking for some data for some other studies." I have been unable to determine what additional data they need and have asked Dr. Khan if that was relayed to him but have not yet heard back.

<image001.jpg>

Thanks!

Scott Herndon

Director of Biotechnology and Regulatory Affairs

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

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North Dakota expires in 12/31/2017

Michigan expires in 6/30/2017

Minnesota expires 12/31/2017

SipCam will renew all of them

Scott Herndon

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Washington, DC 20005

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> In addition, I have attached a cover letter that SipCam submitted to EPA on Friday, May 5th with additional data.

>

> Thanks so much for your help and please don't hesitate to email or call if you have any questions.

>

> Have a great evening!

>

> Scott

>

> Scott Herndon

> Director of Biotechnology and Regulatory Affairs American Sugarbeet

> Growers Association

> 1155 15th Street NW #1100

> Washington, DC 20005

> 202-595-0786

> Ex. 6 - Personal Privacy (cell)

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> Subject: Re: Section 18

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> Thanks!

>

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>>

>> Tate,

>>

>> I have all of the information in my office but am on the Hill
right now. I'll send everything to you this evening.

>>

>> Thanks so much!

>>

>> Scott

>>

>> Sent from my iPhone

>>

>>> On May 8, 2017, at 3:13 PM, Bennett, Tate
<Bennett.Tate@epa.gov> wrote:

>>>

>>> Hey Scott- do you have any summaries/background papers?

>>>

>>>> On May 8, 2017, at 2:47 PM, Cassie Bladow
<Cassie.Bladow@beetsugar.org> wrote:

>>>>

>>>> Tate,

>>>>

>>>> Thank you for taking the time to chat this morning. As we discussed, I am looping Scott Herndon who works for the American Sugarbeet Growers Association into the conversation since he has done a lot of work on this issue and will be able to provide you with background and answer any questions you have.

>>>>

>>>> We really appreciate your guidance helping us move this along, especially given our tight timeline.

>>>>

>>>> Thanks again!

>>>> Cassie

>>>>

> <Section 18 for Chlorothalonil Contacts.docx> <Chlorothalonil

> Background.docx>

> <2017-05-05 Chlorothalonil Tech- Echo 500 Sugarbeet Tol Pet-Label

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**To:** Bennett, Tate[Bennett.Tate@epa.gov]; Beck, Nancy[Beck.Nancy@epa.gov]
**Cc:** Palich, Christian[palich.christian@epa.gov]; Cassie Bladow[Cassie.Bladow@beetsugar.org]; Graham, Amy[graham.amy@epa.gov]
**From:** Scott Herndon
**Sent:** Thur 5/11/2017 4:37:52 PM
**Subject:** RE: Section 18
Section 18 for Chlorothalonil Contacts.docx

Christian and Amy, it was nice meeting you!

I have listened to the hearing about 20 times now so that I could transcribe the Section 18 comments verbatim for our growers. I've pasted them below for you as well. When you are able, do you mind telling me what data is missing, if any? I've heard that it is the vapor data that is missing but have alternatively heard that it is the residue data that is missing. I want to make sure that our folks have or can provide all necessary data. I've also attached the relevant contacts for this issue.

Thanks so much again!

My transcript of Section 18 comments from today's hearing below:

**Senator Stabenow:**

"Thank you Mr. Chairman and thank you to both of our witnesses. Mr. Keigwin, I first want to thank you personally for your engagement with Michigan State University and our Michigan hop growers that created the gift that we just gave to the Chairman to facilitate Section 18 exemptions under FIFRA. Most recently I've heard from Michigan sugar beet growers about emergency use needs under Section 18 as well. What steps can be taken by growers, states, manufacturers and the EPA to make this Section 18 process more efficient so that growers facing unexpected risk can get needed crop insurance tools in a timely manner?"

**Mr. Rick Keigwin, Acting Director, Office of Pesticide Programs, EPA**

"Thank you, Senator, and I've had the great fortune of meeting with Michigan growers on a number of occasions. Your growers sponsor an annual tour to help educate EPA employees about Michigan agriculture and what farmers do to help grow our crops so thank you for that. In terms of Section 18s, we have a pretty solid record of completing our decision making for most Section 18 emergency exemptions in less than 50 days but there are times and I think this

situation with the sugar beet ones, the growers, that came to your attention highlights the need for early engagement between EPA, the Michigan Department of Agriculture and the grower community and the land-grand universities. Knowing early on what tools a grower might need to address an emerging pest situation. It is hard when at the end of the process, or right when they need to apply the product, for EPA to say, 'wait, hold on, we might have a problem' so one process efficiency would probably be for us to have earlier engagement, maybe even before the state submits their Section 18 request to see if there might be any issues with that particular chemical and to the extent to which there are we could work collaboratively with cooperative extension and with the state to maybe find some alternatives that we could move through the process more quickly to address the emerging pest management."

**Scott Herndon**

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

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Thanks so much for the heads up Scott.

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Deputy Associate Administrator

Congressional & Intergovernmental Relations

Ex. 6 - Personal Privacy

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Also, they may bring this up at the Senate Agriculture hearing tomorrow with the Director of Pesticide Programs. We did not ask them to do this but I also don't think that I can ask them not to do it. I just wanted to give you a heads up so you all wouldn't be caught off guard. Hearing info here: https://www.agriculture.senate.gov/hearings/pesticide-registration-under-the-federal-insecticide-fungicide-and-rodenticide-act-providing-stakeholders-with-certainty-through-the-pesticide-registration-improvement-act

Thanks again!

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Scott Herndon

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

202-595-0786

**From:** Cassie Bladow [mailto:Cassie.Bladow@beetsugar.org]
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<image001.jpg>

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SipCam will renew all of them

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**Section 18 for Chlorothalonil**
**Contacts**

**Chlorothalonil Manufacturer Contact:**
SipCam
Lizbeth Rea
lrea@sipcamagro.com
Director of Regulatory Affairs
Sipcam Agro USA, Inc. - 2525 Meridian Parkway, Suite 350 - Durham, NC 27713
919-226-1288 (O) - Ex. 6 - Personal Privacy (C) - 919-226-1196 (F)

**Michigan Contact:**
David Pratt
Chief Agronomist Michigan Sugar Company
122 Uptown Dr. Suite 300
Bay City Mi 48708
Ex. 6 - Personal Privacy cell
david.pratt@michigansugar.com

**North Dakota and Minnesota Contacts:**
Mohamed F. R. Khan, Ph.D
Professor & Extension Sugarbeet Specialist
Plant Pathology Department
**NORTH DAKOTA STATE UNIVERSITY AND**
**UNIVERSITY OF MINNESOTA**
Walster Hall, Room 227
Dept. 7160, PO Box 6050
Fargo ND 58108-6050
phone: 701-231-8596
mobile phone: Ex. 6 - Personal Privacy
fax: 701-231-6186
mohamed.khan@ndsu.edu
www.ndsu.edu

Duane Maatz
Executive Director, Red River Valley Sugarbeet Growers Association
1401 32nd St., SW
Fargo, ND 58103
(W) 701-239-4151
(C) Ex. 6 - Personal Privacy
dmaatz@rrvsga.com

**American Sugarbeet Growers Association Contact:**
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202-595-0786 (direct)
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**From:** Scott Herndon
**Sent:** Thur 5/11/2017 12:28:53 PM
**Subject:** RE: Section 18
Chlorothalonil Talking Points.docx

Here is some additional information that was given to me by SipCam in case it is helpful.

Thanks again!


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**Talking Points**

**Chlorothalonil in/on Sugar Beets**

On May 5, 2017, Sipcam Agro USA, Inc., submitted a petition for tolerance along with supporting data, proposing the establishment of a tolerance for combined residues of the fungicide chlorothalonil (tetrachloroisophthalonitrile), in or on the following commodity:

| Commodity | Proposed Tolerance (ppm) |
|---|---|
| Sugar Beet (roots) | 0.50 ppm |
| Sugar Beet (tops) | NA |
| Molasses | 0.05 ppm |
| Refined sugar | 0.05 ppm |
| Dry pulp | 0.05 ppm |

No tolerance is being proposed for Sugar Beet (tops). The label will include a restriction against feeding of sugar beet tops to livestock.

While the EU MRL for chlorothalonil on sugar beet (roots) is 0.01 mg/kg, the major exported commodity from the US is dry pulp. It is unknown whether an MRL exists in the EU or other countries for this exported commodity.

**Registration Review**

Chlorothalonil is currently under Registration Review. The Chlorothalonil Consortium (Sipcam Agro USA, Inc., Syngenta Crop Protection LLC, Adama, CAC Chemical Americas, Inc., IBC Manufacturing Company) has generated and submitted several studies to address the data gaps outlined in the March 18, 2013 Data Call-In. All data requirements listed in the Data Call-In are expected to be fulfilled in 2017.

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My cell is Ex. 6 - Personal Privacy

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https://www.agriculture.senate.gov/hearings/pesticide-registration-under-the-federal-insecticide-fungicide-and-rodenticide-act-providing-stakeholders-with-certainty-through-the-pesticide-registration-improvement-act

Thanks again!

Scott

Scott Herndon

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

202-595-0786

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**Sent:** Tuesday, May 09, 2017 4:43 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>; Scott Herndon <sherndon@americansugarbeet.org>
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M: Ex. 6 - Personal Privacy
Beck.Nancy@epa.gov

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> Amend-C....pdf> <EPA email to ND and MN Departments of

> Agriculture.docx>

SipcamAdvan
The Natural Choice™

May 5, 2017

Tony Kish (PM-22)
Document Processing Desk (PETN)
Office of Pesticide Programs (7504P)
U.S. Environmental Protection Agency
Room S-4900, One Potomac Yard
2777 South Crystal Drive
Arlington, VA 22202-4501

**Subject: Chlorothalonil Technical (EPA Reg. No. 60063-1)**
**Echo 500 (EPA Reg. No. 60063-5)**
**Petition for Tolerance - Sugar beets**
**PRIA Action Code: R170**

Dear Mr. Kish:

Sipcam Agro USA, Inc. is submitting a petition for tolerance and residue data to expanding the Chlorothalonil Technical label to include sugar beets. This effort is also supportive of the North Dakota and Minnesota Section 18 applications.

This action falls under PRIA Category R170 (Additional food use-Registration Division). The fee due, which has been paid, is $66,124 with a PRIA decision timeline of 15 months.

In support of this new use, the following documents are attached:

Chlorothalonil Technical (EPA Reg. No. 60063-1)-Petition For Tolerance

- Petition for Tolerance Document
- Notice of Filing
- Copy of the PRIA payment from pay.gov
- Magnitude of the Residue Data

| MRID No. | Guideline No. | Study Title |
|---|---|---|
| 50273301 | 830.1500, 830.1520, 830.1340 | Kelley, K.B. 2016. Magnitude of the Residue of Chlorothalonil in Sugar Beet Raw Agricultural and Processed Commodities prepared for Sipcam Agro USA, Inc. by American Agriculture Services, Inc., GLP Technologies, and Golden Pacific Laboratories,Inc., American Ag Study Number AA150713, November 21, 2016, 387 pp. |

Sipcam Agro USA, Inc. Advan LLC Sostram Corporation
2525 Meridian Parkway Suite 350 Durham NC 27713 919-226-1195 Facsimile: 919-226-1196

SipcamAdvan
The Natural Choice™



Chlorothalonil Technical (EPA Reg. No. 60063-1)-Label Amendment

- Application for Amended Pesticide Registration (EPA Form 8570-1)
- Certification with Respect to Citation of Data (EPA Form 8570-34)
- Data Matrix (Agency Internal Use Copy) (EPA Form 8570-35)
- Data Matrix (Public Copy) (EPA Form 8570-35)
- Proposed Product Labeling – Highlighted Copy
- Proposed Product Labeling – Clean Copy

Echo 500 (EPA Reg. No. 60063-5)-Label Amendment

- Application for Amended Pesticide Registration (EPA Form 8570-1)
- Proposed Product Labeling – Highlighted Copy
- Proposed Product Labeling – Clean Copy

If you have any questions regarding this matter, please do not hesitate to contact me at (919) 226-1296 or by e-mail at pmcfadden@sipcamadvan.com.

Sincerely,

Patricia McFadden

Patricia McFadden
Registration Manager
Sipcam Agro USA, Inc.

Sipcam Agro USA, Inc. Advan LLC Sostram Corporation
2525 Meridian Parkway Suite 350 Durham NC 27713 919-226-1195 Facsimile: 919-226-1196

**To:** Cassie Bladow[Cassie.Bladow@beetsugar.org]; Bennett, Tate[Bennett.Tate@epa.gov]
**From:** Scott Herndon
**Sent:** Wed 5/10/2017 12:54:01 PM
**Subject:** RE: Section 18
Section 18 final version.pdf

Tate,

Thanks so much again! Our growers really need the help!

I just received word that the Michigan Department of Agriculture and Rural Development filed their Section 18 request with EPA yesterday. (attached)

**Scott Herndon**

*Director of Biotechnology and Regulatory Affairs*

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Andrea B. Conrath
Biologist, Emergency Response Team
Registration Division ~ Office of Pesticide Programs
United States Environmental Protection Agency
Phone: 703.308.9356 Fax: 703.605.0781
conrath.andrea@epa.gov

Office & Courier:
S-7235, One Potomac Yard
2777 Crystal Drive
Arlington, VA 22202

Mailing Address:
USEPA – OPP (7505P)
1200 Pennsylvania Ave NW
Washington, DC 20004


Visit http://www.EPA.gov/pesticides/regulating/section18_training

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RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF AGRICULTURE
AND RURAL DEVELOPMENT

JAMIE CLOVER ADAMS
DIRECTOR

May 9, 2017

Ms. Tawanda Maignon
Risk Integration, Minor Use and Emergency Response Branch
U.S. EPA / Office of Pesticide Programs (7505P)
Room S4900, One Potomac Yard
2777 S. Crystal Drive
Arlington, VA 22202

Dear Ms. Maignon:

Based on information provided by Dr. Mohamed F. R. Khan, Professor & Extension Sugarbeet Specialist at North Dakota State University & University of Minnesota, and Dr. Noah Rosenzweig, Assistant Professor at Michigan State University, the Michigan Department of Agriculture & Rural Development submits this Specific Exemption request under Section 18 of FIFRA.

MDARD is aware that chlorothalonil is undergoing registration review and that the Agency has identified several areas of concern including oral and inhalation exposure risks. MDARD understands the Agency's concerns and recognizes that protecting human health is of the utmost importance. MDARD also understands the significance of CLS and the impacts the disease is having on growers. As you review this request, please consider addressing any human health concerns you have through mitigation measures such as requiring applicators/handlers to wear additional PPE. Our sugarbeet growers are in an emergency situation and MDARD is eager to work towards a solution that not only gets growers access to a much needed tool, but also allows the Agency to make the necessary and important safety findings.

Brian Verhougstraete

Pesticide Registration Program

Enclosures

Cc: Dr. Mohamed F. R. Khan, North Dakota State University & University of Minnesota
Dr. Noah Rosenzweig, Michigan State University
David Pratt, Michigan Sugar Company
Bruce Wilkinson, EPA Region 5

CONSTITUTION HALL | P.O. BOX 30017 | LANSING, MICHIGAN 48909
www.michigan.gov/mdard | (800) 292-3939

## REQUEST FOR SPECIFIC EXEMPTION: CHLOROTHALONIL ON SUGARBEET IN 2017

Section 18 of amended FIFRA provides the Administrator may exempt a state or federal agency from provisions of FIFRA if a determination is made that emergency conditions exist that require such exemption. The Michigan Department of Agriculture and Rural Development is hereby applying for a specific exemption for the use of Cercos fungicide (chlorothalonil) to control *Cercospora beticola* (CLS) on sugarbeet.

### CONTACT PERSON(S) AND QUALIFIED EXPERT(S) (166.20(A)(1))


CONTACT PERSON:

Mr. Brian Verhougstraete
Pesticide Registration Program
Michigan Department of Agriculture
& Rural Development
P.O Box 30017
Lansing, Michigan, 48909
Phone: 517-284-5666
FAX: 517-335-4540
email: verhougstraeteb@michigan.gov

QUALIFIED EXPERT:

Dr. Mohamed F. R. Khan
Professor & Extension Sugarbeet Specialist
North Dakota State University &
University of Minnesota
227 Walster Hall
North Dakota State University
Fargo, North Dakota 58105-5758
Phone: 701-231-8596
FAX: 701-231-7861
Cell: Ex. 6 - Personal Privacy
e-mail: Mohamed.khan@ndsu.edu


### DESCRIPTION OF PESTICIDE REQUESTED (166.20(a)(2))

**Common Chemical Name (Active Ingredient):** chlorothalonil

**Trade Name and EPA Reg. No.:** Cercos™ (EPA Reg. No. 60063-5)

**Formulation:** Liquid

**Active Ingredient:** 40.4%

**Manufacturer:** Sipcam Agro USA, Inc.

## DESCRIPTION OF PROPOSED USE (166.20(a)(3))

**Sites to be Treated:** Sugarbeet fields in Michigan

**Method of Application:** Ground or aerial spray

**Rate of Application (in terms of a.i. and product):** 23 fl oz/Acre (9.3 oz ai/Acre)

**Maximum Number of Applications:** 2

**Proposed Label:** Included with this request

**Total Area to be Treated:**

| | |
|---|---|
| Michigan | 297,584 acres |

148,792 acres in Michigan are expected to be treated twice, for a total of 297,584 acre applications. This is based on the assumption that all sugarbeet acres planted by Michigan Sugar Company will be treated multiple times for CLS. These assumptions are based on the need for a different and effective mode of action to use with other labeled fungicides such as triphenyltin hydroxide and triazole fungicides. Please note that the number of fungicide applications will depend on the area infected and the disease severity. The counties in Michigan where sugarbeet will be grown and where fungicides are needed for CLS control include Arenac (2,473 acres), Bay (12,769 acres), Calhoun (91 acres), Clinton (774 acres), Genesee (186 acres), Gladwin (528 acres), Gratiot (9,052 acres), Huron (50,717 acres), Ionia (399 acres), Iosco (105 acres), Isabella (776 acres), Lapeer (992 acres), Macomb (53 acres), Midland (2,684 acres), Montcalm (652 acres), Ogemaw (142 acres), Saginaw (15,197 acres), Sanilac (28,305 acres), Shiawassee (1,097 acres) St. Clair (1,863 acres) and Tuscola (19,937 acres).

**Total Amount of Pesticide to be Used (in terms of a.i. and product):**

| | |
|---|---|
| Michigan: | 53,472 gallons (172,293 lbs. ai) |

**Use Period:** June 15, 2017 – Sept. 30, 2017

**Earliest Possible Harvest Dates:** The majority (90%) of the crop will be harvested after October 1, 2017. If root samples indicate a large crop, pre-harvest of about 10% of the crop may begin around **August 15**. Growers and management of Michigan Sugar work together to identify fields that will be harvested early to ensure pre-harvest intervals are complied with when these fields are sprayed with fungicides.

**Additional Restrictions:** All applicable use directions and restrictions are included in the supplemental labeling.

## ALTERNATIVE METHODS OF CONTROL (166.20(a)(4))

**Registered Alternative Pesticides:**

*Benzimidazole fungicides (Benomyl and Thiophanate methyl).* The benzimidazole fungicides were used extensively in 1979-1981 for control of the sugarbeet leafspot pathogen. At that time benomyl and thiabendazole (TBZ) were registered and used extensively. Since then, sugarbeet have been removed from the TBZ label and thiophanate methyl has been registered for use on sugarbeet. Resistance to the benzimidazoles became a serious problem in the 1980s and use of this class of fungicide was no longer recommended.

*Triphenyltin hydroxide (Fentin hydroxide).* After CLS developed resistance to the benzimidazole fungicides, triphenyltin hydroxide (TPTH) was used more frequently and became the dominant fungicide by the mid-1980s until the advent of triazoles and QoI fungicides. TPTH is used in mixtures with other fungicides.

*EBDCs (Mancozeb. Manzate, Penncozeb).* Field research indicates that EBDCs do not provide effective control of CLS.

*Copper hydroxide.* This product is labeled for CLS control but is ineffective and does not provide adequate season-long disease control.

*Azoxystrobin (Quadris).* This product was registered for use on sugarbeet in October of 2000. Growers do not use azoxystrobin for CLS control in Michigan. Since azoxystrobin is very effective at controlling *R. solani*, it is used to manage Rhizoctonia diseases in sugarbeet.

*Trifloxystrobin (Gem).* This product was registered in 2002 and became available in 2003. Only one application of a QoI fungicide is recommended for CLS control per season. Gem fungicide has provided effective control of CLS in the past. However, most growers have used Headline rather than Gem fungicide as their QoI fungicide of choice. Since the current population of *C. beticola* is resistant to all QoI fungicides, Gem will not provide effective CLS control.

*Pyraclostrobin (Headline, and later -2015 - Priaxor that is a mixture of pyraclostrobin and fluxapyroxad).* Pyraclostrobin (Headline) became available in 2003 and was one of the most widely used fungicides for control of CLS. From 2003 to 2011, Headline was one of the most widely used fungicides for controlling CLS in Michigan. In 2011, many fields sprayed with Headline resulted in field failures. Infected leaves were collected from fields with severe CLS in September 2011 and *C. beticola* isolated were found to be resistant to pyraclostrobin. Molecular tests indicated that *C. beticola* collected from fields with fungicide failures had the G143A mutation which is essentially the exchange of glycine to alanine at the 143 position of the mitochondrial cytochrome b gene. This point mutation (G143A) which makes the pathogen become resistant to QoI fungicides [Bolton, M.D; V. Rivera, and G. Secor. 2013. Identification of the G143A mutation associated with QoI resistance in *Cercospora beticola* field isolates from Michigan, United States. Pest Manag Sci. 69(1):35-9]. Since 2012, growers in most production areas of Michigan were not using Headline and other QoI fungicides for controlling CLS.

*Tetraconazole*. EPA approved a section 18 exemption for the use of tetraconazole in 1999. This decision was maintained through 2004 and as a result facilitated effective control of CLS and made the sugarbeet industry, not only in Michigan, but also in North Dakota, Minnesota, and Montana, economically viable. After the EPA task force completed their evaluation of triazoles, tetraconazole and several other triazoles (*fenbuconazole, difenoconazole + propiconazole, prothioconazole,* and *flutriafol*) received full labels for use on sugarbeet. The most widely used triazoles on sugarbeet are tetraconazole (Eminent or Minerva),
difenoconazole + propiconazole (Inspire XT), and prothioconazole (Proline). Our recommendation is to use triazoles at no more than 50% of total fungicide applications for CLS control. Most growers use one triazole application per year to control CLS. In years with severe CLS, two different triazoles are recommended, usually in mixtures with other modes of action. It should be noted that *C. beticola* isolates have also developed resistance to the triazoles (Bolton et al., 2012. Characterization of *Cb*Cyp51 from field isolates of *Cercospora beticola*. Phytopathology. 102 (3):298-305). Consequently, there is an urgent need to find fungicides with different modes of action and which can provide effective control of CLS to be used in rotation or in mixtures with triazoles to delay or prevent widespread resistance of *C. beticola* to the triazoles.

*Resistance Management*. Sterol inhibitors (triazoles) have a different mode of action from quinone outside inhibitors (QoIs), but each class of chemistry requires resistance management. Our fungicide resistance management strategy for many years was to alternate fungicides with different modes of action. For example, for many years, based on field research, we recommended the use of tetraconazole, TPTH and pyraclostrobin in a rotation program to control CLS, manage resistance and get high recoverable sucrose per acre. We included the use of thiophanate methyl mixed with TPTH, once, and early in the season in our recommendations. (Secor, G. A., V. V. Rivera., M. F. R. Khan., and N. C. Gudmestad. 2010 Plant Dis. 94:1272-1282). When field monitoring fungicide sensitivity of *Cercospora beticola* of sugar beet for disease management decisions indicated pathogen populations with reduced sensitivity to a particular mode of action, recommendations were made to avoid using that mode of action until sensitivity increased in the pathogen population. However, conditions were favorable for CLS infection and development in 2015 and 2016. The high overwintering *C. beticola* population from 2015 suddenly increased significantly after heavy rains in August and because many areas had isolates which were resistant to QoI fungicides (Fig 3), field failures (Fig 1&2) resulted soon after QoI fungicides were applied. Sensitive *C. beticola* populations are typically most effectively controlled with triazoles and QoIs compared to other modes of action when used individually. Now that we have a pathogen population highly resistant to QoIs, we need another effective product such as chlorothalonil with a unique mode of action (chloronitrile) to complement the use of triazoles. It should be noted that *C. beticola* has become more resistant to all the modes of action we are currently using including triazoles (See Fig 4). Resistance management is and will continue to be a crucial component of sugarbeet disease management for economical and sustainable production of sugarbeet in most production areas of the USA.

*Summary*. Several fungicides (TPTH, and pyraclostrobin) used alone or in mixtures in a rotation to provide effective control of CLS in the past now have resistance issues (Fig. 2-6). Mancozeb, copper and biological products such as *Bacillus mycoides* do not provide effective control of

CLS in Michigan. Triazole fungicides that were very effective at controlling CLS in the past are now becoming less effective because the pathogen population is becoming resistant to the triazoles as well (Bolton et al., 2012. Characterization of *CbCyp51* from field isolates of *Cercospora beticola*. Phytopathology. 102 (3):298-305). There is an emergency need for a product with a new mode of action to control QoI resistant *C. beticola*. It is proposed that chlorothalonil be made available so that it can be used in mixtures mainly with triazoles and TPTH. Research trials conducted by North Dakota State University and University of Minnesota in 2016 using *C. beticola* isolate resistant to QoIs indicated that mixtures typically provided better disease control and minimized economic loss. As such, growers will need to use mixtures in a rotation program with different modes of action and each of the mixtures must be able to contribute to disease control and help to prevent or delay development of resistance to the high risk fungicides.

**Alternative Control Practices:**

*Cultural Practices.* The Cercospora leafspot pathogen survives on infected sugarbeet crop debris. Crop rotation is normally used by sugarbeet producers as a disease management strategy, and most research and extension personnel recommend a minimum of a 3-year rotation. Most growers try to plant at least 100 yards away from the previous years' sugarbeet field. Growers are also encouraged to incorporate infected debris. However, in 2016, heavy CLS infection resulted in death of older leaves starting from early August. These dead leaves have very large numbers of *C. beticola* pseudostromata that will serve as inoculum for the next two years which strongly indicate that the pathogen population will be very high in 2017 once environmental conditions are favorable for disease development.

*Cultivars.* A complete background on the sugarbeet industry and the cultivars currently grown is provided in the section on conditions leading to an emergency. Studies by Smith and Campbell (Plant Breeding 115:28-32) have shown that there is a strong correlation between susceptibility to Cercospora leafspot and yield. Resistance to *C. beticola* is controlled by a number of genes acting in an additive fashion.

Sugarbeet cultivars in all factory districts are approved for producers' use by the cooperative. New cultivars that are candidates for approval must meet or exceed the average yield of all cultivars in the trial. They must also meet a certain level of Cercospora resistance. Breeders have done a good job of developing better resistant varieties with high recoverable sucrose. However, although varieties have better resistance to CLS, they are not immune and still need fungicides to provide good disease control for acceptable yields.

*BeetCast*™: Weather Innovations Incorporated developed an advisory system to help growers in Michigan decide when to apply fungicides for the control of Cercospora leafspot in sugarbeet. The model uses air temperature and a patented leaf wetness sensor to advise growers when to apply fungicides for control of CLS.

BeetCast rates each day on a scale of 0 to 4, with a value of '4' indicating the weather conditions were very favorable for the disease. A '0' indicates that either the number of hours the leaves

were wet was low, or the temperature was too cool for the leafspot disease to grow. Disease severity values (DSVs) are accumulated daily until a threshold is reached, indicating a spray application is appropriate. The counter is then "zeroed" and additional spray applications are based on the next interval of cumulative DSVs.

This program maximizes the dollars spent on disease control by suggesting the most effective timing of fungicide applications. WIN provides this critical information from 48 weather stations in a timely manner, via the internet. This information can be immediately used by growers to make informed decisions. Growers can tailor their spray program based on their own preferred level of risk management. For example, growers in high risk areas for CLS are advised to make their first application at 55 DSV with subsequent applications at 35 DSV.

Calculation of DSVs begins in mid-May coinciding with the favorable conditions for infection and disease development after canopy closure.

## EFFICACY OF USE PROPOSED UNDER SECTION 18 (166.20(a)(5))

Chlorothalonil was tested from 2012 through 2016 at Foxhome, Minnesota for its efficacy at controlling sensitive isolates of *C. beticola*. Selected treatments are shown in the attached tables below. Please note that the studies were conducted to evaluate fungicides when used mainly in mixtures to control CLS and help to manage fungicide resistance. Chlorothalonil was used alone, in mixtures with tetraconazole and with thiophanate methyl. The data indicated that chlorothalonil when used alone or in mixtures in a fungicide rotation program provided effective and economical control CLS. In the past 18 years, four fungicide applications were the most that were required to provide effective control in field trials inoculated with *C. beticola* sensitive to fungicides. In 2016, although there were significant differences among treatments in terms of disease severity and recoverable sucrose, it was possible that more fungicide applications (than the maximum of four used) could have resulted in better disease control and higher recoverable sucrose since the disease continued to develop after all fungicides were applied. Since our main objective will be to control CLS and manage fungicide resistance economically, Michigan Sugar will recommend chlorothalonil be mixed with other fungicides.

It has been reported that *C. beticola* have also developed resistance to QoI fungicides (Birla, K; Rivera-Varas, V; Secor, GA; Khan, MFR; and Bolton, MD. 2012. Characterization of cytochrome b from European field isolates of *Cercospora beticola* with QoI outside inhibitor resistance. European Journal of Plant Pathology 134: 475-488). Researchers have developed an integrated management system for managing *C. beticola* in Italy. (Cioni, F., M. Collina., G. Maines., M. F. R. Khan; G. A. Secor; and V. V. Rivera. 2014. A new integrated pest management (IPM) model for CLS of sugar beets in the Po Valley. Sugar Tech. 16:92-99). Italian researchers have demonstrated that chlorothalonil was very effective as an alternating and or mixing partner with other non-QoI fungicides for controlling QoI resistant *C. beticola* populations (Domenichini et al., 2000. ATTI Gionate Fitopatologiche, 2000, 2, 277-282). Similarly, North Dakota State University and University of Minnesota faculty have worked with researchers from Serbia who have demonstrated that *C. beticola* has resistance to multiple modes of action including benzimidazole, demethylation inhibitors, and QoI – (unpublished but

currently in review at European Journal of Plant Pathology). Field trials were conducted in Serbia that indicated that chlorothalonil alone in a rotation program and in mixtures provided effective control of *C. beticola* with resistance to multiple modes of action (*Unpublished*). Dr. Khan (Technical Expert) has volunteered to present this information (from Italy and Serbia) to EPA if requested.

Based on the data presented, chlorothalonil can be expected to provide a significant decrease in economic loss and to help delay or prevent resistance to the DMI fungicides used in the fungicide rotation program.

**Use of Chlorothalonil in 2016 Fungicide Trial, Foxhome, MN. Plots were Inoculated with *C. beticola* Sensitive to Fungicides.**

| Product | Rate/A | CLS* Rated on 1-10 scale; Sept 1 | Sucrose % | SLM** % | Tons /A | Recov-erable sucrose Lb/A | Gross Return $/A± | Return % of Non-treated Check |
|---|---|---|---|---|---|---|---|---|
| Tetraconazole/ TPTH + Chlorothalonil/ Pyraclostrobin | 13 fl oz/ 8 fl oz + 24 oz/ 9 fl oz | 7.8 | 12.6 | 1.78 | 32.68 | 7100 | 351 | 228 |
| (Tetraconazole +TPTH)/ Chlorothalonil/ Pyraclostrobin | 16 fl oz/ 24 oz/ 9 fl oz | 8.8 | 13.1 | 1.61 | 33.90 | 7785 | 473 | 307 |
| Non-treated Check | - | 10 | 11.7 | 1.73 | 28.2 | 5588 | 154 | 100 |
| LSD P=-0.5 | | 0.7 | 0.8 | 0.4 | 3.2 | 852 | 168 | - |

*CLS rating 1-10: 1 indicate that all leaves are healthy, 10 indicate that mature leaves are killed with re-growth of new leaves
**SLM – Sugar loss to molasses.
±Gross return was very low in this trial since the variety used was susceptible to *C. beticola* and will not be approved for use because of its susceptibility to the pathogen and its low sugar concentration. Payment system based on American Crystal Sugar Company that incentivizes crops with higher sucrose concentration.

**Use of Chlorothalonil in 2015 Fungicide Trial, Foxhome, MN**

| Product | Rate/A | CLS* Sept 25 | Suc-rose % | SLM** | Tons /A | Recov-erable Sucrose Lb/A | Gross Return $/A | Return % of Non-Treated Check |
|---|---|---|---|---|---|---|---|---|
| (Tetraconazole + TPTH)/ TPTH + Chlorothalonil/ Pyraclostrobin | (16 fl oz) / 8 fl oz+ 24 fl oz/ 9 fl oz | 4.5 | 17.5 | 0.86 | 31.5 | 10,460 | 1,311 | 195 |
| Prothioconazole/ TPTH+ Chlorothalonil/ Pyraclostrobin | 5.7 fl oz/ 8 fl oz+ 24 fl oz/ 9 fl oz | 5.3 | 17.4 | 0.95 | 31.7 | 10,473 | 1,304 | 194 |
| (Difenoconazole + Propiconazole)/ TPTH + Chlorothalonil/ Pyraclostrobin | (7 fl oz) / 8 fl oz + 24 fl oz/ 9 fl oz | 5.0 | 18.1 | 1.05 | 30.5 | 10,374 | 1,337 | 199 |
| ¥TPTH + Thiophanate methyl/ (Tetraconazole + TPTH)/ Pyraclsotrobin | 8 fl oz + 7.6 fl oz/ (16 fl oz) / 9 fl oz | 4.3 | 17.9 | 0.99 | 30.6 | 10,322 | 1,317 | 196 |
| Non-treated Check | | 10 | 15.2 | 1.21 | 24.7 | 6,883 | 673 | 100 |
| LSD (P=0.05) | | 1.0 | 1.1 | 0.15 | 2.5 | 1,035 | 213 | - |

*CLS rating 1-10: 1 indicate that all leaves are healthy, 10 indicate that mature leaves are killed with re-growth of new leaves
**SLM – Sugar loss to molasses.
¥Typical fungicide rotation for effectively controlling populations of *C. beticola* sensitive to fungicides.

**Use of Chlorothalonil in 2012 Fungicide Trial, Foxhome, MN**

| Product | Rate Fl oz/A | CLS* Aug 29 | Sucrose % | SLM** % | Tons/ Acre | Rec. Sucrose /Acre | Gross Return $/Acre | Return % of non-treated Check |
|---|---|---|---|---|---|---|---|---|
| Chlorothalonil + Tetraconazole/ Chlorothalonil/ Pyraclostrobin | 16 + 13/ 16/ 9 | 7 | 19.6 | 2.03 | 22.8 | 7987 | 982 | 154 |
| Chlorothalonil + Tetraconazole/ Chlorothalonil/ Pyraclostrobin | 24 + 13/ 16/ 9 | 6 | 19.5 | 2.05 | 23.9 | 8328 | 1101 | 176 |
| Chlorothalonil + Tetraconazole/ Chlorothalonil + Thiophanate methyl/ Pyraclostrobin | 16 + 13/ 16 + 7.6/ 9 | 6 | 19.2 | 2.01 | 22.0 | 7565 | 984 | 159 |
| Non-Treated Check | | 10 | 17.2 | 2.0 | 19.0 | 5786 | 646 | 100 |
| LSD P=0.5 | | 0.8 | 0.6 | 0.14 | 2.5 | 962 | 211 | - |

*CLS rating 1-10: 1 indicate that all leaves are healthy, 10 indicate that mature leaves are killed with re-growth of new leaves
**SLM – Sugar loss to molasses.

**EXPECTED RESIDUE LEVELS IN FOOD (166.20(A)(6))**

A summary of the treated field RAC samples is presented in the following tables.

| Summary of Chlorothalonil Residues in Sugar Beet Root and Tops | | | | | | |
|---|---|---|---|---|---|---|
| Treatment Description | Matrix and Sampling Timings | n[1] | Chlorothalonil Mean Residues (ppm) | | | |
| | | | Min | Max | Mean[2] | SD[2] |
| post-emergence at at 35±2 and 21±1 days before harvest at 340.65 g ai/A (1.0 pint product/A) | **Sugar beet Root** at 21±1 DALA | 24 | <LOQ | 0.12 | 0.033 | 0.030 |
| | **Sugar beet Tops** at 21±1 DALA | 24 | 0.43 | 12.1 | 4.4 | 4.0 |

[1] n = number of samples
[2] For the purposes of calculations, numbers less than or equal to the LOD were considered to be zero.

| Summary of Hydroxy Chlorothalonil Residues in Sugar Beet Root and Tops | | | | | | |
|---|---|---|---|---|---|---|
| Treatment Description | Matrix and Sampling Timings | n[1] | Hydroxy Chlorothalonil Mean Residues (ppm) | | | |
| | | | Min | Max | Mean[2] | SD[2] |
| post-emergence at at 35±2 and 21±1 days before harvest at 340.65 g ai/A (1.0 pint product/A) | **Sugar beet Root** at 21±1 DALA | 24 | nd | <LOQ | <LOD | <LOD |
| | **Sugar beet Tops** at 21±1 DALA | 24 | <LOQ | 0.063 | 0.025 | 0.021 |

[1] n = number of samples
[2] For the purposes of calculations, numbers less than or equal to the LOD were considered to be zero.

The results of the analyses from the processed fractions are presented in the following table.

| Chlorothalonil and Hydroxy Chlorothalonil Residues in Sugar beet Processed Fractions | | | |
|---|---|---|---|
| **Trial No. AA150713-** | **Sample Type** | **Chlorothalonil (ppm)** | **Hydroxy Chlorothalonil (ppm)** |
| ID | Pre-processing root | 0.420 | 0.017 |
| | Refined sugar | nd | <LOD |
| | Dry pulp | 0.012 | 0.013 |
| | Molasses | <LOD | 0.042 |

There is no indication of concentration of chlorothalonil or hydroxy chlorothalonil in processed commodities of sugar beet. Residues of hydroxy chlorothalonil were 2.5 times higher in molasses than in pre-processing roots. However, the total residue from both analytes in molasses was 0.10 times the residue in pre-processing roots indicating the source of the higher residues of hydroxy chlorothalonil in molasses may be due to chlorothalonil from pre-processing roots. Residues of chlorothalonil and hydroxy chlorothalonil in refined sugar and dry pulp were less than in pre-processing roots.

## DISCUSSION OF RISK INFORMATION (166(a)(7))

Discussion of Risk Information (for Chlorothalonil):

Chlorothalonil (2,4,5,6-tetrachloro-1,3-benzenedicarbonitrile) is a broad-spectrum, non-systemic protectant pesticide mainly used as a fungicide to control fungal foliar diseases of vegetable, field, and ornamental crops. It is also used as a wood protectant, anti-mold and anti-mildew agent, bactericide, microbiocide, algaecide, insecticide, and acaricide. Residential uses include golf courses, use on home gardens, use as a wood preservative, and use in paint formulations (2012. Kramer, George F. et. al. USEPA Memorandum Subject: Chlorothalonil. Human-Health Assessment Scoping Document in Support of Registration Review prepared by the USEPA, dated March 3, 2012. 53 pp.).

Chlorothalonil is currently going through the Registration Review process. The Chlorothalonil Consortium for Conventional Uses and the Chlorothalonil Antimicrobial Testing Task Force are in the process of satisfying all data requirements listed in the March 18, 2013 Generic Data Call-In. Once all data has been generated and submitted, EPA will re-assess the risk to humans and the environment. The information below is information obtained from various documents previously generated either by EPA, Syngenta Crop Protection, LLC or the Chlorothalonil Task Force.

a. Human Health
Please see attached EPA memo dated 13-MAR-2012.

Acute toxicity
Oral: LD50 4100 mg/kg-bw (rat)
Dermal: LD50 >2000 mg/kg-bw (rat)
Inhalation: LC50 0.130 mg/L (4 hr) (rat) (Inhalable Dust)

Irritation/Corrosivity
Causes serious eye irritation. Unlikely to cause skin irritation.

Sensitization
It is not a skin sensitizer in animal tests.

EPA classified chlorothalonil as a "likely" human carcinogen by all routes of exposure. Based on the weight of the evidence presented to the Agency, EPA has concluded that a non-linear risk assessment using a Margin of Exposure (MOE) approach is appropriate for chlorothalonil.
Based on the overall weight-of-evidence, there is no evidence of increased susceptibility to offspring following in utero exposure to rats or rabbits in developmental toxicity studies or following pre/post-natal exposure in the reproductive toxicity studies in rats. There is no evidence that chlorothalonil causes neurotoxicity (2012. Kramer, George F. et. al. USEPA Memorandum Subject: Chlorothalonil. Human-Health Assessment Scoping Document in Support of Registration Review prepared by the USEPA, dated March 3, 2012. 53 pp.).
An immunotoxicity study was conducted in 2012 to remove a restriction on the safety factor assigned to chlorothalonil under FQPA. Under the conditions of the study, treatment of female

CD-1 mice with chlorothalonil in the diet for 28 consecutive days resulted in no suppression of the humoral component of the immune system (2012. Donald, Lyndsay. Chlorothalonil-A 28 Day Immunotoxicity Study by Oral (Dietary) Administration in Mice Using Sheep Red Blood Cells as the Antigen prepared by Charles River Laboratories for the Chlorothalonil Task Force, completed on March 28, 2012, 109 pp.).

b. Potential to be found in drinking water

Chlorothalonil is not mobile in soil and does not leach to groundwater. The chlorothalonil degradate, SDS-3701, is more mobile than the parent, but the potential for leaching to groundwater is low.

Chlorothalonil dissipates rapidly in water with half-lives of 4, 7 and 8 hours. [Gentle (1999) and Gentle & Tattersfield (2000)] In the absence of light, rapid microbial degradation occurs via the glutathione pathway resulting in half-lives ranging from 0.1-3.1 days [Hurt and Oliver (2002), Kirkpatrick (1996) & Hatzenberler (1991)]. The latest EPA assessments resulting in a half-life of 1.5 days. In the presence of sunlight, the half-life is <1 day. [Kirkpatrick (1996)] Water monitoring supports the results found in the lab and field studies. Extensive water monitoring shows low levels of chlorothalonil. Over 9000 samples over 16 years nationwide resulted in 64 detects (<1%), a maximum detect in Ag of 0.71 µg/L and a maximum detect in turf of 48 µg/L.

The residues of concern in drinking water include parent chlorothalonil and its 4-hydroxy metabolite. The Agency used screening level water exposure models in the dietary exposure analysis and risk assessment for chlorothalonil and 4-hydroxy chlorothalonil in drinking water. Based on the Pesticide Root Zone Model/Exposure Analysis Modeling System (PRZM/EXAMS) and Screening Concentration in Ground Water (SCI-GROW) models, the estimated drinking water concentrations (EDWCs) of chlorothalonil and its 4-hydroxy metabolite for chronic exposures are estimated to be 68.2 parts per billion (ppb) for surface water and 3.2 ppb for ground water.

c. Residential Uses

Chlorothalonil is currently registered for the following uses that could result in residential exposures: As a fungicide on golf courses and as a preservative in paints. Based on acute, chronic, short-term/intermediate-term, and aggregate risk assessments, EPA concludes that there is a reasonable certainty that no harm will result to the general population, or to infants and children from aggregate exposure to chlorothalonil residues (2012. Kramer, George F. et. al. USEPA Memorandum Subject: Chlorothalonil. Human-Health Assessment Scoping Document in Support of Registration Review prepared by the USEPA, dated March 3, 2012. 53 pp.).

d. Common Mode of Action

Its postulated mechanism of action as an antifungal agent involves disruption of sulfur-dependent enzymes that mediate energy production in the fungal organism. As there are numerous enzyme targets, chlorothalonil is considered to have a multi-site mode of action that is effective against all four Fungi Classes (Oomycetes - Ascomycetes - Basidiomycetes - Fungi Imperfecti). This makes chlorothalonil a great resistance management tool (http://www.cdpr.ca.gov/docs/emon/surfwtr/presentations/syngenta_presentation_2012.pdf).

e. Endangered or Threatened Species

Please see attached list of threatened or endangered species thought or known to occur in Michigan counties where sugarbeets are grown.

f. Beneficial Organisms

Chlorothalonil is of low toxicity to non-target terrestrial organisms. Consequently, it does not present an unacceptable risk to these organisms.

- Non-target arthropods – Harmless
- Bees - Non-toxic - LD50 > 133 µg ai/bee
- Earthworms - Non-toxic - LC50 >404 mg/kg soil

g. Fish and Aquatic Organisms

Although chlorothalonil has high intrinsic toxicity to some aquatic organisms, it does not result in adverse effects under actual field conditions of use. Due to the very rapid rate of dissipation in aquatic environments, it results in low and transient exposure.

- Fish – very highly to highly toxic - Acute LC50 = 18 - 200 µg/L
- Aquatic invertebrates – highly to moderately toxic - Acute LC50 = 24 - >1600 µg/L
- Aquatic Plants/Algae- very highly to highly toxic - EC50 = 14 - 210 µg/L

## COORDINATION WITH OTHER AFFECTED FEDERAL, STATE, AND LOCAL AGENCIES (166.20(a)(8))

This document has not been shared with other state or federal agencies.

## NOTIFICATION OF REGISTRANT (166.20(1)(9))

The registrant, Sipcam Agro USA, Inc., has been notified and fully supports this request. A letter of support is included.

## ENFORCEMENT PROGRAM (166.20(a)(10))

The Michigan Department of Agriculture and Rural Development will monitor the applications of chlorothalonil during the use season to determine that the conditions of the emergency exemption are correctly followed. Parameters monitored will include acres treated and any adverse effects that may occur. MDARD will respond to all misuse complaints related to use under an exemption.

## REPEAT USES (166.20(a)(11))

This is the **first request** for a section 18 exemption for chlorothalonil on sugarbeet.

## PROGRESS TOWARD REGISTRATION (166.25(b)(2)(ii))

See letter from registrant. The registrant plans to submit a request for registration of chlorothalonil after EPA's current Registration Review of chlorothalonil is satisfactorily completed.

## NAME OF PEST (166.20(b)(1))

**Scientific Name:** *Cercospora beticola*

**Common Name:** Cercospora leaf spot (CLS)

## DISCUSSION OF EVENTS OR CIRCUMSTANCES WHICH BROUGHT ABOUT THE EMERGENCY CONDITION (166.20(b)(2))

**The Sugarbeet Industry in Michigan.**
Sugarbeet was planted on approximately 159,000 acres in Michigan 2016. This region has been a leader in sugarbeet production in the United States and its production represents 13% of the acreage planted annually. The most recent economic analysis for the 2011 fiscal year determined direct impacts (production and processing) in Michigan was $500 million and secondary impacts at an additional $1.1 billion).

Sugar beets in Michigan are produced in 15 Counties with the highest concentration in the Saginaw Valley Thumb Region.

This overview will provide a summary of the industry in Michigan.
In 2002, growers formed the Saginaw Valley Thumb region and bought four factories from Imperial Sugar, then in 2004 purchased the Monitor Sugar factory in Bay City Michigan. Today the Company makes up a cooperative of 1200 members.

**History of Leaf Spot in Michigan**.
Cercospora Leaf Spot has been a concern to growers for the last 15 years but for the most part with proper management through variety resistance and fungicide applications have been able to manage the disease. Unfortunately, starting in 2011, *C. beticola* developed resistance to QoI fungicides that were widely used for controlling the disease and resulted in field failures. Michigan State University confirmed *C. beticola* resistance to QoI fungicides.

This has left us with one primary chemistry left to control leaf spot in Michigan which is the triazole class (Inspire XT, Eminent, Proline, Enable, and Topguard). Unfortunately, *C. beticola* have started to develop resistance to all of the triazole fungicides at a 20% or higher level that has been confirmed by Michigan State University. The other chemistries - EBDC, Copper and TPTH - are not effective for season long control of the disease by themselves. We desperately

need another chemistry to help us control this disease. That chemistry is chlorothalonil, currently very effective especially when used in mixtures to control Cercospora Leaf Spot.
In 2016, our growers averaged five fungicide applications during the season and were unable to effectively control CLS.

**Economic Loss to Michigan Sugar Beet Industry Due to Cercospora.**
First, the toxins from the leaf spots destroy leaf tissue and once infection occurs, it can defoliate the entire field within a couple of weeks and cannot be stopped with fungicides. Management is strictly preventative.
The defoliation has a direct negative effect on sugar % and tonnage of the beets so the net result is lower yield and lower sugar content which both have direct negative effect on how much sugar the factories can produce thus lowering payments to the growers for each ton of beets they deliver.
The toxin also increased the amount of impurities in the beets which reduces the ability of the factories to extract sugar from the beets. Overall, CLS have a negative impact on total sugar produced thus again lowering beet payments to the growers.
Due to the increased impurities in the sugarbeet roots, the extraction process slows significantly and can lead to a 20% reduction in throughput per day. As a result, beets have to be stored longer in an increasing unfavorable environment (warmer temperature and more rainfall) which cause rotting of the beets. These rotten beets then have to be hauled to landfills or back to growers' fields at an additional cost. These beets are a 100% loss and are obviously never processed. In 2015 and 2016 the company disposed of over 225,000 ton of beets (7500 acres of beets lost) with a disposal cost of $2.2 million.

**When you consider the above impact on sugar loss Michigan Sugar Company owned by the growers has easily over the last 2 years lost in excess of 100 million dollars**

## ECONOMIC DATA FROM 2016 (166.20(b)(4)(I))

It should be noted that in 2016, more than 90% of fields in Michigan growing area reported field failures from fungicides at controlling *C. beticola*.

Environmental conditions (such as lots of moisture from rainfall and high temperatures) during the growing season favors a high yielding sugarbeet crop as well as favorable conditions for *C. beticola* to infect and damage the crop. Over the past decade, growers have done an excellent job of using tolerant varieties, crop rotations, incorporating infected crop residue, scouting and timely fungicide applications to manage CLS. Environmental conditions were favorable for a high yielding sugarbeet crop in Michigan in 2016. However, the loss of effectiveness of the QoI fungicides resulted in a significant reduction in sugar quality at all the factories. Growers had severe CLS, and although they harvested relatively high yields (31 tons per planted acre – the potential was there for higher tonnage), their sugar concentration was significantly lower which will mean higher storage losses, higher processing costs and lower sugar price. It is estimated that Michigan Sugar growers with 148,792 acres will lose over $116 million (148,792 acres x

$783.53 per acre), mainly as a result of lower sugar concentration which leads to a higher processing costs and thus lower price for their sugar beet.

**ESTIMATED REVENUES FOR THE SITE TO BE TREATED (166.20(b)(4)(ii)&(iii))**

**Economic data to indicate significant economic loss for Michigan Sugar**

Yield Data

When discussing sugarbeet it is important to look at the definition of yield from two standpoints, weight of the crop in tons per acre and yield of sucrose content per ton harvested. Yield data for Michigan Sugar from 2012 to 2016 shows that sugarbeet weight yields are highly dependent on environmental conditions, especially high moisture and high temperatures. The 2016 growing season featured both, thus the high-weight yielding sugarbeet crop in 2016. CLS (especially when it starts later in the season) primarily affects sucrose content yield which is the major quality component of sugarbeet. Sucrose content is also the major driver in sugarbeet price determination. Sucrose content decreased in 2016 and there was a direct correlation between fungicide-resistant CLS and decreased sucrose content. As displayed in the table below, sucrose content in 2016 was 15.5% compared to an average of 17.9% over the previous four years. This may seem insignificant, but it resulted in a price per ton reduction of $28.65 ($27.85 in 2016 compared to the previous four year average of $56.40, or a reduction of 51% in price per ton). Because 2016 had another high yielding crop (31 tons per acre compared to the previous 4-year average of 29.2 tons per acre and just lower than the 2015 crop of 31.6 tons/ac) a true 20% weight loss per acre was not experienced. However, when we calculate the gross revenue for the 2016 crop (31 tons per acre x 27.85 per ton of root), there was a gross revenue of $863.35 per acre which represented a 48% gross revenue loss as compared to the previous 4-year average.

| Year | Weight Yield (Tons/Acre) | Sucrose Yield (%) | Price($) /Ton | Gross Revenue $/acre |
|---|---|---|---|---|
| 2012 | 29.3 | 18.5 | 72.38 | 2120.73 |
| 2013 | 26.1 | 18.2 | 53.63 | 1399.74 |
| 2014 | 29.6 | 18.1 | 51.54 | 1525.58 |
| 2015 | 31.6 | 17.6 | 48.06 | 1518.69 |
| 2016* | 31.0 | 15.5 | 27.85 | 863.35 |
| Five Year Average | 29.2 | 18.1 | 26.40 | 1,646.88 |

* Abnormal year due to failure of registered fungicides. 2016 was excluded from 5 year average calculations.

Michigan Sugar Company grower /owners realized a 48% reduction in gross revenue in 2016 due to the defoliation and damage of their beets caused by CLS.

Root Sample Data

Yield data and sucrose content are estimated yearly in July by collecting root samples before any disease is present and then roots are collected and analyzed after harvest and yield and sucrose content data are compared. In 2016 at pre-disease sampling sucrose content was projected at

18% and yield was estimated to be 31 tons/acre. Because of uncontrolled resistant-CLS, sucrose content was only 15.5% at harvest. The 15.5% sugar content was the lowest in the past five years. This resulted in a $28.55 per ton price decrease and an overall reduction of $783.53 (48%) gross revenue per acre.

**Expected Losses without Chlorothalonil**

| Year | Weight Yield (tons/acre) | % Sucrose Yield | Price ($/ton) | Gross Revenue ($/acre) |
|---|---|---|---|---|
| **Without Chlorothalonil*** | 31.0 | 15.5 | 27.85 | 863.35 |
| **With Chlorothalonil**** | 29.52 | 17.58 | 50.69 | 1,646.88 |
| **Estimated Loss in Revenue w/o Chlorothalonil** | | | | 783.53 (48% loss) |

*2016 data was used in this calculation as there are no effective alternatives and it can be expected that growers will experience similar or greater losses in 2017 without the availability of chlorothalonil.
**Calculated using 5-year averages.

**Economic data to indicate significant economic loss for Michigan Sugar Growers**
Michigan Sugar growers planted 158,594 acres of sugarbeet in 22 Michigan Counties in 2016 and had average yields of 31 tons per acre. Poor control of CLS resulted in a significantly lower sucrose concentration (14.4% lower than the past 4-year average) and gross revenue by 48% when compared to the previous 4-year average. Based on projected yield and price, it is estimated that Michigan sugarbeet growers lost over $116 million (148,792 acres x $783.53 per acre) because they could not effectively control CLS in 2016.

**Entire Area.** This Section 18 is needed to control fungicide-resistant CLS, prevent further fungicide resistance development, and mitigate potentially devastating losses for sugarbeet growers in Michigan.

# Supporting Documentation

Fig. 1. Beets re-growing tops in Michigan after total defoliation caused by CLS

Fig. 2. Re-growth of foliage after total defoliation from Leaf Spot resulting in sugar loss from the beet and reduced tonnage due to reduced photosynthesis

Figure 3. 100 % of isolates tested showed significant resistance to QoI and benzimidazole fungicides from Lab results at Michigan State University (The more growth in the plates indicates higher levels of resistance)

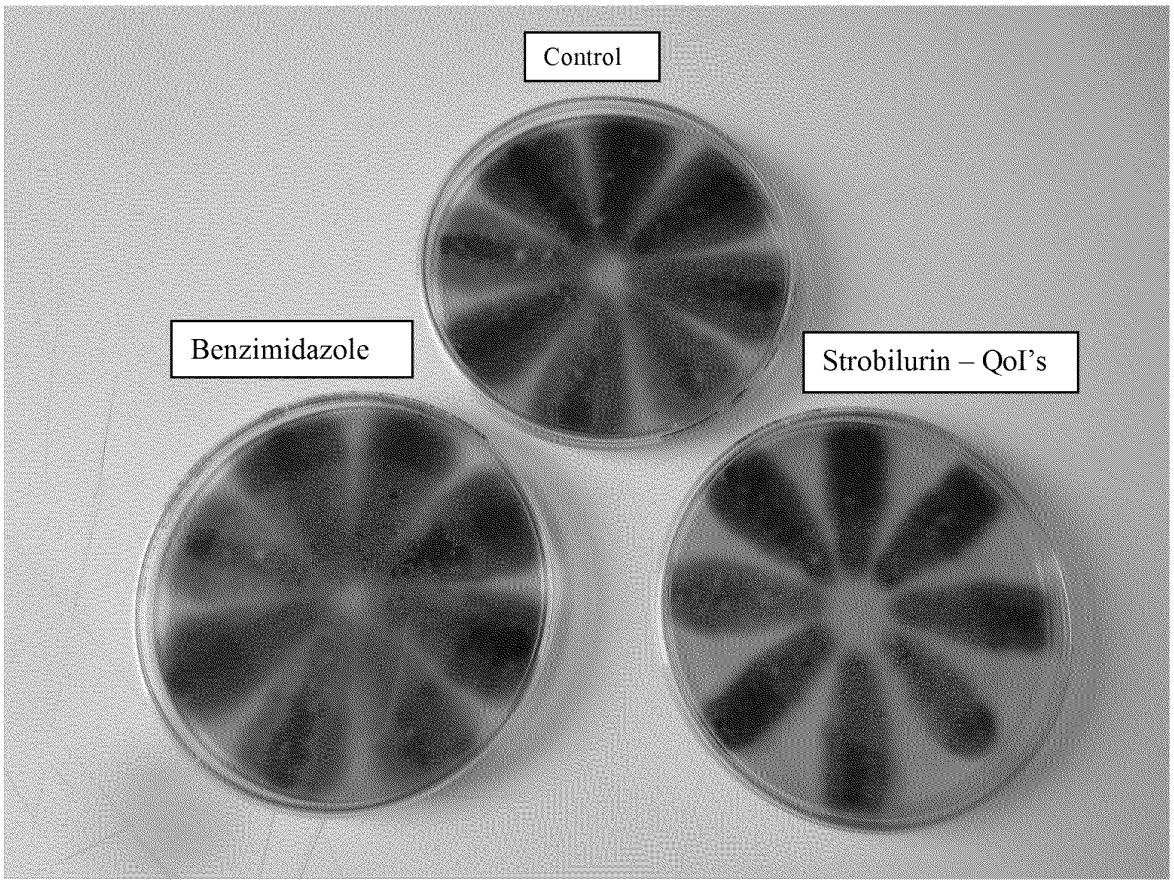
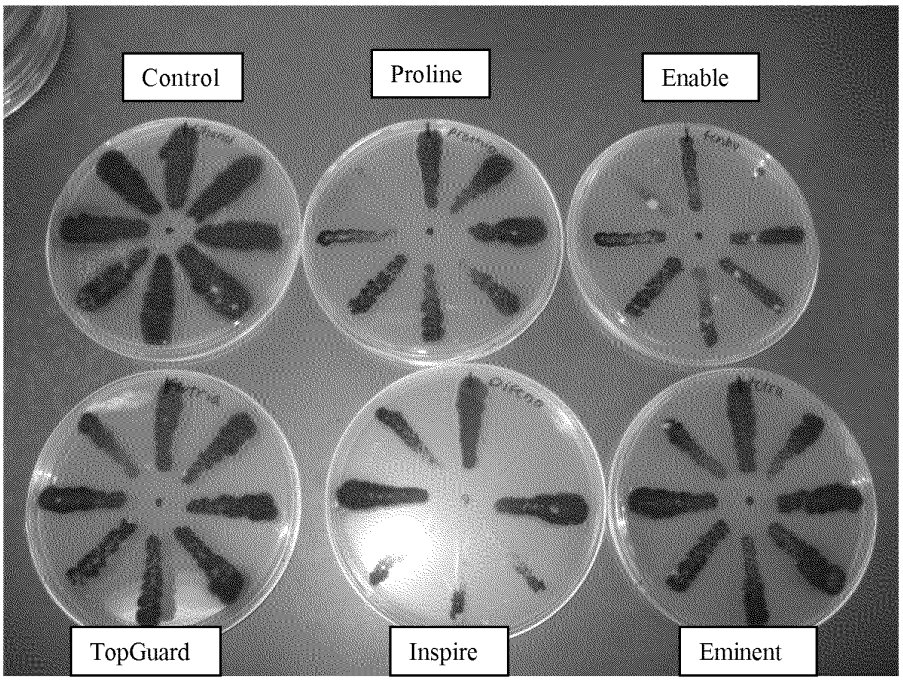


Figure 4. Triazole resistance ranging from 20 to 70 percent of isolates for 5 different commercial products available confirmed at Michigan State University. (The more growth in the plates indicates higher levels of resistance)



SipcamAdvan
The Natural Choice™

April 18, 2017

Mr. David Pratt
Michigan Sugar Company
122 Uptown Drive, Suite 300
Bay City, MI 48708

Subject: Chlorothalonil on Sugarbeets

Dear Mr. Pratt,

We have learned through discussions and correspondences with Dr. Mohammed Khan, North Dakota State University, that cercospora leaf spot is threatening the agricultural productivity of the sugar industry in North Dakota, Minnesota as well as Michigan, which will impact the availability of sugar in the U.S.

We have also aware that our active ingredient, chlorothalonil, the active ingredient in Cercos™ Fungicide, would be useful for the control of cercospora leaf spot in sugarbeets. Chlorothalonil is one of the most popular fungicides applied by growers nationwide to control a wide range of diseases in many agricultural crops. Its efficacy is confirmed for over 50 years. Chlorothalonil, with its multi site mode of action, is an excellent tool to reduce risk of fungicide resistance. Several proven fungicides based on chlorothalonil are in the market as a standalone solution or in premix with other active ingredients.

Should you and the grower community decide that emergency action is required to assure the availability of Cercos™ Fungicide for control of cercospora leaf spot in Michigan sugarbeets during the 2017 growing season, Sipcam Agro USA, Inc. will support your efforts to every extent possible. This letter hereby authorizes the sugarbeet industry, through your support and sponsorship, to cite and to refer to data owned by Sipcam Agro USA, Inc. pertaining to Cercos™ Fungicide in order to secure an emergency exemption through procedures as outlined in FIFRA Section 18. Please keep us informed of your progress so that we may expeditiously make our product available to the grower community.

Best Regards,

Giovanni Mattaini
Manager of Field Development and Regulatory Affairs

Sipcam Agro USA, Inc. Advan LLC Sostram Corporation
2525 Meridian Parkway • Suite 350 • Durham • NC 27713 • 919-226-1195 • Facsimile: 919-226-1196

MICHIGAN STATE
UNIVERSITY

Brian Verhougstraete, Pesticide Registration Program Specialist
Michigan Department of Agriculture & Rural Development
P.O. Box 30017 (correspondence)
P.O. Box 30776 (payments)
525 W. Allegan
Lansing, MI 48909

April 30, 2017

Dear Brian:

I wish to express my support of for a Section 18 emergency exemption label for the use of chlorothalonil in sugarbeet in the state of Michigan. Michigan currently ranks fourth nationally in sugarbeet production with over 150,000 acres grown annually with a farm gate value ~$216 million.

This upcoming season will bring additional challenges in the management of foliar leaf spot diseases of sugarbeet, in particular Cercospora leaf spot (CLS) caused by *Cercospora beticola*, which can and usually does severely impact crop yields in Michigan when conditions are conducive to disease development. Major issues have developed in recent years with the introduction of effective fungicides for management of CLS. Decreased fungicide efficacy related to fungicide application timing, and development of insensitivity to established and novel fungicides in *C. beticola* populations has significantly impacted sugarbeet production and has resulted in a non-routine situation and urgent need for effective broad spectrum chemistries for CLS management. Additionally, data collected by the Michigan State University Potato and Sugarbeet Pathology Laboratory from 2013-2016, has indicated that there has been an increase in frequency of *C. beticola* isolates with triazole and QoI resistance collected from commercial production fields in Michigan. Moreover, the development of reduced sensitivity or insensitivity to some fungicides previously recommended for CLS disease management, most notably benzimidazoles, QoIs and triphenyltin OH highlights the need for effective chemistries for the control of leaf spot diseases of sugarbeet. A further issue for Michigan sugarbeet production is the increase in recovery of isolates of *C. beticola* with triazole resistance collected from commercial production fields. In addition, chlorothalonil is labeled for the control of foliar Cercospora disease in other crops (asparagus, carrot, celery, dry bean, cucurbits, peanut and soybean).

We are hoping for the approval of Section 18 emergency exemption label for the use of chlorothalonil so that sugarbeet growers across the State of Michigan can benefit from this active ingredient while the EPA completes bridging studies for this chemistry.

Sincerely,

Noah Rosenzweig, PhD
Assistant Professor
Michigan State University
Plant, Soil and Microbial Sciences

College of Agriculture and Natural Resources

Department of Plant, Soil and Microbial Sciences

1066 Bogue St.
A286 Plant and Soil Science Bldg.
Michigan State University
East Lansing, MI
48824-6254

517-355-0271

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MICHIGAN SUGAR COMPANY

May 5, 2017

Dear Dr. Khan,

I am writing this letter in the hope that you are able to help Michigan Beet Growers obtain a Section 18 for use of chlorothalonil on Cercospora Leaf Spot (CLS) and Alternaria A. *alternata* of sugarbeets for the 2017 growing season.

Michigan Sugar Company is a grower owned sugarbeet cooperative located in the Saginaw Valley Thumb Region of Michigan. Michigan Growers will grow 150,000 acres of beets in Michigan for the 2017 growing season.

Both Cercospora and Alternaria are a very serious threat to our Beet Crop. In 2016 and 2017 these leaf spot diseases had a serious negative impact on our crop with losses of 100 million dollars to the growers over the last 2 years.

Prior to 2011 we had 4 major classes of fungicide that were effective in helping us successfully manage these diseases (Strobilurin, Benzimidazol, and Triazole and tri-phenyl tin hydroxide). Resistance to the Strobilurin and Benzimidazol fungicides was first detected in 2011 confirmed by Michigan State University. Today these fungicides have virtually no activity on the fungus. In 2016 field level resistance was discovered for the Triazole fungicides which are only now 70% effective and that number is expected to go down over time. That leaves us with only one class of fungicide tri-phenyl tin hydroxide that has not yet developed field level resistance but will over time. Unfortunately the tri-phenyl tin hydroxide fungicide can only be applied at a maximum of 15 oz per season (3 applications) so we virtually have no alternative fungicides that are effective at controlling these diseases to include in a required 5-6 application rotation.

Estimating yield losses is always difficult and is somewhat subjective. Generally speaking, the severe outbreak of both Cercospora and Alternaria Leaf spot that we have experienced over the last 2 years reduced yields by a minimum of 2.5 ton and sugar content by a minimum of 2% at harvest. Unfortunately the sugar loss doesn't stop when the beets are harvested. Beets remain in storage for up to 5 months before all of them can be processed. While in storage the leafspot toxin produces impurities in the beet which can greatly reduce the amount of sugar that can be extracted thus reducing sugar pack in the factory (less sugar to sell). It doesn't stop there, the toxin causes the beet to rot quicker in the piles thus causing beets to rot before they can be processed resulting in over 120,000 tons of beets that had to be hauled to landfills or back to growers fields. The disease has a compounding effect that is devastating to the growers and is putting the future and longevity of the company they own at great risk.

We can't begin to express how desperate we are to have an additional fungicide available to the growers to assist them in successfully managing this disease. We are simply out of options and have nowhere else to turn for help. Please consider and grant our request for a Section 18 of chlorothalonil.

Sincerely,

Corey Guza

Dr. Corey Guza
Director of Agronomy, Michigan Sugar Company

**CORPORATE OFFICE** / 122 Uptown Drive, Suite 300 / Bay City, Michigan 48708 / **989.686.0161** / **WWW.MICHIGANSUGAR.COM**

# SECTION 18 EMERGENCY EXEMPTION FOR THE USE OF CERCOS™ FUNGICIDE FOR CONTROL OF CERCOSPORA LEAF SPOT ON SUGARBEETS

## Cercos™ Fungicide
## (EPA Reg. No. 60063-5)
## For distribution and use only in Michigan.

**MI Section 18 number:**
**Expiration date: 12/31/2017**

**Active Ingredient:** Chlorothalonil (tetrachloroisophthalonitrile) ..... 40.4%

**For use in connection with an emergency exemption authorized under the provisions of Section 18 of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended. This Section 18 label contains directions for use that do not appear on the EPA registered label of Cercos™ Fungicide. Please refer to the production label for additional product information.**

### DIRECTIONS FOR USE

**General Precautions and Restrictions**

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Always read and follow all label directions, restrictions and precautions when using any pesticide alone or in tank mix combinations. The most restrictive labeling applies when using a tank mix. This label must be in the possession of the user at the time of pesticide application.

| For Control of Cercospora Leafspot (*Cercospora beticola*), Powdery Mildew (*Erysiphe betae*) on Sugarbeets | |
|---|---|
| **Rate per Acre** | **Application Directions** |
| 23 fl oz | This fungicide with a multi-site mode of action, may be used to prevent or delay the development of resistance to single-site mode of action fungicides.<br>Apply preventively as a first treatment, when conditions are favorable to disease development and repeat after 14 days. Do not make more than 2 applications.<br>This product must be applied in tank mix with a specific Cercospora Leaf Spot registered fungicide, such as Minerva, or other DMI, Benzimidazoles, or QoI fungicides.<br>Tank mixtures of this product with other pesticides, other than Minerva, and adjuvants should be tested on a small scale for crop safety prior to application to the entire crop.<br>Consult with your Extension Service representatives for guidance on the proper use of this product in programs which attempt to minimize the occurrence of disease resistance to fungicides |
| **Crop Specific Restrictions:**<br>Do not apply more than 1.50 lb of chlorothalonil active ingredient per acre per year.<br>Pre-Harvest Interval (PHI): 21 days<br>Do not graze or feed beet tops to livestock. | |

Sipcam Agro USA, Inc.
2525 Meridian Parkway, Suite 350
Durham, NC 27713

# Michigan

## County Distribution of Federally-Listed Endangered, Threatened and Proposed Species

| County | Species | Status | Habitat |
|---|---|---|---|
| **Alcona** | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler<br>(*Setophaga kirtlandii*) | Endangered | Nests in young jack pine |
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Hine's emerald dragonfly<br>*(Somatochlora hineana)* | Endangered | Spring fed wetlands, wet meadows and marshes; calcareous streams & associated wetlands overlying dolomite bedrock |
| | Pitcher's thistle<br>(*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Alger** | Canada lynx<br>(*Lynx canadensis*) | Threatened | A Canada lynx was recently documented in the Upper Peninsula. The counties listed here have the highest potential for Lynx presence. Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft. |
| | Gray wolf<br>*Canis lupus* | Endangered | Northern forested areas |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler<br>(*Setophaga kirtlandii*) | Endangered | Nests in young jack pine |
| | Piping plover<br>(*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Piping plover<br>(*Charadrius melodus*) | Critical Habitat | |
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Pitcher's thistle<br>(*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |

| | | | |
|---|---|---|---|
| **Allegan** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Karner blue butterfly (*Lycaeides melissa samuelis*) | Endangered | Pine barrens and oak savannas on sandy soils and containing wild lupines *(Lupinus perennis)*, the only known food plant of larvae. |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Alpena** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Piping plover (*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Hine's emerald dragonfly *(Somatochlora hineana)* | Endangered | Spring fed wetlands, wet meadows and marshes; calcareous streams & associated wetlands overlying dolomite bedrock |
| | Dwarf lake iris (*Iris lacustris*) | Threatened | Partially shaded sandy-gravelly soils on lakeshores |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Antrim** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler (*Setophaga kirtlandii*) | Endangered | Nests in young jack pine |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |

| | | | |
|---|---|---|---|
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Arenac** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Baraga** | Canada lynx (*Lynx canadensis*) | Threatened | A Canada lynx was recently documented in the Upper Peninsula. The counties listed here have the highest potential for Lynx presence. Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft. |
| | Gray wolf *Canis lupus* | Endangered | Northern forested areas |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler (*Setophaga kirtlandii*) | Endangered | Nests in young stands of jack pine |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| **Barry** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Mitchell's satyr butterfly (*Neonympha mitchellii mitchellii*) | Endangered | Fens; wetlands characterized by calcareous soils which are fed by carbonate-rich water from seeps and springs |

| | | | |
|---|---|---|---|
| **Bay** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern prairie fringed orchid (*Platanthera leucophaea*) | Threatened | Mesic to wet prairies and meadows |
| **Benzie** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Piping plover (*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Piping plover (*Charadrius melodus*) | Critical Habitat | |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Michigan monkey-flower (*Mimulus michiganensis*) | Endangered | Soils saturated with cold flowing spring water; found along seepages, streams and lakeshores |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Berrien** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Piping plover (*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |

| | | | |
|---|---|---|---|
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Mitchell's satyr butterfly<br>(*Neonympha mitchellii mitchellii*) | Endangered | Fens; wetlands characterized by calcareous soils which are fed by carbonate-rich water from seeps and springs |
| | Pitcher's thistle<br>(*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| | Small whorled pogonia<br>(*Isotria medeoloides*) | Threatened | Dry woodland; upland sites in mixed forests (second or third growth stage) |
| **Branch** | Indiana bat<br>(*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Copperbelly water snake *(Nerodia erythrogaster neglecta)* | Threatened | Wooded and permanently wet areas such as oxbows, sloughs, brushy ditches and floodplain woods |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Mitchell's satyr butterfly<br>(*Neonympha mitchellii mitchellii*) | Endangered | Fens; wetlands characterized by calcareous soils which are fed by carbonate-rich water from seeps and springs |
| **Calhoun** | Indiana bat<br>(*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Copperbelly water snake<br>*(Nerodia erythrogaster neglecta)* | Threatened | Wooded and permanently wet areas such as oxbows, sloughs, brushy ditches and floodplain woods |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |

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| **Cass** | Indiana bat<br>(*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Copperbelly water snake<br>*(Nerodia erythrogaster neglecta)* | Threatened | Wooded and permanently wet areas such as oxbows, sloughs, brushy ditches and floodplain woods |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Mitchell's satyr butterfly<br>(*Neonympha mitchellii mitchellii*) | Endangered | Fens; wetlands characterized by calcareous soils which are fed by carbonate-rich water from seeps and springs |
| **Charlevoix** | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Piping plover<br>(*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Piping plover<br>(*Charadrius melodus*) | Critical Habitat | |
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Dwarf lake iris<br>(*Iris lacustris*) | Threatened | Partially shaded sandy-gravelly soils on lakeshores |
| | Houghton's goldenrod<br>(*Solidago houghtonii*) | Threatened | Sandy flats along Great Lakes shores |
| | Michigan monkey-flower<br>(*Mimulus michiganensis*) | Endangered | Soils saturated with cold flowing spring water; found along seepages, streams and lakeshores |
| | Pitcher's thistle<br>(*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Cheboygan** | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Piping plover<br>(*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Piping plover<br>(*Charadrius melodus*) | Critical Habitat | |
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |

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| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Dwarf lake iris (*Iris lacustris*) | Threatened | Partially shaded sandy-gravelly soils on lakeshores |
| | Eastern prairie fringed orchid *(Platanthera leucophaea)* | Threatened | Mesic to wet prairies and meadows |
| | Houghton's goldenrod (*Solidago houghtonii*) | Threatened | Sandy flats along Great Lakes shores |
| | Michigan monkey-flower (*Mimulus michiganensis*) | Endangered | Soils saturated with cold flowing spring water; found along seepages, streams and lakeshores |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Chippewa** | Canada lynx (*Lynx canadensis*) | Threatened | A Canada lynx was recently documented in the Upper Peninsula. The counties listed here have the highest potential for Lynx presence. Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft. |
| | Gray wolf *Canis lupus* | Endangered | Northern forested areas |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler (*Setophaga kirtlandii*) | Endangered | Nests in young jack pine |
| | Piping plover (*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Piping plover (*Charadrius melodus*) | Critical Habitat Designated | |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | American hart's tongue fern *(Asplenium scolopendrium* var. *americanum*) | Threatened | Cool limestone sinkholes in mature hardwood forest |
| | Dwarf lake iris (*Iris lacustris*) | Threatened | Partially shaded sandy-gravelly soils on lakeshores |
| | Houghton's goldenrod (*Solidago houghtonii*) | Threatened | Sandy flats along Great Lakes shores |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Clare** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler (*Setophaga kirtlandii*) | Endangered | Nests in young stands of jack pine |

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| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| **Clinton** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Eastern prairie fringed orchid *(Platanthera leucophaea)* | Threatened | Mesic to wet prairies and meadows |
| **Crawford** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler (*Setophaga kirtlandii*) | Endangered | Nests in young stands of jack pine |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Houghton's goldenrod (*Solidago houghtonii*) | Threatened | Sandy flats along Great Lakes shores |
| **Delta** | Canada lynx (*Lynx canadensis*) | Threatened | A Canada lynx was recently documented in the Upper Peninsula. The counties listed here have the highest potential for Lynx presence. Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft. |
| | Gray wolf *Canis lupus* | Endangered | Northern forested areas |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler (*Setophaga kirtlandii*) | Endangered | Nests in young stands of jack pine |
| | Piping plover (*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Dwarf lake iris (*Iris lacustris*) | Threatened | Partially shaded sandy-gravelly soils on lakeshores |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |

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| **Dickinson** | Canada lynx<br>(*Lynx canadensis*) | Threatened | A Canada lynx was recently documented in the Upper Peninsula. The counties listed here have the highest potential for Lynx presence. Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft. |
| | Gray wolf<br>*Canis lupus* | Endangered | Northern forested areas |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| **Eaton** | Indiana bat<br>(*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Copperbelly water snake<br>*(Nerodia erythrogaster neglecta)* | Threatened | Wooded and permanently wet areas such as oxbows, sloughs, brushy ditches and floodplain woods |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Eastern prairie fringed orchid<br>(*Platanthera leucophaea*) | Threatened | Mesic to wet prairies and meadows |
| **Emmet** | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Piping plover<br>(*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Piping plover<br>(*Charadrius melodus*) | Critical Habitat | |
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Hungerford's crawling water beetle<br>(*Brychius hungerfordi)* | Endangered | Cool riffles of clean, slightly alkaline streams; known to occur in five streams in northern Michigan |
| | Dwarf lake iris<br>(*Iris lacustris*) | Threatened | Partially shaded sandy-gravelly soils on lakeshores |

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| | Houghton's goldenrod (*Solidago houghtonii*) | Threatened | Sandy flats along Great Lakes shores |
| | Michigan monkey-flower (*Mimulus michiganensis*) | Endangered | Soils saturated with cold flowing spring water; found along seepages, streams and lakeshores |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Genesee** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Eastern prairie fringed orchid (*Platanthera leucophaea*) | Threatened | Mesic to wet prairies and meadows |
| **Gladwin** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| **Gogebic** | Canada lynx (*Lynx canadensis*) | Threatened | A Canada lynx was recently documented in the Upper Peninsula. The counties listed here have the highest potential for Lynx presence. Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft. |
| | Gray wolf *Canis lupus* | Endangered | Northern forested areas |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| **Grand Traverse** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler (*Setophaga kirtlandii*) | Endangered | Nests in young jack pine |

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| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Pitcher's thistle<br>(*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Gratiot** | Indiana bat<br>(*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Snuffbox<br>*Epioblasma triquetra* | Endangered | Small to medium-sized creeks and some larger rivers, in areas with a swift current |
| | Eastern prairie fringed orchid<br>(*Platanthera leucophaea*) | Threatened | Mesic to wet prairies and meadows |
| **Hillsdale** | Indiana bat<br>(*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Copperbelly water snake<br>(*Nerodia erythrogaster neglecta*) | Threatened | Wooded and permanently wet areas such as oxbows, sloughs, brushy ditchcs and floodplain woods |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Clubshell<br>*(Pleurobema clava)* | Endangered | Found in coarse sand and gravel areas of runs and riffles within streams and small rivers |
| | Poweshiek skipperling<br>*(Oarisma poweshiek)* | Endangered<br><br>Critical Habitat | Wet prairie and fens |

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| **Houghton** | Canada lynx<br>(*Lynx canadensis*) | Threatened | A Canada lynx was recently documented in the Upper Peninsula. The counties listed here have the highest potential for Lynx presence. Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft. |
| | Gray wolf<br>*Canis lupus* | Endangered | Northern forested areas |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| **Huron** | Indiana bat<br>(*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Pitcher's thistle<br>(*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| | Eastern prairie fringed orchid<br>(*Platanthera leucophaea*) | Threatened | Mesic to wet prairies and meadows |
| **Ingham** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |

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| **Ionia** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga *Sistrurus catenatus* | Threatened | |
| | Snuffbox *Epioblasma triquetra* | Endangered | Small to medium-sized creeks and some larger rivers, in areas with a swift current |
| | Karner blue butterfly (*Lycaeides melissa samuelis*) | Endangered | Pine barrens and oak savannas on sandy soils and containing wild lupines *(Lupinus perennis)*, the only known food plant of larvae. |
| **Iosco** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Piping plover (*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Piping plover (*Charadrius melodus*) | Critical Habitat | |
| | Kirtland's warbler (*Setophaga kirtlandii*) | Endangered | Nests in young stands of jack pine |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Iron** | Canada lynx (*Lynx canadensis*) | Threatened | A Canada lynx was recently documented in the Upper Peninsula. The counties listed here have the highest potential for Lynx presence. Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft. |
| | Gray wolf *Canis lupus* | Endangered | Northern forested areas |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |

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| **Isabella** | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| **Jackson** | Indiana bat<br>(*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Mitchell's satyr butterfly<br>(*Neonympha mitchellii mitchellii*) | Endangered | Fens; wetlands characterized by calcareous soils which are fed by carbonate-rich water from seeps and springs |
| | Poweshiek skipperling<br>*(Oarisma poweshiek)* | Endangered<br><br>Critical Habitat | Wet prairie and fens |
| **Kalamazoo** | Indiana bat<br>(*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Mitchell's satyr butterfly<br>(*Neonympha mitchellii mitchellii*) | Endangered | Fens; wetlands characterized by calcareous soils which are fed by carbonate-rich water from seeps and springs |
| **Kalkaska** | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler<br>(*Setophaga kirtlandii*) | Endangered | Nests in young stands of jack pine |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Houghton's goldenrod<br>(*Solidago houghtonii*) | Threatened | Sandy flats along Great Lakes shores |

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| **Kent** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Snuffbox<br>*Epioblasma triquetra* | Endangered | Small to medium-sized creeks and some larger rivers, in areas with a swift current |
| | Karner blue butterfly<br>(*Lycaeides melissa samuelis*) | Endangered | Pine barrens and oak savannas on sandy soils and containing wild lupines *(Lupinus perennis)*, the only known food plant of larvae. |
| **Keweenaw** | Canada lynx<br>(*Lynx canadensis*) | Threatened | A Canada lynx was recently documented in the Upper Peninsula. The counties listed here have the highest potential for Lynx presence. Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft. |
| | Gray wolf<br>*Canis lupus* | Endangered | Northern forested areas |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| **Lake** | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Karner blue butterfly<br>(*Lycaeides melissa samuelis*) | Endangered | Pine barrens and oak savannas on sandy soils and containing wild lupines *(Lupinus perennis)*, the only known food plant of larvae. |

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| **Lapeer** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| **Leelanau** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Piping plover (*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Piping plover (*Charadrius melodus*) | Critical Habitat | |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Michigan monkey-flower (*Mimulus michiganensis*) | Endangered | Soils saturated with cold flowing spring water; found along seepages, streams and lakeshores |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Lenawee** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |

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| | Poweshiek skipperling<br>*(Oarisma poweshiek)* | Endangered<br><br>Critical Habitat | Wet prairie and fens |
| **Livingston** | Indiana bat<br>(*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Poweshiek skipperling<br>*(Oarisma poweshiek)* | Endangered<br><br>Critical Habitat | Wet prairie and fens |
| | Snuffbox<br>*Epioblasma triquetra* | Endangered | Small to medium-sized creeks and some larger rivers, in areas with a swift current |
| | Eastern prairie fringed orchid<br>*Platanthera leucophaea* | Threatened | Mesic to wet prairies and meadows |
| **Luce** | Canada lynx (*Lynx canadensis*) | Threatened | A Canada lynx was recently documented in the Upper Peninsula. The counties listed here have the highest potential for Lynx presence. Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft. |
| | Gray wolf<br>*Canis lupus* | Endangered | Northern forested areas |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler<br>(*Setophaga kirtlandii*) | Endangered | Nests in young jack pine |
| | Piping plover<br>(*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Piping plover<br>(*Charadrius melodus*) | Critical Habitat | |
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |

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| **Mackinac** | Canada lynx (*Lynx canadensis*) | Threatened | A Canada lynx was recently documented in the Upper Peninsula. The counties listed here have the highest potential for Lynx presence. Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft. |
| | Gray wolf<br>*Canis lupus* | Endangered | Northern forested areas |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Piping plover (*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Piping plover<br>(*Charadrius melodus*) | Critical Habitat | |
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Hine's emerald dragonfly<br>*(Somatochlora hineana)* | Endangered | Spring fed wetlands, wet meadows and marshes; calcareous streams & associated wetlands overlying dolomite bedrock |
| | American hart's tongue fern<br>*(Asplenium scolopendrium* var. *americanum*) | Threatened | Cool limestone sinkholes in mature hardwood forest |
| | Dwarf lake iris<br>(*Iris lacustris*) | Threatened | Partially shaded sandy-gravelly soils on lakeshores |
| | Houghton's goldenrod<br>(*Solidago houghtonii*) | Threatened | Sandy flats along Great Lakes shores |
| | Lakeside daisy<br>(*Hymenoxys herbacea*) | Threatened | Dry gravelly or sandy thin-soiled fields and alvars with dolomitic or limestone bedrock at or near the surface |
| | Michigan monkey-flower<br>(*Mimulus michiganensis*) | Endangered | Soils saturated with cold flowing spring water; found along seepages, streams and lakeshores |
| | Pitcher's thistle<br>(*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Macomb** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |

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| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| **Manistee** | Indiana bat<br>(*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Piping plover<br>(*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| | Pitcher's thistle<br>(*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Marquette** | Canada lynx<br>(*Lynx canadensis*) | Threatened | A Canada lynx was recently documented in the Upper Peninsula. The counties listed here have the highest potential for Lynx presence. Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft. |
| | Gray wolf<br>*Canis lupus* | Endangered | Northern forested areas |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler<br>(*Setophaga kirtlandii*) | Endangered | Nests in young stands of jack pine |
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |

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| **Mason** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Piping plover (*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Piping plover (*Charadrius melodus*) | Critical Habitat | |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Karner blue butterfly (*Lycaeides melissa samuelis*) | Endangered | Pine barrens and oak savannas on sandy soils and containing wild lupines *(Lupinus perennis)*, the only known food plant of larvae. |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Mecosta** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Karner blue butterfly (*Lycaeides melissa samuelis*) | Endangered | Pine barrens and oak savannas on sandy soils and containing wild lupines *(Lupinus perennis)*, the only known food plant of larvae. |
| **Menominee** | Canada lynx (*Lynx canadensis*) | Threatened | A Canada lynx was recently documented in the Upper Peninsula. The counties listed here have the highest potential for Lynx presence. Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft. |
| | Gray wolf *Canis lupus* | Endangered | Northern forested areas |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |

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| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Hine's emerald dragonfly<br>*(Somatochlora hineana)* | Endangered | Spring fed wetlands, wet meadows and marshes; calcareous streams & associated wetlands overlying dolomite bedrock |
| | Dwarf lake iris<br>(*Iris lacustris*) | Threatened | Partially shaded sandy-gravelly soils on lakeshores |
| **Midland** | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur in large wetland complexes during the Red knot migratory window of MAY 1 - SEPTEMBER 30 |
| **Missaukee** | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga<br>(*Sistrurus catenatus*) | Threatened | |
| **Monroe** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot<br>*(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Karner blue butterfly<br>(*Lycaeides melissa samuelis*) | Endangered | Pine barrens and oak savannas on sandy soils and containing wild lupines *(Lupinus perennis)*, the only known food plant of larvae. |
| | Northern riffleshell<br>(*Epioblasma torulosa rangiana*) | Endangered | Large streams and small rivers in firm sand of riffle areas; also occurs in Lake Erie |
| | Eastern prairie fringed orchid<br>(*Platanthera leucophaea*) | Threatened | Mesic to wet prairies and meadows |

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| **Montcalm** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Karner blue butterfly (*Lycaeides melissa samuelis*) | Endangered | Pine barrens and oak savannas on sandy soils and containing wild lupines *(Lupinus perennis)*, the only known food plant of larvae. |
| **Montmorency** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler (*Setophaga kirtlandii*) | Endangered | Nests in young stands of jack pine |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Hungerford's crawling water beetle (*Brychius hungerfordi)* | Endangered | Cool riffles of clean, slightly alkaline streams; known to occur in five streams in northern Michigan. |
| **Muskegon** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Piping plover (*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Piping plover (*Charadrius melodus*) | Critical Habitat | |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Karner blue butterfly (*Lycaeides melissa samuelis*) | Endangered | Pine barrens and oak savannas on sandy soils and containing wild lupines *(Lupinus perennis)*, the only known food plant of larvae. |

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| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Newaygo** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Karner blue butterfly (*Lycaeides melissa samuelis*) | Endangered | Pine barrens and oak savannas on sandy soils and containing wild lupines *(Lupinus perennis)*, the only known food plant of larvae. |
| **Oakland** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Poweshiek skipperling *(Oarisma poweshiek)* | Endangered<br><br>Critical Habitat | Wet prairie and fens |
| | Rayed Bean Mussel *Villosa fabalis* | Endangered | Clinton River |
| | Snuffbox *Epioblasma triquetra* | Endangered | Small to medium-sized creeks in areas with a swift current and some larger rivers |
| **Oceana** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |

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| | Karner blue butterfly (*Lycaeides melissa samuelis*) | Endangered | Pine barrens and oak savannas on sandy soils and containing wild lupines *(Lupinus perennis)*, the only known food plant of larvae. |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Ogemaw** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler (*Setophaga kirtlandii*) | Endangered | Nests in young stands of jack pine |
| **Ontonagon** | Canada lynx (*Lynx canadensis*) | Threatened | A Canada lynx was recently documented in the Upper Peninsula. The counties listed here have the highest potential for Lynx presence. Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft. |
| | Gray wolf *Canis lupus* | Endangered | Northern forested areas |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| **Osceola** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| **Oscoda** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler (*Setophaga kirtlandii*) | Endangered | Nests in young stands of jack pine |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Hungerford's crawling water beetle (*Brychius hungerfordi)* | Endangered | Cool riffles of clean, slightly alkaline streams; known to occur in five streams in northern Michigan |
| **Otsego** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler (*Setophaga kirtlandii*) | Endangered | Nests in young stands of jack pine |

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| **Ottawa** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Presque Isle** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler (*Setophaga kirtlandii*) | Endangered | Nests in young stands of jack pine |
| | Piping plover (*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |
| | Piping plover (*Charadrius melodus*) | Critical Habitat | |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Hine's emerald dragonfly *(Somatochlora hineana)* | Endangered | Spring fed wetlands, wet meadows and marshes; calcareous streams & associated wetlands overlying dolomite bedrock |
| | Hungerford's crawling water beetle *(Brychius hungerfordi)* | Endangered | Cool riffles of clean, slightly alkaline streams; known to occur in five streams in northern Michigan. |
| | Dwarf lake iris (*Iris lacustris*) | Threatened | Partially shaded sandy-gravelly soils on lakeshores |
| | Houghton's goldenrod (*Solidago houghtonii*) | Threatened | Sandy flats along Great Lakes shores |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Roscommon** | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Kirtland's warbler (*Setophaga kirtlandii*) | Endangered | Nests in young stands of jack pine |

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| **Saginaw** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur in large wetland complexes during the Red knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Eastern prairie fringed orchid (*Platanthera leucophaea*) | Threatened | Mesic to wet prairies and meadows |
| **Sanilac** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Northern riffleshell (*Epioblasma torulosa rangiana*) | Endangered | Large streams and small rivers in firm sand of riffle areas; also occurs in Lake Erie |
| **Schoolcraft** | Canada lynx (*Lynx canadensis*) | Threatened | A Canada lynx was recently documented in the Upper Peninsula. The counties listed here have the highest potential for Lynx presence. Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft. |
| | Gray wolf *Canis lupus* | Endangered | Northern forested areas |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Piping plover (*Charadrius melodus*) | Endangered | Beaches along shorelines of the Great Lakes |

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| | Piping plover (*Charadrius melodus*) | Critical Habitat | |
| | Kirtland's warbler (*Setophaga kirtlandii*) | Endangered | Nests in young stands of jack pine |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Dwarf lake iris (*Iris lacustris*) | Threatened | Partially shaded sandy-gravelly soils on lakeshores |
| | Houghton's goldenrod (*Solidago houghtonii*) | Threatened | Sandy flats along Great Lakes shores |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **St. Clair** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Rayed Bean *Villosa fabalis* | Endangered | Belle, Black, and Pine Rivers |
| | Snuffbox *Epioblasma triquetra* | Endangered | Belle and Pine Rivers |
| | Eastern prairie fringed orchid (*Platanthera leucophaea*) | Threatened | Mesic to wet prairies and meadows |
| **St. Joseph** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Copperbelly water snake *(Nerodia erythrogaster neglecta)* | Threatened | Wooded and permanently wet areas such as oxbows, sloughs, brushy ditches and floodplain woods |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Mitchell's satyr butterfly (*Neonympha mitchellii mitchellii*) | Endangered | Fens; wetlands characterized by calcareous soils which are fed by carbonate-rich water from seeps and springs |

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| | Eastern prairie fringed orchid (*Platanthera leucophaea*) | Threatened | Mesic to wet prairies and meadows |
| **Shiawassee** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur in large wetland complexes during the Red knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| **Tuscola** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern prairie fringed orchid (*Platanthera leucophaea*) | Threatened | Mesic to wet prairies and meadows |
| **Van Buren** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |

| | | | |
|---|---|---|---|
| | Mitchell's satyr butterfly (*Neonympha mitchellii mitchellii*) | Endangered | Fens; wetlands characterized by calcareous soils which are fed by carbonate-rich water from seeps and springs |
| | Pitcher's thistle (*Cirsium pitcheri*) | Threatened | Stabilized dunes and blowout areas |
| **Washtenaw** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Eastern massasauga *Sistrurus catenatus* | Threatened | |
| | Snuffbox *Epioblasma triquetra* | Endangered | Small to medium-sized creeks in areas with a swift current and some larger rivers |
| | Mitchell's satyr butterfly *Neonympha mitchellii mitchellii* | Endangered | Fens; wetlands characterized by calcareous soils which are fed by carbonate-rich water from seeps and springs |
| | Poweshiek skipperling *(Oarisma poweshiek)* | Endangered<br><br>Critical Habitat | Wet prairie and fens |
| | Eastern prairie fringed orchid (*Platanthera leucophaea*) | Threatened | Mesic to wet prairies and meadows |
| **Wayne** | Indiana bat (*Myotis sodalis*) | Endangered | Summer habitat includes small to medium river and stream corridors with well developed riparian woods; woodlots within 1 to 3 miles of small to medium rivers and streams; and upland forests. Caves and mines as hibernacula. |
| | Northern long-eared bat *Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |
| | Rufa Red knot *(Calidris canutus rufa)* | Threatened | Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30 |
| | Eastern massasauga (*Sistrurus catenatus*) | Threatened | |
| | Northern riffleshell (*Epioblasma torulosa rangiana*) | Endangered | Large streams and small rivers in firm sand of riffle areas; also occurs in Lake Erie |
| | Eastern prairie fringed orchid (*Platanthera leucophaea*) | Threatened | Mesic to wet prairies and meadows |

| | | | |
|---|---|---|---|
| **Wexford** | Northern long-eared bat<br>*Myotis septentrionalis* | Threatened | Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer. |

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
WASHINGTON, D.C. 20460

**OFFICE OF CHEMICAL SAFETY AND POLLUTION PREVENTION**

**MEMORANDUM**

**Date:** 13-MAR-2012

**SUBJECT:** **Chlorothalonil.** Human-Health Assessment Scoping Document in Support of Registration Review.

**PC Code:** 081901
**Decision No.:** 455504
**Petition No.:** N/A
**Risk Assessment Type:** N/A
**TXR No.:** N/A
**MRID No.:** N/A

**DP Barcode:** D394659
**Registration No.:** N/A
**Regulatory Action:** Registration Review Scoping Document
**Case No.:** 97
**CAS No.:** 1897-45-6
**40 CFR:** §180.275

**FROM:** George F. Kramer, Ph.D., Senior Chemist
Kelly M. Lowe, Environmental Scientist
Chester E. Rodriguez, Ph.D., Pharmacologist
Risk Assessment Branch 1 (RAB1)
Health Effects Division (HED, 7509P)
Office of Pesticide Programs (OPP)

And

Timothy C. Dole, CIH, Industrial Hygienist
Risk Assessment and Science Support Branch 1 (RASSB)
Antimicrobials Division (AD)/OPP (7510P)

**THROUGH:** Dana M. Vogel, Branch Chief
RAB1/HED/OPP (7509P)

**TO:** José Gayoso, Chemical Review Manager
Pesticide Re-Evaluation Division (PRD)/OPP (7508P)

## Executive Summary

Introduction and Background

Chlorothalonil (2,4,5,6-tetrachloro-1,3-benzenedicarbonitrile) is a broad-spectrum, non-systemic protectant pesticide mainly used as a fungicide to control fungal foliar diseases of vegetable, field, and ornamental crops. It is also used as a wood protectant, anti-mold and anti-mildew agent, bactericide, microbiocide, algaecide, insecticide, and acaricide. Residential uses include golf courses, use on home gardens, use as a wood preservative, and use in paint formulations. Chlorothalonil-containing products are sold under the names Bravo, Echo, Daconil, Tuffguard, Busan 1192, Antiblu, and Densil. Since the Chlorothalonil Reregistration Eligibility Decision

(RED) was completed in 1999, the following commodities have been assessed and registered: edible-podded peas, ginseng, horseradish, lentil, lupin, okra, persimmon, rhubarb, yam, *Brassica* head and stem subgroup (5A), cucurbit vegetable group (9), fruiting vegetable group (8). The most recent human-health risk assessment for chlorothalonil was completed in 2010 (Memo, G. Kramer *et al.*, 12/23/10, D370486) in conjunction with a registration request for use on low-growing berry subgroup 13-07G, bushberry subgroup 13-07B, bulb onion subgroup 3-07A, and green onion subgroup 3-07B. HED and AD have evaluated the status of the human-health assessments for chlorothalonil to determine whether sufficient data are available and whether any updates are needed to support Registration Review. HED and AD have considered the most recent human-health risk assessments for chlorothalonil with respect to its toxicity, exposure, and usage databases, and the most updated Agency science policy and risk assessment methodologies to determine the scope of work necessary to support Registration Review.

Toxicology

The oral and inhalation routes of exposure are of the most toxicological concern with chlorothalonil. Based on acute toxicity studies, chlorothalonil is highly toxic via the inhalation route of exposure (Category I). There was a high level of lethality reported in the critical acute inhalation toxicity study ($LC_{50}$ = 0.032 [M] and 0.013 [F] mg/L). RAB1, in conjunction with the HED Science Advisory Council for Toxicology (ToxSAC), believes that using any oral endpoint may underestimate risk via the inhalation route. The decision was based on the low fraction of the administered dose that was absorbed through the oral route (estimated at 14-20%), which may underestimate toxicity at a higher absorbed fraction (bioavailability) through the inhalation pathway. The lack of a no-observed adverse-effect level (NOAEL) in several acute inhalation toxicity studies carried out with technical-grade chlorothalonil or end-use product formulations is also a concern. Clinical signs consistent with respiratory-tract irritation (i.e., portal-of-entry effects) including nasal discharge, gasping, decreased activity, ptosis, and lethargy, were reported at all exposure concentrations tested across several acute inhalation toxicity studies for chlorothalonil. The effects of short- and intermediate-term inhalation exposures (portal-of-entry or systemic) have not been studied. In the absence of such information, HED recommends that the lowest-observed adverse-effect level (LOAEL) from the critical acute inhalation toxicity study with appropriate uncertainty factors (UFs) be used as the point of departure (POD) to assess inhalation risks (acute, short-, and intermediate-term). At this LOAEL, there were no deaths (male or female) and the very slight to slight (severity) clinical signs of respiratory distress resolved after two days post-exposure. The use of this LOAEL that is based on mild portal-of-entry effects is likely to be protective against any systemic toxicity through the inhalation route of exposure. If the registrant submits a subchronic inhalation study, with a subset of animals designed to identify the NOAEL for acute inhalation toxicity (i.e., after one day of exposure), then the current UFs may be reduced accordingly. Therefore, HED believes that the submission of a 90-day inhalation study (with acute toxicity measurements) is needed to refine the current residential risk assessments. Based on the lack of incident data related to inhalation effects and the fact that an acute inhalation toxicity study is being used to assess short- and intermediate-term risk, the risk assessment can be characterized as conservative.

Chlorothalonil exhibited low acute oral toxicity (Category IV), but in long-term (subchronic and chronic) oral dietary studies with rodents, chlorothalonil caused epithelial hyperplasia and hyperkeratosis at the limiting ridge and/or non-glandular region of the stomach. There were also kidney effects that included weight increase (relative and absolute), dilation of renal medullary tubules, pelvic dilation, tubular cysts, and tubular degeneration. In subchronic dietary studies with dogs, the reported effects included infiltration of inflammatory cells in the liver of both

sexes and decreased body-weight gains in males. The effects in a chronic dietary study with dogs included decreased body-weight gain and food consumption, macroscopic and microscopic pathological findings in the stomach that included thickened appearance and intra-epithelial nuclear pyknosis in the mucosal epithelium of the antrum, and a very slight cell hypertrophy in the zona fasciculata of the adrenal glands.

No specific malformations, or increase in malformations or reproductive effects attributable to administration of chlorothalonil were observed. In the 2-generation reproductive toxicity study, both parental animals and offspring exhibited pathological effects involving the stomach consisting of thickened and/or roughening of the forestomach with depressions in the epithelial aspect, and hyperplasia and hyperkeratosis of the non-glandular epithelium of the stomach. Based on overall weight-of-evidence, there is no evidence of increased susceptibility to offspring following *in utero* exposure to rats or rabbits in developmental toxicity studies or following pre/post-natal exposure in the reproductive toxicity studies in rats.

Chlorothalonil exhibited low acute toxicity via the dermal route of exposure (Category IV) and only caused moderate skin irritation (Category III). In longer-term dermal toxicity studies, the reported effects were local involving skin irritation (erythema) in the absence of any systemic toxicity. In the previous risk assessment, chlorothalonil was classified as not being a dermal sensitizer. However, a published literature study in mice and guinea pig ranks chlorothalonil as an extremely potent contact allergen, inducing sensitization using only topical exposures on intact skin. The data from this study will be evaluated in the registration review of chlorothalonil.

No appropriate acute endpoint was identified in the hazard database to quantitate the risk to the general population or to females 13-50 years old from single-dose oral administration of chlorothalonil. Therefore, there is no acute reference dose (aRfD) or acute population-adjusted dose (aPAD).

The chronic RfD (cRfD) is established based on the LOAEL from a chronic toxicity study in the rat. The LOAEL of 4.0 mg/kg/day is based on the increased incidence and severity of epithelial hyperplasia in the renal proximal convoluted tubules of female rats. The NOAEL is 2.0 mg/kg/day. This NOAEL is lower than any NOAEL in the database based on kidney effects. Although lower NOAELs/LOAELs were observed for gastrointestinal irritation in rodents, HED's Hazard Assessment and Policy Committee (HASPOC) determined that the forestomach lesions in rodent species should not be used for risk assessment due to the lack of a human forestomach counterpart.

Overall, there was no clear evidence that chlorothalonil was mutagenic. The Scientific Advisory Panel (SAP) concluded that the forestomach tumors chlorothalonil produced in rodents involved sustained cytotoxicity and regenerative cell proliferation as the mode of action and that a margin-of-exposure (MOE) approach would be appropriate. Quantification of excess lifetime cancer risk using a linear approach is, therefore, not required.

Quantification of dermal risk (all exposure scenarios) is not required since there is no systemic toxicity in a dermal toxicity study in rats at doses up to 600 mg/kg/day and the level of concern (LOC) for developmental toxicity and/or neurotoxicity is low.

Short- and intermediate-term incidental oral endpoints are based on kidney toxicity observed in the 90-day oral mouse study with a NOAEL of 41.3 mg/kg/day. A target MOE of 100 is

considered adequate for short and intermediate-term incidental oral and inhalation exposure.

After evaluating the toxicological database, HED identified the following factors supporting reduction of the Food Quality Protection Act (FQPA) Safety Factor (SF) from 10X to 1X for oral exposure assessments: 1) there are no significant data gaps in the hazard and exposure databases, 2) there are low concerns for pre- and/or postnatal toxicity, 3) there are no residual uncertainties with regard to pre- and/or postnatal toxicity, 4) the LOC for neurotoxicity is low, 5) there are no residual uncertainties in the exposure database, and 6) there was no evidence of immunotoxicity in the database. However, the chlorothalonil risk assessment team recommends setting the FQPA SF at 3X for acute and 30X for repeated residential inhalation exposure scenarios based on the lack of an inhalation study of appropriate duration to assess repeated exposures. There are only acute inhalation studies available for chlorothalonil. Its classification for acute inhalation toxicity is Category I (combined $LC_{50}$ = 0.020 mg/L). The non-lethal effects reported in acute studies even at the lowest concentration tested (i.e., no NOAEL attained) consist of clinical signs indicative of respiratory-tract effects including nasal discharge, gasping/difficulty breathing, decreased activity/lethargy, respiratory rales/gurgle, ptosis, and piloerection. The effects of short- and intermediate-term inhalation exposures (portal-of-entry or systemic) have not been studied and justify retaining the FQPA SF at 10X for repeated exposure scenarios. Since there is no NOAEL available for any of the available acute inhalation studies, but the reported portal-of-entry effects were relatively mild at the LOAEL for the critical study, an additional 3X factor should be added to all exposure scenarios, resulting in an overall FQPA SF of 3X and 30X for acute and repeated inhalation exposures, respectively. Since the UFs applied to residential inhalation exposure assessment are related to uncertainty in the hazard database, the same factors are applied to the occupational assessment of inhalation exposure.

Dietary Exposure

The most recent dietary-exposure assessment was performed in conjunction with the December 2010 human-health risk assessment conducted by HED in conjunction with a registration request for use on low-growing berry subgroup 13-07G; bushberry subgroup 13-07B; onion, bulb subgroup 3-07A; and onion, green subgroup 3-07B (D370486, G. Kramer, *et al.*; 23-DEC-2010). HED was unable to make a safety finding due to inhalation risks and the proposed uses were subsequently withdrawn. An acute dietary-exposure assessment was not performed because no appropriate endpoint was available to determine the aRfD for the general population or any population subgroup. A partially refined chronic dietary-exposure assessment was performed using 100% crop treated (CT) for all crops; tolerance-level residues, and the Dietary Exposure Evaluation Model software with the Food Commodity Intake Database (DEEM-FCID™) 7.81 default processing factors for all foods except for tomatoes (average field-trial residues and empirical processing factors used), peppers (average field-trial residues used), orange juice (empirical processing factor translated from tomato juice), and snap beans (average field-trial residues used). Dietary risk estimates were determined considering exposures from food plus drinking water using estimated drinking water concentrations (EDWCs) for surface water sources provided by the Environmental Fate and Effects Division (EFED).

The resulting chronic dietary risk estimates for food and drinking water combined are below HED's LOC [i.e., <100% of the chronic population-adjusted dose (cPAD) of 0.02 mg/kg bw/day] for the overall U.S. population and all population subgroups. Using DEEM-FCID™, dietary risk is estimated at 41% of the cPAD for the U.S. population and 98% of the cPAD for children 1-2 years old, the population subgroup with the highest estimated chronic dietary exposure to chlorothalonil. Dietary cancer risk concerns due to long-term consumption of

chlorothalonil residues are adequately addressed by the chronic exposure analysis using the cPAD.

Residue Chemistry and Tolerances

The residue chemistry database is sufficient to support the current registrations. The following data requirement remains outstanding: multiresidue method recovery data for the 4-hydroxy metabolite.

The U.S., Canadian, and Codex tolerances/maximum residue limits (MRLs) for residues of chlorothalonil are generally not harmonized. For plant commodities, the U.S. and Canadian residue definitions are harmonized; however, the Codex residue definition is not harmonized, as it does not include the 4-hydroxy metabolite. The U.S. and Codex residue definitions for livestock commodities are harmonized and the U.S. and Codex have established MRLs for residues in cattle, goats, hogs, horses, and sheep commodities at different levels. Canadian MRLs are not established for residues in livestock commodities.

Residential Exposure

There is sufficient information available to assess residential exposure and risk from the conventional uses. The residential assessments that have been performed by HED are reflective of the currently registered residential uses, except for the use on home gardens. In the most recent risk assessment, **inhalation risk concerns for the short-/intermediate-term exposure durations were identified for residential handlers using treated paint, post-application exposure from inhaling vapors from treated paint, and for bystander volatilization inhalation exposure.** As noted above, there is no inhalation study of appropriate length available to assess short- and intermediate-term exposures, therefore, HED relied upon an acute study (in which no NOAEL was achieved) to assess short- and intermediate-term exposure. HED believes that the submission of a 90-day inhalation study (with acute toxicity measurements) is needed to refine the current residential risk assessments. Based on the lack of incident data related to inhalation effects and the fact that an acute inhalation toxicity study is being used to assess short- and intermediate-term risk, the risk assessment can be characterized as conservative.

Assessments may need to be conducted of the registered home garden uses. HED has revised its Residential Standard Operating Procedures (SOPs), including those used to determine exposure associated with treated paints/stains and home gardens. HED will incorporate new guidance from the updated SOPs to refine exposure estimates, as appropriate. In addition, in the most recent risk assessment, the Agency requested additional inhalation toxicity data that may affect the inhalation POD chosen for chlorothalonil. If changes are made, exposure scenarios may need to be reassessed.

With regard to the antimicrobial uses, there is potential for dermal and incidental oral exposure to pressure-treated wood that is used in residential structures such as porches and steps. These exposures were not assessed in the RED; therefore, they may need to be assessed during registration review. It will also be necessary to reassess the paint uses and determine if the precautionary labeling strategy required by the RED is still valid or if paints containing chlorothalonil should have labeling that can only be accomplished by having separate registrations for each paint product.

Occupational Exposures

There is sufficient information available to assess occupational handler and post-application exposure and risk for the conventional uses. In the most recent risk assessment, **inhalation risk concerns for occupational handlers were identified for both acute and short-/intermediate-term exposures.** As noted above, there is no inhalation study of appropriate length available to assess short- and intermediate-term exposures, therefore, HED relied upon an acute study (in which no NOAEL was achieved) to assess short- and intermediate-term exposure. HED believes that the submission of a 90-day inhalation study (with acute toxicity measurements) is needed to refine the current occupational risk assessments. Based on the lack of incident data related to inhalation effects and the fact that an acute inhalation toxicity study is being used to assess short- and intermediate-term risk, the risk assessment can be characterized as conservative.

Occupational handler scenarios may need to be reassessed during Registration Review to account for scenarios that have not been covered previously, updated exposure data, and changes to the toxicological PODs. In the most recent risk assessment, the Agency requested additional inhalation toxicity data that may affect the inhalation POD chosen for chlorothalonil. If changes are made, then exposure scenarios may need to be reassessed. During Registration Review, a review of the restricted-entry intervals (REIs) listed on the labels and the associated label language will need to be checked for consistency across products. A review of the labels will also need to be done to ensure all labels with registered turf uses include a statement prohibiting use on home lawns and other residential turf sites as required by the RED. In addition, a check of the ornamental label co-formulated with propamocarb will need to be done to ensure the revisions have been made regarding maximum allowable application rates.

With respect to the antimicrobial uses, the occupational handler exposures that occur from the use of chlorothalonil for material preservation were assessed in the RED; however, these assessments may also have to be repeated during registration review to account for changes in the toxicological PODs. In particular, the handler exposures from the open pouring of wettable powder will have to be reassessed because the antimicrobial wettable powder products are not packaged in water-soluble packaging as required by the RED. In addition, exposures that occur from the use of chlorothalonil as a wood preservative may have to be assessed because they were not assessed previously. These exposures can occur during both dip and spray treatments (i.e., sapstain treatment) and during pressure treatment.

**Data Needs and Risk Assessment Updates Required:**

**Toxicology:**

- The toxicity endpoint/dose selection along with the FQPA SF may need to be re-evaluated according to current policy.
- The following studies are required as specified in the revised 40 CFR Part 158:
  - Guideline 870.3465 90-day inhalation study (rat)
  - Guideline 870.7800 immunotoxicity, and
  - Guideline 870.6200 acute neurotoxicity.

**Residue Chemistry:**

- Guideline 860.1360 Multiresidue method recovery data for the 4-hydroxy metabolite.

- The tolerance expression for chlorothalonil residues needs to be updated to reflect current Agency policy under 40 CFR §180.275(a)(1): "Tolerances are established for residues of

chlorothalonil, including its metabolites and degradates, in or on the commodities in the table below. Compliance with the tolerance levels specified below is to be determined by measuring only chlorothalonil (2,4,5,6-tetrachloro-1,3-benzenedicarbonitrile) and its metabolite 4-hydroxy-2,5,6-trichloro-1,3-benzenedicarbonitrile, calculated as the stoichiometric equivalent of chlorothalonil, in or on the commodity," and under 40 CFR §180.275(a)(2): "Tolerances are established for residues of chlorothalonil, including its metabolites and degradates, in or on the commodities in the table below. Compliance with the tolerance levels specified below is to be determined by measuring only 4-hydroxy-2,5,6-trichloro-1,3-benzenedicarbonitrile in or on the commodity."

**Dietary Exposure:**

- A new dietary exposure and risk assessment may be conducted if there are changes to the chlorothalonil toxicological PODs and EDWCs.

**Occupational/Residential Exposure:**

- A revised occupational/residential exposure and risk assessment is required.

- The following studies are required for occupational/residential exposure assessment:
  - Guideline 875.1400 Indoor Exposure, Inhalation
  - Guideline 875.1600 Applicator Exposure Monitoring Data Reporting
  - Guideline 875.1700 Product Use Information
  - Guideline 875.2300 Surface Residue Dissipation

## 1.0 Introduction

Chlorothalonil (2,4,5,6-tetrachloro-1,3-benzenedicarbonitrile) is a broad-spectrum, non-systemic protectant pesticide mainly used as a fungicide to control fungal foliar diseases of vegetable, field, and ornamental crops. It is also used as a wood protectant, anti-mold and anti-mildew agent, bactericide, microbiocide, algaecide, insecticide, and acaricide. Residential uses include golf courses, wood preservatives, and use in paint formulations. Chlorothalonil-containing products are sold under the names Bravo, Echo, Daconil, Tuffguard, Busan 1192, Antiblu, and Densil. Since the Chlorothalonil RED was completed in 1999, the following commodities have been assessed and registered: edible-podded peas, ginseng, horseradish, lentil, lupin, okra, persimmon, rhubarb, yam, *Brassica* head and stem subgroup (5A), cucurbit vegetable group (9), fruiting vegetable group (8). The most recent human-health risk assessment for chlorothalonil was completed in 2010 (Memo, G. Kramer *et al.*, 12/23/10, D370486) in conjunction with a registration request for use on low-growing berry subgroup 13-07G, bushberry subgroup 13-07B, bulb onion subgroup 3-07A, and green onion subgroup 3-07B. This petition was withdrawn when HED was unable to make a safety finding.

## 2.0 Hazard Identification/Toxicology

Chlorothalonil is a broad-spectrum, non-systemic protectant pesticide mainly used as a fungicide to control fungal foliar diseases of vegetable fields and ornamental crops. Its postulated mechanism of action as an antifungal agent involves disruption of sulfur-dependent enzymes that mediate energy production in the fungal organism. Its primary mode of action in mammals via the oral route of administration is similar in that it involves sulfur-dependent reactivity but differs in that nephrotoxic cysteine S-conjugates are generated through a bioactivation process in

the kidney.

In metabolism/pharmacokinetic studies, chlorothalonil at a dose of 1.5 mg/kg was rapidly absorbed via the oral route, reaching peak levels at 2-4 and 6 hours in the rat and dog, respectively. The fraction absorbed in the rat was estimated at 23% at 1.5 mg/kg bw and about 14% at 50 mg/kg bw. The plasma half-life of radiolabeled chlorothalonil in the rat at 1.5 mg/kg was longer in females (57.2 h) than in males (44.1 h), while being longest in the dog (74.2 h) at the same dose. At 50 mg/kg, peak levels of chlorothalonil in the rat were observed at 12 hours and, along with changes in maximum plasma concentration and area under the plasma concentration-time curve, suggest changes in absorption (rate and extent) at this higher dose. The majority of the radioactivity was recovered in the feces. Radioactivity did not appear to be retained significantly by any specific tissue, although it was detected in the kidneys at both doses at 120 hours post-dose. The metabolite profiles of the urine, bile, and tissue extracts show differences in the presence and proportions of the metabolites present, most notably the presence of mercapturic acid-containing moieties in the rat that were not detected in the dog.

The oral and inhalation routes of exposure are of the most toxicological concern with chlorothalonil. Based on acute toxicity studies, chlorothalonil is highly toxic via the inhalation route of exposure (Category I). There was a high level of lethality reported in the critical acute inhalation toxicity study ($LC_{50}$ = 0.032 [M] and 0.013 [F] mg/L). RAB1, in conjunction with the HED ToxSAC, believes that using any oral endpoint may underestimate risk via the inhalation route. The decision was based on the low fraction of the administered dose that was absorbed through the oral route (estimated at 14-20%), which may underestimate toxicity at a higher absorbed fraction (bioavailability) through the inhalation pathway. The lack of a NOAEL in several acute inhalation toxicity studies carried out with technical-grade chlorothalonil or end-use product formulations is also a concern. Clinical signs consistent with respiratory-tract irritation (i.e., portal-of-entry effects) including nasal discharge, gasping, decreased activity, ptosis, and lethargy, were reported at all exposure concentrations tested across the available acute inhalation toxicity studies for chlorothalonil. The effects of short- and intermediate-term inhalation exposures (portal-of-entry or systemic) have not been studied. In the last risk assessment (G. Kramer, 12/23/10; D370486), a 90-day inhalation study was requested as condition for registration. No new inhalation studies have been submitted to the Agency and a 90-day inhalation study represents a pending data requirement. However, the registrants are working with the Agency to clarify the data needed to fulfill this data gap.

In the absence of such information, HED recommends that the LOAEL from the critical acute inhalation toxicity study with appropriate UFs be used as the POD to assess inhalation risks (acute, short-, and intermediate-term). At this LOAEL, there were no deaths (male or female) and the very slight to slight (severity) clinical signs of respiratory distress resolved after two days post-exposure. The use of this LOAEL that is based on mild portal-of-entry effects is likely to be protective against any systemic toxicity through the inhalation route of exposure. The methods and dosimetry equations described in EPA's RfC guidance (1994) were used for calculating human-equivalent concentrations (HECs) based on an inhalation toxicity LOAEL for use in MOE calculations. The regional deposited-dose ratio (RDDR), which accounts for the particulate diameter (mass median aerodynamic diameter [MMAD] and geometric standard deviation [$\sigma_g$] of aerosols), can be used to estimate the different dose fractions deposited along the respiratory tract. The RDDR is also based on interspecies differences in ventilation and respiratory-tract surface areas. Thus, the RDDR can be used to adjust an observed inhalation particulate exposure of an animal to the predicted inhalation exposure for a human. For the aerosolized chlorothalonil used in the critical acute inhalation toxicity study (Holbert, 1993), an

RDDR was estimated at 1.29 based on the reported MMAD of 2.35 μm and $\sigma_g$ of 5.80 and the entire respiratory-tract surface area of the rat relative to the human. The details of these calculations are listed in the last risk assessment (G. Kramer, 12/23/10; D370486).

Chlorothalonil exhibited low acute oral toxicity (Category IV), but in long-term (subchronic and chronic) oral dietary studies with rodents, chlorothalonil caused epithelial hyperplasia and hyperkeratosis at the limiting ridge and/or non-glandular region of the stomach. However, effects related to forestomach irritation (i.e., hyperplasia and hyperkeratosis of the non-glandular area of the stomach) are not considered relevant for human health risk assessment due to the lack of a human forestomach counterpart (HED Cancer Assessment Review Committee (CARC)-HASPOC meeting in 2008). There were also kidney effects that are relevant for human-health risk assessment including weight increase (relative and absolute), dilation of renal medullary tubules, pelvic dilation, tubular cysts, and tubular degeneration. In subchronic dietary studies with dogs, reported effects included infiltration of inflammatory cells in the liver of both sexes and decreased body-weight gains in males. The effects in a chronic dietary study with dogs included decreased body-weight gain and food consumption, macroscopic and microscopic pathological findings in the stomach that included thickened appearance and intra-epithelial nuclear pyknosis in the mucosal epithelium of the antrum, and a very slight cell hypertrophy in the zona fasciculata of the adrenal glands.

In one of two rabbit developmental toxicity studies, there was an increased incidence of thirteen ribs and reduced sternebrae that represented a small (2x) quantitative difference in susceptibility between fetal and maternal effect levels. However, the difference is often observed in the particular strain of rabbit used and was not observed in another rabbit developmental study carried out in the same strain of rabbit and at the same doses of chlorothalonil. In one of two rat prenatal developmental toxicity studies, an increase in total resorptions per dam with a related increase in post-implantation loss was reported at a very high dose (400 mg/kg bw/day) in the presence of maternal toxicity (i.e., clinical signs of toxicity, decreases in body-weight gain, and food consumption). Similar findings were reported in a recently published mouse prenatal developmental toxicity study where very high doses of chlorothalonil (400-600 mg/kg bw/day) significantly affected the number of live fetuses, were associated with early resorptions, and caused fetal weight deficits, all in the presence of maternal toxicity (Faraq, *et al.*; 2006). In the 2-generation reproductive toxicity study, both parental animals and offspring exhibited pathological effects involving the forestomach that are not considered relevant for human health risk assessment. Based on the overall weight-of-evidence, there is no evidence of increased susceptibility to offspring following *in utero* exposure to rats or rabbits in developmental toxicity studies or following pre/post-natal exposure in the reproductive toxicity studies in rats. The developmental effects reported in the rat and mouse prenatal developmental toxicity studies only occur in the presence of severe maternal toxicity and only at high maternal doses.

The results of a subchronic neurotoxicity study with chlorothalonil did not reveal any signs of neurotoxicity, only body weight and food consumption deficits were reported. There is no acute neurotoxicity (ACN) study available for chlorothalonil. The Agency denied a waiver request for the ACN study requirement on the basis that the highest dose evaluated in that study was several orders of magnitude lower than the recommended limit dose without any dose-selection rationale provided. Moreover, several clinical observations in the $LD_{50}$ studies are indicative of potential neurotoxicity, including ataxia, ptosis, decreased muscle tone, tremors, and nervousness. Neurotoxicity in the absence of lethality is more likely to be captured by an acute neurotoxicity study consisting of a robust functional-observational battery and motor-activity measurements. More details of the evaluation of the waiver by the Agency are provided in the 2010 risk

assessment (G. Kramer, 12/23/10; D370486)

Chlorothalonil has been classified as a "likely" human carcinogen by all routes of exposure based on an increased incidence of renal adenomas and carcinomas observed in both sexes of rats and mice. The mechanistic data, including the negative findings of all genetic toxicology testing, supported a non-neoplastic pathology as directly related to the eventual neoplasia and a non-linear mode of action for tumor production by chlorothalonil.

Chlorothalonil exhibited low acute toxicity via the dermal route of exposure (Category IV) and only caused moderate skin irritation (Category III). In longer-term dermal toxicity studies, the reported effects were local involving skin irritation (erythema) in the absence of any systemic toxicity. In the previous risk assessment (G. Kramer, 12/23/10; D370486), chlorothalonil was classified as not being a dermal sensitizer. However, a published literature study in mice and guinea pig ranks chlorothalonil as an extremely potent contact allergen, inducing sensitization through topical exposures on intact skin (Boman *et al.*, 2000). The data from this study will be evaluated during registration review of chlorothalonil.

In the last risk assessment (G. Kramer, 12/23/10; D370486), there was no acute endpoint identified in the hazard database to quantitate the risk to the general population or to females 13-50 years old from single-dose oral administration of chlorothalonil. The cRfD and incidental oral endpoints (short- and intermediate-term) were based on kidney effects from rat chronic and subchronic studies, respectively. Dermal risk assessment (all exposure scenarios) was not performed based on the lack of systemic effects in rat dermal toxicity study in rats and the LOC for developmental toxicity and/or neurotoxicity being low. For inhalation exposure scenarios, an acute inhalation study was used with a composite FQPA SF of 30x applied to short- and intermediate-term residential inhalation exposures on the basis that there was no inhalation study of appropriate duration (only acute studies are available) available for assessing risk from repeated inhalation exposures. The composite FQPA SF of 30x was made up of 3x for the use of a minimal LOAEL (no NOAEL achieved) from the acute inhalation study and a 10x factor for the extrapolation of findings of an acute study to longer durations of exposure. Similarly, a composite database UF of 30x was applied to short- and intermediate-term occupational inhalation exposure for the same reasons listed above. Based on the lack of incident data related to inhalation effects, the application of these UFs can be characterized as being conservative. The registrant(s) has consulted the Agency regarding the design of an appropriate inhalation study to be submitted in the future. Once the appropriate inhalation study is submitted and evaluated by the Agency, some, if not all, the applied UFs can be reduced accordingly.

In future risk assessments of chlorothalonil, the FQPA SF may need to be updated based upon submission of pending toxicity studies including inhalation, acute neurotoxicity, and immunotoxicity studies (see below).

**Immunotoxicity**

An immunotoxicity study is required as a part of new data requirements in the 40 CFR Part 158 for conventional pesticide registration. Because the immune system is highly complex, studies not specifically conducted to assess immunotoxic endpoints are inadequate to characterize a pesticide's potential immunotoxicity. While data from hematology, lymphoid organ weights, and histopathology in routine chronic or subchronic toxicity studies may offer useful information on potential immunotoxic effects, these endpoints alone are insufficient to predict immunotoxicity. In the absence of required studies, EPA may use a database UF of up to 10X. An immunotoxicity study on chlorothalonil should be conducted. Once all data have been

received and reviewed, the chlorothalonil Registration Review Team recommends that the PODs and safety factors used for risk assessment purposes be reexamined and a new risk assessment done, if necessary.

**Endocrine Disruption**

As required by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Federal Food, Drug, and Cosmetic Act (FFDCA), EPA reviews numerous studies to assess potential adverse outcomes from exposure to chemicals. Collectively, these studies include acute, subchronic, and chronic toxicity, including assessments of carcinogenicity, neurotoxicity, developmental, reproductive, and general or systemic toxicity. These studies include endpoints that may be susceptible to endocrine influence, including effects on endocrine target organ histopathology, organ weights, estrus cyclicity, sexual maturation, fertility, pregnancy rates, reproductive loss, and sex ratios in offspring. For ecological hazard assessments, EPA evaluates acute tests and chronic studies that assess growth, developmental and reproductive effects in different taxonomic groups. As part of its most recent registration decision, EPA reviewed these data and selected the most sensitive endpoints for relevant risk assessment scenarios from the existing hazard database. However, as required by FFDCA section 408(p), chlorothalonil is subject to the endocrine screening part of the Endocrine Disruptor Screening Program (EDSP).

EPA has developed the EDSP to determine whether certain substances (including pesticide active and other ingredients) may have an effect in humans or wildlife similar to an effect produced by a "naturally occurring estrogen, or other such endocrine effects as the Administrator may designate." The EDSP employs a two-tiered approach to making the statutorily required determinations. Tier 1 consists of a battery of 11 screening assays to identify the potential of a chemical substance to interact with the estrogen, androgen, or thyroid (E, A, or T) hormonal systems. Chemicals that go through Tier 1 screening and are found to have the potential to interact with E, A, or T hormonal systems will proceed to the next stage of the EDSP where EPA will determine which, if any, of the Tier 2 tests are necessary based on the available data. Tier 2 testing is designed to identify any adverse endocrine-related effects caused by the substance, and establish a dose-response relationship between the dose and the E, A, or T effect.

Under FFDCA section 408(p), the Agency must screen all pesticide chemicals. Between October 2009 and February 2010, EPA issued test orders/data call-ins for the first group of 67 chemicals, which contains 58 pesticide active ingredients and 9 inert ingredients. Chlorothalonil was included on that list and has been issued an order to conduct the Tier 1 testing. Once all required Tier 1 and Tier 2 data have been received and reviewed, the endpoints and safety factors used for risk assessment purposes will be examined and a new risk assessment performed if necessary. For further information on the status of the EDSP, the policies and procedures, the list of 67 chemicals, future lists, the test guidelines and the Tier 1 screening battery, please visit our website: http://www.epa.gov/endo/.

**Conclusions**

The current toxicity database for chlorothalonil lacks the following studies according to the conditional and new 40 CFR Part 158 data requirements:

| | |
|---|---|
| 870.3465 | 90-day inhalation study (rat) |
| 870.6200 | Acute neurotoxicity study |
| 870.7800 | Immunotoxicity study |

When the aforementioned studies are submitted, the current toxicity endpoint/dose selection may need to be re-evaluated along with the FQPA SF for future risk assessments.

## 3.0 Residue Chemistry

The qualitative nature of the residue in plants is adequately understood based on acceptable metabolism studies with carrots, celery, lettuce, snap beans, and tomatoes. The residues of concern are chlorothalonil and its 4-hydroxy metabolite, SDS-3701. The qualitative nature of the residue in livestock is adequately understood. The residue of concern in meat and milk is SDS-3701. Chlorothalonil *per se* has been shown to be so unstable in ruminant tissues that it is impractical to establish tolerances that include the parent.

The Pesticide Analytical Manual (PAM) Vol. II lists Method I, a gas chromatography/electron-capture detection (GC/ECD) method, for the enforcement of tolerances for plant commodities. The limit of quantitation (LOQ) is 0.01 ppm for both chlorothalonil and its 4-hydroxy metabolite. Samples of crop commodities from recently submitted field trials were analyzed for residues of chlorothalonil and its metabolite SDS-3701 using modified versions of the previously enforcement method entitled "Residue Analytical Method for the Determination of Chlorothalonil and R182281 in Crops." The lower limit of method validation (LLMV) was 0.01 ppm for each analyte using gas chromatography/mass-selective detector (GC/MSD) analyses.

The FDA PESTDATA database (dated 06/05) indicates that chlorothalonil is completely recovered (>80%) using FDA multiresidue method Sections 302 (Protocol D), 303 (Protocol E), and 304 (Protocol F). The database also contains information for chlorothalonil trichloro impurity (trichloroisophthalonitrile), which is recovered (no quantitative information available) using Sections 302 and 303 but is not recovered using Section 304. The database does not contain any information for the 4-hydroxy metabolite. In the Chlorothalonil Residue Chemistry RED Chapter, the multiresidue method recovery data for chlorothalonil trichloro impurity were incorrectly attributed to the 4-hydroxy metabolite; see DP# 228522, W. Smith. Multiresidue method recovery data for the 4-hydroxy metabolite thus remain outstanding.

Adequate crop field trial data are available to support the established tolerances on crops.

A 28-day ruminant feeding study has been reviewed and accepted by HED. HED recommended for the establishment of tolerances for the 4-hydroxy metabolite (SDS-3701) in meat and milk based on the results of this study. The requirement for a poultry feeding study was waived based on the results of the poultry metabolism study.

Adequate data pertaining to rotational crops are available. In response to an Agency evaluation of confined rotational crop data, the registrant submitted several rotational crop studies. These data indicated that the only residue that was detected in rotated crops was the soil metabolite SDS-46851 (3-carbamyl-2,4,5-trichlorobenzoic acid). Because of the low toxicity of this metabolite, an exemption for the requirement of a tolerance has been established for residues of SDS-46851 as inadvertent residues in rotated crops (40 CFR §180.1110). In addition, the registrant's request to delete rotational crop restrictions from chlorothalonil labels was approved.

**Conclusions**

The qualitative nature of the residue in plants and livestock is adequately understood. The residues of concern are chlorothalonil and its 4-hydroxy metabolite (SDS-3701). The residue chemistry database is sufficient to support the current registrations. The following data requirement remains outstanding: multiresidue method recovery data for the 4-hydroxy metabolite.

## 4.0 Dietary Exposure

The most recent dietary exposure and risk assessment was performed in conjunction with the December 2010 human-health risk assessment conducted by HED (D370486, G. Kramer, *et al.*; 23-DEC-2010). An acute dietary assessment was not performed because no appropriate endpoint was available to determine the aRfD for the general population or any population subgroup. A partially refined chronic dietary exposure and risk assessment was performed using 100% CT for all crops; tolerance-level residues, and DEEM-FCID™ 7.81 default processing factors for all foods except for tomatoes (average field-trial residues and empirical processing factors used), peppers (average field-trial residues used), orange juice (empirical processing factor translated from tomato juice), and snap beans (average field-trial residues used). Dietary risk estimates were determined considering exposures from food plus drinking water using EDWCs for surface water sources provided by EFED. Ground water sources were not included, as the EDWCs for this drinking water source are minimal in comparison to those for surface water.

The resulting chronic dietary risk estimates for food and drinking water combined are below HED's LOC [i.e., <100% of the cPAD of 0.02 mg/kg bw/day] for the overall U.S. population and all population subgroups. Using DEEM-FCID™, dietary risk is estimated at 41% of the cPAD for the U.S. population and 98% of the cPAD for children 1-2 years old, the population subgroup with the highest estimated chronic dietary exposure to chlorothalonil. Dietary cancer risk concerns due to long-term consumption of chlorothalonil residues are adequately addressed by the chronic exposure analysis using the cPAD.

EFED has provided Tier II EDWCs for use in drinking water assessments when chlorothalonil is used according to proposed labeling (Memo, R. Bohaty, 07-MAY-2010; DP# 370488). Because monitoring data are unavailable, estimates of chlorothalonil and the major degradate SDS-3701 concentrations were made only with mathematical models. The models PRZM/EXAMS were used to conduct surface water exposure assessments. EDWCs were generated for the total residues of concern for risk assessment; parent chlorothalonil and the major degradate SDS-3701 (G. Kramer, *et al.*, 12/21/06; DP# 332752). This drinking water assessment (DWA) used revised input parameters to accurately reflect all scientifically available data, follow the most current input parameter guidance, and correct all erroneous values used in the previous DWA (DP# D346321); resulting in significantly lower EDWCs. The highest estimated surface water concentrations were associated with the Georgia onion application scenario. Water residues (surface water EDWC of 0.006 ppm) were incorporated in DEEM-FCID™ into the food categories "water, direct, all sources" and "water, indirect, all sources" for the chronic assessment.

**Conclusions**

The dietary-exposure database is adequate to support the existing registrations. However, a new dietary exposure and risk assessment may be required during Registration Review to incorporate potential changes to the chlorothalonil toxicological PODs and EDWCs.

## 5.0 Residential Exposure

Chlorothalonil is currently registered for use on turfgrass (including golf courses), home gardens, and is formulated into paints (for interior and exterior applications), coatings, adhesives, caulks, sealants, grout and joint compounds, wood stains, wood or wood structure protection treatments

(seasoned, unseasoned), and for mold control. A review was performed of the most recent Label Use Information System (LUIS) report (dated 9/14/11) prepared by the Biological and Economic Analysis Division (BEAD) to determine the current residential registrations, methods of application and maximum application rates for chlorothalonil. A summary of the home garden uses is provided in Table A4.2; the golf course uses are summarized as part of the occupational use summary in Table A4.1. Table A4.3 provides a summary of the registered paint uses. A summary of the antimicrobial uses is provided in Table A4.3.

Based on the registered uses, there is the potential for residential handler and post-application exposure, including the following: (1) post-application dermal and inhalation exposure from the use on golf courses; (2) handler and post-application dermal and inhalation exposure from the use on home gardens; (3) handler and post-application dermal and inhalation exposure from the use in treated paints. In the most recent risk assessment, exposures were assessed for residential handlers using treated paint, post-application exposure from inhaling vapors from treated paint, incidental ingestion of treated paint chips, and bystander volatilization inhalation exposure from the agricultural uses. The potential for residential post-application dermal exposure from the use on golf courses was identified; however, since no hazard had been identified via the dermal route for chlorothalonil, no quantitative assessment was conducted. Post-application inhalation exposure was also identified as a potential exposure pathway for golfers on treated courses, but the residential bystander assessment was expected to cover those potential exposures.

**Residential Exposure to Paints**

The most recent HED risk assessment (Memo, G. Kramer, 12/23/10, D370486) included an assessment of residential exposures from the use of treated paint, using the most up-to-date toxicological PODs. The residential exposure assessment included inhalation risk estimates for residential handlers using treated paint (Table A5.1), post-application inhalation risk estimates for residents from exposure to treated paint (Table A5.2), post-application incidental oral risk estimates for incidental ingestion of paint chips by children (Table A5.3), and a residential bystander assessment to address potential volatilization of chlorothalonil from treated fields (Table A5.4).

In that assessment, dermal risk was not quantified since no hazard was identified via the dermal route for chlorothalonil. The inhalation endpoint was revised from previous assessments and was based on effects observed in an acute inhalation study. The POD (a LOAEL of 0.002 mg/L) was converted to HECs for use in the exposure assessment for different durations. For acute inhalation exposures, the LOC was 100 (3X for interspecies factor extrapolation; 10X for intraspecies variations; and 3X for lack of NOAEL) and for longer-term durations, another 10x was added to account for the use of an acute duration study for longer-term exposures, making the LOC 1,000. The incidental oral endpoint was also revised from previous assessments and was based on effects in a 90-day oral mouse study, with a LOC of 100.

For residential handlers using treated paint, there were no inhalation risks of concern for the acute exposure duration (all MOEs >LOC of 100), but there were risks of concern for the short-term exposure duration (all MOEs <LOC of 1000). For post-application inhalation exposure, a chemical-specific study (MRID 43600102) was available that measured air concentrations in a room treated with chlorothalonil and the data were used to assess indoor post-application inhalation exposure. Using the available data, there were no risks of concern for acute exposures; however, there may be risks of concern for longer-term durations. There is no inhalation study of appropriate length available to assess short- and intermediate-term exposures, therefore, HED relied upon an acute study (in which no NOAEL was achieved) to assess short-

and intermediate-term exposure. HED believes that the submission of a 90-day inhalation study (with acute toxicity measurements) is needed to refine the current residential risk assessments. Based on the lack of incident data related to inhalation effects and the fact that an acute inhalation toxicity study is being used to assess short- and intermediate-term risk, the risk assessment can be characterized as conservative. An assessment was also conducted for incidental ingestion of paint chips by children. The short-term incidental oral MOE was greater than 100 and, therefore, was not of concern.

AD also assesses dermal irritation for products that have residential uses; however, this assessment was not included in the RED and will be done during registration review. Although not yet reviewed, there is a dermal toxicity study in rats (MRID 00158254) that indicates irritation effects occurred with a LOAEL of 2.5 mg/kg/day, which corresponds to a dose/concentration 2.5 mg/ml or 0.25 percent. This concentration is lower than the rates of 0.5 and 1.0 percent allowed for interior and exterior paints and suggests that dermal irritation risks may be of concern for antimicrobial uses of chlorothalonil only. This study will be formally reviewed during Registration Review and the results will be used to determine whether a quantitative dermal assessment is needed.

**Residential Post-application Exposure to Pressure-Treated Wood**
There is potential for dermal and incidental oral exposure to pressure-treated wood that is used in residential structures such as porches and steps. These exposures were not assessed in the RED; therefore, they may need to be assessed during registration review. There are three products (1022-584, 50534-115, 71581-2) that allow pressure treatment of wood. Product 71581-2 is labeled only for pressure treatment and can be applied to wood used for a variety of structures, including porches and steps. Product 1022-584 can be only applied as a co-ingredient with pressure-treatment solutions containing chromated copper arsenate (CCA) and the wood uses are not specified. Product 71581-2 can be used in a similar manner with the exception that the primary ingredient is not identified.

**Residential Bystander Post-application Inhalation Exposure**
The Agency developed a preliminary bystander volatilization inhalation exposure assessment for chlorothalonil utilizing currently available inhalation toxicity and air monitoring data. The chlorothalonil bystander volatilization inhalation exposure assessment compared the maximum air concentration detected in each of the monitoring studies to the acute HEC for residential bystanders. This comparison was done to represent a potential resident who lives next to a treated field and may be exposed to the peak concentration of chlorothalonil volatilizing off the field over a 24-hour period. In addition, the arithmetic mean chlorothalonil air concentration from each study was compared to the short-/intermediate-term HEC for residential bystanders. This comparison was done to represent a potential seasonal exposure. None of the air concentrations results in acute risks of concern; however, there were a couple of average air concentrations from some sites that resulted in short-/intermediate-term risks of concern.

**Spray Drift**
Spray drift is always a potential source of exposure to residents nearby to spraying operations. This is particularly the case with aerial application, but, to a lesser extent, could also be a potential source of exposure from the ground application method employed for chlorothalonil. The Agency has been working with the Spray Drift Task Force, EPA Regional Offices, and State Lead Agencies for pesticide regulation and other parties to develop the best spray drift management practices (see the Agency's Spray Drift website for more information at http://www.epa.gov/opp00001/factsheets/spraydrift.htm). On a chemical-by-chemical basis, the

Agency is now requiring interim mitigation measures for aerial applications that must be placed on product labels/labeling. The Agency has completed its evaluation of the new database submitted by the Spray Drift Task Force, a membership of U.S. pesticide registrants, and is developing a policy on how to appropriately apply the data and the AgDRIFT® computer model to its risk assessments for pesticides applied by air, orchard airblast and ground hydraulic methods. After the policy is in place, the Agency may impose further refinements in spray-drift-management practices to reduce off-target drift with specific products with significant risks associated with drift.

**Conclusions**

There is sufficient information available to assess residential exposure and risk for all of the residential uses except pressure-treated wood and paint. The residential assessments that have been performed by HED are reflective of the currently registered residential uses, except for the home garden and pressure-treated wood uses. In the most recent risk assessment, **inhalation risk concerns for the short-/intermediate-term exposure durations were identified for residential handlers using treated paint, post-application exposure from inhaling vapors from treated paint, and for bystander volatilization inhalation exposure.** As noted above, there is no inhalation study of appropriate length available to assess short- and intermediate-term exposures, therefore, HED relied upon an acute study (in which no NOAEL was achieved) to assess short- and intermediate-term exposure. HED believes that the submission of a 90-day inhalation study (with acute toxicity measurements) is needed to refine the current residential risk assessments. Based on the lack of incident data related to inhalation effects and the fact that an acute inhalation toxicity study is being used to assess short- and intermediate-term risk, the risk assessment can be characterized as conservative.

Assessments may need to be conducted for the registered home garden, treated paints/stains, and pressure-treated wood uses. HED has revised its Residential SOPs, including those used to determine exposure associated with treated paints/stains and home gardens. Registration review residential risk assessments will incorporate new guidance from the updated SOPs to refine exposure estimates as appropriate. In addition, in the most recent risk assessment, the Agency requested additional inhalation toxicity data that may affect the inhalation POD chosen for chlorothalonil. If changes are made, exposure scenarios may need to be reassessed.

## 6.0 Aggregate-Risk Assessment

The most recent aggregate-risk assessment was performed in conjunction with the December 2010 human-health risk assessment conducted by HED (D370486, G. Kramer, *et al.*; 23-DEC-2010). An acute aggregate-risk assessment was not performed because no appropriate endpoint was available to determine the aRfD for the general population or any population subgroup. A chronic aggregate exposure assessment takes into consideration dietary food + water exposure only. The chronic dietary estimates represent chronic aggregate risk. In aggregating short- and intermediate-term risk, the Agency routinely combines background chronic dietary exposure (food + water) with short- and intermediate-term residential exposure. Because there is no systemic hazard via the dermal route, and since incidental oral exposure from treated paint is considered to be episodic, only inhalation exposures for homeowners applying chlorothalonil products could be included in the short- and intermediate-term aggregate risk assessment. However, as the endpoints for dietary exposure (kidney effects) and residential short-term inhalation exposure (clinical signs) being used for the current assessment are not the same, these exposures cannot be combined.

**Conclusions**

A new aggregate risk assessment may be required during Registration Review to incorporate potential changes to the chlorothalonil toxicological PODs and EDWCs.

## 7.0 Occupational Exposure

Chlorothalonil is used as a fungicide to control fungal diseases of agricultural crops, turf (including non-residential turf, commercial/industrial lawns, sod farms, and golf courses), conifers (including Christmas tree plantations and nurseries), and ornamentals (field- and greenhouse-grown). It is also used as a wood protectant, anti-mold and anti-mildew agent, bactericide, microbiocide, algaecide, insecticide, and acaricide. A review was performed of the most recent LUIS report (dated 9/14/11) prepared by BEAD to determine the current agricultural/commercial registrations, methods of application and maximum application rates for chlorothalonil. A summary of the information provided in the LUIS report is provided in Table A4.1. The current registrations include several Special Local Needs registrations.

**Occupational Handlers**

There is the potential for dermal and inhalation exposure to occupational handlers from the currently registered use pattern of chlorothalonil. In all past risk assessments, no chemical-specific data were available with which to assess potential exposure to pesticide handlers; therefore, occupational handler assessments were based primarily on surrogate unit exposures from the Pesticide Handlers Exposure Database (PHED). Recently, both the Outdoor Residential Exposure Task Force (ORETF) and Agricultural Handler Exposure Task Force (AHETF) have produced pesticide handler exposure monitoring data that the Agency is using in place of PHED[1]. As more-reliable data become available (such as that from the AHETF and ORETF), the Agency will continue to replace existing exposure data. As a result, occupational handler scenarios may need to be revisited during Registration Review. Previous risk calculations were typically based on the maximum application rates and assuming maximum area treated per day or gallons handled. Handler's exposure and risk were calculated at baseline (long pants, a long-sleeved shirt, no chemical-resistant gloves, and no respirator) and with personal protective equipment when necessary (e.g., chemical-resistant gloves, respirators, and engineering controls).

The most recent occupational handler exposure assessment was conducted in December of 2010 (Memo, K. Lowe, 23-DEC-2010; D371456). Numerous occupational handler scenarios have been assessed in the past; however, the toxicological PODs were revised for the most recent risk assessment and, therefore, only the exposure scenarios and resulting risk estimates from that assessment have been included in Table A6.1 of the attachments. As mentioned in the residential exposure section, dermal risk was not quantified in the most recent assessment since no hazard was identified via the dermal route for chlorothalonil and the inhalation assessment was conducted using a HEC calculated from a POD from an acute inhalation study. HED determined that inhalation risks were of concern for both acute exposures (i.e., MOEs were <100) and short-/intermediate-term exposure (i.e., MOEs were <1,000). Even though these risk estimates represent the latest toxicological information, the exposure scenarios may need to be revisited during Registration Review to account for the revised handler surrogate-exposure data now available.

[1] http://www.epa.gov/pesticides/science/handler-exposure-data.html

In a previous risk assessment (D353243), HED had recommended that additional personal-protective equipment (PPE) be added to labels that allowed applications via high-pressure handwands due to risk concerns. At the time, a dust/mist respirator (i.e., a PF5 respirator) was required to reach acceptable MOEs. During Registration Review, this scenario may need to be reassessed taking into account changes in both handler unit exposures and PODs to determine if a respirator is still necessary.

There is one label registered for chlorothalonil for use on ornamentals that is co-formulated with another active ingredient, propamocarb. In the most recent occupational exposure assessment for propamocarb (Memo, K. Lowe, 05-NOV-2009; D368432), a review of this label identified issues with the use directions that allowed for high application rates to be calculated, which resulted in risks of concern for handlers. HED, EFED, and RD recommended revisions to the labeled use directions to clearly indicate the maximum application rates allowable that would not result in worker and/or drinking water risks. Discussions with the registrants are currently on going and during Registration Review, the label will need to be checked to ensure the revised rates do not result in risks of concern for chlorothalonil.

The most recent HED risk assessment did not cover all formulations (i.e., did not assess exposure from the use of dry flowable and wettable powder formulations) and use sites currently registered for chlorothalonil. In addition, as mentioned above, for the scenarios that were assessed, the unit exposures for those scenarios have subsequently been revised. Therefore, representative scenarios that cover the currently registered chlorothalonil uses may need to be assessed during Registration Review to account for changes in exposure data and toxicological PODs.

With respect to the antimicrobial uses, the occupational handler exposures that occur from the use of chlorothalonil for material preservation were assessed in the RED; however, these assessments may also have to be repeated during registration review to account for changes in the toxicological PODs. In particular, the handler exposures from the open pouring of wettable powder will have to be reassessed because the antimicrobial wettable powder products are not packaged in water-soluble packaging as required by the RED. In addition, exposures that occur from the use of chlorothalonil as a wood preservative may have to be assessed because they have not been assessed previously. These exposures can occur during both during dip and spray treatments (i.e., sapstain treatment) and during pressure treatment.

**Occupational Post-Application**

In the case of chlorothalonil, there is a potential for post-application dermal exposure to workers following foliar and dip applications of chlorothalonil to agricultural crops, turf use sites, conifers, and ornamentals (both field and greenhouse grown). Since there is no dermal POD, an assessment of post-application dermal exposure and risk was not conducted and may not need to be conducted if no change is made. Based on the Agency's current practices, a quantitative occupational post-application inhalation exposure assessment was not performed for chlorothalonil at this time. However, a quantitative assessment of residential bystander risk (for individuals in or around treated fields) was done based on available air monitoring data for chlorothalonil. The assessment of bystander risk is expected to be protective of all potential occupational post-application inhalation exposures.

Since there is no dermal endpoint and a quantitative post-application dermal exposure/risk assessment was not conducted for chlorothalonil, the REI would normally be based on the acute toxicity categories of the active ingredient. Chlorothalonil is classified in Acute Toxicity

Category IV for acute dermal toxicity, Toxicity Category III for primary dermal irritation, and Toxicity Category I for acute inhalation toxicity and for primary eye irritation. For chlorothalonil, the REI would be 48 hours based on the Toxicity Category for primary eye irritation. However, the REI for chlorothalonil has been set at 12 hours previously because the available incident data indicate that irritation to worker's eyes can occur beyond the 48-hour REI [see Memo, M. Clock, 1/7/98, *The Revised HED Chapter of the Reregistration Eligibility Decision (RED) Document for Chlorothalonil*]. It was also noted that available residue dissipation data show that residues do not often dissipate significantly within 48 hours of application. In the absence of a model in which to assess reentry exposure to compounds that have adverse eye effects, previous assessments have made recommendations for specific label language/product stewardship in lieu of the interim 48-hour REI imposed by the Worker Protection Standard (WPS). During Registration Review, a review of the REIs listed on the labels and the associated label language will need to be checked for consistency across products.

**Conclusions**

There is sufficient information available to assess occupational handler and post-application exposure and risk, except for wettable powder formulations, wood preservatives, and paints. In the most recent risk assessment, **inhalation risk concerns for occupational handlers were identified for both acute and short-/intermediate-term exposures.** As noted above, there is no inhalation study of appropriate length available to assess short- and intermediate-term exposures, therefore, HED relied upon an acute study (in which no NOAEL was achieved) to assess short- and intermediate-term exposure. HED believes that the submission of a 90-day inhalation study (with acute toxicity measurements) is needed to refine the current occupational risk assessments. Based on the lack of incident data related to inhalation effects and the fact that an acute inhalation toxicity study is being used to assess short- and intermediate-term risk, the risk assessment can be characterized as conservative.

Occupational handler scenarios may need to be reassessed during Registration Review to account for scenarios that have not been covered previously, updated exposure data, and changes to the toxicological PODs. In addition, in the most recent risk assessment, the Agency requested additional inhalation toxicity data that may affect the inhalation POD chosen for chlorothalonil. If changes are made, exposure scenarios may need to be reassessed. During Registration Review, a review of the REIs listed on the labels and the associated label language will need to be checked for consistency across products. A review of the labels will also need to be done to ensure all labels with registered turf uses include a statement prohibiting use on home lawns and other residential turf sites as required by the RED. In addition, a check of the ornamental label co-formulated with propamocarb will need to be done to ensure the revisions have been made regarding maximum allowable application rates.

A review was performed of (1) the data requests from the RED, (2) the available submitted data for chlorothalonil, and (3) the granted data waiver requests. Table A7.1 of the attachments lists all of the submitted studies available for chlorothalonil and Agency reviews of the data. Data waiver requests were submitted and granted in 2006 for the following studies:

- 132-1a -- Foliar residue dissipation
- 133-3 -- Dermal passive dosimetry exposure
- 133-4 -- Inhalation passive dosimetry exposure
- 231 -- Estimated Dermal exposure – outdoors
- 232 -- Estimated Inhalation exposure - indoors

It was determined that additional handler and post-application studies for the conventional uses are not necessary at this point considering the data that have been received in recent years from various task forces (e.g., ORETF, Agricultural Reentry Task Force (ARTF), AHETF). In addition, since there currently are no dermal hazard concerns for the conventional uses of chlorothalonil, additional dislodgeable foliar residue and turf-transferable residue data are not required at this time.

Exposure data are required to assess occupational handler inhalation exposures from certain antimicrobial use scenarios including wood preservation (dip, spray and pressure treatment), open pouring of liquids and wettable powders during material preservation and application of treated paints.

## 8.0 Public Health and Pesticide Epidemiology Data

For this evaluation, the OPP Incident Data System (IDS) was utilized for pesticide incident data on the active ingredient chlorothalonil. Chlorothalonil acts primarily as a fungicide and mildewcide, but also has some activity as a bactericide, microbiocide, algaecide, insecticide, and acaricide. It is a broad-spectrum, non-systemic pesticide. Chlorothalonil is registered on a wide variety of sites including field, vegetable, and orchard crops; turf; and as a mildewcide to be added to paint and other surface treatments. The purpose of the database search is to identify potential patterns in the frequency and severity of the health effects attributed to chlorothalonil exposure. The IDS includes reports of alleged human health incidents from various sources, including mandatory FIFRA Section 6(a)(2) reports from registrants, other federal and state health and environmental agencies, and individual consumers. Since 1992, OPP has compiled these reports in IDS. IDS contains reports from across the U.S. and most incidents have all relevant product information recorded. Reports submitted to the IDS represent anecdotal reports or allegations only, unless otherwise stated in the report.

The Agricultural Health Study (AHS) is a high-quality, prospective epidemiology study evaluating the link between pesticide use and various health outcomes including cancer. The AHS includes private and commercial pesticide applicators and their spouses. The AHS includes information on use of 50 different pesticide active ingredients commonly used in agriculture.

Incidents resulting in higher severity outcomes reported by registrants and incidents reported directly to the Agency by non-registrants are recorded in an IDS module called the Main IDS module. This system stores incident data for death, major and moderate incidents (and some minor or no effects incidents that are reported as unique cases to the Agency), and it includes more details about the location, date and nature of the incident. Main IDS incidents involving only one pesticide are considered to provide more certain information about the potential effects of exposure from the pesticide. When an incident involves more than one pesticide, it is difficult to determine which effects are attributed to the pesticide being considered. The less-severe human incidents (minor, unknown, or no effects outcomes) are reported by registrants as counts called aggregate summaries and are recorded in a separate module called Aggregate IDS.

In Aggregate IDS, which contains exposures classified as minor, unknown, or no effects outcomes, from January 1, 2006 to November 2, 2011, there were 117 reported exposures involving chlorothalonil resulting in low severity. As discussed, there are relatively few details provided on the incidents in the Aggregate IDS module and these incidents are low severity.

For the Main IDS, from January 1, 2006 to November 2, 2011, there are 22 exposures reported for single chemical only in the database (20 exposure classified as resulting in a moderate outcome and 2 classified as major), and 12 additional exposures that involved more than one chemical. During the scoping phase of Registration Review, the higher severity exposures (those resulting in fatal or major outcomes) are considered in more detail. Additionally, as described above, incidents involving one pesticide are typically focused on because they are considered to provide more certain information about the potential effects of the particular pesticide. The higher severity exposures (those resulting in fatal or major outcomes) that involve chlorothalonil are described in Table 1 (two major outcomes).

Currently available research from the AHS does not provide strong evidence in support of an association between chlorothalonil and all cancers combined, or with lung, colorectal, and prostate cancers specifically, the only anatomical cancer sites for which authors were able to measure an association. The authors note that a link between the pesticide and kidney tumors, which have been reported in some animal studies, was not investigated in this study due to limited number of exposed cases to perform a robust statistical analysis. A preliminary study linked chlorothalonil exposure (yes/no) and monoclonal gammopathy of undetermined significance (MGUS), a pre-cursor biomarker of potential multiple myeloma malignancy; however, additional mechanistic and epidemiologic research is needed to clarify the nature of this relationship.

In general, both the Aggregate and Main IDS modules result in relatively high frequency of chlorothalonil exposures. Although most of these exposures resulted in low-severity outcomes, high-severity outcomes did occur. Based on the frequency and severity of incident cases and AHS results, for chlorothalonil, there may be a potential for exposure. These incident data may warrant further analysis in the preliminary risk assessment phase of Registration Review.

**Table 1. Main IDS High-Severity Incidents Involving Chlorothalonil.**

| Chemical: Chlorothalonil | | | PC code: 081901 | Human Incidents | | | |
|---|---|---|---|---|---|---|---|
| Incident Number | Incident Date | Product Name | Reg. Number | City | State | Exposure Type* | Incident Description |
| 017747 - 00505 | 5/30/06 | GARDEN DISEASE CONTROL | 000239-02522 | PLAINFIELD | IL | HB | An unknown age adult female got the product on her arm and shoulder. About 3 weeks later she went to the hospital feeling dizzy and like she was falling to the right. |
| 022933 - 00030 | 10/1/09 | MULTI-PURPOSE FUNGICIDE DACONIL 2787 | 000239-02522 | | CA | HB | A senior (>65 years old) female sprayed her peach tree in fall of 2009 and spring of 2010. She has experienced episodes of high sed rate, low hemoglobin and pain in her hips and legs ever since. |

* Severity Categories

| | | |
|---|---|---|
| H-A | Human Fatality | Death (if the person died) |
| H-B | Human Major | Major (if the person alleged or exhibited symptoms which may have been life-threatening, or resulted in adverse reproductive effects or in residual disability) |
| H-C | Human Moderate | Moderate (if the person alleged or exhibited symptoms more pronounced, more prolonged or of a more systemic nature than minor symptoms; and involved some form of treatment, even though symptoms were not life threatening and the person returned to his/her pre-exposure state of health with no additional residual disability) |
| H-D | Human Minor | Minor (if the person alleged or exhibited some symptoms, but they were minimally traumatic; the symptoms resolved rapidly and usually involve skin, eye or respiratory irritation) |
| H-E | Human Unspecified | Unspecified (if symptoms are unknown, unspecified or are alleged to be of a delayed or chronic nature that may appear in the future) |

| | | |
|---|---|---|
| H | Human | Undetermined (an undetermined severity) |

from 40 CFR § 159.184

## 9.0 Tolerance Assessment and International Harmonization

U.S. permanent tolerances (listed in 40 CFR 180.275) and Canadian and Codex maximum residue limits (MRLs) are summarized in Attachment 8. The U.S., Canadian, and Codex tolerances/MRLs for residues of chlorothalonil are generally not harmonized. For plant commodities, the U.S. and Canadian residue definitions are harmonized; however, the Codex residue definition is not harmonized, as it does not include the 4-hydroxy metabolite. Only tolerances/MRLs for residues in cherries and tomato are harmonized with Canada and Codex. Several tolerances/MRLs for residues in/on various commodities are harmonized with Canada (i.e., asparagus, carrots, celery, lentils, mushroom, parsnips, peaches, peanuts, and cucurbit vegetables), but not with Codex. Two tolerances/MRLs are harmonized with Codex (cranberry, bulb onions), but not with Canada. There are several U.S. tolerances for which there are not Canadian and/or Codex MRLs (e.g., almond, apricot, banana, blueberry, tropical fruits, edible-podded peas, plums, and fruiting vegetables except tomato). Several tolerances/MRLs for residues in/on various commodities are not harmonized between either the U.S., Canada, or Codex (e.g., dry bean seeds, *Brassica* head and stem subgroup, and potatoes). The U.S. and Codex residue definitions for livestock commodities are harmonized and the U.S. and Codex have established MRLs for residues in cattle, goats, hogs, horses, and sheep commodities at different levels. Canadian MRLs are not established for residues in livestock commodities. Codex has established MRLs for residues in barley, currants, gooseberry, grapes, leeks, Chinese onions, welsh onions, parsley, poultry commodities, strawberries, sugar beets, and wheat commodities; however, Canadian and U.S. tolerances/MRLs are not established for residues in these commodities. Mexico adopts U.S. tolerances and/or Codex MRLs for its export purposes.

## 10.0 Environmental Justice

Potential areas of environmental justice concerns, to the extent possible, were considered in the human-health risk assessment, in accordance with U.S. Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," (http://www.hss.energy.gov/nuclearsafety/env/guidance/justice/eo12898.pdf). The OPP typically considers the highest potential exposures from the legal use of a pesticide when conducting human-health risk assessments, including, but not limited to, people who obtain drinking water from sources near agricultural areas, the variability of diets within the U.S., and people who may be exposed when harvesting crops. Should these highest exposures indicate potential risks of concern, OPP further refines the risk assessments to ensure that the risk estimates are based on the best available information.

## 11.0 Human Studies

Past chlorothalonil risk assessments rely in part on data from studies in which adult human subjects were intentionally exposed to a pesticide to determine their dermal and inhalation exposure. Many such studies, involving exposure to many different pesticides, comprise generic pesticide exposure databases such as PHED, the ORETF Database, and the ARTF Database. EPA has reviewed all the studies supporting these multi-pesticide generic exposure databases, and has found no clear and convincing evidence that the conduct of any of them was either

fundamentally unethical or significantly deficient relative to the ethical standards prevailing at the time the research was conducted. All applicable requirements of EPA's Rule for the Protection of Human Subjects of Research (40 CFR Part 26) have been satisfied, and there is no regulatory barrier to continued reliance on these studies.

## 12.0 Data Requirements

**Toxicology:**

- The toxicity endpoint/dose selection along with the FQPA SF may need to be re-evaluated according to current policy.
- The following studies are required as specified in the revised 40 CFR Part 158:
  - Guideline 870.3465 90-day inhalation study (rat)
  - Guideline 870.7800 immunotoxicity, and
  - Guideline 870.6200 acute neurotoxicity.

**Residue Chemistry:**

- Multiresidue method recovery data for the 4-hydroxy metabolite (Guideline 860.1360).

- The tolerance expression for chlorothalonil residues needs to be updated to reflect current Agency policy under 40 CFR §180.275(a)(1): "Tolerances are established for residues of chlorothalonil, including its metabolites and degradates, in or on the commodities in the table below. Compliance with the tolerance levels specified below is to be determined by measuring only chlorothalonil (2,4,5,6-tetrachloro-1,3-benzenedicarbonitrile) and its metabolite 4-hydroxy-2,5,6-trichloro-1,3-benzenedicarbonitrile, calculated as the stoichiometric equivalent of chlorothalonil, in or on the commodity," and under 40 CFR §180.275(a)(2): "Tolerances are established for residues of chlorothalonil, including its metabolites and degradates, in or on the commodities in the table below. Compliance with the tolerance levels specified below is to be determined by measuring only 4-hydroxy-2,5,6-trichloro-1,3-benzenedicarbonitrile in or on the commodity."

**Dietary Exposure:**

- A new dietary exposure and risk assessment may need to be conducted to incorporate potential changes to the chlorothalonil toxicological PODs and EDWCs.

**Occupational/Residential Exposure:**

- A revised occupational/residential exposure and risk assessment is required.

- There are three exposures studies that are needed to assess occupational/residential exposure scenarios. These studies are listed in Table 2.



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| Table 2. Exposure Studies Needed for Chlorothalonil Registration Review. | | |
|---|---|---|
| **Study Needed** | **Guideline** | **Applicable Exposure Scenarios** |
| Inhalation Exposure, Indoor Exposure Monitoring Data Reporting | 875.1400<br>875.1600 | Open-pour liquids during material preservation[A,B]<br>Open-pour wettable powders during material preservation[A,B]<br>Brush/roller application of treated paints[B]<br>Airless sprayer application of treated paints[B]<br>Dip, spray, and pressure treatment of wood[B] |
| Surface Residue Dissipation | 875.2300 | Residential exposure to pressure-treated wood |
| Product Use Information | 875.1700 | A detailed written description is needed of all the antimicrobial uses of chlorothalonil to define and characterize exposure scenarios. |

A. If the labels are amended to require closed mixing/loading, then the exposure study for this scenario can be waived.
B. It may be possible to use proprietary surrogate exposure data if data compensation issues can be addressed.

## 13.0 References

| Table 3. Memoranda Relevant to Registration Review. | | | |
|---|---|---|---|
| Author | Barcode | Date | Title |
| G. Kramer, *et al.* | D370486 | 23-DEC-2010 | **Chlorothalonil.** Registration Request for Use on Low-Growing Berry Subgroup 13-07G; Bushberry Subgroup 13-07B; Onion, Bulb Subgroup 3-07A; and Onion, Green Subgroup 3-07B. **Human-Health Risk Assessment.** |
| G. Kramer | D371455 | 23-DEC-2010 | **Chlorothalonil**: Chronic Dietary (Food and Drinking Water) Exposure and Risk Assessment to Support a Petition For Tolerances on Low-Growing Berry Subgroup 13-07G; Bushberry Subgroup 13-07B; Onion, Bulb Subgroup 3-07A; and Onion, Green Subgroup 3-07B. |
| G. Kramer | D371454 | 23-DEC-2010 | **Chlorothalonil.** Petition For Tolerances Low-Growing Berry Subgroup 13-07G; Bushberry Subgroup 13-07B; Onion, Bulb Subgroup 3-07A; and Onion, Green Subgroup 3-07B. **Summary of Analytical Chemistry and Residue Data.** |
| R. Bohaty | D370488 | 07-MAY-2010 | Drinking Water Assessment for the IR-4 Registration of Chlorothalonil (Bravo Weather Stick®, 54%) and the Degradation Product, 4-Hydroxy-2,5,6-trichloro-1,3-dicyanobenzene (SDS-3701) for the New Uses On: Bulb Vegetables, Bushberries, and Low Growing Berries. |
| G. Kramer, *et al.* | D371946 | 18-FEB-2010 | **Chlorothalonil.** Section 18 Emergency Exemption Registration Request For Use on Oranges in CA. **Human-Health Risk Assessment.** |
| G. Kramer | D370763 | 18-FEB-2010 | **Chlorothalonil.** Request for Conditional Registration Bravo 825® (EPA Reg. No. 50534-201) to Add Uses on Fruiting Vegetables. |
| G. Kramer | D373460 | 18-FEB-2010 | **Chlorothalonil**: Chronic Dietary (Food and Drinking Water) Exposure and Risk Assessment to Support Section 18 Registration Request For Use on Oranges in CA. |
| G. Kramer | D351364 | 01-MAY-2009 | **Chlorothalonil** Technical Fungicide - Review of Residue Chemistry Studies Submitted by Vischim S.R.L. |
| L. Shanaman | D346321 | 02-APR-2008 | Drinking Water Assessment for the IR-4 Registration of Chlorothalonil (Bravo Weather Stick®, 54%) and the Degradation Product, 4-Hydroxy-2,5,6-trichloro-1,3-dicyanobenzene (SDS-3701) for the New Uses on: Fruiting Vegetables, Cucurbit Vegetables, Okra, Persimmon, Horseradish, Rhubarb, Ginseng, Yam, Lupin, Lentils and Brassica Head and Stem Vegetables. |
| G. Kramer | D346319 | 04-SEP-2008 | **Chlorothalonil.** Petition For Tolerances on *Brassica* Head and Stem Subgroup 5A, Cucurbit Vegetable Group 9, |

**Table 3. Memoranda Relevant to Registration Review.**

| Author | Barcode | Date | Title |
|---|---|---|---|
| | | | Fruiting Vegetable Group 8, Ginseng, Horseradish, Lentil, Lupin, Okra, Persimmon, Rhubarb, Yam, Lychee, and Starfruit. **Summary of Analytical Chemistry and Residue Data.** |
| G. Kramer, *et al.* | D353243 | 09-OCT-2008 | **Chlorothalonil.** Petition For Tolerances on *Brassica* Head and Stem Subgroup 5A, Cucurbit Vegetable Group 9, Fruiting Vegetable Group 8, Ginseng, Horseradish, Lentil, Lupin, Okra, Persimmon, Rhubarb, Yam, Lychee, and Starfruit. **Human-Health Risk Assessment.** |
| G. Kramer | D323612 | 03-MAR-2006 | **Chlorothalonil** Technical Fungicide - Review of Residue Chemistry Studies Submitted by Vischim S.R.L. |
| G. Kramer, *et al.* | D337925 | 16-MAR-2007 | #3E6795. **Chlorothalonil**: Updated Revised Risk Assessment for a Tolerance on Edible-Podded Peas Without a U.S. Registration. |
| L. Shanaman | D306584 | 04-AUG-2006 | Further Refined Drinking Water Assessment Characterization for the Me Too Registration of Chlorothalonil and the Degradation Product, 4-Hydroxy-2,5,6-trichloro-1,3-dicyanobenzene (4-Hydroxy-2,5,6-tricloroisophthalonitrile; SDS-3701) in Surface Water. |
| G. Kramer | D332540 | 14-SEP-2006 | **Chlorothalonil**: Preliminary Chronic Dietary Exposure Assessment for a Tolerance on Edible-Podded Peas Without a U.S. Registration. |
| G. Kramer, *et al.* | D332752 | 21-DEC-2006 | PP#3E6795. **Chlorothalonil**: Revised Risk Assessment for a Tolerance on Edible-Podded Peas Without a U.S. Registration. |
| J. Tomerlin | D310791 | 09-FEB-2005 | ARIA Risk Assessment: Chlorothalonil Human Health Exposure and Risk Assessment for a Tolerance Without a Registration in the United States on Edible Podded Peas (including snow peas and sugar snaps). |
| J. Tomerlin | D310791 | 15-DEC-2004 | **Chlorothalonil**: Acute and Chronic Dietary Exposure Assessments for a Tolerance on Edible Podded Peas Without a US Registration |
| L. Rossi | EPA 738-R-99-004 | April 1999 | Chlorothalonil Reregistration Eligibility Decision (RED). |
| W. Smith | D257651 | 12-JUL-1999 | CHLOROTHALONIL REREGISTRATION. Reassessment of Tolerance Exemption for the Soil Metabolite 3-carbamyl-2,4,5-trichlorobenzoic acid (40 CFR §180.1110). |
| M. Clock | | 07-JAN-1998 | The Revised HED Chapter of the Reregistration Eligibility Decision (RED) Document for Chlorothalonil. |
| W. Smith | D232879 | 30-JUN-1997 | Chlorothalonil Reregistration: List A Case No. 0097: Chemical No. 081901: ISK-Bioscience's Submission of Magnitude of the Residues of Chlorothalonil on Sweet Corn. |
| W. Smith | D237223 | 30-JUL-1997 | PP#6F4611. Chlorothalonil. Petition Method Validation Results for the Metabolite SDS-3701. |
| M. Clock | D244490 | 10-JUN-1998 | Chlorothalonil: HED Response to ISK Biosciences February, 1998 Comments on the HED Science Chapter (dated November 25, 1997). |
| S. Knizner | D249046 | 01-SEP-1998 | HED Review of Chlorothalonil RED. |
| M. Clock | | 07-May-1997 | The HED Chapter of the Reregistration Eligibility Decision Document (RED) for Chlorothalonil. |
| W. Smith | D240979 | 23-DEC-1997 | PP#6F4611. Chlorothalonil. Revised Enforcement Method for the Metabolite SDS-3701. |
| W. Smith | D228522 | 10-AUG-1996 | Chlorothalonil: Reregistration Case No. 0097: Chemical No. 08190: Comments from ISK Biosciences on the Chlorothalonil HED RED Chapter. |

**Table 3. Memoranda Relevant to Registration Review.**

| Author | Barcode | Date | Title |
|---|---|---|---|
| W. Smith | D201522 | 13-JUN-1995 | Chlorothalonil: List A Reregistration Case No. 0097: Chemical ID No. 081901: Product and Residue Chemistry Considerations to be Included in the HED Chapter of the Reregistration Eligibility Decision Document. |
| C. Lewis | D217313 | 17-JUL-1995 | Exposure Assessment for Section 18 Use of Chlorothalonil and Propamocarb on Tomatoes. |
| C. Lewis | D220337 | 01-NOV-1995 | Exposure Assessment for Section 18 Use of Chlorothalonil and Propamocarb on Tomatoes in Florida. |
| C. Lewis | D221016 | 29-NOV-1995 | Exposure Assessment for Section 18 Use of Chlorothalonil and Propamocarb Hydrochloride on Irish Potatoes. |
| J. Evans | D201524 | 22-JAN-1997 | Revised Occupational And Residential Exposure Assessment For The Chlorothalonil Reregistration Eligibility Decision (RED). |
| J. Evans | D201524 | 07-DEC-1995 | Occupational And Residential Exposure Assessment For The Chlorothalonil Reregistration Eligibility Decision (RED). |
| J. Evans | D228520 | 20-AUG-1996 | OREB Comments Regarding ISK Biosciences' Response To The HED Draft Chapter For The Chlorothalonil RED. |
| J. Evans | NA | 08-MAY-1997 | Revised Mixer/Loader/Applicator Exposure Estimates (Based On 100% Inhalation Absorption) For The Chlorothalonil Reregistration Eligibility Decision (RED). |
| J. Evans | NA | 20-JUL-1999 | Indiana Petition Request - Reduction Of REI From 48 Hours To 0 Hours For Applications Of Reduced Rate (0.78 Ai/Acre) Of Chlorothalonil To Muskmelons. |
| D. Smegal | D295139 | 16-JAN-2004 | Chlorothalonil: Evaluation of new use for mold control on treated wood and wallboard in buildings to support a labeling amendment for CLORTRAM™ F-40 Flowable Fungicide (EPA Reg. No. 72304-1). |
| M. Dow | D318049 | 15-JUN-2005 | Chlorothalonil-Requested Data Waivers |
| S. Tadayon | D327361 | 06-MAR-2006 | Study Review: Determination of Dermal and Inhalation Exposure to Reentry Workers During Maintenance Activities in Golf Courses" (MRID# 467340-01), DP Barcode 327361. |
| M. Dow | D317058 | 21-DEC-2006 | Chlorothalonil - Consideration of Request for Data Waivers by Vischim S.r.l. |
| M. Dow | D346460 | 14-JUL-2008 | **CHLOROTHALONIL** – Exposure/Risk Assessment for the Proposed Uses of Chlorothalonil on Fruiting Vegetables, Cucurbits, Persimmon, Rhubarb, Horseradish, Ginseng, Yam, Okra, Lupin, Lentil, and Head and Stem Brassica. |
| J. Evans | D343367 | 30-MAR-2009 | Secondary Review of AHETF Field Studies: AHE17-21. |
| K. Lowe | D371456 | 23-JUL-2010 | **Chlorothalonil:** Occupational and Residential Exposure/Risk Assessment of Proposed Section 3 Uses on Strawberry (and other low growing berries), Bushberry (low bushberry subgroup, except cranberry) and Bulb Vegetables. |
| J. Dawson, *et al.* | D373605 | 11-MAR-2011 | (RE-ISSUED) Health Effects Division (HED) Review of Agricultural Handler Exposure Task Force (AHETF) Monograph: Open Pour Mixing and Loading Dry Flowable Formulations<br><br>(RE-ISSUED) Health Effects Division (HED) Review of Agricultural Handler Exposure Task Force (AHETF) Monograph: Open Pour Mixing and Loading Liquid Formulations |

**Table 3. Memoranda Relevant to Registration Review.**

| Author | Barcode | Date | Title |
|---|---|---|---|
| | | | (RE-ISSUED) Health Effects Division (HED) Review of Agricultural Handler Exposure Task Force (AHETF) Monograph: Open Cab Ground Boom Application of Liquid Sprays |
| M. Crowley | D381148 | 28-APR-2011 | Review of Agricultural Handler Exposure Task Force (AHETF) Closed Cab Airblast Applicator Exposure Monitoring Studies: AHE55, AHE56, AHE57, AHE58, AHE59. |
| M. Crowley | D393093 | 22-SEP-2011 | HED Secondary Review of Chlorothalonil Handler Exposure During Applications of Daconil 2787 Flowable Fungicide in Greenhouses. |

**Literature:**

Faraq A.T., Karkour T.A., El Okazy A., Embryotoxicity of oral administered chlorothalonil in mice. Birth Defects Res B Dev Reprod. Toxicol. 2006 Apr:77(2):104-9.

Boman A., Montelius, J., Rissanen, R.L., and Liden, C. Sensitizing potential of chlorothalonil in the guinea pig and the mouse. Contact Dermatitis 2000, 273-279

Lensen *et al.*, Contact Dermatitis Caused by Chlorothalonil on Imported Roses: Irritant or Allergic Reaction. Contact Dermatitis, Volume 65, Issue 1, pp 50 –U97, 2011.

**Attachments:**

**Attachment 1: Chemical Identity Table.**
**Attachment 2: Chlorothalonil Endpoint Selection Tables.**
**Attachment 3: Exposure Potential for Adult and Child Aggregate Risk Estimates.**
**Attachment 4: Occupational Use Patterns/Exposure Scenarios for Chlorothalonil.**
**Attachment 5: Residential Handler and Post-application Scenarios Assessed and Risk Estimates.**
**Attachment 6: Occupational Handler Scenarios Assessed and Risk Estimates.**
**Attachment 7: Submitted Occupational/Residential Exposure Studies for Chlorothalonil**
**Attachment 8: Chlorothalonil International Residue Limit Status Sheet.**

cc: K. Lowe (RAB1), G. Kramer (RAB1), C. Rodriguez (RAB1)
RDI: RAB1 (11/24/11); S. Knizner (12/20/11)
G.F. Kramer:S10957:PY-S:(703)305-5079:7509P:RAB1



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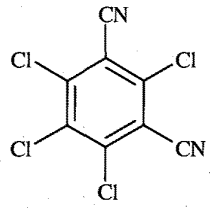
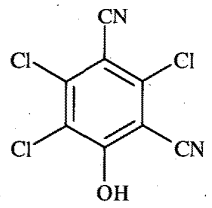
## Attachment 1: Chemical Identity Table.

| TABLE A1. Test Compound Nomenclature. | |
|---|---|
| Compound |  |
| Common name | Chlorothalonil |
| Company experimental name | N/A |
| IUPAC name | tetrachloroisophthalonitrile |
| CAS name | 2,4,5,6-tetrachloro-1,3-benzenedicarbonitrile |
| CAS registry number | 1897-45-6 |
| Compound |  |
| Common name | 4-Hydroxy metabolite |
| Company experimental name | SDS-3701 |
| IUPAC name | 2,4,5-trichloro-6-hydroxyisophthalonitrile |
| CAS name | 4-hydroxy-2,5,6-trichloro-1,3-benzenedicarbonitrile |
| CAS registry number | Not provided |

## Attachment 2: Chlorothalonil Endpoint Selection Tables.

**Table A2.1. Summary of Toxicological Endpoints and PODs for Chlorothalonil Used in the 2010 Dietary and Residential Risk Assessment.**

| Exposure Scenario | Dose Used in Risk Assessment, UF | | FQPA SF OR LOC | Study and Relevant Toxicological Effects |
|---|---|---|---|---|
| Acute Dietary-general population, including infants and children | N/A | | | An endpoint of concern (effect) attributable to a single dose was not identified in the database. Quantification of acute risk to general population including infants and children is not required. |
| Acute Dietary-females 13-49 years old | N/A | | | An endpoint of concern (effect) attributable to a single dose was not identified in the database. Quantification of acute risk to females 13-49 years old is not required. |
| Chronic Dietary-general population, including infants and children | NOAEL = 2.0 mg/kg/day UF = 100 | | FQPA SF = 1X cRfD = cPAD = 0.02 mg/kg/day | Chlorothalonil chronic toxicity/carcinogenicity – rat. LOAEL = 4.0 mg/kg/day, based on kidney effects consisting of epithelial hyperplasia in the renal proximal convoluted tubules of female rats. |
| Short-Term (1-30 days) Incidental Oral | NOAEL = 41.3 mg/kg/day | | LOC = MOE = 100 (residential/recreational; includes the FQPA SF = 1X) | Chlorothalonil 90-day – mouse: LOAEL = 113 mg/kg/day, based on kidney effects consisting of minimal to slight (severity) hyperplasia of the epithelium of the proximal convoluted tubules. |
| Intermediate-Term (1-6 months) Incidental Oral | NOAEL = 41.3 mg/kg/day | | LOC = MOE = 100 (residential/recreational; includes the FQPA SF = 1X) | |
| Short-(1-30 days) and Intermediate (1-6 months)-Term Dermal | N/A | | | Quantification of dermal risk is not required. |
| Acute Inhalation | LOAEL = 0.002 mg/L | HEC = 0.0004 mg/L | 100 (3X interspecies, 10X intraspecies, 3X FQPA) | Chlorothalonil- Acute inhalation-rat: LOAEL = 0.002 mg/L based on clinical signs consisting of hypoactivity, gasping, lacrimation, nasal discharge, piloerection, ptosis, and respiratory gurgle. |
| Short-Term (1-30 days) Inhalation | LOAEL = 0.002 mg/L | HEC = 0.00006 mg/L | LOC = 1000 (3X interspecies, 10X intraspecies, 30X FQPA) | Chlorothalonil- Acute inhalation-rat: LOAEL = 0.002 mg/L based on clinical signs consisting of hypoactivity, gasping, lacrimation, nasal discharge, piloerection, ptosis, and respiratory gurgle. |
| Intermediate-Term (1-6 months) Inhalation | | | | |
| Long-Term (>6 months) Inhalation | N/A | | | Long-term inhalation exposures are not expected to occur based on the registered/proposed uses. |
| Cancer (oral, dermal, inhalation) | **Classification:** "Likely" to be a human carcinogen by all routes of exposure (HED CPRC, 4th Meeting, 6/11/1997); however, the SAP decision (6/30/98) supports the use of an MOE approach in risk assessment for chlorothalonil. The HASPOC deliberated on 3/12/08 and supported the MOE approach. | | | |

UF = uncertainty factor, FQPA SF = FQPA Safety Factor, NOAEL = no-observed-adverse-effect level, LOAEL = lowest-observed-adverse-effect level, RfD = reference dose (c = chronic), PAD = population-adjusted dose, MOE = margin of exposure,

LOC = level of concern, N/A = not applicable, CPRC = Carcinogenicity Peer Review Committee, SAP = Scientific Advisory Panel, HASPOC = Hazard Assessment and Policy Committee, HEC = human-equivalent concentration.

**Table A2.2. Summary of Toxicological Endpoints and PODs for Chlorothalonil in the 2010 Occupational Exposure Risk Assessments.**

| Exposure Scenario | Dose Used in Risk Assessment | HEC | LOC for Risk Assessment | Study and Relevant Toxicological Effects |
|---|---|---|---|---|
| Short-(1-30 days) and Intermediate (1-6 months)-Term Dermal | N/A | | | Quantification of dermal risk is not required. |
| Acute Inhalation | LOAEL = 0.002 mg/L | 0.001 mg/L | 100 (3X interspecies, 10X intraspecies, 3X for no NOAEL) | Chlorothalonil- Acute inhalation- rat: LOAEL = 0.002 mg/L based on clinical signs consisting of hypoactivity, gasping, lacrimation, nasal discharge, piloerection, ptosis, and respiratory gurgle. |
| Short-Term (1-30 days) Inhalation | | 0.0003 mg/L | 1000 (3X interspecies, 10X intraspecies, 3X for no NOAEL 10X for exposure duration) | |
| Intermediate-Term (1-6 months) Inhalation | | | | |
| Long-Term (>6 months) Inhalation | N/A | | | Long-term inhalation exposures are not expected based on the registered/proposed uses. |

NOAEL = no-observed-adverse-effect level, LOAEL = lowest-observed-adverse-effect level, LOC = level of concern, N/A = not applicable, HEC = human-equivalent concentration.

**Attachment 3: Exposure Potential for Adult and Child Aggregate Risk Estimates.**
(From D370486, G. Kramer, *et al.*; 23-DEC-2010)

**Table A3. Summary of Chronic Dietary Exposure and Risk for Chlorothalonil (Food + Water).**

| Age Group | cPAD (mg/kg/day) | Exposure (mg/kg/day) | % cPAD |
|---|---|---|---|
| General U.S. Population | 0.02 | 0.008119 | 41 |
| All Infants (<1 year old) | 0.02 | 0.008653 | 43 |
| Children 1-2 years old | 0.02 | **0.019630** | **98** |
| Children 3-5 years old | 0.02 | 0.016483 | 82 |
| Children 6-12 years old | 0.02 | 0.010663 | 53 |
| Youth 13-19 years old | 0.02 | 0.006142 | 31 |
| Adults 20-49 years old | 0.02 | 0.006480 | 32 |
| Adults 50+ years old | 0.02 | 0.007754 | 39 |
| Females 13-49 years old | 0.02 | 0.006573 | 33 |

*The values for the highest exposed population for each type of risk assessment are bolded.

## Attachment 4: Summary of Occupational and Residential Registered Uses Pulled From LUIS Report (dated 9/14/11).

**Table A4.1. Occupational Registered Uses.**

| Use Site | Formulation | Application Method Equipment | Maximum Application Rate (lb ai/A unless otherwise noted) | Re-entry Interval |
|---|---|---|---|---|
| Almond | Liquid | Aerial, Airblast | 3 | 12 hr |
| | Dry Flowable | | | |
| Apricot | Dry Flowable | Aerial, Airblast | 3.1 | 12 hr |
| | Liquid | | | 12 hr |
| | | Chemigation | 3.1 | 12 hr |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| Asparagus | Liquid | Aerial, Groundboom | 3 | 12 hr |
| | Dry Flowable | | | |
| Banana (SLN PR040006) | Liquid | Airblast | 1.5 | NS |
| Beans | Dry Flowable | Aerial, Groundboom, Chemigation | 2.3 | 12 hr |
| | Liquid | | | |
| | | Handheld equipment | 0.01 lb ai/gal OR 2.3 lb ai/A | NS |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| Blueberry | Dry Flowable | Aerial, Groundboom | 3 | 12 hr |
| | Liquid | | | |
| | | Handheld equipment | 0.0033 lb ai/gal OR 3 lb ai/A | NS |
| Blueberry (SLN FL040007; MS050017) | Liquid | Groundboom | 3 | NS; except for MS050017 label lists 12 hr REI |
| Blueberry (SLN FL040008; GA040004) | DF | | | |
| Blueberry (GA040005) | | | 0.27 gal/A | |
| Brassica | Liquid | Aerial, Groundboom, Chemigation | 1.5 | 12 hr |
| Broccoli | Dry Flowable | Chemigation | 1.16 | 12 hr |
| | | Aerial, Groundboom | 1.5 | 12 hr |
| | Liquid | | | 24 hr |
| | | Handheld equipment | 0.0076 lb ai/gal OR 1.65 lb ai/A | NS |
| | | Chemigation | 1.43 | 12 hr |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| Brussels sprouts | Dry Flowable | Chemigation | 1.16 | 12 hr |
| | | Aerial, Groundboom | 1.5 | 12 hr |
| | Liquid | Handheld equipment | 0.0076 lb ai/gal OR 1.65 lb ai/A | NS |
| | | Aerial, Groundboom, Chemigation | 1.5 | 12 hr |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| Bulb vegetables | Liquid | Aerial, Groundboom, Chemigation | 1.25 | 12 hr |

**Table A4.1. Occupational Registered Uses.**

| Use Site | Formulation | Application Method Equipment | Maximum Application Rate (lb ai/A unless otherwise noted) | Re-entry Interval |
|---|---|---|---|---|
| Cabbage | Dry Flowable | Aerial, Groundboom | 1.5 | 12 hr |
| | | Chemigation | 1.16 | 12 hr |
| | Liquid | Handheld equipment | 0.0076 lb ai/gal OR 1.65 lb ai/A | NS |
| | | Aerial, Groundboom | 1.5 | 24 hr |
| | | Chemigation | 1.4 | 12 hr |
| Carrot | Dry Flowable | Aerial, Groundboom, Chemigation | 1.5 | 12 hr |
| | Wettable Powder in Water Soluble Bags | Aerial, Groundboom, Chemigation | 1.44 | 48 hr |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| | Liquid | Aerial, Groundboom, Chemigation | 1.5 | 12 hr |
| | | Handheld equipment | 0.0076 lb ai/gal OR 1.65 lb ai/A | NS |
| Cauliflower | Dry Flowable | Aerial, Groundboom | 1.5 | 12 hr |
| | | Chemigation | 1.16 | 12 hr |
| | Liquid | Handheld equipment | 0.0076 lb ai/gal OR 1.65 lb ai/A | NS |
| | | Aerial, Groundboom | 1.5 | 24 hr |
| | | Chemigation | 1.43 | 12 hr |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| Celery | Dry Flowable | Aerial, Groundboom, Chemigation | 2.25 | 12 hr |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| | Liquid | Aerial, Groundboom, Chemigation | 2.31 | 12 hr |
| | | Handheld equipment | 0.01 lb ai/gal OR 2.27 lb ai/A | NS |
| Cherry | Dry Flowable | Aerial, airblast | 3.135 | 12 hr |
| | Liquid | Aerial, Airblast | 3.1 lb ai/A OR 0.01 lb ai/gal | 12 hr |
| | | Chemigation | 3.1 | 12 hr |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| Cole crops | WP in WSB | Aerial, Groundboom, Chemigation | 1.08 | 48 hr |
| Commercial / Industrial Lawns | G | Spreader | 11.31 | NS |
| | Liquid | Groundboom, Handheld sprayers | 11.44 | 12 hr |
| | | Chemigation | 11.3 | 12 hr |
| | Dry Flowable | Groundboom, Handheld sprayers | 10.87 | 12 hr |

**Table A4.1. Occupational Registered Uses.**

| Use Site | | Formulation | Application Method Equipment | Maximum Application Rate (lb ai/A unless otherwise noted) | Re-entry Interval |
|---|---|---|---|---|---|
| Conifers | Christmas tree plantations and Forest stands | Dry Flowable | Aerial, airblast | 4.125 | 12 hr |
| | Seed beds; field grown and greenhouse | Dry Flowable | Chemigation | 4.10 lb ai/A OR 1.44 lb ai/100 gallons | 12 hr |
| | Christmas trees, nursery beds, and forest stands | Liquid | Aerial, Airblast | 4.17 | 12 hr |
| | | Liquid | Handheld equipment | 0.0047 lb ai/gal OR 4.13 lb ai/A | NS |
| | Plantations, Nurseries, Forest Trees (SLN WA000014) | Dry Flowable | Airblast | 2.1 lb ai/100 gal | 12 hr |
| Corn | | Dry Flowable | Aerial, Groundboom, Chemigation | 1.5 | 12 hr |
| | | Liquid | | | |
| | | Liquid | Handheld equipment | 0.0076 lb ai/gal OR 1.65 lb ai/A | NS |
| | | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| Cranberry | | Liquid | Aerial, Groundboom, Chemigation | 5.25 | 12 hr |
| | | Dry Flowable | | | |
| Cucumber | | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| | | Liquid | Aerial, Groundboom | 1.36 | 48 hr |
| Cucurbits | | Dry Flowable | Aerial, Groundboom, Chemigation | 2.25 | 12 hr |
| | | Liquid | | | |
| | | | Handheld equipment | 0.01 lb ai/gal OR 2.27 lb ai/A | NS |
| | | Wettable Powder in Water Soluble Bags | Aerial, Groundboom, Chemigation | 2.16 | 48 hr |
| Filbert (Hazelnut) | | Dry Flowable | Aerial, Airblast | 3 | 12 hr |
| | | Liquid | | | |
| | | | Handheld equipment | 0.0033 lb ai/gal OR 2.89 lb ai/A | NS |
| Fruiting vegetables | | Liquid | Aerial, Groundboom, Chemigation | 1.125 | 12 hr |
| Garbanzos [SLN WA020012 (L); OR030008 (DF)] | | Liquid | Groundboom, Chemigation | 1.5 | 12 hr |
| | | Dry Flowable | Aerial, Groundboom, Chemigation | | NS |
| Garlic | | Dry Flowable | Aerial, Groundboom, Chemigation | 2.25 | 12 hr |
| | | Liquid | | | |
| | | | Handheld equipment | 0.01 lb ai/gal OR 2.27 lb ai/A | NS |
| | | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| Ginseng | | Liquid | Aerial, Groundboom, Chemigation | 1.5 | 12 hr |
| Ginseng (SLN MI100002, WI100004) | | | Aerial, Groundboom | | |
| Golf Course Turf | | Granular | Spreader | 11.31 | NS |

**Table A4.1. Occupational Registered Uses.**

| Use Site | Formulation | Application Method Equipment | Maximum Application Rate (lb ai/A unless otherwise noted) | Re-entry Interval |
|---|---|---|---|---|
| | Liquid | Groundboom, Handheld sprayers | 11.44 | 12 hr |
| | | Chemigation | 8 | 12 hr |
| | Dry Flowable | Groundboom, Handheld sprayers | 11.34 | 12 hr |
| Grasses grown for seed | Dry Flowable | Aerial, Groundboom, Chemigation | 1.5 | 12 hr |
| | Liquid | | | |
| Horseradish | Liquid | Aerial, Groundboom, Chemigation | 2.25 | 12 hr |
| Leek | Dry Flowable | Aerial, Groundboom, Chemigation | 2.25 | 12 hr |
| | Liquid | | | |
| | Liquid | Handheld equipment | 0.01 lb ai/gal OR 2.27 lb ai/A | NS |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| Lentils and Lupine | Liquid | Aerial, Groundboom, Chemigation | 1.125 | 12 hr |
| Mango | Dry Flowable | Aerial, airblast | 2.625 | 12 hr |
| | Liquid | | | |
| Melons | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| | Liquid | Aerial, Groundboom | 1.36 | 48 hr |
| Mint | Dry Flowable | Aerial, Groundboom | 1.03 | 12 hr |
| | Liquid | | | |
| Mint (SLN ND020009; OR990038) | Liquid | Aerial, Groundboom, Chemigation | 1.05 | 12 hr on ND020009 48 hr on OR990038 |
| Mint (SLN OR990037) | Dry Flowable | Aerial, Groundboom, Chemigation | 1.03 | 12 hr |
| Mushrooms | Dry Flowable | Drench; Handheld equipment | 11.3 lb ai/A OR 0.02 lb ai/gal OR | 12 hr |
| | Liquid | | | |
| Nectarine | Dry Flowable | Aerial, Airblast | 3.135 | 12 hr |
| | Liquid | Aerial, Airblast, Chemigation | 3.1 lb ai/A OR 0.01 lb ai/gal | 12 hr |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| Onion | Dry Flowable | Aerial, Groundboom, Chemigation | 2.25 | 12 hr |
| | Liquid | Handheld equipment | 0.01 lb ai/gal OR 2.27 lb ai/A | NS |
| | | Aerial, Groundboom, Chemigation | 2.31 | 12 hr |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| | Wettable Powder in Water Soluble Bags | Aerial, Groundboom, Chemigation | 1.44 | 48 hr |

**Table A4.1. Occupational Registered Uses.**

| Use Site | Formulation | Application Method Equipment | Maximum Application Rate (lb ai/A unless otherwise noted) | Re-entry Interval |
|---|---|---|---|---|
| Ornamentals (field-grown) | Dry Flowable | Airblast, Handheld equipment | 1.55 lb ai/A OR 1.44 lb ai/100 gallons | 12 hr |
| Ornamentals (in greenhouses) | Fogger/ Smoke generator | Fogger/Smoke Generator | 1 3.5-oz can / 1000 ft2 (1.9 lb ai/A) | 12 hr |
| Ornamentals grown in nurseries, greenhouses | Liquid | Handheld equipment | 0.01 lb ai/gal | 12 hr |
| Ornamentals (groundcover) | Dry Flowable | Groundboom, Handheld sprayers | 3.10 lb ai/A OR 1.44 lb ai/100 gallons | 12 hr |
| | Liquid | Aerial, Groundboom, Chemigation | 3.1 | 12 hr |
| Ornamentals (including shade trees, herbaceous plants, non-flowering plants, woody shrubs, and vines)[a] | Liquid | Sprayer | 0.01 lb ai/gal OR 48 lb ai/A[a] | 48 hr |
| | | Drench application | 0.01 lb ai/gal OR 66 lb ai/A[a] | 48 hr |
| | | Drench application | 0.01 lb ai/gal OR 85 lb ai/A[a] | 48 hr |
| | | Drench application | 0.0003 lb ai/4-in pot (0.01 lb ai/gal)[a] | 48 hr |
| Ornamentals (including foliage plants) | Liquid | Handheld equipment | 2.1 | 12 hr |
| | | Groundboom | 0.02 lb ai/gal OR 3.1 lb ai/A | 12 hr |
| | Dry Flowable | Aerial, Groundboom | 3.1 | |
| Ornamentals (including shrubs, trees, flowering plants, and bulbs) | Dry Flowable | Aerial, Airblast, Groundboom | 1.55 | 12 hr |
| | Liquid | Aerial | 0.01 lb ai/gal OR 1.56 lb ai/A | 12 hr |
| | | Handheld equipment | 0.0085 lb ai/gal OR 1.11 lb ai/A | NS |
| Ornamentals (including shrubs, trees, flowering plants and bulbs, foliage plants) | Liquid | Airblast, Groundboom | 1.35 | NS |
| | Dry Flowable | Groundboom, airblast, handheld equipment | 1.16 lb ai/100 gal | 12 hr |
| Ornamentals (including shrubs/trees, foliage plants) | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| Ornamental bulbs and corms | Dry Flowable | Dip | 0.002 lb ai/gal | 12 hr |
| Ornamentals (SLN CA030010) | Liquid | Dip | 0.25 lb ai/corm | 12 hr |
| Ornamentals (SLN OR000023; WA000003) | Dry Flowable | Dip | 0.041 lb ai/gal | 12 hr |
| Papaya | Dry Flowable | Aerial, Airblast | 2.25 | 12 hr |
| | Liquid | Handheld equipment | 0.01 lb ai/gal OR 2.27 lb ai/A | NS |
| | | Airblast | 2.25 | 12 hr |
| | | Aerial, airblast | 2.15 | NS |
| Parsnip | Dry Flowable | Aerial, Groundboom, Chemigation | 1.5 | 12 hr |
| | Liquid | Handheld equipment | 0.0076 lb ai/gal OR 1.65 lb ai/A | NS |
| | | Aerial, Groundboom, Chemigation | 1.5 | 12 hr |
| Passion Fruit | Dry Flowable | Airblast | 1.5 | 12 hr |

**Table A4.1. Occupational Registered Uses.**

| Use Site | Formulation | Application Method Equipment | Maximum Application Rate (lb ai/A unless otherwise noted) | Re-entry Interval |
|---|---|---|---|---|
| | Liquid | Handheld equipment | 0.0076 lb ai/gal OR 1.65 lb ai/A | NS |
| | | Airblast | 1.5 | 12 hr |
| Peach | Dry Flowable | Aerial, Airblast | 3.135 | 12 hr |
| | Liquid | Aerial, airblast | 3.1 lb ai/A OR 0.01 lb ai/gal | 12 hr |
| | | Chemigation | 3.1 | 12 hr |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| Peanuts | Dry Flowable | Aerial, Groundboom, Chemigation | 1.125 | 12 hr |
| | Liquid | Aerial, Groundboom, Chemigation | 1.172 | 12 hr |
| | | Aerial | 1.44 | 12 hr |
| Peas | Liquid | Aerial, Groundboom, Chemigation | 1.5 | 12 hr |
| Persimmon | Liquid | Aerial, Airblast, Chemigation | 0.9375 | 12 hr |
| Pistachio | Dry Flowable | Aerial, Airblast | 4.5 | 12 hr |
| | Liquid | Aerial, Airblast | 4.5 lb ai/A OR 0.023 lb ai/gal | 12 hr |
| Plantain (SLN PR040006) | Liquid | Airblast | 1.5 | 12 hr |
| Plum | Dry Flowable | Aerial, airblast | 3.135 | 12 hr |
| | Liquid | Aerial, Airblast, Chemigation | 3.1 lb ai/A OR 0.01 lb ai/gal | 12 hr |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| Potato | Dry Flowable | Aerial, Groundboom, Chemigation | 1.125 | 12 hr |
| | Liquid | Aerial | 1.44 | 12 hr |
| | | Handheld equipment | 0.0057 lb ai/gal OR 1.24 lb ai/A | NS |
| | | Aerial, Groundboom, Chemigation | 1.125 | 12 hr |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| | Wettable Powder in Water Soluble Bags | Chemigation | 1.44 | 48 hr |
| Potato (SLN WI070006) | Dry Flowable | Aerial, Groundboom, Chemigation | 1.12 | 12 hr |
| Potato (SLN MN030007) | | Groundboom, Chemigation | | NS |
| Potato (SLN ND030017) | Liquid | Aerial, Groundboom | 0.78 | 12 hr |
| Potato (SLN WI040005) | | Groundboom | 0.84 | 12 hr |
| Potato (SLN MN030011, WI040006, WI100002) | | Aerial, Groundboom | 1.1 | 12 hr |

**Table A4.1. Occupational Registered Uses.**

| Use Site | Formulation | Application Method Equipment | Maximum Application Rate (lb ai/A unless otherwise noted) | Re-entry Interval |
|---|---|---|---|---|
| Potato (SLN MN030008) | | Groundboom, Chemigation | | NS |
| Potato (SLN NE090002, ME100001) | | Aerial, Groundboom, Chemigation | | 12 hr |
| Potato (SLN MI040001, MN030006, MN030010, ND030007) | | Groundboom, Chemigation | 1.12 | 12 hr |
| Potato (SLN ND030016) | | Aerial, Groundboom | | 12 hr |
| Potato (SLN NE030004) | | Groundboom | | NS |
| Potato (SLN NE090001) | | Aerial, Groundboom, Chemigation | | 12 hr |
| Potato (SLN WI100001) | | Aerial, Groundboom | 1.13 | 12 hr |
| Potato (SLN NE030005) | | Groundboom | 1.16 | NS |
| Potato (SLN MI040002) | | Groundboom, Chemigation | 1.17 | 12 hr |
| Potato (SLN ND030008, WI070008) | | Aerial, Groundboom, Chemigation | | |
| Professional and Collegiate Athletic fields | Liquid | Groundboom, Handheld sprayers | 11.44 | 12 hr |
| | Dry Flowable | Groundboom, Handheld sprayers | 10.87 | |
| Prune | Dry Flowable | Aerial, airblast | 3.135 | 12 hr |
| | Liquid | Aerial, airblast | 3.1 lb ai/A OR 0.01 lb ai/gal | 12 hr |
| | | Chemigation | 3.1 | 12 hr |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| Pumpkin | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| | Liquid | Aerial, Groundboom | 1.36 | 48 hr |
| Rhubarb | Liquid | Aerial, Groundboom, Chemigation | 2.25 | 12 hr |
| Rose (field-grown) | Liquid | Aerial, Groundboom, Chemigation | 1.08 | NS |
| | Dry Flowable | Chemigation | 1.10 lb ai/A OR 1.44 lb ai/100 gallons | 12 hr |
| Shallot | Dry Flowable | Aerial, Groundboom, Chemigation | 2.25 | 12 hr |
| | Liquid | Handheld equipment | 0.01 lb ai/gal OR 2.27 lb ai/A | NS |
| | | Aerial, Groundboom, Chemigation | 2.25 | 12 hr |
| | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| Sod Farms | Liquid | Groundboom, Chemigation | 13 | 12 hr |
| | | Aerial | 11.25 | 12 hr |

**Table A4.1. Occupational Registered Uses.**

| Use Site | Formulation | Application Method Equipment | Maximum Application Rate (lb ai/A unless otherwise noted) | Re-entry Interval |
|---|---|---|---|---|
| | Granular | Spreader | 11.31 | 24 hr |
| | Dry Flowable | Ground | 11.34 | 12 hr |
| Soybeans | Dry Flowable | Aerial, Groundboom, Chemigation | 1.9 | 12 hr |
| | Liquid | Aerial, Groundboom, Chemigation | 1.69 | 12 hr |
| | | Aerial | 1.84 | 12 hr |
| Squash | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| | Liquid | Aerial, Groundboom | 1.36 | 48 hr |
| Stone fruits | Dry Flowable | Aerial, Airblast | 3.15 | 12 hr |
| | Liquid | Aerial, Airblast | 3.13 | 12 hr |
| | | Handheld equipment | 0.0036 lb ai/A OR 3.09 lb ai/A | NS |
| Strawberry | Liquid | Aerial, Groundboom | 1.125 | 12 hr |
| | | Dip | 0.011 lb ai/gal | 12 hr |
| Strawberry (SLN CA960027) | Liquid | Dip | 0.011 lb ai/gal | 12 hr |
| Strawberry (SLN CA960027) | | Aerial, Groundboom, Chemigation | 1.12 | 12 hr |
| Sugarbeet (SLN OR990039) | Dry Flowable | Aerial, Groundboom | 1.32 | 48 hr |
| Sugarbeet (SLN OR990040) | Liquid | Aerial, Groundboom, Chemigation | 1.27 | 12 hr |
| Tomato | Ready-to-Use | Sprayer | Apply to point of runoff | NS |
| | Wettable Powder in Water Soluble Bags | Chemigation | 2.16 | 48 hr |
| | Dry Flowable | Aerial, Groundboom, Chemigation | 2.27 | 12 hr |
| | Liquid | Aerial, Groundboom, Chemigation | 2.25 | 12 hr |
| | | Handheld equipment | 0.0095 lb ai/gal OR 2.06 lb ai/A | NS |
| Turf (with restriction on home lawns and other residential sites) | Granular | Spreader | 11.31 | NS |
| | Dry Flowable | Groundboom, Handheld sprayers | 11.34 | 12 hr |
| | Liquid | Groundboom, Handheld sprayers | 11.5 | 12 hr |
| Wood treatment (freshly sawed lumber or timber) | Liquid | Dip or spray | 0.021 lb ai/gal | NS |
| | | Paintbrush, Airless sprayer | 0.105 lb ai/gal | NS |
| Yam | Liquid | Aerial, Groundboom | 0.9375 | 12 hr |

a. These uses and rates are associated with a label that includes both chlorothalonil and propamocarb as the active ingredients. The labels were not clear with respect to the maximum application rates allowed and, therefore, the highest rates able to be calculated were used in the risk assessment. Risks of concern were identified and HED, EFED, and RD recommended revisions to the labeled use directions to clearly indicate the maximum application rates allowable that would not result in worker and/or drinking water risks.

**Table A4.2. Registered Residential Home Garden Uses.**

| Use Site | Formulation | Application Method Equipment | Maximum Application Rate (lb ai/A) |
|---|---|---|---|
| Apricot | Liquid | Handheld equipment | 3.17 lb ai/A OR 0.0036 lb ai/gal |
| Beans | Liquid | Handheld equipment | 2.54 lb ai/A OR 0.012 lb ai/gal |
| Blueberry | Liquid | Handheld equipment | 2.86 lb ai/A OR 0.0033 lb ai/gal |
| Broccoli | Liquid | Handheld equipment | 1.59 lb ai/A OR 0.0073 lb ai/gal |
| Brussels sprouts | Liquid | Handheld equipment | 1.59 lb ai/A OR 0.0073 lb ai/gal |
| Cabbage | Liquid | Handheld equipment | 1.59 lb ai/A OR 0.0073 lb ai/gal |
| Carrot | Liquid | Handheld equipment | 1.59 lb ai/A OR 0.0073 lb ai/gal |
| Cauliflower | Liquid | Handheld equipment | 1.59 lb ai/A OR 0.0073 lb ai/gal |
| Celery | Liquid | Handheld equipment | 2.54 lb ai/A OR 0.012 lb ai/gal |
| Cherry | Liquid | Handheld equipment | 3.17 lb ai/A OR 0.0036 lb ai/gal |
| Corn | Liquid | Handheld equipment | 1.59 lb ai/A OR 0.0073 lb ai/gal |
| Cucumber | Liquid | Handheld equipment | 2.54 lb ai/A OR 0.012 lb ai/gal |
| Filbert | Liquid | Handheld equipment | 2.86 lb ai/A OR 0.0033 lb ai/gal |
| Garlic | Liquid | Handheld equipment | 2.54 lb ai/A OR 0.012 lb ai/gal |
| Leek | Liquid | Handheld equipment | 2.54 lb ai/A OR 0.012 lb ai/gal |
| Melons | Liquid | Handheld equipment | 2.54 lb ai/A OR 0.012 lb ai/gal |
| Nectarine | Liquid | Handheld equipment | 3.17 lb ai/A OR 0.0036 lb ai/gal |
| Onion | Liquid | Handheld equipment | 2.54 lb ai/A OR 0.012 lb ai/gal |
| Conifers | Liquid | Handheld equipment | 4.45 lb ai/A OR 0.0051 lb ai/gal |
| Ornamentals (including trees, shrubs, flowering plants and bulbs, foliage plants) | Liquid | Handheld equipment | 2.54 lb ai/A OR 0.0029 lb ai/gal |
| Papaya | Liquid | Handheld equipment | 2.22 lb ai/A OR 0.0026 lb ai/gal |
| Parsnip | Liquid | Handheld equipment | 1.59 lb ai/A OR 0.0073 lb ai/gal |
| Passion fruit | Liquid | Handheld equipment | 1.59 lb ai/A OR 0.0073 lb ai/gal |
| Peach | Liquid | Handheld equipment | 3.17 lb ai/A OR 0.0036 lb ai/gal |
| Plum | Liquid | Handheld equipment | 3.17 lb ai/A OR 0.0036 lb ai/gal |
| Potato | Liquid | Handheld equipment | 1.27 lb ai/A OR 0.0058 lb ai/gal |
| Prune | Liquid | Handheld equipment | 3.17 lb ai/A OR 0.0036 lb ai/gal |
| Pumpkin | Liquid | Handheld equipment | 2.54 lb ai/A OR 0.012 lb ai/gal |
| Shallot | Liquid | Handheld equipment | 2.54 lb ai/A OR 0.012 lb ai/gal |
| Squash | Liquid | Handheld equipment | 2.54 lb ai/A OR 0.012 lb ai/gal |
| Tomato | Liquid | Handheld equipment | 1.9 lb ai/A OR 0.0088 lb ai/gal |

**Table A4.3. Registered Antimicrobial Uses.**

| Use | Application Rate | Notes |
|---|---|---|
| Adhesives, Caulks and Sealants | 4800 – 10019 ppm | Note 1 |
| Composite Wood Products | 4.8 to 5.05 pcf | |
| Grouts and Joint Compounds | 15350 – 15680 ppm | |
| Paints, Stains and Coatings, Exterior Latex | 2200-10100 ppm | |
| Paints, Stains and Coatings, Exterior Solvent | 11500 -11800 ppm | |
| Paints, Stains and Coatings, Interior Latex | 660 – 5000 ppm | |
| Paper and Paperboard (non-food) | 1415 ppm | Note 2 |
| Surface treatment of wood, wallboard concrete and masonry block in buildings | 9790 - 10620 ppm (as a spray) | Note 3 |
| Wood preservative applied by brush, spray or dip to lumber, timbers and particle board wood | 250 - 23800 ppm | Note 4 |
| Wood preservative applied by pressure treatment | 0.8 pcf<br>200 – 500 ppm | Note 5<br>Note 6 |
| Wood preservative stain applied to existing structures | 10,100 ppm | |

Note 1 – Labels have food contact prohibitions for caulks and sealants.
Note 2 - The paper and paperboard use is only one label 74075-1.
Note 3 – Interior sides of living spaces must be covered with overlayment materials.
Note 4 – Only label #1022-589 has a maximum rate of 23,800 ppm. The other labels have a maximum rate of 10,800 ppm.
Note 5 – Only two products (#71581-2 and #1022-580) specify the rate in terms of pounds per cubic feet (pcf).
Note 6 – Added to the pressure treatment solution as a co-ingredient.

## Attachment 5: Residential Handler and Post-application Scenarios Assessed and Risk Estimates (from D371456).

**Table A5.1. Risk Estimates for Residential Handlers**

| Exposure Scenario | Use pattern | Application Rate (lb ai/gallon)[a] | Acute Baseline Inhalation MOE[e] (LOC = 100) | Short-term Baseline Inhalation MOE[e] (LOC = 1000) |
|---|---|---|---|---|
| Mixing/Loading/Applying Liquids with a Paint Brush | painting with latex interior paint | 0.048 | 1,300 | **220** |
| | painting with latex exterior paint | 0.096 | 670 | **110** |
| | painting with alkyd exterior paint | 0.11 | 580 | **97** |
| Mixing/Loading/Applying Liquids with an Airless Sprayer | painting with latex interior paint | 0.048 | 310 | **52** |
| | painting with latex exterior paint | 0.096 | 870 | **140** |
| | painting with alkyd exterior paint | 0.11 | 1,000 | **170** |

a. The application rate is based on the highest application rate for residential painting uses for chlorothalonil.
b. Science Advisory Council Policy # 12.
c. Unit Exposures based on PHED for the paintbrush scenario and from MRID 43600102 for the airless sprayer scenario. Baseline Inhalation: no respirator.
d. Dose = daily unit exposure (mg/lb ai) x application rate (lb ai/gal) x amount handled (gal) / body weight (70 kg adult).
e. MOE = HED (0.348 mg/kg/day) / Inhalation Dose (mg/kg/day).

**Table A5.2. Residential Post-application Inhalation Exposure/Risk from the use of Treated Paint.**

| Sampling time | Measured air concentrations (mg/m$^3$) | MOEs | |
|---|---|---|---|
| 0-6 hrs | 0.00059 | Acute (LOC = 100) | Short-/Intermediate-Term (LOC = 1,000) |
| 6-12 hrs | 0.00053 | | |
| 12-18 hrs | 0.00058 | | |
| 18-24 hrs | 0.00062 | | |
| ***Maximum air concentration:*** | 0.00062 | 650 | -- |
| ***Average air concentration:*** | 0.00058 | -- | 100 |

**Table A5.3. Residential Post-application Exposure and Risk from Ingestion of Paint Chips Containing Chlorothalonil Residues.**

| IgR (g/day) | Percent of ai in paint[a] | Fraction of ai available for ingestion | CF1 (mg/g) | BW (kg) | PDR[b] (mg/kg/day) | MOE[c] **(LOC = 100)** |
|---|---|---|---|---|---|---|
| 0.04 | 0.48% | 0.2 | 1,000 | 15 | 0.0026 | 16,000 |

a. % of ai in product is 40.4% however the % of ai in a gallon of paint is 0.48% (153.6 oz/12,800 oz x 40.4% = 0.48%).
b. PDR = potential dose rate = IgR x (Percent ai in paint) x Fraction of ai available for ingestion x CF1 / BW.
c. MOE = NOAEL (41.3 mg/kg/day)/PDR.

**Table A5.4. Chlorothalonil Preliminary Volatilization MOE Analysis for Residential Bystanders.**

| Study | Year of Study | Sampler/Site Location | Number of samples | Duration of samples | Duration of sampling period | Maximum Air Concentration (ng/m$^3$) | Arithmetic Mean Air Concentration (ng/m$^3$) | Acute MOEs[a] **(LOC = 100)** | Short-term MOEs[b] **(LOC = 1,000)** |
|---|---|---|---|---|---|---|---|---|---|
| **Ambient Air Data** | | | | | | | | | |
| Lompoc, CA (CalDPR)[c] | 2000 | Central | 40 | 24-hour | 2 months | 4.29 | 1.27 | 93,000 | 47,000 |
| | | Northwest | 40 | | | 4.29 | 1.07 | 93,000 | 56,000 |
| | | Southwest | 40 | | | 4.29 | 1.34 | 93,000 | 45,000 |
| | | West | 40 | | | 4.29 | 1.61 | 93,000 | 37,000 |
| Fresno County, CA (CARB)[d] | 1989 | Cantua School, Cantua Creek | 18 | 24-hour | 1 month | 3.5 | -- | 110,000 | -- |
| | | Martin Gunderson School, Five Points | 19 | | | 3.5 | | 110,000 | |
| | | U.C. Field Station, Five Points | 19 | | | 3.5 | | 110,000 | |
| | | Police Station, Huron | 18 | | | 3.5 | | 110,000 | |
| | | Fresno (ARB air-monitoring station; background site) | 18 | | | 3.5 | | 110,000 | |
| Ventura County, CA (CARB)[e] | 1990 | Animal Control Shelter, Camarillo | 30 (5 above the MDL) | 24-hour | 1 month | 5 | 4 | 80,000 | 15,000 |
| | | Tierra Vista School, Oxnard | 30 (none above MDL) | | | 2 | -- | 200,000 | -- |
| | | Oxnard high School, Oxnard | 30 (none above MDL) | | | 2 | -- | 200,000 | -- |
| | | Ventura (Air Pollution Control District Office; background site) | 30 (none above MDL) | | | 2 | -- | 200,000 | -- |
| Hastings, FL (PANNA) | 2007 | One drift catcher site located 65 ft southwest of cabbage field. Thirty-nine samples were collected over the monitoring period (October 1 - December 6, 2007). The Drift Catcher operator observed "spraying" or "fogging" on the mornings of October 13 and 29, and November 24. | 39 | 24-hour (some multi-day) | 2 months | 555 | 134 | 720 | **450** |
| MN (PANNA)[f] | 2006/ 2007 | Browerville Site 1 (~1/8 mi from hybrid poplar, ~3 mi from potatoes) | 8 in 2006 and 13 in 2007 | 24-hour | 1 month in 2006 and 1 month in 2007 | 29 | 5 | 14,000 | 12,000 |
| | | Browerville Site 2 (Within a few hundred yards of potatoes) | 9 in 2006 and 10 in 2007 | | 1 month in 2006 and 2 weeks in 2007 | 6 | 2 | 67,000 | 30,000 |



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**Table A5.4. Chlorothalonil Preliminary Volatilization MOE Analysis for Residential Bystanders.**

| Study | Year of Study | Sampler/Site Location | Number of samples | Duration of samples | Duration of sampling period | Maximum Air Concentration (ng/m$^3$) | Arithmetic Mean Air Concentration (ng/m$^3$) | Acute MOEs[a] **(LOC = 100)** | Short-term MOEs[b] **(LOC = 1,000)** |
|---|---|---|---|---|---|---|---|---|---|
| | | Browerville Site 3 (Within a few hundred yards of potatoes) | 9 in 2006 and 10 in 2007 | | 2 weeks in 2006 and 2 weeks in 2007 | 46 | 8 | 8,700 | 7,500 |
| | | Browerville Site 4 | 11 | | 2 weeks in 2006 | 65 | 26 | 6,200 | 2,300 |
| | | Browerville Site 5 | 4 | | 1 week in 2006 | 5 | 2 | 80,000 | 30,000 |
| | | Staples Site 1 | 4 | | 1 week in 2006 | 0.5 | 0.5 | 800,000 | 120,000 |
| | | Staples Site 2 | 13 | | 1 month in 2006 | 197 | 65 | 2,000 | **920** |
| | | Frazee Site (One sampler moved around, but generally within 1/2 mi of potato fields, sometimes within a few hundred feet) | 67 in 2006 and 29 in 2007 | | 2 months in 2006 and 2 months in 2007 | 190 | 31 | 2,100 | 1,900 |
| | | Waubun Site (No potatoes in vicinity of sampler) | 15 | | 1 month in 2006 | 0.5 | 0.5 | 800,000 | 120,000 |
| **Application Site Data** | | | | | | | | | |
| San Joaquin County, CA (CARB)[g] | 2002 | North | Each site included 9 samples (including background sample) | Ranged from 1-hour to 24-hour samples; taken pre-application up to 3 days post-application | 3 days | 70 | 32 | 5,700 | 1,900 |
| | | Northeast | | | | 83 | 45 | 4,800 | 1,300 |
| | | East | | | | 737 | 324 | 540 | **190** |
| | | Southeast | | | | 413 | 262 | 970 | **230** |
| | | South | | | | 296 | 198 | 1,400 | **300** |
| | | Southwest | | | | 80 | 36 | 5,000 | 1,700 |
| | | West | | | | 372 | 127 | 1,100 | **470** |
| | | Northwest | | | | 29 | 17 | 14,000 | 3,500 |
| Ventura County, CA (CARB) | 1992 | East Site 1 | Ranch site included 8 samples (including background sample) | Ranged from 1-hour to 24-hour samples; taken pre-application up to 3 days post-application | 3 days | 158 | 74 | 2,500 | **810** |
| | | East Site 2 | | | | 58 | 28 | 6,900 | 2,100 |
| | | West Sites 1 and 2 | | | | 34 | 23 | 12,000 | 2,600 |

a. Acute MOE = Acute HEC (400,000 ng/m$^3$) / Study maximum air concentration (ng/m$^3$). LOC = 100.
b. Short-term MOE = Short-term HEC (60,000 ng/m$^3$) / Study arithmetic mean air concentration (ng/m$^3$). LOC = 1,000.



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c. All non-detects and trace concentrations reported. For non-detects, assumed 1/2 Method Detection Limit (MDL) of 1.43 ng/m$^3$. For trace concentrations, assumed concentration halfway between MDL and Estimated Quantitation Limit (7.15 ng/m$^3$).

d. All samples were <MDL of 7.0 ng/m$^3$.

e. All sites except for Animal Control Shelter, were <MDL of 4 ng/m$^3$.

f. Samples analyzed by either PANNA lab (MDL ranged from 0.2 to 1.0 ng/m3, depending on analyte and when sample was analyzed and the GC parameters; estimated limit of quantitation ranged from 1.0 to 5.2 ng/m3, depending when sample was analyzed and GC parameters; and values marked "trace" indicate that a sample's concentration was between the MDL and LOQ) or Commercial lab (reporting limit for chlorothalonil-specific analysis: 10 ng/tube, or 3.5 ng/m3 assuming 24 h sample and 2.0 L/min flow rate). All of the sampling sites were adjacent to large fields. At some sites, sampling was timed to coincide with anticipated pesticide applications, while other sampling projects captured "ambient" pesticide concentrations.

g. Winds mostly out of West to Northwest.



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## Attachment 6: Occupational Handler Scenarios Assessed and Risk Estimates.

**Table A6.1. Acute and Short-/Intermediate-term Occupational Handler Exposure and Risk Estimates for Chlorothalonil.**

| Exposure Scenario | App Rate (lb ai/acre)[a] | Area Treated Daily (acres)[b] | Acute MOE[g] (LOC = 100) | | | | Short- and Intermediate-term MOE[g] (LOC = 1,000) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Baseline[c] | PF5 Respirator[d] | PF10 Respirator[e] | Engineering Control[f] | Baseline | PF5 Respirator | PF10 Respirator | Engineering Control |
| **Mixer/Loader** | | | | | | | | | | |
| Mixing/Loading Liquids for Aerial Applications | 3 | 350 | **10** | **48** | 97 | 140 | **3** | **14** | **29** | **42** |
| Mixing/Loading Liquids for Chemigation Applications | 3 | 350 | **10** | **48** | 97 | 140 | **3** | **14** | **29** | **42** |
| Mixing/Loading Liquids for Groundboom Applications | 3 | 80 | **42** | 210 | 420 | 610 | **13** | **63** | 130 | 180 |
| Mixing/Loading Liquids via Dip | 0.015 lb ai/gallon | 100 | 6,800 | 34,000 | 68,000 | 98,000 | 2,000 | 10,000 | 20,000 | 29,000 |
| | | 1000 | 680 | 3,400 | 6,800 | 9,800 | 200 | 1,000 | 2,000 | 2,900 |
| **Applicator** | | | | | | | | | | |
| Applying Sprays via Aerial Equipment | 3 | 350 | No Data | No Data | No Data | 170 | No Data | No Data | No Data | **51** |
| Applying Sprays via Groundboom Equipment | 3 | 80 | **69** | 340 | 690 | 1,200 | **20** | 100 | 200 | 350 |
| **Flagger** | | | | | | | | | | |
| Flagging for Aerial Sprays Applications | 3 | 350 | **33** | 170 | 330 | 1,700 | **10** | **50** | 99 | 500 |

a. The application rate was based on the highest application rate for the most recently proposed uses for chlorothalonil that included the low-growing berry subgroup 13-07G; bushberry subgroup 13-07B; onion, bulb subgroup 3-07A; and onion, green subgroup 3-07B.
b. ExpoSAC Policy # 9.1 and information from previous assessment on applications via dip (D327566).
c. Baseline Inhalation: no respirator.
d. PF5 Respirator: 80% protection factor provided by a NIOSH-approved quarter-face, cup-style respirator.
e. PF10 Respirator: 90% protection factor is provided by a NIOSH-approved half-face cartridge or canister respirator or a PAPR.
f. Engineering control for applying sprays via aerial equipment: enclosed cockpit.
g. MOEs based on comparison of calculated dose to human-equivalent doses (HED); HED = 0.174 mg/kg/day for acute exposures and HED = 0.052 mg/kg/day for short-and intermediate-term exposures.



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## Attachment 7. Submitted Occupational/Residential Exposure Studies for Chlorothalonil.

**Table A7.1. Exposure / Residue Studies Submitted for Chlorothalonil.**

| MRID - Study Citation | Agency Review |
|---|---|
| 147976 Ballee, D. (1985) A Tomato Harvester Exposure Study with Chlorothalonil--1984: Document No. 655-3HE-84-0043-001. Unpublished study prepared by SDS Biotech Corp. 235 p.a | Data were reviewed and incorporated as part of revisions to Occupational Pesticide Post-application Exposure Data |
| 42433810 Ballee, D. (1988) A Mixer, Applicator and Mower Exposure Study with Chlorothalonil for Golf Course Maintenance--1985: Lab Project Number: 1148-85-0051: 1148-85-0051-HE-001. Unpublished study prepared by Ricerca, Inc. 477 p.a | Data provided are superseded by newer submitted golf course maintenance studies (see below under ARTF); primary contractor reviews are available |
| 42433811 Ballee, D. (1990) A Golfer Exposure Study with Chlorothalonil Used for Golf Course Maintenance--1985: Lab Project Number: 1148-85-0059: 1148-85-0059-HE-001. Unpublished study prepared by Ricerca, Inc. 264 p.a | |
| 43600102 Formella, T. (1995) Potential Exposure of Workers to Chlorothalonil when Handling and Applying Paint Containing Chlorothalonil: Lab Project Number: 94-0204: ISKB-1894-002-02: 5227-94-0204-CR-001. Unpublished study prepared by Ricerca, Inc. 272 p. (43600101 = pilot study)a | Data were reviewed and incorporated as part of revisions to Occupational Pesticide Handler Exposure Data |
| 43623202 King, C.; Prince, P.; Formella, T. (1995) Chlorothalonil Worker Exposure During Application of Daconil 2787 Flowable Fungicide in Greenhouses: Lab Project Number: 5968-94-0168-CR-001: 94-0168: SDS-2787. Unpublished study prepared by Ricerca, Inc 298 p. (43623201 = pilot study) | D393093 |
| Agricultural Re-entry Task Force (ARTF) Studies -- Data were reviewed and incorporated as part of revisions to Occupational Pesticide Post-application Exposure Data | |
| 45005904 Klonne, D.; Fuller, R.; Honeycutt, R. (1999) Determination of Dermal and Inhalation Exposure to Reentry Workers During Scouting in Sweet Corn (Chlorothalonil): Lab Project Number: ARF009: 97-708HE: 017-03. Unpublished study prepared by H.E.R.A.C., Inc., and Centre Analytical Laboratories, Inc. 371 p. | Primary contractor reviews available |
| 45005905 Klonne, D.; Fuller, R.; Honeycutt, R. (1999) Determination of Dermal and Inhalation Exposure from Chlorothalonil to Reentry Workers During Scouting in Sweet Corn: Lab Project Number: ARF010: 017-04: 97-709HE. Unpublished study prepared by H.E.R.A.C., Inc., and Centre Analytical Laboratories, Inc. 401 p. | |
| 45005906 Klonne, D.; Artz, S.; Rotondaro, A. (1999) Determination of Dermal and Inhalation Exposure to Reentry Workers During Scouting in Cauliflower (Chlorothalonil): Lab Project Number: ARF011: 97-295: 7443-98-0027-CR-001. Unpublished study prepared by Grayson Research LLC, and Ricerca, Inc. 387 p. | |
| 45005907 Klonne, D.; Artz, S.; Prochaska, C. et al. (1999) Determination of Dermal and Inhalation Exposure to Reentry Workers During Scouting in Cauliflower (Chlorothalonil): Lab Project Number: 97-296: ARF012: 98-0005. Unpublished study prepared by Grayson Research LLC, and Ricerca, Inc. 533 p. | |
| 45005908 Klonne, D.; Artz, S.; Rotondaro, A. (1999) Determination of Dermal and Inhalation Exposure to Reentry Workers During Scouting in Dry Peas (Chlorothalonil): Lab Project Number: ARF021: 98-326: 7608-98-0111-CR-001. Unpublished study prepared by Grayson Research LLC, and Ricerca, Inc. 361 p. | |
| 45005909 Klonne, D.; Bruce, E.; Artz, S. (1999) Determination of Dermal and Inhalation Exposure to Reentry Workers During Scouting in Sunflower (Chlorothalonil): Lab Project Number: ARF022: 44500: A048.007. Unpublished study prepared by ABC Laboratories, Inc. and Maxim Technologies, Inc. 318 p. | |
| 45005910 Klonne, D.; Artz, S.; Bruce, E. (1999) Determination of Dermal and Inhalation Exposure to Reentry Workers During Scouting in Grapes (Chlorothalonil): Lab Project Number: ARF023: ERS98011: 44835. Unpublished study prepared by ABC Laboratories, Inc., and Excel Research Services, Inc. 333 p. | |
| 45005911 Klonne, D.; Artz, S.; Prochaska, C. et al. (1999) Determination of Dermal and Inhalation Exposure to Reentry Workers During Scouting in Tobacco (Chlorothalonil): Lab Project Number: ARF024: 98-327: ML98-0739-ART. Unpublished study prepared by Grayson Research, LLC. and Morse Laboratories, Inc. 335 p. | |
| 45224801 Klonne, D.; Filler, R.; Howell, C. (2000) Determination of Dermal and Inhalation Exposure to Reentry Workers During Hand Line Irrigation in Potato: (Chlorothalonil): Lab Project Number: 45165: 10625-1: ARF036. Unpublished study prepared by ABC Laboratories and Ricerca, LLC. 417 p. | |
| 45530101 Klonne, D.; Fuller, R.; Honeycutt, R. (2001) Determination of Dermal and Inhalation Exposure to Reentry Workers During Maintenance Activities on Golf Courses: Lab Project Number: ARF046. Unpublished study prepared by H.E.R.A.C. Inc. 420 p. | |

**Table A7.1. Exposure / Residue Studies Submitted for Chlorothalonil.**

| MRID - Study Citation | Agency Review |
|---|---|
| 45530102 Klonne, D.; Fuller, R.; Honeycutt, R. (2001) Determination of Dermal and Inhalation Exposure to Reentry Workers During Harvesting in Cabbage: Lab Project Number: ERS20020: ML00-0849-ART: ARF050. Unpublished study prepared by Excel Research Services, Inc. 345 p. | |
| 45530103 Klonne, D.; Fuller, R.; Merricks, D. (2001) Determination of Dermal and Inhalation Exposure to Reentry Workers During Tying in Tomatoes: Lab Project Number: 3905: HL10267: ARF051. Unpublished study prepared by Agrisearch Inc. 382 p. | |
| 46734001 Klonne, D.; Bruce, E. (2005) Determination of Dermal and Inhalation Exposure to Reentry Workers During Maintenance Activities in Golf Courses: (Chlorothalonil). Project Number: ARTF/ARF057, ARF057/MG, ARF057/CC. Unpublished study prepared by Agricultural Reentry Task Force and Ricerca Biosciences, LLC. 485 p. | D327361 |
| Agricultural Handlers Exposure Task Force (AHETF) Studies -- Data were reviewed and incorporated as part of revisions to Occupational Pesticide Handler Exposure Data | |
| 47212806 Bruce, E. (2007) Determination of Dermal and Inhalation Exposure to Workers in the Pacific Northwest During Open Pour/Mising Loading a Dry Flowable Pesticide Product and During Application to Various Sites by a Variety of Application Methods. Project Number: AHE18, 050186. Unpublished study prepared by Agricultural Handlers Exposure Task Force. 416 p. | |
| 47212808 Klonne, D. (2007) Determination of Dermal and Inhalation Exposure to Workers in Southern Georgia During Open Pour Mixing/Loading a Dry Flowable Pesticide Product and During Application to Various Sites by a Variety of Application Methods. Project Number: AHE20, 050188. Unpublished study prepared by Agricultural Handlers Exposure Task Force. 441 p. | D343367 |
| 47212809 Klonne, D. (2007) Determination of Dermal and Inhalation Exposure to Workers in Northern Florida During Open Pour Mixing/Loading a Dry Flowable Pesticide Product and during Application to Various Sites by a Variety of Application Methods. Project Number: AHE21. Unpublished study prepared by Agricultural Handlers Exposure Task Force, LLC. 406 p. | |
| 47259801 Klonne, D.; Holden, L. (2007) Agricultural Handler Exposure Scenario Monograph: Mixing and Loading Dry Flowable Formulations. Project Number: AHE1001. Unpublished study prepared by Agricultural Handlers Exposure Task Force. L.L.C. 107 p. | |
| 47947801 Klonne, D.; Holden, L. (2009) Agricultural Handler Exposure Scenario Monograph: Open Pour Mixing and Loading Dry Flowable Formulations. Project Number: AHE1001. Unpublished study prepared by Agricultural Handler Exposure Task Force. 229 p. | |
| 47947802 Klonne, D.; Holden, L. (2009) Agricultural Handler Exposure Scenario Monograph: Open Pour Mixing and Loading of Liquid Formulations. Project Number: AHE1003. Unpublished study prepared by Agricultural Handler Exposure Task Force. 209 p. | D373605 |
| 47947803 Bruce, E.; Holden, L. (2009) Agricultural Handler Exposure Scenario Monograph: Open Cab Groundboom Application of Liquid Sprays. Project Number: AHE1004. Unpublished study prepared by Agricultural Handler Exposure Task Force. 216 p. | |
| 48303501 Smith, L. (2010) Determination of Dermal and Inhalation Exposure to Workers During Airblast Applications of Liquid Sprays Using Closed Cab Equipment in Michigan Stone Fruit. Project Number: AHE57. Unpublished study prepared by Agricultural Handler Exposure Task Force. 169 p. | D381148 |
| 48164901 Klonne, D.; Holden, L. (2010) Agricultural Handler Exposure Scenario Monograph: Closed Cab Airblast Application of Liquid Sprays. Project Number: AHE1005. Unpublished study prepared by Agricultural Handlers Exposure Task Force. 216 p. | Data were reviewed and incorporated as part of revisions to Occupational Pesticide Handler Exposure Data |
| 47714402 Klonne, D.; Holden, L. (2009) Agricultural Handler Exposure Scenario Monograph: Open Cab Groundboom Application of Liquid Sprays. Project Number: AHE1004. Unpublished study prepared by Agricultural Handlers Exposure Task Force. 86 p. | |
| Dislodgeable Foliar Residue Studies | |
| 42875902 Formella, T. (1993) Determination of Dislodgeable Foliar Residues of Chlorothalonil and HCB from BRAVO 720 Treated Cherry Trees: Lab Project Number: 5224-92-0069-CR-001. Unpublished study prepared by Ricerca, Inc. 212 p.a | No dermal hazard concerns currently (i.e., no quantitative dermal risk assessments necessary). |
| 42875903 Formella, T. (1993) Determination of Dislodgeable Foliar Residues of Chlorothalonil and HCB from BRAVO 720 Treated Broccoli Plants: Lab Project Number: 5224-92-0069-CR-002. Unpublished study prepared by Ricerca, Inc. 252 p.a | Data will need to be reviewed if quantitative assessments required in future. |
| 42875904 Formella, T. (1993) Determination of Dislodgeable Foliar Residues of Chlorothalonil and HCB from BRAVO 720 Treated Cucumber Plants: Lab Project Number: 5224-92-0069-CR-003. Unpublished study prepared by Ricerca, Inc. 230 p.a | |
| 44868601 Prochaska, L. (1999) Dissipation of Dislodgeable Foliar Residues of Chlorothalonil on Broccoli: Final Report: Lab Project Number: 468C-102: SARS-97-51: 97.388. | Primary contractor reviews available for 42875902 and |

**Table A7.1. Exposure / Residue Studies Submitted for Chlorothalonil.**

| MRID - Study Citation | Agency Review |
|---|---|
| Unpublished study prepared by Stewart Agricultural Research Services, Inc. and Wildlife International, Ltd. 202 p. {OPPTS 875.2100} | 42875903 |
| 44868602 Prochaska, L. (1999) Dissipation of Dislodgeable Foliar Residues of Chlorothalonil on Sweet Corn: Final Report: Lab Project Number: 468C-104: SARS-97-53: SARS-97-CA-53. Unpublished study prepared by Stewart Agricultural Research Services, Inc. and Wildlife International, Ltd. 170 p. {OPPTS 875.2100} | |
| Turf Transferable Residue Studies | |
| 45071501 Belcher, T. (2000) Daconol Ultrex and Daconil WeatherStik Transferable Turf Residue Study on Golf Course Greens: Lab Project Number: RR-99-072B. Unpublished study prepared by Zeneca Ag Products. 436 p. {OPPTS 875.2100} | No dermal hazard concerns currently (i.e., no quantitative dermal risk assessments necessary).<br><br>Data will need to be reviewed if quantitative assessments required in future. |
| 45064901 Belcher, T. (2000) Daconil Ultrex and Daconil WeatherStik Transferable Turf Residue Study on Golf Course Fairways: Lab Project Number: RR 99-071B: CHLO-99-TR-01: ERS-99011. Unpublished study prepared by GB Biosciences Corporation. 376 p. {OPPTS 875.2100} | |
| 44901001 Hofen, J. (1999) Determination of Transferable Residues on Turf Treated With Chlorothalonil: Final Report: Lab Project Number: SARS-98-80: 7616-98-0160-CR: 7616-98-0160-CR-001. Unpublished study prepared by Stewart Agricultural Research Services, Inc., and Ricerca, Inc. 511 p. {OPPTS 875.2100} | |

a. Studies were noted as submitted in RED

**Attachment 8: Chlorothalonil International Residue Limit Status Sheet.**

# International Residue Limits

**Chlorothalonil** (081901; 10/14/11)

| Summary of US and International Tolerances and Maximum Residue Limits | | | | |
|---|---|---|---|---|
| *Residue Definition*: | | | | |
| US | | Canada | Mexico[1] | Codex[2] |
| 40 CFR 180.275:<br>Plant: chlorothalonil (tetrachloroisophthalonitrile) and its metabolite 4-hydroxy-2,5,6-trichloroisophthalonitrile<br>Livestock: the metabolite 4-hydroxy-2,5,6-trichloroisophthalonitrile | | Chlorothalonil tetrachloroisophthalonitrile, including the metabolite 4-hydroxy-2,5,6-trichloro-1,3-benzenedicarbonitrile | | Plant : chlorothalonil.<br><br>Livestock: SDS-3701 (2,5,6-trichloro-4-hydroxyisophthalonitrile ).<br>The residue is not fat-soluble. |
| *Commodity* | *Tolerance (ppm) /Maximum Residue Limit (mg/kg)* | | | |
| | US | Canada | Mexico[1] | Codex[2] |
| Almond | 0.05 | | | |
| Almond, hulls | 1.0 | | | |
| Apricot | 0.5 | | | |
| Asparagus | 0.1 | 0.1 | | |
| Banana (NMT 0.05 ppm in edible pulp) | 0.5 | | | 0.01 (*)[4] |
| Bean, dry, seed | 0.1 | 5 beans<br>7 dry chickpeas<br>0.1 lentils | | 0.2 beans (dry)[4]<br>1 pulses[3] |
| Bean, snap, succulent | 5 | | | 5 Common bean (pods and/or immature seeds)[4] |
| Blueberry | 1.0 | 0.6 | | |
| Brassica, head and stem, subgroup 5A | 5.0 | 5 broccoli, Brussels sprouts, cauliflower, cabbages | | 5 brocolli[4],<br>5 Brussels sprouts<br>6 Brussels sprouts[3]<br>1 cabbages, head[4], cauliflower[4]<br>5 Flowerhead brassicas (includes broccoli, broccoli Chinese and cauliflower)[3] |
| Carrot, roots | 1 | 1.0 carrots | | 1[4]<br>0.3 root and tuber vegetables[3] |
| Celery | 15 | 15 | | Celery 10;<br>Celery 20[3]<br>3 celery leaves[4] |
| Cherry, sweet | 0.5 | 0.5 cherries | | 0.5 cherries[4] |
| Cherry, tart | 0.5 | 0.5 cherries | | 0.5 cherries[4] |
| Cocoa bean, dried bean | 0.05 | | | |
| Coffee, bean, green | 0.20 | | | |
| Corn, sweet, kernel plus cob with husks removed | 1 | 0.02 | | |
| Cranberry | 5.0 | 2.0 | | 5[4] |
| Ginseng | 4.0 | | | 0.3 root and tuber vegetables[3] |
| Horseradish | 4.0 | | | |
| Lentil | 0.10 | 0.1 | | 0.2 beans (dry)[4]<br>1 pulses[3] |
| Lychee | 15 | | | |
| Mango | 1.0 | | | |

| Summary of US and International Tolerances and Maximum Residue Limits | | | | |
|---|---|---|---|---|
| *Residue Definition*: | | | | |
| US | | Canada | Mexico[1] | Codex[2] |
| Mushroom | 1.0 | 1.0 | | |
| Nectarine | 0.5 | | | |
| Okra | 6.0 | | | |
| Onion, bulb | 0.5 | 5.0 onions | | 0.5[4] |
| Onion, green | 5 | | | 10[3] spring onion |
| Papaya | 15 | | | 20[3] |
| Parsnip, roots | 1 | 1.0 parsnips | | 0.3 root and tuber vegetables[3] |
| Passionfruit | 3 | | | |
| Pea, edible podded | 5 | | | |
| Peach | 0.5 | 0.5 peaches/nectarines | | 0.2[4] |
| Peanut | 0.3 | 0.3 | | 0.05<br>0.1[3] |
| Pistachio | 0.2 | | | |
| Plum | 0.2 | | | |
| Plum, prune | 0.2 | | | |
| Potato | 0.1 | 0.08 | | 0.2[4]<br>0.3 root and tuber vegetables[3] |
| Rhubarb | 4.0 | | | |
| Soybean | 0.2 | | | 0.2 beans (dry)[4]<br>1 pulses[3] |
| Starfruit | 3.0 | | | |
| Tomato | 5 | 5.0 | | 5[4] |
| Vegetable, cucurbit, group 9 | 5.0 | 5.0 balsam apples, balsam pears, cantaloupes, chayote fruit, Chinese cucumbers, Chinese waxgourds, citron melons, cucumbers, edible gourds (other than those listed in this item), muskmelons (other than those listed in this item) pumpkins, summer squash, watermelons, west Indian gherkins, winter squash | | 5 cucumber; squash, summer; winter squash[4]<br><br>3 cucumber[3], gherkin[3] Squash, summer[3]<br><br>2 melons, except watermelon<br>2 melons, except watermelon[3] |
| Vegetable, fruiting, group 8, except tomato | 6.0 | | | 70 peppers Chili, dried[4]<br>7 peppers, Sweet (including pimento or pimiento)[4] |
| Yam, true | 0.10 | | | 0.3 root and tuber vegetables[3] |
| US [40 CFR §180.275(a)(2)] | | Canada | Mexico[1] | Codex[2] |
| Tolerances are established for the metabolite 4-hydroxy-2,5,6-trichloroisophthalonitrile in or on the following food commodities | | Same as above | | Same as above |
| *Commodity* | *Tolerance (ppm) /Maximum Residue Limit (mg/kg)* | | | |
| | US | Canada | Mexico[1] | Codex[2] |
| Cattle, fat | 0.1 | | | 0.07 mammalian fats (except milk fats)[3] |
| Cattle, kidney | 0.5 | | | 0.2 Edible offal (mammalian)[3] |
| Cattle, meat byproducts, except kidney | 0.05 | | | |

| Summary of US and International Tolerances and Maximum Residue Limits | | | | |
|---|---|---|---|---|
| *Residue Definition*: | | | | |
| US | | Canada | Mexico[1] | Codex[2] |
| Cattle, meat | 0.03 | | | 0.02 meat from mammals other than marine mammals)[3] |
| Goat, fat | 0.1 | | | 0.07 mammalian fats (except milk fats)[3] |
| Goat, kidney | 0.5 | | | 0.2 Edible offal (mammalian)[3] |
| Goat, meat byproducts, except kidney | 0.05 | | | |
| Goat, meat | 0.03 | | | 0.02 meat from mammals other than marine mammals)[3] |
| Hog, fat | 0.1 | | | 0.07 mammalian fats (except milk fats)[3] |
| Hog, kidney | 0.5 | | | 0.2 Edible offal (mammalian)[3] |
| Hog, meat byproducts, except kidney | 0.05 | | | |
| Hog, meat | 0.03 | | | 0.02 meat from mammals other than marine mammals)[3] |
| Horse, fat | 0.1 | | | 0.07 mammalian fats (except milk fats)[3] |
| Horse, kidney | 0.5 | | | 0.2 Edible offal (mammalian)[3] |
| Horse, meat byproducts, except kidney | 0.05 | | | |
| Horse, meat | 0.03 | | | 0.02 meat from mammals other than marine mammals)[3] |
| Milk | 0.1 | | | 0.07 milks[3] |
| Sheep, fat | 0.1 | | | 0.07 mammalian fats (except milk fats)[3] |
| Sheep, kidney | 0.5 | | | 0.2 Edible offal (mammalian)[3] |
| Sheep, meat byproducts, except kidney | 0.05 | | | |
| Sheep, meat | 0.03 | | | 0.02 meat from mammals other than marine mammals)[3] |
| *MRLs with NO US equivalent* | | | | |
| Barley | | | | 0.1[4] |
| Barley straw and fodder, dry | | | | 20[4] |
| Currants, Black, Red, White | | | | 5<br>20[3] |
| Gooseberry | | | | 20[3] |
| Grapes | | | | 0.5<br>3[3] |
| Leek | | | | 40[3] |
| Onion, Chinese | | | | 10[3] |
| Onion, Welsh | | | | 10[3] |
| Parsley | | | | 3 |
| Poultry fats | | | | 0.01[3] |
| Poultry meat | | | | 0.01[3] |
| Poultry skin | | | | 0.01[3] |
| Poultry edible offal | | | | 0.07[3] |
| Strawberry | | | | 5[3] |
| Sugar beet | | | | 0.2 |
| Wheat | | | | 0.1[4] |

| Summary of US and International Tolerances and Maximum Residue Limits | | | | |
|---|---|---|---|---|
| *Residue Definition*: | | | | |
| US | | Canada | Mexico[1] | Codex[2] |
| Wheat straw and fodder, dry | | | | 20[4] |
| Wasabi | | 5.0 | | |
| | | | | |
| Completed: M. Negussie; 10/18/2011 | | | | |

[1] Mexico adopts US tolerances and/or Codex MRLs for its export purposes.

[2] * = absent at the limit of quantitation; Po = postharvest treatment, such as treatment of stored grains. PoP = processed postharvest treated commodity, such as processing of treated stored wheat. (fat) = to be measured on the fat portion of the sample. MRLs indicated as proposed have not been finalized by the CCPR and the CAC.

[3] Proposed MRL.

[4] Withdrawal recommended.

(c) *Tolerances with regional registrations.* Tolerances with regional registration, as defined in §180.1(l), are established for the combined residues of chlorothalonil and its metabolite in or on the following raw agricultural commodities:

| Commodity | Parts per million |
|---|---|
| Hazelnut | 0.1 |
| Peppermint, tops | 2 |
| Persimmon | 1.5 |
| Spearmint, tops | 2 |

**To:** Bennett, Tate[Bennett.Tate@epa.gov]
**Cc:** Cassie Bladow[Cassie.Bladow@beetsugar.org]
**From:** Scott Herndon
**Sent:** Tue 5/9/2017 8:42:15 PM
**Subject:** Re: Section 18

Thanks so much! We really appreciate the help!

Sent from my iPhone

On May 9, 2017, at 4:36 PM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:

FYI we are on it.

Interesting. I'm not confident her management is aware of these conversations. Will find out.

Nancy B. Beck, Ph.D., DABT
Deputy Assistant Administrator, OCSPP
P: 202-564-1273
M: Ex. 6 - Personal Privacy
Beck.Nancy@epa.gov

**From:** Scott Herndon [mailto:sherndon@americansugarbeet.org]
**Sent:** Tuesday, May 9, 2017 4:09 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>
**Cc:** Cassie Bladow <Cassie.Bladow@beetsugar.org>
**Subject:** RE: Section 18

Tate,

I've looped Cassie back in and wanted to give you both an update. Dr. Mohamed Khan with NDSU had a conversation with Andrea Conrath at EPA (her contact information is below) this morning about the new data that was supplied by SipCam. Dr. Khan prepared the

Section 18 applications that were requested by the ND and MN Departments of Agriculture. He also prepared the application that we expect the Michigan Department of Agriculture to file soon.

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<image001.jpg>

Thanks!

Scott Herndon

Director of Biotechnology and Regulatory Affairs

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

-----Original Message-----
From: Scott Herndon
Sent: Monday, May 8, 2017 5:43 PM
To: 'Bennett, Tate' <Bennett.Tate@epa.gov>
Subject: RE: Section 18

SipCam has state registrations for Cercos (brand name) in Michigan, North Dakota, Minnesota.

North Dakota expires in 12/31/2017

Michigan expires in 6/30/2017

Minnesota expires 12/31/2017

SipCam will renew all of them

Scott Herndon

Director of Biotechnology and Regulatory Affairs American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

-----Original Message-----

From: Bennett, Tate [mailto:Bennett.Tate@epa.gov]

Sent: Monday, May 8, 2017 5:33 PM

To: Scott Herndon <sherndon@americansugarbeet.org>

Subject: Re: Section 18

Do these states currently have permits? What is the exact date of expiration?

> On May 8, 2017, at 5:20 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:

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> Tate,

>

> Apologies for the delay! I am now back at my computer and have put together a short backgrounder as well as relevant industry contacts.

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> I have also attached the correspondence from EPA to the ND and MN Departments of Agriculture asking them to withdraw their request.

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> Thanks so much for your help and please don't hesitate to email or call if you have any questions.

>

> Have a great evening!

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> Scott

>

> Scott Herndon

> Director of Biotechnology and Regulatory Affairs American Sugarbeet

> Growers Association

> 1155 15th Street NW #1100

> Washington, DC 20005

> 202-595-0786

> Ex. 6 - Personal Privacy (cell)

>

> -----Original Message-----

> From: Bennett, Tate [mailto:Bennett.Tate@epa.gov]

> Sent: Monday, May 8, 2017 3:34 PM

> To: Scott Herndon <sherndon@americansugarbeet.org>

> Cc: Cassie Bladow <Cassie.Bladow@beetsugar.org>

> Subject: Re: Section 18

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> Thanks!

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> <Section 18 for Chlorothalonil Contacts.docx> <Chlorothalonil

> Background.docx>

> <2017-05-05 Chlorothalonil Tech- Echo 500 Sugarbeet Tol Pet-Label

> Amend-C....pdf> <EPA email to ND and MN Departments of

> Agriculture.docx>

# Andrea B. Conrath

Biologist, Emergency Response Team
Registration Division – Office of Pesticide Programs
United States Environmental Protection Agency
Phone: 703.308.9356 Fax: 703.605.0781
conrath.andrea@epa.gov

Office & Courier
S-7235, One Potomac Yard
2777 Crystal Drive
Arlington, VA 22202

Mailing Address
USEPA – OPP (7505P)
1200 Pennsylvania Ave NW
Washington, DC 20004


Visit http://www.EPA.gov/pesticides/regulating/section18_training

ED_001311A_00000131

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**Cc:** Cassie Bladow[Cassie.Bladow@beetsugar.org]
**From:** Scott Herndon
**Sent:** Tue 5/9/2017 8:09:08 PM
**Subject:** RE: Section 18

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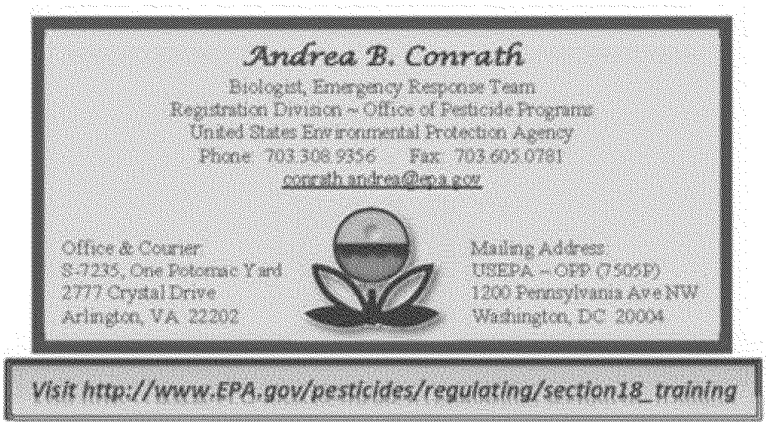


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> Ex. 6 - Personal Privacy (cell)

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> <2017-05-05 Chlorothalonil Tech- Echo 500 Sugarbeet Tol Pet-Label

> Amend-C....pdf> <EPA email to ND and MN Departments of

> Agriculture.docx>

**To:** Bennett, Tate[Bennett.Tate@epa.gov]
**From:** Scott Herndon
**Sent:** Mon 5/8/2017 9:42:16 PM
**Subject:** RE: Section 18

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**To:** Bennett, Tate[Bennett.Tate@epa.gov]
**Cc:** Cassie Bladow[Cassie.Bladow@beetsugar.org]
**From:** Scott Herndon
**Sent:** Mon 5/8/2017 9:19:46 PM
**Subject:** RE: Section 18
Section 18 for Chlorothalonil Contacts.docx
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>
>> On May 8, 2017, at 3:13 PM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:
>>
>> Hey Scott- do you have any summaries/background papers?
>>
>>> On May 8, 2017, at 2:47 PM, Cassie Bladow <Cassie.Bladow@beetsugar.org> wrote:
>>>
>>> Tate,
>>>
>>> Thank you for taking the time to chat this morning. As we discussed, I am looping Scott Herndon who works for the American Sugarbeet Growers Association into the conversation since he has done a lot of work on this issue and will be able to provide you with background and answer any questions you have.
>>>
>>> We really appreciate your guidance helping us move this along, especially given our tight timeline.
>>>
>>> Thanks again!
>>> Cassie
>>>

SipcamAdvan
The Natural Choice™

May 5, 2017

Tony Kish (PM-22)
Document Processing Desk (PETN)
Office of Pesticide Programs (7504P)
U.S. Environmental Protection Agency
Room S-4900, One Potomac Yard
2777 South Crystal Drive
Arlington, VA 22202-4501

**Subject: Chlorothalonil Technical (EPA Reg. No. 60063-1)**
**Echo 500 (EPA Reg. No. 60063-5)**
**Petition for Tolerance - Sugar beets**
**PRIA Action Code: R170**

Dear Mr. Kish:

Sipcam Agro USA, Inc. is submitting a petition for tolerance and residue data to expanding the Chlorothalonil Technical label to include sugar beets. This effort is also supportive of the North Dakota and Minnesota Section 18 applications.

This action falls under PRIA Category R170 (Additional food use-Registration Division). The fee due, which has been paid, is $66,124 with a PRIA decision timeline of 15 months.

In support of this new use, the following documents are attached:

Chlorothalonil Technical (EPA Reg. No. 60063-1)-Petition For Tolerance

- Petition for Tolerance Document
- Notice of Filing
- Copy of the PRIA payment from pay.gov
- Magnitude of the Residue Data

| MRID No. | Guideline No. | Study Title |
|---|---|---|
| 50273301 | 830.1500, 830.1520, 830.1340 | Kelley, K.B. 2016. Magnitude of the Residue of Chlorothalonil in Sugar Beet Raw Agricultural and Processed Commodities prepared for Sipcam Agro USA, Inc. by American Agriculture Services, Inc., GLP Technologies, and Golden Pacific Laboratories,Inc., American Ag Study Number AA150713, November 21, 2016, 387 pp. |

Sipcam Agro USA, Inc. Advan LLC Sostram Corporation
2525 Meridian Parkway Suite 350 Durham NC 27713 919-226-1195 Facsimile: 919-226-1196

SipcamAdvan
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Chlorothalonil Technical (EPA Reg. No. 60063-1)-Label Amendment

- Application for Amended Pesticide Registration (EPA Form 8570-1)
- Certification with Respect to Citation of Data (EPA Form 8570-34)
- Data Matrix (Agency Internal Use Copy) (EPA Form 8570-35)
- Data Matrix (Public Copy) (EPA Form 8570-35)
- Proposed Product Labeling – Highlighted Copy
- Proposed Product Labeling – Clean Copy

Echo 500 (EPA Reg. No. 60063-5)-Label Amendment

- Application for Amended Pesticide Registration (EPA Form 8570-1)
- Proposed Product Labeling – Highlighted Copy
- Proposed Product Labeling – Clean Copy

If you have any questions regarding this matter, please do not hesitate to contact me at (919) 226-1296 or by e-mail at pmcfadden@sipcamadvan.com.

Sincerely,

Patricia McFadden

Patricia McFadden
Registration Manager
Sipcam Agro USA, Inc.

Sipcam Agro USA, Inc. Advan LLC Sostram Corporation
2525 Meridian Parkway Suite 350 Durham NC 27713 919-226-1195 Facsimile: 919-226-1196

Chlorothalonil Background

Farmers in Michigan, Minnesota, and North Dakota are planting 779,000 acres of sugar beets this year, which is sixty-nine percent of the total sugar beet acreage in the United States. The sugar beet industry has a combined economic impact of $6,500,000,000 in those three states. The North Dakota Department of Agriculture and the Minnesota Department of Agriculture have both submitted Section 18 requests to the Environmental Protection Agency for the emergency use of chlorothalonil to combat *Cercospora beticola*, which causes Cercsopora leaf spot (CLS). We expect the Michigan Department of Agriculture to file a Section 18 request with EPA soon.

CLS attacks sugar beets and causes a dramatic loss in sugar content before and after harvest. In 2016 alone, CLS caused sugar beet growers in Minnesota, North Dakota, and Michigan to lose an estimated $328,200,000. The sugar beet growers in those states are facing a crisis because CLS has developed increased resistance to the currently registered fungicides. The resistance data is well documented in the Section 18 emergency exemption requests submitted by the North Dakota and the Minnesota Departments of Agriculture.

The Section 18 requests to both state departments of agriculture were originally requested jointly late in 2016 by agricultural research scientist Dr. Mohammed Khan with joint positions at North Dakota State University and the University of Minnesota. The requests were made to both state departments of agriculture jointly following past practice and because the production areas are contiguous along the borders of both states. However, this year, after Dr. Kahn submitted the information, he was asked to revise the submission and submit them individually with state specific information, causing an unexpected and untimely delay. The North Dakota Department of Agriculture submitted their Section 18 request to EPA on March 3, 2017. The Minnesota Department of Agriculture submitted their request to EPA on April 6, 2017. Both states have now been asked by EPA to withdraw their Section 18 requests because of a desire for more data. We understand that additional data has been submitted to EPA since the withdrawal requests were made. The new data should be weighed with the impending economic crisis caused by this outbreak in mind. Dr. Khan also submitted a request to the Michigan Department of Agriculture in late April of 2017. The Michigan Department of Agriculture has not yet submitted their Section 18 request to EPA.

Chlorothalonil (Cercos – Chloronitrile, broad spectrum) is the only fungicide identified by agricultural research scientists that can be used this season as a previously unavailable tank mix partner to help overcome this outbreak of resistant CLS. **Time is of the essence**. The 779,000 acres of sugar beets in all three states are at severe risk. Without the emergency exemption for chlorothalonil, the losses for 2017 are expected to be much greater than the $328,200,000 suffered in 2016 because of the high level of overwintering spores of CLS in infected leaf debris that remains in the growing regions. In order to allow enough time for an adequate supply of chlorothalonil to be manufactured, Section 18 emergency exemption would need to be granted by mid-May of 2017. Growers will start fungicide application around the end of June to early July. Farmers are facing historically low prices across the board on the commodities they grow and many may not be able to continue growing sugar beets if losses from CLS continue.

**From:** Conrath, Andrea B [mailto:Conrath.Andrea@epa.gov]
**Sent:** Friday, April 28, 2017 4:57 PM
**To:** Sauter, Jerry D. <jdsauter@nd.gov>; Matthew Sunseri (matthew.sunseri@state.mn.us) <matthew.sunseri@state.mn.us>
**Cc:** Maignan, Tawanda <Maignan.Tawanda@epa.gov>; Johnson, Marion <Johnson.Marion@epa.gov>
**Subject:** Section 18 Exemption Request for Chlorothalonil in Sugar Beet from ND and MN
**Importance:** High

To: Jerry Sauter, Pesticide Program Manager
North Dakota Department of Agriculture

Matt Sunseri, Pesticide Program Manager
Minnesota Department of Agriculture

From: Andrea Conrath, Biologist
Minor Use and Emergency Response Branch / RD
Office of Pesticide Programs / USEPA

I'm emailing you regarding the specific exemption requests submitted to the Environmental Protection Agency for use of chlorothalonil (Cercos™ Fungicide, containing 40.4% chlorothalonil; EPA Reg No. 60063-5; Sipcam Agro) on sugar beets to control Cercospora leaf spot (caused by *Cercospora beticola)* in North Dakota and Minnesota.

Although we haven't yet completed our review to determine if the criteria for an emergency are met, unfortunately we cannot currently make the safety findings required to allow this use.

Additionally, in accordance with the provisions of section 18 of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and FFDCA, EPA must establish tolerances for food uses that occur under the emergency exemption program, and at this time it is not possible at this time to establish any new tolerances for chlorothalonil.

For additional detail on EPA's findings and risk evaluations for chlorothalonil, I refer you to the docket for the registration review of this chemical. The docket is number docket EPA-HQ-OPP-2011-0840 and may be found at: https://www.regulations.gov/docket?D=EPA-HQ-OPP-2011-0840

In particular, please refer to the **March 13, 2012** ***Chlorothalonil. Human-Health Assessment Scoping Document in Support of Registration Review***, for a detailed discussion of the anticipated human health risk assessment and data needs, which may be found at:
https://www.regulations.gov/document?D=EPA-HQ-OPP-2011-0840-0002

Consequently, EPA recommends that the specific exemption requests be withdrawn. If convenient, you may do so via email communication.

Please let me know if you would like to discuss further or have any questions.

cc: Tawanda Maignan, Team Leader, ERT/MUERB/RD/OPP

Marion Johnson, Branch Chief, MUERB/RD/OPP

*Andrea B. Conrath*
Biologist, Emergency Response Team
Registration Division ~ Office of Pesticide Programs
United States Environmental Protection Agency
Phone: 703.308.9356 Fax: 703.605.0781
conrath.andrea@epa.gov

Office & Courier:
S-7235, One Potomac Yard
2777 Crystal Drive
Arlington, VA 22202

Mailing Address:
USEPA ~ OPP (7505P)
1200 Pennsylvania Ave NW
Washington, DC 20004

*Visit http://www.EPA.gov/pesticides/regulating/section18_training*

**To:** Bennett, Tate[Bennett.Tate@epa.gov]
**From:** Provost, Megan (J)
**Sent:** Fri 4/21/2017 7:29:49 PM
**Subject:** RE: Congratulations!

Hey, Tate! I hope you're getting settled in over there!

I wanted to follow-up to see if you had some time to catch up. Any chance you're available on Monday (the 24th) or Tuesday (the 25th)?

**From:** Provost, Megan (J)
**Sent:** Saturday, April 1, 2017 10:59 AM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>
**Subject:** Re: Congratulations!

No, I'm back and forth, though I'm in DC pretty often. I'm not out a ton over recess... How do April 10 (Monday) or 21 (Friday) look for you?

On a work-related note, I also wanted to give you a heads up that I spoke with Michal Freedhoff with the EPW Committee a couple times last week on EPA's recent decision on chlorpyrifos. It sounds like Sen. Carper will likely be sending (if he hasn't already) a letter to the Administrator.

Thanks!

Megan

On Mar 31, 2017, at 7:50 AM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:

Hey Megan!

Are you back in DC? Admittedly these next few weeks are rough schedule wise. What might

work on your end?

Tate

Sent from my iPhone

On Mar 30, 2017, at 11:55 AM, Provost, Megan (J) <MProvost@dow.com> wrote:

Tate!

I just heard the fantastic news… Congratulations on your new role! I'm so excited for you! (And, selfishly, I'm even more excited that I'll get to work with you more again!)

I would love to grab coffee and catch up sometime… Let me know how your schedule looks these days and if you've got time.

Congrats, again!

Megan

Megan J. Provost

Dow AgroSciences

U.S. Government Affairs

Mobile: Ex. 6 - Personal Privacy

Email: mprovost@dow.com

**To:** Bennett, Tate[Bennett.Tate@epa.gov]
**From:** Provost, Megan (J)
**Sent:** Sat 4/1/2017 2:59:28 PM
**Subject:** Re: Congratulations!

No, I'm back and forth, though I'm in DC pretty often. I'm not out a ton over recess... How do April 10 (Monday) or 21 (Friday) look for you?

On a work-related note, I also wanted to give you a heads up that I spoke with Michal Freedhoff with the EPW Committee a couple times last week on EPA's recent decision on chlorpyrifos. It sounds like Sen. Carper will likely be sending (if he hasn't already) a letter to the Administrator.

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Congrats, again!

Megan

Megan J. Provost

Dow AgroSciences

U.S. Government Affairs

Mobile: Ex. 6 - Personal Privacy

Email: mprovost@dow.com

**To:** Bennett, Tate[Bennett.Tate@epa.gov]
**From:** Provost, Megan (J)
**Sent:** Thur 3/30/2017 3:55:15 PM
**Subject:** Congratulations!

Tate!

I just heard the fantastic news… Congratulations on your new role! I'm so excited for you! (And, selfishly, I'm even more excited that I'll get to work with you more again!)

I would love to grab coffee and catch up sometime… Let me know how your schedule looks these days and if you've got time.

Congrats, again!

Megan

Megan J. Provost

Dow AgroSciences

U.S. Government Affairs

Mobile: Ex. 6 - Personal Privacy

Email: mprovost@dow.com

**To:** Provost, Megan (J)[MProvost@dow.com]
**From:** Bennett, Tate
**Sent:** Fri 3/31/2017 11:50:28 AM
**Subject:** Re: Congratulations!

Hey Megan!

Are you back in DC? Admittedly these next few weeks are rough schedule wise. What might work on your end?

Tate

Sent from my iPhone

On Mar 30, 2017, at 11:55 AM, Provost, Megan (J) <MProvost@dow.com> wrote:

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Megan J. Provost

Dow AgroSciences

U.S. Government Affairs

Mobile: Ex. 6 - Personal Privacy

Email: mprovost@dow.com

**To:** Scott Herndon[sherndon@americansugarbeet.org]
**Cc:** Cassie Bladow[Cassie.Bladow@beetsugar.org]
**From:** Bennett, Tate
**Sent:** Sun 6/25/2017 8:50:38 PM
**Subject:** Re: Cercospora

Thanks for the heads up! I know there are several things going on in ND. Who from OPP will be there do you know?

On Jun 21, 2017, at 9:25 AM, Scott Herndon <sherndon@americansugarbeet.org> wrote:

Tate,

Our sugarbeet growers from the Red River Valley Sugarbeet Growers Association in North Dakota are hosting some EPA OPP staff from June 26-30th in Fargo to discuss sugarbeets. I know that they will be peppering them with questions on Cercospora and Chlorothalonil so thought it may be helpful to give you a heads up of the attendees. I've attached their bios.

From Dr. Beck's last email it seems like EPA is waiting for the Chlorothalonil Coalition to develop the appropriate data and we are basically on hold until then. If get wind of any timeline I'd love to know. I'll reach out to Syngenta and SipCam to see what I can find out as well.

Thanks again for all of your help on this! We really appreciate it!

Scott

**Scott Herndon**

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

<Bios_OPP E-Tour Participants.docx>

**To:** Scott Herndon[sherndon@americansugarbeet.org]
**From:** Bennett, Tate
**Sent:** Wed 5/31/2017 11:55:31 AM
**Subject:** Re: Sugarbeets

Might have an update later today.

On May 30, 2017, at 12:38 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:

Tate,

My folks asked me what product EPA and Syngenta think will work. Is that something that you can share with me?

Thanks again!

Scott Herndon

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

202-595-0786

**From:** Bennett, Tate [mailto:Bennett.Tate@epa.gov]
**Sent:** Friday, May 26, 2017 9:44 AM
**To:** Scott Herndon <sherndon@americansugarbeet.org>
**Subject:** Re: Sugarbeets

Received. No problem!

On May 26, 2017, at 9:06 AM, Scott Herndon <sherndon@americansugarbeet.org> wrote:

Tate,

I'm not sure if my first response went through because my phone spazzed out and I got error messages.

I want to sincerely thank you for the update and for keeping me in the loop! Sorry for the delayed response. I slipped out of town for the long weekend.

Thanks again!

Scott

Sent from my iPhone

On May 25, 2017, at 10:15 AM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:

**From:** Beck, Nancy
**Sent:** Wednesday, May 24, 2017 6:47 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>
**Subject:** Sugarbeets

Got an update today, in case you get inquiries:

While some believe that clorothalonil is the only option, EPA is continuing to work with Syngenta (which is part of the chlorothalonil coalition) as both EPA and Syngenta think there are other registered products that could do the trick. Thus we continue to talk with states about the use of these alternatives.

**********

Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator

Office of Chemical Safety and Pollution Prevention

P: 202-564-1273

M: Ex. 6 - Personal Privacy

beck.nancy@epa.gov

**To:** Scott Herndon[sherndon@americansugarbeet.org]
**From:** Bennett, Tate
**Sent:** Fri 5/26/2017 1:44:17 PM
**Subject:** Re: Sugarbeets

Received. No problem!

On May 26, 2017, at 9:06 AM, Scott Herndon <sherndon@americansugarbeet.org> wrote:

Tate,

I'm not sure if my first response went through because my phone spazzed out and I got error messages.

I want to sincerely thank you for the update and for keeping me in the loop! Sorry for the delayed response. I slipped out of town for the long weekend.

Thanks again!

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Sent from my iPhone

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**Sent:** Wednesday, May 24, 2017 6:47 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>
**Subject:** Sugarbeets

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Deputy Assistant Administrator

Office of Chemical Safety and Pollution Prevention

P: 202-564-1273

M: Ex. 6 - Personal Privacy

beck.nancy@epa.gov

**To:** Scott Herndon[sherndon@americansugarbeet.org]
**From:** Bennett, Tate
**Sent:** Thur 5/25/2017 3:15:11 PM
**Subject:** FW: Sugarbeets

**From:** Beck, Nancy
**Sent:** Wednesday, May 24, 2017 6:47 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>
**Subject:** Sugarbeets

Got an update today, in case you get inquiries:

While some believe that clorothalonil is the only option, EPA is continuing to work with Syngenta (which is part of the chlorothalonil coalition) as both EPA and Syngenta think there are other registered products that could do the trick. Thus we continue to talk with states about the use of these alternatives.

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Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator

Office of Chemical Safety and Pollution Prevention

P: 202-564-1273

M Ex. 6 - Personal Privacy

beck.nancy@epa.gov

**To:** Scott Herndon[sherndon@americansugarbeet.org]
**From:** Bennett, Tate
**Sent:** Tue 5/23/2017 12:17:24 AM
**Subject:** Re: Running into another meeting

Checking!

> On May 22, 2017, at 2:51 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:
>
> Tate,
>
> I certainly don't want to harass you but wanted to check in to see if there is any news.
>
> Thanks!
>
> Scott
>
> Scott Herndon
> Director of Biotechnology and Regulatory Affairs
> American Sugarbeet Growers Association
> 1155 15th Street NW #1100
> Washington, DC 20005
> 202-595-0786
>
> -----Original Message-----
> From: Bennett, Tate [mailto:Bennett.Tate@epa.gov]
> Sent: Friday, May 19, 2017 6:47 PM
> To: Scott Herndon <sherndon@americansugarbeet.org>
> Subject: Re: Running into another meeting
>
> No news today. The governor was happy we are scrambling to help. Check back on Monday?
>
>> On May 19, 2017, at 8:27 AM, Scott Herndon <sherndon@americansugarbeet.org> wrote:
>>
>> Tate,
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>> Thanks so much for all of your help with this!
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>> Scott Herndon
>> Director of Biotechnology and Regulatory Affairs American Sugarbeet
>> Growers Association
>> 1155 15th Street NW #1100
>> Washington, DC 20005
>> 202-595-0786
>>
>> -----Original Message-----
>> From: Bennett, Tate [mailto:Bennett.Tate@epa.gov]
>> Sent: Thursday, May 18, 2017 2:14 PM
>> To: Scott Herndon <sherndon@americansugarbeet.org>
>> Subject: Re: Running into another meeting

>>
>> False alarm. Just had a historical ? Pre commissioner goehring meeting
>>
>>> On May 18, 2017, at 2:09 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:
>>>
>>> I'm free now Ex. 6 - Personal Privacy
>>>
>>> Sent from my iPhone
>>>
>>>> On May 18, 2017, at 1:01 PM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:
>>>>
>>>> No worries
>>>>
>>>>> On May 18, 2017, at 12:54 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:
>>>>>
>>>>> Probably will take over an hour but I can call you ASAP when leave
>>>>> a mess
>>>>>
>>>>> Sent from my iPhone

**To:** Scott Herndon[sherndon@americansugarbeet.org]
**From:** Bennett, Tate
**Sent:** Fri 5/19/2017 10:46:40 PM
**Subject:** Re: Running into another meeting

No news today. The governor was happy we are scrambling to help. Check back on Monday?

> On May 19, 2017, at 8:27 AM, Scott Herndon <sherndon@americansugarbeet.org> wrote:
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> Tate,
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> If you are able to give me an update on the Section 18 that would be great. I'd be curious to hear how the meeting with Goehring went too. My impression is that it doesn't look good but if there is a ray of hope that would be awesome. Is there anything else that I can do?
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> To: Scott Herndon <sherndon@americansugarbeet.org>
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>>>> On May 18, 2017, at 12:54 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:
>>>>
>>>> Probably will take over an hour but I can call you ASAP when leave a mess
>>>>
>>>> Sent from my iPhone

**To:** Scott Herndon[sherndon@americansugarbeet.org]
**From:** Bennett, Tate
**Sent:** Thur 5/18/2017 4:18:08 PM
**Subject:** RE: Fungicides - potentially for use in sugarbeets

Can I give you a quick buzz.

**From:** Scott Herndon [mailto:sherndon@americansugarbeet.org]
**Sent:** Thursday, May 18, 2017 10:47 AM
**To:** Beck, Nancy <Beck.Nancy@epa.gov>
**Cc:** Graham, Amy <graham.amy@epa.gov>; Palich, Christian <palich.christian@epa.gov>; Bennett, Tate <Bennett.Tate@epa.gov>; Cassie Bladow <Cassie.Bladow@beetsugar.org>
**Subject:** FW: Fungicides - potentially for use in sugarbeets

Dr. Beck,

I am forwarding this email from Dr. Kahn to Andrea Conrath in case is helpful.

Thanks again for your attention to this issue!

Scott

**Scott Herndon**

*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

1155 15th Street NW #1100

Washington, DC 20005

202-595-0786

**From:** Khan, Mohamed [mailto:mohamed.khan@ndsu.edu]
**Sent:** Thursday, May 18, 2017 10:19 AM
**To:** 'Conrath, Andrea B' <Conrath.Andrea@epa.gov>
**Cc:** Scott Herndon <sherndon@americansugarbeet.org>; 'dmaatz@rrvsga.com' <dmaatz@rrvsga.com>; 'Sunseri, Matthew (MDA)' <matthew.sunseri@state.mn.us>; 'jdsauter@nd.gov' <jdsauter@nd.gov>; 'ray.vandriessche@michigansugar.com' <IMCEAINVALID-ray+2Evandriessche+40michigansugar+2Ecom@namprd08.prod.outlook.com>; 'Pratt, David' <David.Pratt@Michigansugar.com>; 'verhougstraeteb@michigan.gov' <verhougstraeteb@michigan.gov>; 'Tyler Grove' <TGrove@crystalsugar.com>
**Subject:** RE: Fungicides - potentially for use in sugarbeets

Hello Andrea:

I have put together a few pictures on slides/comments which I hope will make it easy to understand why I do not recommend using several products for controlling CLS although they are labeled for use on sugarbeet.

I have continued checking with colleagues worldwide who are working with sugarbeet and unfortunately there is no other new chemistry that is effective against CLS, thus our request for chlorothalonil. I am also attaching a paper which demonstrates that *C. beticola* has developed resistance not only to QoI fungicides, but also to the benzimidazoles and DMI (triazoles) fungicides. It should be noted that in 2016, 14.4% of our isolates tested were resistant to TPTH + a DMI + Topsin + Headline and 24.4% of our isolates tested were resistant to triazoles (tetraconazole, difenoconazole+propiconazole, prothioconazole) (Secor et al. 2017. Sensitivity of Cercospora beticola to foliar fungicides in 2016. 2016 Sugarbeet Research and Extension Reports. 47:154-162). We are trying to manage fungicide resistance so that we can have the triazoles as a major tool for the future and to use other MOAs to target and significantly reduce the QoI resistant *C. beticola* population so that we can make the QoI fungicides effective again as we did for TPTH in the 2000s.

Once again, thanks for helping us in the past and I hope help will be forthcoming again before it is too late for the economic survival of the sugarbeet industry.

Regards,

Mohamed.

Mohamed F. R. Khan, Ph.D

Professor & Extension Sugarbeet Specialist

Plant Pathology Department

**NORTH DAKOTA STATE UNIVERSITY AND**

**UNIVERSITY OF MINNESOTA**

Walster Hall, Room 227

Dept. 7160, PO Box 6050

Fargo ND 58108-6050

phone: 701-231-8596

mobile phone: Ex. 6 - Personal Privacy

fax: 701-231-6186

mohamed.khan@ndsu.edu

www.ndsu.edu

NDSU NORTH DAKOTA STATE UNIVERSITY

**From:** Conrath, Andrea B [mailto:Conrath.Andrea@epa.gov]
**Sent:** Tuesday, May 16, 2017 4:06 PM
**To:** Matthew Sunseri (matthew.sunseri@state.mn.us) <matthew.sunseri@state.mn.us>; Brian Verhougstraete <verhougstraeteb@michigan.gov>; Sauter, Jerry D. <jdsauter@nd.gov>
**Cc:** Khan, Mohamed <mohamed.khan@ndsu.edu>; Johnson, Marion <Johnson.Marion@epa.gov>; Maignan, Tawanda <Maignan.Tawanda@epa.gov>
**Subject:** Fungicides - potentially for use in sugarbeets
**Importance:** High

Hello all –

Thank you for making time to discuss the exemption request with us today on such short notice. We will be sharing the evaluation from our Biological and Economic Analysis Division (BEAD) when it is finalized, probably next week. This should help clarify the areas of question with respect to meeting the criteria mandated to determine whether an emergency exemption may be warranted.

In the meantime, I wanted to share with you a short list of fungicides that our pathologist identified as potentially being options to explore for Cercospora management in sugarbeets. Please share with the other researcher if appropriate, since I didn't catch their name on our phone call.

Research from NY for Cercospora leaf spot on table beets (http://www.hort.cornell.edu/expo/proceedings/2016/ProcessingVegetables.Diversity%20and%20fungal%20resi ) looking for possible treatments (not necessarily registered). They had good results in trials with a few products that were tested:

1. cyprodinil + difenoconazole (pre-mix product, difenoconazole is already labeled for sugar beet),

2. difenoconazole + benzovindiflupyr (a Group 7 fungicide) [sugar beet currently has a pre-mix Group 7, fluxapyroxad + Group 11 pyraclostrobin, which has resistance),

3. fluazinam

Mancozeb provided good results as well (although lack of efficacy is claimed for CLS in sugarbeet).

Regards,

Andrea


**Andrea B. Conrath**
Biologist, Emergency Response Team
Registration Division ~ Office of Pesticide Programs
United States Environmental Protection Agency
Phone: 703.308.9356 Fax: 703.605.0781
conrath.andrea@epa.gov

Office & Courier:
S-7235, One Potomac Yard
2777 Crystal Drive
Arlington, VA 22202

Mailing Address:
USEPA ~ OPP (7505P)
1200 Pennsylvania Ave NW
Washington, DC 20004


*Visit http://www.EPA.gov/pesticides/regulating/section18_training*

**To:** Beck, Nancy[Beck.Nancy@epa.gov]
**Cc:** Palich, Christian[palich.christian@epa.gov]; Scott Herndon[sherndon@americansugarbeet.org]; Cassie Bladow[Cassie.Bladow@beetsugar.org]; Graham, Amy[graham.amy@epa.gov]
**From:** Bennett, Tate
**Sent:** Thur 5/11/2017 2:20:46 AM
**Subject:** Re: Section 18

Scott- Christian and Amy will be at the hearing tomorrow with Rick. Were you planning to be there?

On May 10, 2017, at 10:05 PM, Beck, Nancy <Beck.Nancy@epa.gov> wrote:

This is bizarre. On our call when we discussed reaching out to Stabenow, Rick clearly stated that he would state that believed his staff spoke prematurely and that they were looking at all the options.
Rick seems like such a straight shooter this just isn't adding up. Are we sure that Rick was the only one that spoke w Stabenows office and there wasn't some other call with his staffer?
I can check w Sven as he would have been on the call.

Nancy B. Beck, Ph.D., DABT
Deputy Assistant Administrator, OCSPP
P: 202-564-1273
M: Ex. 6 - Personal Privacy
Beck.Nancy@epa.gov

On May 10, 2017, at 9:27 PM, Palich, Christian <palich.christian@epa.gov> wrote:

I sat in on that call for a minute but was pulled away to another meeting, ill follow up with career staff in the morning to see a status.

I'll defer to Nancy on how to handle this more technical response.

Thanks so much for the heads up Scott.

Christian R. Palich
Deputy Associate Administrator
Congressional & Intergovernmental Relations
Ex. 6 - Personal Privacy

Sent from my iPhone

On May 10, 2017, at 9:15 PM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:

Thank you for the heads up. Looping in Nancy as it relates to the imminent hearing tomorrow. We probably need to give some messaging instructions on this so he doesn't tie our hands "on the record." Thoughts?

On May 10, 2017, at 9:10 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:

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Thanks again!

Scott

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*Director of Biotechnology and Regulatory Affairs*

American Sugarbeet Growers Association

202-595-0786

**From:** Cassie Bladow [mailto:Cassie.Bladow@beetsugar.org]
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ED_001311A_00000221

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> <EPA email to ND and MN Departments of Agriculture.docx>

**To:** Scott Herndon[sherndon@americansugarbeet.org]
**Cc:** Cassie Bladow[Cassie.Bladow@beetsugar.org]
**From:** Bennett, Tate
**Sent:** Mon 5/8/2017 7:34:29 PM
**Subject:** Re: Section 18

Thanks!

> On May 8, 2017, at 3:32 PM, Scott Herndon <sherndon@americansugarbeet.org> wrote:
>
> Tate,
>
> I have all of the information in my office but am on the Hill right now. I'll send everything to you this evening.
>
> Thanks so much!
>
> Scott
>
> Sent from my iPhone
>
>> On May 8, 2017, at 3:13 PM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:
>>
>> Hey Scott- do you have any summaries/background papers?
>>
>>> On May 8, 2017, at 2:47 PM, Cassie Bladow <Cassie.Bladow@beetsugar.org> wrote:
>>>
>>> Tate,
>>>
>>> Thank you for taking the time to chat this morning. As we discussed, I am looping Scott Herndon who works for the American Sugarbeet Growers Association into the conversation since he has done a lot of work on this issue and will be able to provide you with background and answer any questions you have.
>>>
>>> We really appreciate your guidance helping us move this along, especially given our tight timeline.
>>>
>>> Thanks again!
>>> Cassie
>>>

**To:** Cassie Bladow[Cassie.Bladow@beetsugar.org]
**Cc:** Scott Herndon[sherndon@americansugarbeet.org]
**From:** Bennett, Tate
**Sent:** Mon 5/8/2017 7:13:28 PM
**Subject:** Re: Section 18

Hey Scott- do you have any summaries/background papers?

> On May 8, 2017, at 2:47 PM, Cassie Bladow <Cassie.Bladow@beetsugar.org> wrote:
>
> Tate,
>
> Thank you for taking the time to chat this morning. As we discussed, I am looping Scott Herndon who works for the American Sugarbeet Growers Association into the conversation since he has done a lot of work on this issue and will be able to provide you with background and answer any questions you have.
>
> We really appreciate your guidance helping us move this along, especially given our tight timeline.
>
> Thanks again!
> Cassie
>

**To:** Provost, Megan (J)[MProvost@dow.com]
**From:** Bennett, Tate
**Sent:** Mon 4/24/2017 8:45:59 PM
**Subject:** RE: Congratulations!

Hey. Sorry but we are totally slammed this week. Happy to catch up via phone soon, however.

**From:** Provost, Megan (J) [mailto:MProvost@dow.com]
**Sent:** Friday, April 21, 2017 3:30 PM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>
**Subject:** RE: Congratulations!

Hey, Tate! I hope you're getting settled in over there!

I wanted to follow-up to see if you had some time to catch up. Any chance you're available on Monday (the 24th) or Tuesday (the 25th)?

**From:** Provost, Megan (J)
**Sent:** Saturday, April 1, 2017 10:59 AM
**To:** Bennett, Tate <Bennett.Tate@epa.gov>
**Subject:** Re: Congratulations!

No, I'm back and forth, though I'm in DC pretty often. I'm not out a ton over recess... How do April 10 (Monday) or 21 (Friday) look for you?

On a work-related note, I also wanted to give you a heads up that I spoke with Michal Freedhoff with the EPW Committee a couple times last week on EPA's recent decision on chlorpyrifos. It sounds like Sen. Carper will likely be sending (if he hasn't already) a letter to the Administrator.

Thanks!

Megan

On Mar 31, 2017, at 7:50 AM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:

Hey Megan!

Are you back in DC? Admittedly these next few weeks are rough schedule wise. What might work on your end?

Tate

Sent from my iPhone

On Mar 30, 2017, at 11:55 AM, Provost, Megan (J) <MProvost@dow.com> wrote:

Tate!

I just heard the fantastic news… Congratulations on your new role! I'm so excited for you! (And, selfishly, I'm even more excited that I'll get to work with you more again!)

I would love to grab coffee and catch up sometime… Let me know how your schedule looks these days and if you've got time.

Congrats, again!

Megan

Megan J. Provost

Dow AgroSciences

U.S. Government Affairs

Mobile: Ex. 6 - Personal Privacy

Email: mprovost@dow.com

**To:** Brown, Byron[brown.byron@epa.gov]
**Cc:** 'Mike Seyfert (mike.seyfert@fmc.com)'[mike.seyfert@fmc.com]
**From:** Provost, Megan (J)
**Sent:** Wed 4/12/2017 6:42:26 PM
**Subject:** Touching Base re: Endangered Species Act & Pesticides

Byron-

I wanted to touch base with you on behalf of Adama, Dow AgroSciences, and FMC, to give you a quick heads up that you all will be receiving a letter later this week sharing some concerns with the Environmental Protection Agency's (EPA's) recently finalized Endangered Species Act (ESA) biological evaluations (BEs) for diazinon, chlorpyrifos, and malathion.

On January 18, 2017, the EPA finalized BEs for these three important organophosphate (OP) pesticides. These BEs were conducted (1) as part of an "interim approach" agreed to by EPA and the Services to create a path forward for pesticide registrations under the ESA and (2) in addition to the detailed evaluation of the ecological impact these pesticides have gone through over decades of registration and re-registration already required by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

Unfortunately, these BEs were seriously flawed. For example, with regard to one OP, EPA proposed that over 97% of the 1,835 endangered species and 98% of the 794 critical habitats have a "likely to adversely affect" determination – for a product that has been in use since 1965. In addition, these BEs were rushed through the rulemaking process and demonstrate the unworkability of the "interim approach" being proposed by the agencies. These BEs have now been passed to the Services for use in developing more detailed biological opinions (BiOps).

As such, we are asking that the BEs be withdrawn because those work products did not provide a rational basis for further analysis. We're happy to answer any questions you have and to discuss this in further detail.

Thanks,

Megan

**Megan J. Provost**

U.S. Government Affairs

**Dow AgroSciences, LLC**

500 North Capitol Street, NW | Suite 200 | Washington, DC 20001

Phone: (202) 429-3434 | Mobile: Ex. 6 - Personal Privacy

Email: mprovost@dow.com | Fax: (866) 264-3820

http://www.dowagro.com | Facebook | Twitter | YouTube

Dow AgroSciences | *Solutions for the Growing World*

**To:** Jackson, Ryan[jackson.ryan@epa.gov]; Raymond.A.Starling@[redacted] Brown, Byron[brown.byron@epa.gov]; Sheryl Kunickis[redacted]; Brian Klippenstein [redacted]
**From:** Rebeckah Adcock
**Sent:** Fri 3/31/2017 7:05:21 PM
**Subject:** FYI Pesticide Policy Coalition Praises EPA Chlorpyrifos Decision

# PESTICIDE POLICY COALITION

A Coalition Working for Sound Pest Management Policies

## NEWS RELEASE

For more information, contact:

Ethan Mathews, mathews@ncga.com

Work: (202) 326-0647 Cell: (202) 374-9566

**Pesticide Policy Coalition Praises EPA Chlorpyrifos Decision**

WASHINGTON (March 30, 2017) – Members of the Pesticide Policy Coalition (PPC) today praised the U.S. Environmental Protection Agency (EPA)'s decision to deny a petition to remove the crop protection tool chlorpyrifos from the market.

"We need to provide regulatory certainty to the thousands of American farmers that rely on chlorpyrifos, while still protecting human health and the environment," EPA Administrator Scott Pruitt stated in the announcement. "By reversing the previous administration's steps to ban one of the most widely used pesticides in the world, we are returning to using sound science in decision-making."

PPC is a coalition of food, agriculture, pest management, and related organizations that support transparent, fair, and science-based regulation of pest management. PPC members heralded the announcement.

"The National Corn Growers Association supports transparent, science-based oversight of pesticides. We are encouraged by the EPA's decision because it signals a return to those standards and procedures. Farmers need access to many crop protection tools to ensure all tools can remain effective," said NCGA President Wesley Spurlock, a farmer from Stratford, Texas.

"As USDA has noted, chlorpyrifos has been used as part of environmentally-friendly integrated pest management programs for nearly 50 years. It is widely and safely used for a range of crops, including alfalfa, citrus, vegetables, soybeans, [and] almonds… [and] also protects hundreds of thousands of acres of grass seed production," said American Farm Bureau Federation President Zippy Duvall.

"Farmers count on the continual advancement of crop protection technology to stay ahead of crop threats, and that advancement hinges on a predictable regulatory process. EPA heeded the concerns laid out by stakeholders, state regulators, trading partners and even USDA in the public record. Today's decision reinforces the strength, objectivity and consistency of EPA's pesticide registration and registration-review process," stated Jay Vroom, president and CEO of CropLife America (CLA).

**About the Pesticide Policy Coalition**

PPC is a coalition of food, agriculture, pest management, and related organizations that support transparent, fair and science-based regulation of pest management. PPC members include nationwide and regional farm, commodity, specialty crop, and silviculture organizations; cooperatives; food processors and marketers; pesticide manufacturers, formulators and distributors; pest- and vector-control operators; research organizations; and other interested parties. PPC serves as a forum for the review, discussion, development, and advocacy of pest management policies and issues important to its members.

# # #

**To:** Brown, Byron[brown.byron@epa.gov]; Jackson, Ryan[jackson.ryan@epa.gov]
**From:** Rebeckah Adcock
**Sent:** Thur 3/30/2017 4:10:52 PM
**Subject:** FW: FINAL CEO Council Meeting Agenda and Materials
Pruitt Meeting Materials.pdf
ATT00001.htm

FYI – final materials for today's meeting.

Reb

**From:** "Mary Jo Tomalewski" <mjtomalewski@croplifeamerica.org>
**To:** "Hupp, Sydney" <hupp.sydney@epa.gov>
**Cc:** "Jay Vroom" <JVroom@croplifeamerica.org>
**Subject: FINAL Meeting Agenda and Materials**

Sydney,

We have refined our proposed topics for today's CEO Council meeting with the administrator. Attached, please find:

- Revised "Final Proposed Agenda Topics," which includes the list of those CEO Council members who will attend our meeting today, and their short bios
- Introduction / Mission Overview of the CEO Council
- CEO Council Letter to President Trump, dated February 9, 2017

We assume we can skip a formal "round table of introductions" at the beginning of the meeting as our time is short and we want to maximize time spent talking about issues.

MJ

*Mary Jo Tomalewski*

Executive Assistant to the President & CEO

CropLife America

1156 15th Street, NW

Suite 400

Washington, DC 20005

**Direct Dial** (202) 872-3849

**Main Switchboard** (202) 296-1585

**Mobile** Ex. 6 - Personal Privacy

**Fax** (202) 466-5832

**Email** mjtomalewski@croplifeamerica.org

**Web** www.croplifeamerica.org

***How can I serve you today?***

***Future Meetings***

2017 Spring Regulator Conference – April 6-7, Arlington, VA

2017 Annual Meeting – September 22-27, Dana Point, CA

2018 Winter Board of Directors Meeting – March 5-7, Washington, DC

2018 Annual Meeting – September 21-26, The Ritz-Carlton Amelia Island

# FINAL PROPOSED AGENDA TOPICS

**Meeting Information:** **Office of EPA Administrator Scott Pruitt**
1200 Pennsylvania Avenue, NW
Washington, DC
Thursday, March 30, 2017 3:45-4:30 PM

| Topic |
|---|
| 1. Thanks to Trump Administration and Administrator Pruitt for early decisive actions:<br>a. WOTUS<br>b. Chlorpyrifos Petition |
| 2. Top Priority Issues<br>a. **Ag Advisor Position –** We recommend adding additional title of "Assistant Deputy Administrator" as a title<br>b. **Water**<br>i. Next steps to refine / clarify beyond WOTUS<br>ii. NPDES permits (CAFO Program needs work; legislation to fix water permits NOT needed for lawful use of pesticides)<br>c. **Pesticides Policy**<br>i. **Endangered Species Act** conflicts with Pesticide Regulation and Biotech Regulation<br>ii. **Epidemiology** Study Policy (as aftermath from Chlorpyrifos matter)<br>iii. **Reform Certification & Training and Worker Protection Rules** – Suspend implementation and revise<br>d. **Renewable Fuels Standard** – current program kept consistent<br>e. **Communication / Messaging / Opinion Polling** – vital to all parties' ability to advance sound policy<br>f. **EPA and USDA Cooperation and Coordination** – Already vast progress; more can be done!<br>g. **Environmental Justice, Research & Development, and Children's Health Offices** – Better integration with and reform of EPA program offices; sound science<br>h. **Regulation of Manufacturing & Mining Facilities for Ag Inputs** – Restore science and process<br>i. **Public and Science Advisory Panels** at EPA – Balance, strategic agendas<br>j. **"Air Emissions"** from farming operations |

**CEO Attendees**

| | |
|---|---|
| **American Seed Trade Association** | Andrew "Andy" LaVigne, President and CEO |
| **American Soybean Association** | Steve Censky, Chief Executive Officer (***Co-Chair***) |
| **Biotechnology Innovation Organization** | Dana O'Brien, Executive Vice President |
| **CropLife America** | Jay Vroom, President and CEO (***Co-Chair***) |
| **The Fertilizer Institute** | Chris Jahn, President |
| **National Association of Wheat Growers** | Chandler Goule, CEO |
| **National Corn Growers Association** | Chris Novak, CEO (***Co-Chair***) |
| **National Cotton Council** | Gary Adams, President and CEO |
| **National Council of Farmer Cooperatives** | Chuck Conner, President and CEO |
| **National Pork Producers Council** | Neil Dierks, CEO |
| **United Fresh Produce Association** | Tom Stenzel, President and CEO |
| **USA Rice Federation** | Betsy Ward, President & CEO |
| **National Association of State Departments of Agriculture** | Barb Glenn, CEO, ***ex-officio*** |

**Others**

| | |
|---|---|
| **American Farm Bureau Federation** | Dale Moore, Deputy Executive Director |
| **Corn Refiners Association** | John Bode, President & CEO |
| **National Farmers Union** | Rob Larew, Senior VP |

# Production Agriculture's CEO Council

**Introduction/Mission Statement:** The production agriculture "CEO Council" coordinates alignment on core issues of modern agricultural systems through telling our story, sharing information and leveraging our strengths, while serving as a resource for government decision makers and others interested in USA food, fiber and renewable fuels.

## Core Focus of Interest

- Research and innovation
- Technology access
- Science and risk-based regulation
- Sustainability, environment, and weather
- Marketability, trade, and economic prosperity
- Government leadership and partnership with private sector
- Food access and food safety
- Plant and animal health
- Ag labor

## The Council supports (principles/themes):

- Accelerating rural economic growth and improving productivity through innovation and technology
- Promoting research and innovation that enables development of tools and techniques necessary for discovering new products that hold tremendous potential for farmers and society at large
- Enabling a regulatory and commercial environment in which agricultural products are marketable, both domestically and internationally
- Appropriate balance between Federal and State Governments and a cooperative regulatory approach
- Access to essential labor in balance with an effective Federal immigration policy and adequate worker safety protections
- Support for all methods of agricultural production
- Transparency and dialogue with consumers

**Members of the CEO Council (see reversed)**

March 30, 2017

## ***CEO Council Members***

| | |
|---|---|
| **American Farm Bureau** | Vincent "Zippy" Duvall, President |
| **American Seed Trade Association** | Andrew "Andy" LaVigne, President and CEO |
| **American Soybean Association** | Steve Censky, Chief Executive Officer (***Co-Chair***) |
| **Biotechnology Innovation Organization** | Dana O'Brien, Executive Vice President |
| **CropLife America** | Jay Vroom, President and CEO (***Co-Chair***) |
| **The Fertilizer Institute** | Chris Jahn, President |
| **National Association of Wheat Growers** | Chandler Goule, CEO |
| **National Cattlemen's Beef Association** | Kendal Frazier, CEO |
| **National Chicken Council** | Michael Brown, President |
| **National Corn Growers Association** | Chris Novak, CEO (***Co-Chair***) |
| **National Cotton Council** | Gary Adams, President and CEO |
| **National Council of Farmer Cooperatives** | Chuck Conner, President and CEO |
| **National Farmers Union** | Roger Johnson, President |
| **National Milk Producers Federation** | Jim Mulhern, President and CEO |
| **National Pork Producers Council** | Neil Dierks, CEO |
| **United Fresh Produce Association** | Tom Stenzel, President and CEO |
| **USA Rice Federation** | Betsy Ward, President & CEO |
| **National Association of State Departments of Agriculture** | Barb Glenn, CEO, ***ex-officio*** |

March 2017

February 9, 2017

The President
The White House
Washington, D.C. 20500

Dear Mr. President,

We, the CEO Council (undersigned herein), representing the production agricultural value chain, including many agricultural producers and farm input developers and suppliers, look forward to working with you and your Administration on matters of importance to American agriculture.

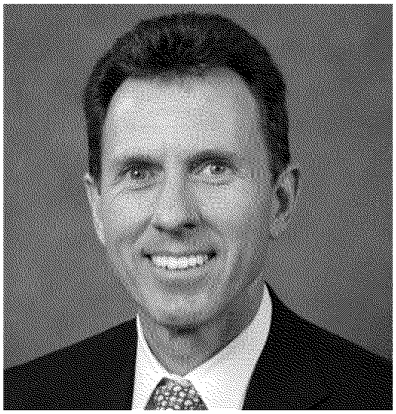
The challenges we face in agriculture are significant. Many experts emphasize that producers must grow as much food in the next 50 years as was produced over all previous history to meet the demands of our expanding global population. A firm commitment by the U.S. government to aggressively support agricultural innovation and science-based regulatory decisions will be necessary to ensure farmers have the tools they need to produce a safe and abundant supply of nutritious food, in addition to feed, fuel and fiber, in an environmentally sound and sustainable manner.

The policy and regulatory environment your Administration establishes can ensure that agricultural innovation flourishes and American farmers are able to meet the food production goals necessary to feed billions more people. We are ready to provide the White House and the Executive Branch Departments and Agencies, as well as Congress, with policy concepts that foster stability in the U.S. agriculture economy with a strong and predictable farm safety net and promotes American competitiveness through research; marketability and trade of agricultural commodities; rural economic growth; and plant, animal, and environmental health, among many other things.

We appreciate your attention to these and other issues of value to American production agriculture and food consumers everywhere.

Sincerely,

**American Farm Bureau Foundation,** Zippy Duvall
**American Seed Trade Association,** Andy LaVigne
**American Soybean Association,** Steve Censky
**Biotechnology Innovation Organization ,** Dana O'Brien
**CropLife America,** Jay Vroom
**The Fertilizer Institute,** Chris Jahn
**National Association of Wheat Growers,** Chandler Goule
**National Cattlemen's Beef Association,** Kendal Frazier
**National Corn Growers Association,** Chris Novak
**National Cotton Council,** Gary Adams
**National Council of Farmer Cooperatives,** Chuck Conner
**National Farmers Union,** Roger Johnson
**National Milk Producers Federation,** Jim Mulhern
**National Pork Producers Council,** Neil Dierks
**United Fresh Produce Association,** Tom Stenzel
**USA Rice Federation,** Betsy Ward



**Gary M. Adams**
President and Chief Executive Officer
National Cotton Council of America

Gary Adams assumed the position of President and Chief Executive Officer of the National Cotton Council in February 2015. He plays a key role in guiding the industry's seven segments to reach consensus on critical policies affecting U.S. cotton, with the mission of helping all U.S. cotton industry segments compete effectively and profitably in global markets.

Prior to that, Gary served the Council for 13 years as the Vice President of Economic and Policy Analysis. As the Council's chief economist, he provided economic outlooks for global cotton markets, as well as analyzing the impacts of farm and trade policies.

Gary also represents the U.S. cotton industry as a member of USDA's Agricultural Policy Advisory Committee. Previously, Gary served on USDA's Advisory Committee on Trade from 2005 through 2011 and the NASS Advisory Committee on Agricultural Statistics from 2003 through 2009.

Prior to joining the Council, Gary was a Research Assistant Professor in the Department of Agricultural Economics at the University of Missouri. During his 13-year tenure at the university, Gary's primary responsibilities included policy analysis and market outlook for the Food and Agricultural Policy Research Institute, also known as FAPRI. While at FAPRI, Gary and his colleagues were recognized by the American Agricultural Economics Association for their distinguished policy contributions.

Gary has B.S. and M.A. degrees in Applied Mathematics from the University of Alabama and a Ph.D. in Agricultural Economics from the University of Missouri. Gary and his wife, Ex. 6 - Personal Privacy

Ex. 6 - Personal Privacy

**Stephen L. Censky**
Chief Executive Officer

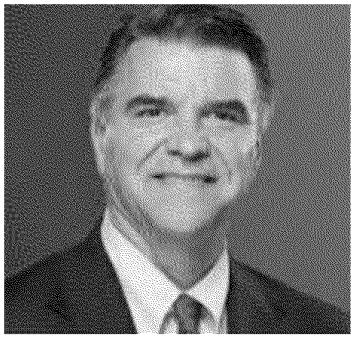
Stephen L. Censky is the American Soybean Association's (ASA) Chief Executive Officer, a staff position he accepted in April 1996. As ASA's top executive, Censky is in charge of managing ASA's legislative, trade policy, membership and education and training programs.

The American Soybean Association is a national, not-for-profit commodity organization with over 22,000 members. ASA works as the domestic and international policy advocate for soybean producer members.

Prior to joining ASA, Censky worked in Washington, D.C. for over a decade. He began his career on Capitol Hill as a legislative assistant for agricultural and transportation matters to Senator Jim Abdnor (R-SD). Later he served in both the Reagan and Bush Administrations at the U.S. Department of Agriculture, helping to craft the 1990 Farm Bill and eventually serving as Administrator of the Foreign Agricultural Service where he was involved in global trade negotiations and running our nation's export programs.

Censky received his Bachelor's of Science degree of Agriculture from South Dakota State University and his Master's Diploma in Agriculture Studies from the University of Melbourne, Australia.

NCFC
National Council of Farmer Cooperatives



**Charles F. (Chuck) Conner**

***President and CEO***
***National Council of Farmer Cooperatives***

Charles F. (Chuck) Conner became president & CEO of the National Council of Farmer Cooperatives (NCFC) on January 22, 2009. As president of NCFC, Conner will oversee the organization's work to promote and protect the business and public policy interests of America's farmer-owned cooperatives. He will also provide the strategic vision for the trade association as it continues to seek new ways in which to add value for its membership.

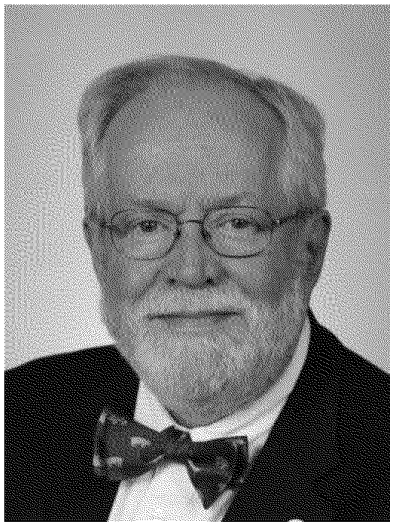
Prior to joining NCFC, Conner had served as the Deputy Secretary at the U.S. Department of Agriculture since mid-2005. In this capacity, he was the Chief Operating Officer (COO) overseeing day-to-day operations of the department. Conner interacted directly with President George W. Bush and his senior staff to formulate domestic and international food, trade, security and energy policy. He led development of the Bush Administration's $300 billion Farm Bill proposal and the strategy to educate and inform industry, constituents and Congress.

From August 2007 to January 2008, Conner served as both USDA Secretary and Deputy Secretary. He played a key role in developing the Administration's immigration policy including important changes to the H2A program.

Conner's experience also includes the assignment of Special Assistant to the President, Executive Office of the President, from October 2001 to May 2005, working on the 2001/2 Farm Bill to develop the strategy behind the transfer of several USDA agency functions to the newly formed Department of Homeland Security.

From May 1997 to October 2001 Conner served as President of the Corn Refiners Association. He also served for 17 years as an advisor to U.S. Senator Richard Lugar of Indiana.

Conner is a graduate of Purdue University, with a Bachelor's of Science degree and is the recipient of Purdue's Distinguished Alumni Award. He and his wif Ex. 6 - Personal Privacy



**Neil Dierks, Chief Executive Officer**

Neil Dierks is Chief Executive Officer of the National Pork Producers Council (NPPC). In this position, he is responsible for the overall implementation of all NPPC programs. Dierks' position requires him to spend time in both Des Moines, Iowa, the national office of NPPC, and Washington, D.C.

Beginning in 1990, Dierks served NPPC in a series of senior executive positions, including Executive Director of Operations, Vice President for Research and Education and Senior Vice President for Programs. Prior to his service with NPPC, Dierks was the Special Activities Director for the Iowa Pork Producers Association and Marketing Director for the Iowa Corn Promotion Board.

Neil grew up on a livestock farm in eastern Iowa and remains involved in a family farming operation. He is a graduate of Iowa State University.

**Dr. Barbara Glenn** recently joined the National Association of State Departments of Agriculture (NASDA) as CEO on August 18, 2014.

NASDA is a nonpartisan, nonprofit association which represents the elected and appointed commissioners, secretaries, and directors of the departments of agriculture in all fifty states and four U.S. territories.

Dr. Glenn is a scientist with decades of experience as a policy researcher and advocate for agriculture. She previously served as Senior Vice President of Science and Regulatory Affairs for CropLife America, where she was responsible for developing policies and regulations to support agriculture through crop protection. Prior to joining CropLife America, Dr. Glenn served as Managing Director of the Animal Biotechnology, Food and Agriculture Section of the Biotechnology Industry Association in Washington, DC.

Dr. Glenn holds a B.S. in animal science and a Ph.D. in ruminant nutrition from the University of Kentucky. She previously worked for the U.S. Department of Agriculture, Agricultural Research Service and the Federation of Animal Science Societies.

Born in Lincoln, Nebraska and raised in Centerville, Ohio, Dr. Glenn developed a passion for agriculture from her parents and her involvement in 4-H. She lives [redacted] Ex. 6 - Personal Privacy serves on various boards for farm bureau and 4-H.

**Chandler Goule**
CEO

Chandler Goule assumed his responsibilities as CEO of the National Association of Wheat Growers on July 5, 2016. In addition, he also serves as the executive director of the National Wheat Foundation.

Most recently, Goule served as senior vice president of programs at the National Farmers Union (NFU) where he was heavily involved in farm bill legislation.

Originally from Texas, Goule holds degrees from Texas A&M and George Washington University and served as a subcommittee staff director for the House Agriculture Committee before moving to the National Farmers Union in 2009 as vice president of government relations. He was appointed senior vice president of NFU programs in 2014.

The Fertilizer Institute
Nourish, Replenish, Grow

# BIOGRAPHY OF CHRISTOPHER JAHN

## President
## The Fertilizer Institute and the Nutrients for Life Foundation

Christopher L. Jahn is president of The Fertilizer Institute (TFI), the fertilizer industry's national trade association. As TFI president, Jahn works to represent, promote and protect a sound fertilizer industry through legislative and regulatory activities and to promote a favorable public image of the fertilizer industry and agriculture. Jahn also serves as president of the Nutrients for Life Foundation (NFL).

Jahn comes to TFI having served as president of the National Association of Chemical Distributors (NACD) since 2006. Prior to leading NACD, Jahn served as president of the Contract Services Association (CSA).

Before joining CSA, Jahn had an active role in the United States Senate working for nearly 10 years for U.S. Senator Craig Thomas (R-Wyo.) in a variety of roles, including legislative assistant, legislative director and Chief of Staff.

After graduating from Columbia University with a B.A. in Political Science, Jahn co-founded a book distribution business. He also earned an MBA from the University of Maryland.

A native of Wyoming, Chris and his wife Ex. 6 - Personal Privacy
( Ex. 6 - Personal Privacy

Capitol View
425 Third Street, S.W., Suite 950
Washington, DC 20024

202.962.0490
202.962.0577 fax
www.tfi.org

**Roger Johnson**
President

Roger Johnson is president of the National Farmers Union (NFU), a grassroots organization that represents more than 200,000 family farmers, ranchers, fisherman and rural communities across the Unites States.

Johnson was elected to lead the family farm organization at NFU's 107th anniversary convention in 2009. He has since expanded the education department by providing more programs for beginning, college-aged and women farmers, increased the number of Farmers Union state divisions, and developed a strategic plan for the organization. Johnson has also overseen a number of important policy initiatives important to family farmers including: passage of the 2014 Farm Bill; maintaining a strong Renewable Fuel Standard and Country-of-Origin Labeling, promoting policies that allow farmers to address the growing threat of climate change; and renewing the nation's focus on eliminating an overwhelming trade deficit that results in lost jobs and prosperity for rural America.

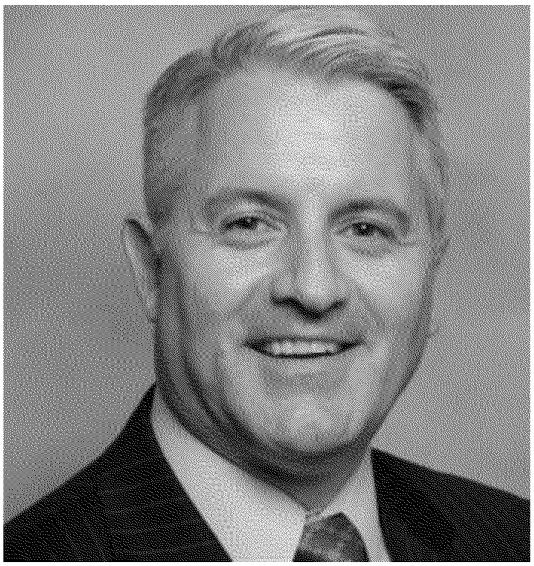
Prior to leading National Farmers Union, Johnson, a third-generation family farmer from Turtle Lake, N.D., served as North Dakota Agriculture Commissioner, a position he was first elected to in 1996. While Agriculture Commissioner, Johnson served on the State Industrial Commission, the North Dakota Trade Office Advisory Board, and the State Board of Agricultural Research and Education, among many other boards and commissions.

From 2007-2008, Johnson served as president of the National Association of State Departments of Agriculture (NASDA). He is a past president of the Midwestern Association of State Departments of Agriculture (MASDA), past president of the Food Export Association of the Midwest and a former chairman of the Interstate Pest Control Compact.

Johnson graduated from North Dakota State University with a degree in agricultural economics. Johnson and his wife, Ex. 6 - Personal Privacy

Ex. 6 - Personal Privacy

# AMERICAN SEED TRADE ASSOCIATION



**Andrew W. "Andy" LaVigne**
**President & CEO**

Andrew W. LaVigne is currently the President and CEO of the American Seed Trade Association. He joined ASTA in February, 2006. Andy has had a 30-year career in government relations, industry representation, public affairs advocacy, and management. His core areas of expertise include agriculture, food policy and international trade.

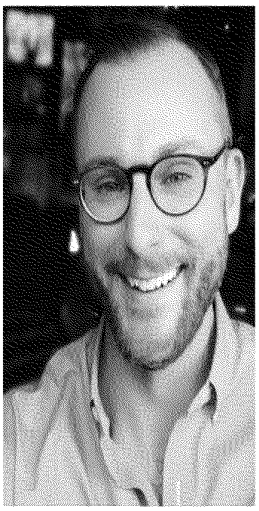
Prior to joining ASTA, Andy was Executive Vice President/CEO of Florida Citrus Mutual, representing citrus growers on issues affecting their business. Prior to joining Florida Citrus Mutual, Andy spent four years as Florida Fertilizer and Agrichemical Association's (FFAA) President and Executive Director. FFAA is a non-profit, agricultural trade organization representing companies that specialize in crop protection and plant nutrition products.

Before his position at FFAA, Andy spent eight years in Washington, D.C. working in the U.S. Congress and the U.S. Department of Agriculture. He served as Legislative Director for Congressman Charles Canady, Agriculture Committee staffer for Congressman Tom Lewis, and on the staff of USDA Secretary Ed Madigan.

Andy is a native of Florida with a BA degree in Political Science, with a minor in economics, from the University of Florida.

1701 Duke Street • Suite 275 • Alexandria, VA 22314 • Phone: (703) 837-8140 • Fax: (703) 837-9365

Biotechnology Innovation Organization



# Dana O'Brien

Executive Vice President, Food & Agriculture

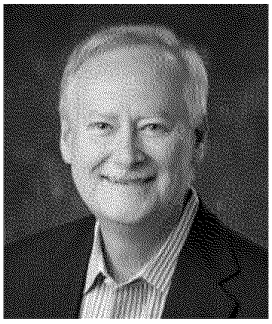
Dana O'Brien is Executive Vice President for Food and Agriculture and is responsible for the development of public policy and strategic advocacy, public affairs, and legal strategies that advance industry and stakeholder objectives in the United States.

Prior to becoming EVP, Dana served as BIO Food and Agriculture's chief legislative advocate as Senior Director of Federal Government Relations since March 2011.

Before BIO, Dana worked in Congress for the late Representative Ike Skelton (D-MO) managing his legislative team and concentrating on a variety of agricultural, energy, and trade matters.

A native of Sedalia, Missouri, and a graduate of Missouri University with a bachelor's degree in psychology, Dana joined the Skelton team immediately out of college and served there for nearly 14 years

UNITED FRESH
PRODUCE ASSOCIATION



Tom Stenzel
President and CEO
United Fresh Produce Association
1901 Pennsylvania Avenue NW, Suite 1100
Washington, DC 20006
202/303-3400
tstenzel@unitedfresh.org

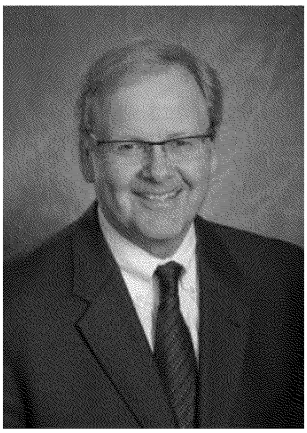
Tom Stenzel is President and CEO of the United Fresh Produce Association, a position he has held since 1993. United Fresh is the pre-eminent trade association for the produce industry in shaping legislative and regulatory policies; providing scientific and technical leadership in food safety and nutrition; and developing educational programs for its members. Founded in 1904, United Fresh represents the interests of companies from small family businesses to the largest international corporations throughout the global fresh produce supply chain.

United Fresh is widely known for its work in government affairs, agricultural policy, food safety and nutrition, working to promote political and environmental change to help the next generation of children double their consumption of fresh produce. The United Fresh Start Foundation is committed to increasing children's access to fresh fruits and vegetables, and is a founding partner of the *Let's Move Salad Bars to Schools* campaign. The campaign has donated salad bars to more than 6,000 schools across the country.

Tom is a frequent speaker on industry issues and has been recognized often by the produce industry throughout his career. He was honored as the 2002 *Produce Man of the Year* by *The Packer* newspaper, and is the past Chairman of the International Federation for Produce Standards, a global body representing national produce associations around the world.

He is a member of the U.S. Chamber of Commerce Committee of 100 leading association executives, the Advisory Board of the International Food Protection Training Institute, and the Key Industry Associations Committee of the American Society of Association Executives, from which he achieved the Certified Association Executive (CAE) designation in 1990. He has served in many government and industry leadership positions, including the first U.S. Department of Agriculture Fruit and Vegetable Industry Advisory Committee, President George W. Bush's Transition Advisory Team for Agriculture, and as an advisor on the U.S. Agricultural Policy Advisory Committee for Trade.

Tom was the founding President of the International Food Information Council (IFIC) in 1986, and was previously director of public affairs for the National Soft Drink Association. Tom is a 1977 graduate of the University of Richmond.



Jay Vroom has served as President and CEO of the trade association known as CropLife America (CLA) since 1989. CLA is the leading U.S. trade group for the crop protection industry in the U.S.

Vroom is a founding member of the CropLife Foundation, serving as chairman since its inception in 2001, and now serves as the Foundation's Vice-Chair, since 2015.

His sits of the Board of Directors for the Agricultural Retailers Association, Asmark, National Wheat Foundation, the National Association of Manufacturers Council of Manufacturing Associations, and the Soil Health Institute. He is also a member of the Farm Foundation Roundtable Steering Committee, and the North American Climate Smart Ag Alliance Steering Committee.

Vroom was a member of the youth organization, Future Farmers of America, and served as an elected state officer in Illinois. Today, he is a member of the FFA Foundation's Individual Giving Council and Board of Trustees.

Vroom co-chairs the Coalition for the Advancement of Precision Agriculture and the CEO Council.

He is a member of the Friends of the National Arboretum (FONA) FONA Council.

He graduated with honors from the College of Agriculture, Consumer and Environmental Sciences at the University of Illinois Urbana-Champaign. Vroom was raised on a grain and livestock farm in north-central Illinois and continues to own the farming operation.

# Elizabeth Ward

Betsy Ward was appointed President & CEO of the USA Rice Federation in 2007. From 2003-2005, Ward was the Vice President of International and Domestic Promotion at USA Rice where she was in charge of developing and implementing domestic and international promotion, and food aid programs.

From 2005-2007, Ward served as the chief executive for the Hardwood Federation, a trade association representing over 15,000 hardwood producers across the United States. From 1995 to 2003, she ran the Wood Products International Group at the American Forest & Paper Association, directing the wood trade policy and global forestry agenda for the industry.

In 2011, Ward was elected Chairman of the U.S. Agricultural Export Development Council (USAEDC) which represents the interests of more than 80 commodity organizations who grow and process a wide variety of U.S. agricultural products. She currently serves as Past Chair. Since 2011, Ward has also served on the Board of Directors of the Sustainable Fisheries Partnership, an independent non-governmental organization (NGO) working to ensure healthy marine and aquatic ecosystems; secure seafood supplies; and a thriving, responsible seafood economy.

Ward served for six years as a cleared advisor on the Industry Trade Advisory Committee for forest and paper products (ITAC-7) and was appointed forest products representative to USDA's Agricultural Policy Advisory Committee (APAC) in 2001.

Ward holds a Bachelor's degree in History and Political Science from the University of New Hampshire and a Master's degree in International Security Affairs from the School of International Affairs at Columbia University.

**To:** Dravis, Samantha[dravis.samantha@epa.gov]
**From:** Mapes, Cathy (CJ)
**Sent:** Wed 5/24/2017 7:59:31 PM
**Subject:** Thanks - looking forward to the work ahead!

Samantha,

Thank you for attending a portion of our ACC Environmental Management Committee meeting yesterday. I know you're just getting started and have an enormous job ahead, but what a fantastic opportunity – shaping the future of policy and business.

We stand ready to help you however we can, either directly or through our trade associations, as you begin the work of prioritizing and making change.

---

Best regards,

**Cathy Mapes**
Director, Global Regulatory Services,

EH&S Auditing & Compliance
The Dow Chemical Company
Tel. 989-636-8393
Fax 989-636-1651
E-mail: cjmapes@dow.com

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WORLDWIDE PARTNER

**To:** Dravis, Samantha[dravis.samantha@epa.gov]
**From:** Mapes, Cathy (CJ)
**Sent:** Wed 5/24/2017 9:54:38 PM
**Subject:** RE: Thanks - looking forward to the work ahead!

Absolutely. Is there an admin person that we can work on your end to make it happen?

**From:** Dravis, Samantha [mailto:dravis.samantha@epa.gov]
**Sent:** Wednesday, May 24, 2017 5:02 PM
**To:** Mapes, Cathy (CJ) <CJMapes@dow.com>
**Subject:** RE: Thanks - looking forward to the work ahead!

Thank you very much, Cathy. I would welcome a meeting in the next few weeks as schedules allow.

Best,

Samantha

**From:** Mapes, Cathy (CJ) [mailto:CJMapes@dow.com]
**Sent:** Wednesday, May 24, 2017 4:00 PM
**To:** Dravis, Samantha <dravis.samantha@epa.gov>
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Fax 989-636-1651
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www.dow.com | Facebook | Twitter | YouTube

**To:** Mapes, Cathy (CJ)[CJMapes@dow.com]
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