

To: Hupp, Sydney[hupp.sydney@epa.gov]
Cc: Hale, Michelle[hale.michelle@epa.gov]; Curtis Lando[Curtis.Lando@thirdsecurity.com]; Huff, Karen[KHuff@intrexon.com]; Gay Ludwick[gay@gdcillc.com]
From: Gay Ludwick
Sent: Mon 5/15/2017 8:08:04 PM
Subject: RE: Request; May 18th at 8:30 am ET meeting with EPA Administrator Pruitt and RJ Kirk of Intrexon

Sydney,

The attendees to the 8:30 am May 18th meeting will be:

Mr. RJ Kirk

Lt. Gen. (Ret.) Tom Bostick

Mr. Roy Bailey

Thanks,

Gay Ludwick

Gay M. Ludwick

Executive Assistant to Mr. Roy W. Bailey

Giuliani Deason Capital Interests, LLC

5956 Sherry Lane - Suite 800

Dallas, Texas 75225 - 214.378.3663

gay@gdcillc.com

From: Hupp, Sydney [mailto:hupp.sydney@epa.gov]
Sent: Monday, May 15, 2017 2:57 PM
To: Gay Ludwick <gay@gdcillc.com>
Cc: Hale, Michelle <hale.michelle@epa.gov>; Curtis Lando <Curtis.Lando@thirdsecurity.com>
Subject: RE: Request; Reschedule meeting with Administrator Pruitt and RJ Kirk of Intrexon

Great! Thank you.

Sydney Hupp

Executive Scheduler

Office of the Administrator

202.816.1659 (c)

From: Gay Ludwick [<mailto:gay@gdcillc.com>]
Sent: Monday, May 15, 2017 3:17 PM
To: Hupp, Sydney <hupp.sydney@epa.gov>
Cc: Hale, Michelle <hale.michelle@epa.gov>; Curtis Lando <Curtis.Lando@thirdsecurity.com>; Gay Ludwick <gay@gdcillc.com>
Subject: RE: Request; Reschedule meeting with Administrator Pruitt and RJ Kirk of Intrexon

Hello Sydney,

Thank you. The 18th at 8:30 am is fine. I will follow up with the names of the attendees.

Sincerely,

Gay Ludwick

Gay M. Ludwick

Executive Assistant to Mr. Roy W. Bailey

Giuliani Deason Capital Interests, LLC

5956 Sherry Lane - Suite 800

Dallas, Texas 75225 - 214.378.3663

gay@gdcillc.com

From: Hupp, Sydney [<mailto:hupp.sydney@epa.gov>]
Sent: Monday, May 15, 2017 2:11 PM
To: Gay Ludwick <gay@gdcillc.com>; Hale, Michelle <hale.michelle@epa.gov>
Subject: RE: Request; Reschedule meeting with Administrator Pruitt and RJ Kirk of Intrexon

Thank you for reaching out! How about 8:30AM on the 18th?

Sydney Hupp

Executive Scheduler

Office of the Administrator

202.816.1659 (c)

From: Gay Ludwick [<mailto:gay@gdcillc.com>]
Sent: Monday, May 15, 2017 10:44 AM
To: Hupp, Sydney <hupp.sydney@epa.gov>; Hale, Michelle <hale.michelle@epa.gov>
Cc: Gay Ludwick <gay@gdcillc.com>
Subject: Request; Reschedule meeting with Administrator Pruitt and RJ Kirk of Intrexon

Dear Sydney and Michelle,

On behalf of Roy Bailey I am writing to you to reschedule the meeting with Administrator Pruitt for this week. The Administrator and Mr. Bailey spoke recently and discussed this request. Mr. Kirk just happens to be in the East this week and wondered if the Administrator would be open to meet with Mr. Kirk and Mr. Bailey on the morning of the 17th or 18th. Mr. Kirk needs to be in New York City the afternoon of the 17th. That is why we choose those dates. Please let us know if either Wednesday or Thursday morning will work or what you might have to offer.

I look forward to hearing from you soon so, we may make plans.

Sincerely,

Gay

Gay M. Ludwick

Executive Assistant to Mr. Roy W. Bailey

Giuliani Deason Capital Interests, LLC

5956 Sherry Lane - Suite 800

Dallas, Texas 75225 - 214.378.3663

gay@gdcillc.com

To: Gay Ludwick[gay@gdcillc.com]
Cc: Hale, Michelle[hale.michelle@epa.gov]; Curtis Lando[Curtis.Lando@thirdsecurity.com]
From: Hupp, Sydney
Sent: Mon 5/15/2017 7:57:12 PM
Subject: RE: Request; Reschedule meeting with Administrator Pruitt and RJ Kirk of Intrexon

Great! Thank you.

Sydney Hupp

Executive Scheduler

Office of the Administrator

202.816.1659 (c)

From: Gay Ludwick [mailto:gay@gdcillc.com]
Sent: Monday, May 15, 2017 3:17 PM
To: Hupp, Sydney <hupp.sydney@epa.gov>
Cc: Hale, Michelle <hale.michelle@epa.gov>; Curtis Lando <Curtis.Lando@thirdsecurity.com>; Gay Ludwick <gay@gdcillc.com>
Subject: RE: Request; Reschedule meeting with Administrator Pruitt and RJ Kirk of Intrexon

Hello Sydney,

Thank you. The 18th at 8:30 am is fine. I will follow up with the names of the attendees.

Sincerely,

Gay Ludwick

Gay M. Ludwick

Executive Assistant to Mr. Roy W. Bailey

Giuliani Deason Capital Interests, LLC

5956 Sherry Lane - Suite 800

Dallas, Texas 75225 - 214.378.3663

gay@gdcillc.com

From: Hupp, Sydney [<mailto:hupp.sydney@epa.gov>]
Sent: Monday, May 15, 2017 2:11 PM
To: Gay Ludwick <gay@gdcillc.com>; Hale, Michelle <hale.michelle@epa.gov>
Subject: RE: Request; Reschedule meeting with Administrator Pruitt and RJ Kirk of Intrexon

Thank you for reaching out! How about 8:30AM on the 18th?

Sydney Hupp

Executive Scheduler

Office of the Administrator

202.816.1659 (c)

From: Gay Ludwick [<mailto:gay@gdcillc.com>]
Sent: Monday, May 15, 2017 10:44 AM
To: Hupp, Sydney <hupp.sydney@epa.gov>; Hale, Michelle <hale.michelle@epa.gov>
Cc: Gay Ludwick <gay@gdcillc.com>
Subject: Request; Reschedule meeting with Administrator Pruitt and RJ Kirk of Intrexon

Dear Sydney and Michelle,

On behalf of Roy Bailey I am writing to you to reschedule the meeting with Administrator Pruitt for this week. The Administrator and Mr. Bailey spoke recently and discussed this request. Mr. Kirk just happens to be in the East this week and wondered if the

Administrator would be open to meet with Mr. Kirk and Mr. Bailey on the morning of the 17th or 18th. Mr. Kirk needs to be in New York City the afternoon of the 17th. That is why we choose those dates. Please let us know if either Wednesday or Thursday morning will work or what you might have to offer.

I look forward to hearing from you soon so, we may make plans.

Sincerely,

Gay

Gay M. Ludwick

Executive Assistant to Mr. Roy W. Bailey

Giuliani Deason Capital Interests, LLC

5956 Sherry Lane - Suite 800

Dallas, Texas 75225 - 214.378.3663

gay@gdcillc.com

To: Beck, Nancy[beck.nancy@epa.gov]
Cc: Roy Bailey[rbailey@gdcillc.com]; kmatthews@wileyrein.com[kmatthews@wileyrein.com]; Brown, Byron[brown.byron@epa.gov]; Keigwin, Richard[Keigwin.Richard@epa.gov]; Dravis, Samantha[dravis.samantha@epa.gov]; Bobo, Jack[JBobo@intrexon.com]
From: Bostick, Thomas
Sent: Thur 5/18/2017 8:37:34 PM
Subject: Re: Sec 3 Registration for Mosquitos

Nancy, I could not agree more with Roy. I know RJ really appreciated and enjoyed the opportunity this morning. Many thanks!

Administer Pruitt and the EPA team were very gracious with your time. We look forward to our continued efforts together on this very important work.

I have added Jack Bobo who leads our Government Affairs for Intrexon and will work to follow up with you and others at EPA.

Thank you,
Tom

Sent from my iPhone

On May 18, 2017, at 4:19 PM, Roy Bailey <rbailey@gdcillc.com> wrote:

Nancy,

Thanks for the good news and more importantly, your fast response and attention to this important technology. We greatly appreciated your time today as well as the hard work Byron and team put into this over the last week.

I will step aside and let you experts do your work.

Thanks again and best regards

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell 214.208.1721
Office 214.378.3663
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

On May 18, 2017, at 2:58 PM, Beck, Nancy <Beck.Nancy@epa.gov> wrote:

Tom, Roy, and Keith,

It was a pleasure to meet you all today (and yesterday). The work you are doing is fascinating to me, not to mention the large potential public health significance.

I've checked with Rick Keigwin, the Acting Director of our Pesticides office, and he has confirmed that you can indeed submit the registration request, and begin the process, before the authority is transferred from FDA to EPA. Rick is cc'd above if you have any specific questions about how to make this happen. I'm sure his staff can provide assistance.

Regards,

Nancy

Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator

Office of Chemical Safety and Pollution Prevention

P: 202-564-1273

M: 202-731-9910

beck.nancy@epa.gov

CONFIDENTIAL TRANSMISSION - To the extent this electronic communication or any of its attachments contain information that is not in the public domain, such information is considered by Intrexon Corporation to be confidential and proprietary. This communication is expected to be read and/or used only by the individual(s) for whom it is intended. If you have received this electronic communication in

error, please reply to the sender advising of the error in transmission and delete the original message and any accompanying documents from your system immediately, without copying, reviewing or otherwise using them for any purpose. Thank you for your cooperation.

To: Hupp, Sydney[hupp.sydney@epa.gov]
From: Doug Deason
Sent: Thur 5/4/2017 11:04:32 AM
Subject: Fwd: Meeting with Secretary Pruitt

Try again, thanks!

Begin forwarded message:

From: Doug Deason <doug@deasoncap.com>
Date: May 3, 2017 at 6:41:15 PM CDT
To: "hupp.sidney@epa.gov" <hupp.sidney@epa.gov>
Cc: Doug Deason <doug@deasoncap.com>
Subject: FW: Meeting with Secretary Pruitt

Hi Sidney,

Sorry we are playing phone tag! I have three issues to discuss with you:

- 1) We will plan on being at the front door of the EPA Headquarters Building just before 3 PM on the 18th. Is the [Personal Phone/Ex. 6] number your cell? You said text if easier, so I thought it might be. We will land at Dulles that day by 1 PM and will be at the Trump easily by 2 PM. Call my cell if anything changes or you want to check on our arrival.

- 2) On a separate note, Roy Bailey, who was Finance Chair of the President's Inauguration Ceremony and our CEO of Giuliani Deason Capital Interests will be in DC next week. He will be with one of our close friends, RJ Kirk, the CEO of Intrexon (see the email below). I truly believe that Scott and his team would benefit greatly from meeting with RJ. If Scott and/or Ryan Jackson have any time I would really appreciate it if they would give RJ 15 mins or so. They will learn a lot!

- 3) Scott told me this past weekend that he was going to have Ryan Jackson call me to schedule a meeting in DC with our Environmental team at the Texas Public Policy Foundation and me, ASAP. He asked that I help them add a few experts on a new proposed Science Advisory Board. Could you check on the status please?

Thanks!

Doug Deason

From: Roy Bailey
Sent: Wednesday, May 3, 2017 6:16 PM
To: Doug Deason <doug@deasoncap.com>
Cc: Roy Bailey <rbailey@gdcille.com>
Subject: Meeting with Secretary Pruitt

Doug,

I know that you and Secretary Pruitt are good friends. I know him, but probably not as well so I wanted to see if you could ask him and his chief of staff to take a meeting .

RJ Kirk, is the leading bio-tech investor in the US and Chairman/CEO of Intrexon (NYSE). Intrexon is the leading 2nd generation life science genetic engineering company in the world. One of Intrexon's subsidiaries is OxiTec which owns the mosquito technology which can eradicate Zika virus and other mosquito carrying diseases.

RJ and I would like to meet with the Secretary and his chief of staff and make a courtesy call to explain the technology and evolution of this business. Would you please see if they could meet with us at a convenient time next week Wed May 10, Thurs May 11, or Friday morning May 12. We would greatly appreciate it.

Thanks so much

Warm regards

Roy W. Bailey

CEO

Giuliani Deason Capital Interests, LLC

Cell 214.208.1721

Office 214.378.3663

Rbailey@gdcillc.com

Rbailey@baileystrategicadvisors.com

To: Gay Ludwick[gay@gdcillc.com]
Cc: Woodward, Cheryl[Woodward.Cheryl@epa.gov]
From: Hupp, Sydney
Sent: Fri 5/5/2017 8:51:48 PM
Subject: RE: Meeting

Hi Gay,

Thank you for the information! Could we do 45 minutes with a 9:30AM start time, please? I am looping in Cheryl who can send you all of the logistical details on the location and arrival. Please feel free to reach out to me at any time with questions!

Thank you!

Sydney Hupp
Executive Scheduler
Office of the Administrator
202.816.1659 (c)

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

From: Gay Ludwick [<mailto:gay@gdcillc.com>]
Sent: Friday, May 5, 2017 11:01 AM
To: Hupp, Sydney <hupp.sydney@epa.gov>
Cc: Gay Ludwick <gay@gdcillc.com>
Subject: RE: Meeting

Dear Sydney,

On behalf of Roy Bailey and RJ Kirk I am writing to set the appointment for Thursday the 11th. I was able to move some appointments around and they are available the morning of Thursday, May 11th. May we please have an hour appointment? Would 9:30 or 10:00 am start time work best for this appointment? You may call me to discuss or email me back. Once we have a set time I will need an address and any special directions to enter the building, etc. The appointment will be with RJ Kirk, Bob Walsh and Roy Bailey.

I look forward to hearing from you.

Sincerely,
Gay Ludwick

Gay M. Ludwick
Executive Assistant to Mr. Roy W. Bailey

Giuliani Deason Capital Interests, LLC
5956 Sherry Lane - Suite 800
Dallas, Texas 75225 - 214.378.3663
gay@gdcillc.com

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

From: Hupp, Sydney [<mailto:hupp.sydney@epa.gov>]
Sent: Friday, May 5, 2017 8:44 AM
To: Roy Bailey <rbailey@gdcillc.com>
Cc: Gay Ludwick <gay@gdcillc.com>; Curtis M. Lando <clando@intrexon.com>
Subject: RE: Meeting

Great! Might be a little tight but we could push it up to 9:15AM if that works? Or we could do Wednesday at 3:45PM?

Thank you!

Sydney Hupp
Executive Scheduler
Office of the Administrator
202.816.1659 (c)

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

From: Roy Bailey [mailto:rbailey@gdcillc.com]
Sent: Friday, May 5, 2017 9:38 AM
To: Hupp, Sydney <hupp.sydney@epa.gov>
Cc: Gay Ludwick <gay@gdcillc.com>; Curtis M. Lando <clando@intrexon.com>
Subject: Re: Meeting

Sydney,

That's wonderful news and thank you so much. I have cc'd my asst Gay so she can help coordinate the meeting. RJ Kirk's exec asst Curtis is also cc'd.

I think we have a meeting at Dept of Energy at 10am on Thurs May 11. Could we possibly do it a bit earlier or later on Thursday? We are available Wednesday as well.

I greatly appreciate it and look forward to seeing you all.

Best regards

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell 214.208.1721
Office 214.378.3663
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

> On May 5, 2017, at 8:31 AM, Hupp, Sydney <hupp.sydney@epa.gov> wrote:

>

> Good morning Mr. Bailey,

>

> Hope this email finds you well! I am reaching out about the below request forwarded over to me by Ryan Jackson. I would be happy to facilitate getting it set up! Could we perhaps do Thursday morning at 9:30AM?

>

> Thank you!

>

>

> Sydney Hupp
> Executive Scheduler
> Office of the Administrator
> 202.816.1659 (c)

>

>

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

> From: Roy Bailey [mailto:rbailey@gdcillc.com]
> Sent: Thursday, May 4, 2017 6:53 PM

> To: Jackson, Ryan <jackson.ryan@epa.gov>
> Cc: Hale, Michelle <hale.michelle@epa.gov>; Gay Ludwick
> <gay@gdcillc.com>
> Subject: Meeting
>
> Dear Ryan,
>
> Hope all is well. Just a quick intro, I was national finance co-chairman for Trump and Co-Finance
Chairman for the inauguration (a great honor).
>
> I have met Secretary Pruitt several times and I think he will know me. I admire him greatly.
>
> Congratulations to you on your high level of service.
>
> I will be in DC next week on Wed and Thurs and would like to meet with the Secretary and you if
possible. I will be accompanied by RJ Kirk - the leading bio-tech investor and executive in the U.S. RJ
is Chairman/CEO of Intrexon a leading life science company and they have the genetically engineered
mosquito technology which can eradicate Zika virus and other viruses associated with mosquito bites. (OxiTec) My understanding is that their technology will fall under the purview of the EPA.
>
> I know you will find RJ very interesting and I think you will want to understand the details of their life
saving technology.
>
> Please let me know if there is a date and time convenient for us to stop by for a few minutes. It will be
productive indeed.
>
> Thanks for your consideration.
>
> Best regards
>
> Roy W. Bailey
> CEO
> Giuliani Deason Capital Interests, LLC Cell 214.208.1721 Office
> 214.378.3663 Rbailey@gdcillc.com Rbailey@baileystategicadvisors.com
>

To: Hupp, Sydney[hupp.sydney@epa.gov]
Cc: Woodward, Cheryl[Woodward.Cheryl@epa.gov]; Curtis Lando[Curtis.Lando@thirdsecurity.com]; Gay Ludwick[gay@gdcillc.com]
From: Gay Ludwick
Sent: Fri 5/5/2017 8:57:30 PM
Subject: RE: Meeting

Dear Sydney,

Thank you so much. Yes, we will take the 9:30 am slot. I look forward to receiving the information from Cheryl. I will send you names for security next week. Please also let us know who from your team will be in the meeting too.

Thanks again.

Have a wonderful weekend.

Regards,

Gay

Gay M. Ludwick
Executive Assistant to Mr. Roy W. Bailey

Giuliani Deason Capital Interests, LLC
5956 Sherry Lane - Suite 800
Dallas, Texas 75225 - 214.378.3663
gay@gdcillc.com

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

From: Hupp, Sydney [mailto:hupp.sydney@epa.gov]
Sent: Friday, May 5, 2017 3:52 PM
To: Gay Ludwick <gay@gdcillc.com>
Cc: Woodward, Cheryl <Woodward.Cheryl@epa.gov>
Subject: RE: Meeting

Hi Gay,

Thank you for the information! Could we do 45 minutes with a 9:30AM start time, please? I am looping in Cheryl who can send you all of the logistical details on the location and arrival. Please feel free to reach out to me at any time with questions!

Thank you!

Sydney Hupp
Executive Scheduler
Office of the Administrator
202.816.1659 (c)

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

From: Gay Ludwick [mailto:gay@gdcillc.com]
Sent: Friday, May 5, 2017 11:01 AM
To: Hupp, Sydney <hupp.sydney@epa.gov>
Cc: Gay Ludwick <gay@gdcillc.com>
Subject: RE: Meeting

Dear Sydney,

On behalf of Roy Bailey and RJ Kirk I am writing to set the appointment for Thursday the 11th. I was able to move some appointments around and they are available the morning of Thursday, May 11th. May we please have an hour appointment? Would 9:30 or 10:00 am start time work best for this appointment?

You may call me to discuss or email me back. Once we have a set time I will need an address and any special directions to enter the building, etc. The appointment will be with RJ Kirk, Bob Walsh and Roy Bailey.

I look forward to hearing from you.

Sincerely,
Gay Ludwick

Gay M. Ludwick
Executive Assistant to Mr. Roy W. Bailey

Giuliani Deason Capital Interests, LLC
5956 Sherry Lane - Suite 800
Dallas, Texas 75225 - 214.378.3663
gay@gdcillc.com

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

From: Hupp, Sydney [mailto:hupp.sydney@epa.gov]
Sent: Friday, May 5, 2017 8:44 AM
To: Roy Bailey <rbailey@gdcillc.com>
Cc: Gay Ludwick <gay@gdcillc.com>; Curtis M. Lando <clando@intrexon.com>
Subject: RE: Meeting

Great! Might be a little tight but we could push it up to 9:15AM if that works? Or we could do Wednesday at 3:45PM?

Thank you!

Sydney Hupp
Executive Scheduler
Office of the Administrator
202.816.1659 (c)

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

From: Roy Bailey [mailto:rbailey@gdcillc.com]
Sent: Friday, May 5, 2017 9:38 AM
To: Hupp, Sydney <hupp.sydney@epa.gov>
Cc: Gay Ludwick <gay@gdcillc.com>; Curtis M. Lando <clando@intrexon.com>
Subject: Re: Meeting

Sydney,

That's wonderful news and thank you so much. I have cc'd my asst Gay so she can help coordinate the meeting. RJ Kirk's exec asst Curtis is also cc'd.

I think we have a meeting at Dept of Energy at 10am on Thurs May 11. Could we possibly do it a bit earlier or later on Thursday? We are available Wednesday as well.

I greatly appreciate it and look forward to seeing you all.

Best regards

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell 214.208.1721

Office 214.378.3663
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

> On May 5, 2017, at 8:31 AM, Hupp, Sydney <hupp.sydney@epa.gov> wrote:

>

> Good morning Mr. Bailey,

>

> Hope this email finds you well! I am reaching out about the below request forwarded over to me by Ryan Jackson. I would be happy to facilitate getting it set up! Could we perhaps do Thursday morning at 9:30AM?

>

> Thank you!

>

>

> _____
> Sydney Hupp

> Executive Scheduler

> Office of the Administrator

> 202.816.1659 (c)

>

>

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

> From: Roy Bailey [mailto:rbailey@gdcillc.com]

> Sent: Thursday, May 4, 2017 6:53 PM

> To: Jackson, Ryan <jackson.ryan@epa.gov>

> Cc: Hale, Michelle <hale.michelle@epa.gov>; Gay Ludwick

> <gay@gdcillc.com>

> Subject: Meeting

>

> Dear Ryan,

>

> Hope all is well. Just a quick intro, I was national finance co-chairman for Trump and Co-Finance Chairman for the inauguration (a great honor).

>

> I have met Secretary Pruitt several times and I think he will know me. I admire him greatly.

>

> Congratulations to you on your high level of service.

>

> I will be in DC next week on Wed and Thurs and would like to meet with the Secretary and you if possible. I will be accompanied by RJ Kirk - the leading bio-tech investor and executive in the U.S. RJ is Chairman/CEO of Intrexon a leading life science company and they have the genetically engineered mosquito technology which can eradicate Zika virus and other viruses associated with mosquito bites. (OxiTec) My understanding is that their technology will fall under the purview of the EPA.

>

> I know you will find RJ very interesting and I think you will want to understand the details of their life saving technology.

>

> Please let me know if there is a date and time convenient for us to stop by for a few minutes. It will be productive indeed.

>

> Thanks for your consideration.

>

> Best regards

>

> Roy W. Bailey

- > CEO
- > Giuliani Deason Capital Interests, LLC Cell 214.208.1721 Office
- > 214.378.3663 Rbailey@gdcilc.com Rbailey@baileystrategicadvisors.com
- >

To: Hupp, Sydney[hupp.sydney@epa.gov]; Woodward, Cheryl[Woodward.Cheryl@epa.gov]
Cc: Curtis Lando[Curtis.Lando@thirdsecurity.com]
From: Gay Ludwick
Sent: Mon 5/8/2017 8:18:41 PM
Subject: RE: Meeting

I appreciate your help. Thank you.

Gay

Gay M. Ludwick
Executive Assistant to Mr. Roy W. Bailey

Giuliani Deason Capital Interests, LLC
5956 Sherry Lane - Suite 800
Dallas, Texas 75225 - 214.378.3663
gay@gdcillc.com

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

From: Hupp, Sydney [mailto:hupp.sydney@epa.gov]
Sent: Monday, May 8, 2017 3:16 PM
To: Gay Ludwick <gay@gdcillc.com>; Woodward, Cheryl <Woodward.Cheryl@epa.gov>
Cc: Curtis Lando <Curtis.Lando@thirdsecurity.com>
Subject: RE: Meeting

Good afternoon,

Cheryl can get you those details ASAP. The Administrator and our Chief of Staff, Ryan Jackson, will be in attendance.

Thank you!

Sydney Hupp
Executive Scheduler
Office of the Administrator
202.816.1659 (c)

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

From: Gay Ludwick [mailto:gay@gdcillc.com]
Sent: Monday, May 8, 2017 3:52 PM
To: Hupp, Sydney <hupp.sydney@epa.gov>; Woodward, Cheryl <Woodward.Cheryl@epa.gov>
Cc: Curtis Lando <Curtis.Lando@thirdsecurity.com>; Gay Ludwick <gay@gdcillc.com>
Subject: RE: Meeting

Good afternoon,

I hope all had a great weekend. Please send me the needed logistical details for the Thursday morning 9:30 am ET meeting. Also, who from the EPA will be attending this meeting? The attendees from our side are the following:

RJ Kirk - Intrexon
Lt. Gen. (Ret.) Tom Bostick - Intrexon
Roy Bailey - Giuliani Deason Capital Interests (Bob Walsh will not be attending)

I look forward to hearing from you. Thank you.

Sincerely,
Gay Ludwick

Gay M. Ludwick
Executive Assistant to Mr. Roy W. Bailey

Giuliani Deason Capital Interests, LLC
5956 Sherry Lane - Suite 800
Dallas, Texas 75225 - 214.378.3663
gay@gdcillc.com

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

From: Hupp, Sydney [mailto:hupp.sydney@epa.gov]
Sent: Friday, May 5, 2017 3:52 PM
To: Gay Ludwick <gay@gdcillc.com>
Cc: Woodward, Cheryl <Woodward.Cheryl@epa.gov>
Subject: RE: Meeting

Hi Gay,

Thank you for the information! Could we do 45 minutes with a 9:30AM start time, please? I am looping in Cheryl who can send you all of the logistical details on the location and arrival. Please feel free to reach out to me at any time with questions!

Thank you!

Sydney Hupp
Executive Scheduler
Office of the Administrator
202.816.1659 (c)

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

From: Gay Ludwick [mailto:gay@gdcillc.com]
Sent: Friday, May 5, 2017 11:01 AM
To: Hupp, Sydney <hupp.sydney@epa.gov>
Cc: Gay Ludwick <gay@gdcillc.com>
Subject: RE: Meeting

Dear Sydney,

On behalf of Roy Bailey and RJ Kirk I am writing to set the appointment for Thursday the 11th. I was able to move some appointments around and they are available the morning of Thursday, May 11th. May we please have an hour appointment? Would 9:30 or 10:00 am start time work best for this appointment? You may call me to discuss or email me back. Once we have a set time I will need an address and any special directions to enter the building, etc. The appointment will be with RJ Kirk, Bob Walsh and Roy Bailey.

I look forward to hearing from you.

Sincerely,
Gay Ludwick

Gay M. Ludwick
Executive Assistant to Mr. Roy W. Bailey

Giuliani Deason Capital Interests, LLC
5956 Sherry Lane - Suite 800

Dallas, Texas 75225 - 214.378.3663
gay@gdcillc.com

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

From: Hupp, Sydney [mailto:hupp.sydney@epa.gov]
Sent: Friday, May 5, 2017 8:44 AM
To: Roy Bailey <rbailey@gdcillc.com>
Cc: Gay Ludwick <gay@gdcillc.com>; Curtis M. Lando <clando@intrexon.com>
Subject: RE: Meeting

Great! Might be a little tight but we could push it up to 9:15AM if that works? Or we could do Wednesday at 3:45PM?

Thank you!

Sydney Hupp
Executive Scheduler
Office of the Administrator
202.816.1659 (c)

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

From: Roy Bailey [mailto:rbailey@gdcillc.com]
Sent: Friday, May 5, 2017 9:38 AM
To: Hupp, Sydney <hupp.sydney@epa.gov>
Cc: Gay Ludwick <gay@gdcillc.com>; Curtis M. Lando <clando@intrexon.com>
Subject: Re: Meeting

Sydney,

That's wonderful news and thank you so much. I have cc'd my asst Gay so she can help coordinate the meeting. RJ Kirk's exec asst Curtis is also cc'd.

I think we have a meeting at Dept of Energy at 10am on Thurs May 11. Could we possibly do it a bit earlier or later on Thursday? We are available Wednesday as well.

I greatly appreciate it and look forward to seeing you all.

Best regards

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell 214.208.1721
Office 214.378.3663
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

> On May 5, 2017, at 8:31 AM, Hupp, Sydney <hupp.sydney@epa.gov> wrote:

>

> Good morning Mr. Bailey,

>

> Hope this email finds you well! I am reaching out about the below request forwarded over to me by Ryan Jackson. I would be happy to facilitate getting it set up! Could we perhaps do Thursday morning at 9:30AM?

>
> Thank you!
>
> _____
> Sydney Hupp
> Executive Scheduler
> Office of the Administrator
> 202.816.1659 (c)
>
>
> -----Original Message-----
> From: Roy Bailey [mailto:rbailey@gdcillc.com]
> Sent: Thursday, May 4, 2017 6:53 PM
> To: Jackson, Ryan <jackson.ryan@epa.gov>
> Cc: Hale, Michelle <hale.michelle@epa.gov>; Gay Ludwick
> <gay@gdcillc.com>
> Subject: Meeting
>
> Dear Ryan,
>
> Hope all is well. Just a quick intro, I was national finance co-chairman for Trump and Co-Finance
Chairman for the inauguration (a great honor).
>
> I have met Secretary Pruitt several times and I think he will know me. I admire him greatly.
>
> Congratulations to you on your high level of service.
>
> I will be in DC next week on Wed and Thurs and would like to meet with the Secretary and you if
possible. I will be accompanied by RJ Kirk - the leading bio-tech investor and executive in the U.S. RJ
is Chairman/CEO of Intrexon a leading life science company and they have the genetically engineered
mosquito technology which can eradicate Zika virus and other viruses associated with mosquito bites. (OxiTec) My understanding is that their technology will fall under the purview of the EPA.
>
> I know you will find RJ very interesting and I think you will want to understand the details of their life
saving technology.
>
> Please let me know if there is a date and time convenient for us to stop by for a few minutes. It will be
productive indeed.
>
> Thanks for your consideration.
>
> Best regards
>
> Roy W. Bailey
> CEO
> Giuliani Deason Capital Interests, LLC Cell 214.208.1721 Office
> 214.378.3663 Rbailey@gdcillc.com Rbailey@baileystrategicadvisors.com
>

To: 'Gay Ludwick'[gay@gdcillc.com]; Hupp, Sydney[hupp.sydney@epa.gov]
Cc: Curtis Lando[Curtis.Lando@thirdsecurity.com]
From: Woodward, Cheryl
Sent: Mon 5/8/2017 8:21:30 PM
Subject: RE: Meeting

My name is Cheryl Woodward and I will assist you in the logistics for your meeting at EPA on Thursday, May 11th at 9:30 am. The instructions/directions to EPA is below and if you have any questions please contact me. Look forward to seeing you all.

Directions: If you come by Metro, the Federal Triangle metro stop is directly below the building entrances. You would leave the metro station and go up all three sets of escalators from the train otherwise two escalators then do a small U-Turn to the right heading toward 12th street, the South Lobby entrance is directly and immediately to your right (Glass Doors -EPA Signified on Glass).

EPA address is 1200 Pennsylvania Avenue, NW. If you are coming by taxi/vehicle, you want to be dropped off on 12th NW, which is between 12th and Constitution Avenues. It is almost exactly half way between the two avenues on 12th street with Federal Triangle Metro sign and Trump Hotel Towers side entrance can be used as a landmark. From 12th Street, facing the building with the EPA and American flags, walk toward the building (under the flags) and take the glass door on your left hand side with the escalators going down to the metro on your left. This again will be the South Lobby of the William Jefferson Clinton building.

Once inside the building, security will prompt you to scan all items such as bags, coats etc., and then let the guards know that you were instructed to call Cheryl Woodward at 564-1274 or Michelle Hale at 564-1430 to escort you to the meeting with the Administrator. Security will make temporary cards for everyone. Allow for 15 minutes to get through the process.

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

From: Gay Ludwick [mailto:gay@gdcillc.com]
Sent: Monday, May 08, 2017 3:52 PM
To: Hupp, Sydney <hupp.sydney@epa.gov>; Woodward, Cheryl <Woodward.Cheryl@epa.gov>
Cc: Curtis Lando <Curtis.Lando@thirdsecurity.com>; Gay Ludwick <gay@gdcillc.com>
Subject: RE: Meeting

Good afternoon,

I hope all had a great weekend. Please send me the needed logistical details for the Thursday morning 9:30 am ET meeting. Also, who from the EPA will be attending this meeting? The attendees from our side are the following:

RJ Kirk - Intrexon
Lt. Gen. (Ret.) Tom Bostick - Intrexon
Roy Bailey - Giuliani Deason Capital Interests (Bob Walsh will not be attending)

I look forward to hearing from you. Thank you.

Sincerely,
Gay Ludwick

Gay M. Ludwick
Executive Assistant to Mr. Roy W. Bailey

Giuliani Deason Capital Interests, LLC
5956 Sherry Lane - Suite 800
Dallas, Texas 75225 - 214.378.3663

gay@gdcillc.com

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

From: Hupp, Sydney [mailto:hupp.sydney@epa.gov]
Sent: Friday, May 5, 2017 3:52 PM
To: Gay Ludwick <gay@gdcillc.com>
Cc: Woodward, Cheryl <Woodward.Cheryl@epa.gov>
Subject: RE: Meeting

Hi Gay,

Thank you for the information! Could we do 45 minutes with a 9:30AM start time, please? I am looping in Cheryl who can send you all of the logistical details on the location and arrival. Please feel free to reach out to me at any time with questions!

Thank you!

Sydney Hupp
Executive Scheduler
Office of the Administrator
202.816.1659 (c)

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

From: Gay Ludwick [mailto:gay@gdcillc.com]
Sent: Friday, May 5, 2017 11:01 AM
To: Hupp, Sydney <hupp.sydney@epa.gov>
Cc: Gay Ludwick <gay@gdcillc.com>
Subject: RE: Meeting

Dear Sydney,

On behalf of Roy Bailey and RJ Kirk I am writing to set the appointment for Thursday the 11th. I was able to move some appointments around and they are available the morning of Thursday, May 11th. May we please have an hour appointment? Would 9:30 or 10:00 am start time work best for this appointment? You may call me to discuss or email me back. Once we have a set time I will need an address and any special directions to enter the building, etc. The appointment will be with RJ Kirk, Bob Walsh and Roy Bailey.

I look forward to hearing from you.

Sincerely,
Gay Ludwick

Gay M. Ludwick
Executive Assistant to Mr. Roy W. Bailey

Giuliani Deason Capital Interests, LLC
5956 Sherry Lane - Suite 800
Dallas, Texas 75225 - 214.378.3663
gay@gdcillc.com

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

From: Hupp, Sydney [mailto:hupp.sydney@epa.gov]
Sent: Friday, May 5, 2017 8:44 AM
To: Roy Bailey <rbailey@gdcillc.com>
Cc: Gay Ludwick <gay@gdcillc.com>; Curtis M. Lando <clando@intrexon.com>
Subject: RE: Meeting

Great! Might be a little tight but we could push it up to 9:15AM if that works? Or we could do Wednesday at 3:45PM?

Thank you!

Sydney Hupp
Executive Scheduler
Office of the Administrator
202.816.1659 (c)

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

From: Roy Bailey [mailto:rbailey@gdcillc.com]
Sent: Friday, May 5, 2017 9:38 AM
To: Hupp, Sydney <hupp.sydney@epa.gov>
Cc: Gay Ludwick <gay@gdcillc.com>; Curtis M. Lando <clando@intrexon.com>
Subject: Re: Meeting

Sydney,

That's wonderful news and thank you so much. I have cc'd my asst Gay so she can help coordinate the meeting. RJ Kirk's exec asst Curtis is also cc'd.

I think we have a meeting at Dept of Energy at 10am on Thurs May 11. Could we possibly do it a bit earlier or later on Thursday ? We are available Wednesday as well.

I greatly appreciate it and look forward to seeing you all.

Best regards

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell 214.208.1721
Office 214.378.3663
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

> On May 5, 2017, at 8:31 AM, Hupp, Sydney <hupp.sydney@epa.gov> wrote:

>

> Good morning Mr. Bailey,

>

> Hope this email finds you well! I am reaching out about the below request forwarded over to me by Ryan Jackson. I would be happy to facilitate getting it set up! Could we perhaps do Thursday morning at 9:30AM?

>

> Thank you!

>

>

> Sydney Hupp
> Executive Scheduler
> Office of the Administrator
> 202.816.1659 (c)

>

>

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

> From: Roy Bailey [mailto:rbailey@gdcillc.com]

> Sent: Thursday, May 4, 2017 6:53 PM

> To: Jackson, Ryan <jackson.ryan@epa.gov>

> Cc: Hale, Michelle <hale.michelle@epa.gov>; Gay Ludwick

> <gay@gdcillc.com>

> Subject: Meeting

>

> Dear Ryan,

>

> Hope all is well. Just a quick intro, I was national finance co-chairman for Trump and Co-Finance Chairman for the inauguration (a great honor).

>

> I have met Secretary Pruitt several times and I think he will know me. I admire him greatly.

>

> Congratulations to you on your high level of service.

>

> I will be in DC next week on Wed and Thurs and would like to meet with the Secretary and you if possible. I will be accompanied by RJ Kirk - the leading bio-tech investor and executive in the U.S. RJ is Chairman/CEO of Intrexon a leading life science company and they have the genetically engineered mosquito technology which can eradicate Zika virus and other viruses associated with mosquito bites. (OxiTec) My understanding is that their technology will fall under the purview of the EPA.

>

> I know you will find RJ very interesting and I think you will want to understand the details of their life saving technology.

>

> Please let me know if there is a date and time convenient for us to stop by for a few minutes. It will be productive indeed.

>

> Thanks for your consideration.

>

> Best regards

>

> Roy W. Bailey

> CEO

> Giuliani Deason Capital Interests, LLC Cell 214.208.1721 Office

> 214.378.3663 Rbailey@gdcillc.com Rbailey@baileystrategicadvisors.com

>

To: Beck, Nancy[Beck.Nancy@epa.gov]; Pruitt, Scott[Pruitt.Scott@epa.gov]; Brown, Byron[brown.byron@epa.gov]; Jackson, Ryan[jackson.ryan@epa.gov]; Dravis, Samantha[dravis.samantha@epa.gov]
Cc: Gay Ludwick[gay@gdcillc.com]; Roy Bailey[rbailey@gdcillc.com]
From: Roy Bailey
Sent: Sun 7/16/2017 3:36:39 AM
Subject: Attention please
[EPA Improperly Granted the Wolbachia EUP.DOCX ATT00001.htm](#)

Administrator,

I hope you are well.

I want to bring to your team's immediate attention something that hopefully you and your team will appreciate.

I have included an attachment for your review. The timing is now and hopefully after reviewing the attachment you will consider canceling the field trials until the potential human and environmental impact of the mentioned technology can be reviewed and studied.

There are some very smart and experienced people who understand this technology backwards and forwards and they believe, once reviewed, it won't pass muster. At a minimum, a pause and some time to study it could avoid a disaster and embarrassment to your agency.

I will be more than pleased to put our friends from Intrexon on a call immediately to discuss. After all, they have been in this mosquito business for over 10 years and have extensive knowledge of the subject matter.

Thank you and your team for considering this request and for your attention to the concerns outlined in the memo.

All my best regards and respect

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell 214.208.1721
Office 214.378.3663
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

Begin forwarded message:

From: "Bobo, Jack" <JBobo@intrexon.com>
Date: July 15, 2017 at 6:59:38 PM PDT

To: 'Roy Bailey' <rbailey@gdcillc.com>
Subject: Memo

CONFIDENTIAL TRANSMISSION - To the extent this electronic communication or any of its attachments contain information that is not in the public domain, such information is considered by Intrexon Corporation to be confidential and proprietary. This communication is expected to be read and/or used only by the individual(s) for whom it is intended. If you have received this electronic communication in error, please reply to the sender advising of the error in transmission and delete the original message and any accompanying documents from your system immediately, without copying, reviewing or otherwise using them for any purpose. Thank you for your cooperation.

To: Pruitt, Scott[Pruitt.Scott@epa.gov]; Beck, Nancy[Beck.Nancy@epa.gov]; Bennett, Tate[Bennett.Tate@epa.gov]; Brown, Byron[brown.byron@epa.gov]; Jackson, Ryan[jackson.ryan@epa.gov]
Cc: michelle@epa.gov[michelle@epa.gov]; Roy Bailey[rbailey@gdcillc.com]
From: Roy Bailey
Sent: Sun 7/16/2017 10:28:10 PM
Subject: Revised memo
[EPA Improperly Granted the Wolbachia EUP_07 16 17.docx](#)
[ATT00001.htm](#)

Administrator,

I have attached a revised memo which we think may be even more compelling and helpful. (sorry that it wasn't included in the previous email.) We are available for a call anytime today or tomorrow that is convenient for your team.

Again, we hope the EPA will consider revoking the field trial permit EUP for the referenced technology until the EPA can complete a full impact study on humans and the environment.

Thanks for your interest and consideration.

Respectfully and best regards

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell 214.208.1721
Office 214.378.3663
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

Begin forwarded message:

From: "Bobo, Jack" <JBobo@intrexon.com>
Date: July 16, 2017 at 3:07:45 PM PDT
To: 'Roy Bailey' <rbailey@gdcillc.com>
Subject: EPA Memo Updated

CONFIDENTIAL TRANSMISSION - To the extent this electronic communication or any of its attachments contain information that is not in the public domain, such information is considered by

Intrexon Corporation to be confidential and proprietary. This communication is expected to be read and/or used only by the individual(s) for whom it is intended. If you have received this electronic communication in error, please reply to the sender advising of the error in transmission and delete the original message and any accompanying documents from your system immediately, without copying, reviewing or otherwise using them for any purpose. Thank you for your cooperation.

Message

From: Roy Bailey [rbailey@gdcillc.com]
Sent: 7/28/2017 9:36:09 PM
To: Beck, Nancy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=168ecb5184ac44de95a913297f353745-Beck, Nancy]; Bennett, Tate [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=1fa92542f7ca4d01973b18b2f11b9141-Bennett, El]; Brown, Byron [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9242d85c7df343d287659f840d730e65-Brown, Byro]
Subject: RE: For your assistance

Thanks so much Nancy – sure appreciate everyone’s attention to our concern.

Hope you have a great weekend

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell **Ex. 6**
Office **Ex. 6**
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

From: Beck, Nancy [mailto:Beck.Nancy@epa.gov]
Sent: Friday, July 28, 2017 4:33 PM
To: Roy Bailey <rbailey@gdcillc.com>; Bennett, Tate <Bennett.Tate@epa.gov>; Brown, Byron <brown.byron@epa.gov>
Subject: RE: For your assistance

Thanks Roy.

I will pass these along to our experts for their review and input. I will get back to you once I have a sense from them regarding how long a review will take.

Regards,
Nancy

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

From: Roy Bailey [mailto:rbailey@gdcillc.com]
Sent: Friday, July 28, 2017 5:17 PM
To: Beck, Nancy <Beck.Nancy@epa.gov>; Bennett, Tate <Bennett.Tate@epa.gov>; Brown, Byron <brown.byron@epa.gov>; Beck, Nancy <Beck.Nancy@epa.gov>

Cc: Roy Bailey <rbailey@gdcillc.com>

Subject: For your assistance

Nancy,

Please find the attachment for you and the team's review. It is a thoughtful and substantive summary of answers and feedbacks to that which was sent to me earlier this week.

I hope you all find this helpful. We are more than happy to get together next week or whenever you think appropriate.

All my respect and regards

Roy W. Bailey

CEO

Giuliani Deason Capital Interests, LLC

Cell **Ex. 6**

Office **Ex. 6**

Rbailey@gdcillc.com

Rbailey@baileystrategicadvisors.com

Begin forwarded message:

From: "Chris Basta (INTREXON CORP)" <cbasta7@bloomberg.net>

Date: July 28, 2017 at 3:49:10 PM CDT

To: undisclosed-recipients.;

Subject: Follow-up

Reply-To: Chris Basta <cbasta7@bloomberg.net>

Roy,

With respect to the email you had sent on Tuesday regarding the scientific publications highlighting concerns or risks surrounding Wolbachia, please see the attached document with feedback to the points that were raised.

Hope you have a great weekend.

Best regards,

Chris

Message

From: Roy Bailey [rbailey@gdcillc.com]
Sent: 7/28/2017 9:17:17 PM
To: Beck, Nancy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=168ecb5184ac44de95a913297f353745-Beck, Nancy]; Bennett, Tate [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=1fa92542f7ca4d01973b18b2f11b9141-Bennett, El]; Brown, Byron [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9242d85c7df343d287659f840d730e65-Brown, Byro]; Beck, Nancy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=168ecb5184ac44de95a913297f353745-Beck, Nancy]
CC: Roy Bailey [rbailey@gdcillc.com]
Subject: For your assistance
Attachments: Feedback to Points Raised Regarding Publications - 7.28.2017.docx; ATT00001.htm

Nancy,

Please find the attachment for you and the team's review. It is a thoughtful and substantive summary of answers and feedbacks to that which was sent to me earlier this week.

I hope you all find this helpful. We are more than happy to get together next week or whenever you think appropriate.

All my respect and regards

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell Ex. 6
Office Ex. 6
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

Begin forwarded message:

From: "Chris Basta (INTREXON CORP)" <cbasta7@bloomberg.net>
Date: July 28, 2017 at 3:49:10 PM CDT
To: undisclosed-recipients;
Subject: Follow-up
Reply-To: Chris Basta <cbasta7@bloomberg.net>

Roy,

With respect to the email you had sent on Tuesday regarding the scientific publications highlighting concerns or risks surrounding Wolbachia, please see the attached document with feedback to the points that were raised.

Hope you have a great weekend.

Best regards,
Chris

Overall it appears that an adequate biosafety risk examination of this particular strain of *Wolbachia* (wAlb) in this particular mosquito (*Aedes aegypti*) has not been performed by the applicants. As '*Wolbachia causes very different responses depending on the host*' then each time *Wolbachia* is inserted into a new host it should be fully assessed. The information in publications from numerous independent scientists that cite various risks regarding the use of *Wolbachia* as a vector (i.e., mosquito) control method should be cause for concern.

Below is specific feedback to comments in the email received, as well as the EPA response to public comments from August 2016 that were cited in response to third-party scientist publications that express concerns or note potential issues with *Wolbachia*, including several specifically citing risks for its use in vector control.

1. Feedback to comments in email received:

Email comment – *“Citation 5: This research is for a completely different organism, Spodoptera exempta (African armyworm), not mosquitoes, and Wolbachia causes very different responses depending on the host. This information, while interesting, cannot be used to make predictions about mosquitoes.”*

Feedback – These two publications listed here are: (1) specific to mosquitoes and (2) involve the wAlbB strain of *Wolbachia*. These are not being cited to make predictions, however they involve mosquitoes as well as the wAlbB strain, and are relevant to a proper risk assessment:

- *Wolbachia* Strain wAlbB Enhances Infection by the Rodent Malaria Parasite Plasmodium berghei in Anopheles gambiae Mosquitoes
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3294472/>
- *Wolbachia* Enhances West Nile Virus (WNV) Infection in the Mosquito Culex tarsalis
<http://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0002965>

As noted in EPA comments '*Wolbachia causes very different responses depending on the host*', therefore, every insertion of *Wolbachia* into a new host – like *Aedes aegypti* - should be tested and fully assessed given the interactions are unknown and unpredictable.

Email comment - *Citation 12: With respect to the Wolbachia phage encoding a toxin from the black widow spider, this comment is referring to Citation 12 (“Eukaryotic association module in phage WO genomes from Wolbachia”). In this study, the WO-B phage in wAlbB strain mosquitoes were not studied. Only moth and parasitoid wasp WO phage were researched. Aedes aegypti wAlbB strain does have a WO-B phage associated with it; however, phage are specific to their hosts, horizontal gene transfer is happening on evolutionary time scales, there is no indication that the widow spider toxin sequence is expressed in the Wolbachia infection, and it is not reported that the WO-B phage in wAlbB Aedes aegypti produce the toxin from black widow spider. Also, most importantly, viruses*

have been shown to incorporate host sequences numerous times, but this is the first report of a virus of an obligate intercellular parasitic bacterium having sequences from both hosts: bacterial and eukaryotic. The widow spider toxin is a huge multimeric toxin with the entire 150kD monomer needing to be expressed and binding to form a tetramer to have full toxin activity. The sequence detected in the prophage sequence is only the C-terminus (maybe 18 kD) of the entire monomeric protein (150 kD). This C-terminus has been implicated in passage through membranes to release the toxins when produced in the spider. Furthermore, there is no evidence that *Wolbachia* alone are being transferred to animals when a female mosquito bites and takes a blood meal from an animal.

Feedback - Granting an experimental use permit notwithstanding the current lack of understanding of potential adverse effects that may result from the transfer of potentially harmful genes would seem to be inconsistent with EPA's regulatory obligations under FIFRA. It is well known that phage have ability to insert its genes into bacterial genomes. The WO phage (once inserted it's called a prophage) can and does insert into the *Wolbachia* genome – this has been established as per this 2016 publication:

- Eukaryotic association module in phage WO genomes from *Wolbachia*
<http://www.nature.com/articles/ncomms13155>

This results in genetic transformation that is unknown and uncharacterized, i.e., an unknown transgenic genome. The argument that the spider toxin will not be expressed because it is not the full genome is not the point. What is the C-terminus encoding for? Why is it there? What is the impact of it being there? It is imperative that these questions be addressed and investigated prior to *Wolbachia* being released into the environment in human biting mosquitoes.

Email comment – Citation 13, 14, and 15: *The Wolbachia pipientis strains associated with River blindness and lymphatic filariasis are in different clades than the wAlbB, and the wAlbB strain is not associated with these diseases.*

Feedback – The proponents of *Wolbachia* as a potential vector control method continuously cite that ~60% of insects may be infected with *Wolbachia* and therefore it is safe.

This estimate, which is at the highest end of the range of 20% to 60% listed in various publications, covers all *Wolbachia* strains including the clades of *Wolbachia* that are associated with river blindness that has infected over 30 million people in a single year and with lymphatic filariasis that infects an estimated 120 million people in tropical and subtropical areas according to the World Health Organization.

The mechanisms of action of any of the clades of *Wolbachia* are not completely understood and given these statistics and publications, extreme caution should be taken with the artificial introduction into a human biting mosquito.

These publications discuss *Wolbachia*'s association with these devastating diseases that impact tens of millions of people worldwide:

- Onchocerciasis: the Role of *Wolbachia* Bacterial Endosymbionts in Parasite Biology, Disease Pathogenesis, and Treatment
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3131055/>
- The Role of Endosymbiotic *Wolbachia* Bacteria in the Pathogenesis of River Blindness
<http://www.nature.com/news/2002/020304/full/news020304-9.html>
- Short Course, High Dose Rifampicin Achieves *Wolbachia* Depletion Predictive of Curative Outcomes in Preclinical Models of Lymphatic Filariasis and Onchocerciasis
<http://archive.lstmed.ac.uk/6918/>
- *Wolbachia* bacteria in filarial immunity and disease.
<https://www.ncbi.nlm.nih.gov/pubmed/11472559>

-
2. **Feedback to Comments in EPA's Response to Comments Received on the April 26, 2016, Notice of Receipt for an Amendment and Extension to Experimental Use Permit 88877-EUP-2 (Docket ID Number: EPA-HQ-OPP-2015-0374; FRL-9944-96) cited in the email. EPA's response to comments Public Comment #3.**

EPA Response to Public Comment #2 – *“The *Wolbachia*-based *Aedes aegypti* product proposed for experimental field trials mimics the cytoplasmic incompatibility phenotype as known from numerous insects and other arthropods; while a single report exists in the literature indicating natural infection of *Aedes aegypti*, it is estimated that greater than 1 million species extant in the environment harbor naturally occurring *Wolbachia* strains. This presence and degree of exposure to a variety of organisms without documented negative impacts suggests that the product under consideration by EPA is also likely to pose minimal probability of adverse effects to humans and the environment.”*

Feedback - This seems to state the following:

1. There are “naturally occurring” *Wolbachia* in over 1 million species “without documented negative impacts,” therefore, *Wolbachia* in *Aedes aegypti* is “likely to pose” minimal risk; and
2. *Wolbachia* strains associated with River Blindness and lymphatic filariasis have been well documented, yet they are different to the *Wolbachia* strain being utilized, so there should be no risk.

These points are logically inconsistent and are mutually incompatible. On the one hand, this comment says there are no risks because of no documented negative effects. Yet there are obviously negative documented negative effects, yet these don't count.

These publications discuss *Wolbachia's* association with devastating diseases that impact tens of millions of people worldwide, as well as its potential role in driving pathogen increase in its hosts:

- Onchocerciasis: the Role of Wolbachia Bacterial Endosymbionts in Parasite Biology, Disease Pathogenesis, and Treatment
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3131055/>
- The Role of Endosymbiotic Wolbachia Bacteria in the Pathogenesis of River Blindness
<http://www.nature.com/news/2002/020304/full/news020304-9.html>
- Wolbachia bacteria in filarial immunity and disease.
<https://www.ncbi.nlm.nih.gov/pubmed/11472559>
- Short Course, High Dose Rifampicin Achieves Wolbachia Depletion Predictive of Curative Outcomes in Preclinical Models of Lymphatic Filariasis and Onchocerciasis
<http://archive.lstmed.ac.uk/6918/>
- Wolbachia Can Enhance Plasmodium Infection in Mosquitoes: Implications for Malaria Control?
<http://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.1004182>
- Wolbachia Enhances West Nile Virus (WNV) Infection in the Mosquito *Culex tarsalis*
<http://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0002965>
- Wolbachia increases susceptibility to Plasmodium infection in a natural system
<http://rspb.royalsocietypublishing.org/content/281/1779/20132837>
- Wolbachia Strain wAlbB Enhances Infection by the Rodent Malaria Parasite Plasmodium berghei in *Anopheles gambiae* Mosquitoes
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3294472/>
- Wolbachia in a major African crop pest increases susceptibility to viral disease rather than protects.
<https://www.ncbi.nlm.nih.gov/pubmed/22731846>

EPA Response to Public Comment #2 – *“...it is estimated that greater than 1 million species extant in the environment harbor naturally occurring Wolbachia strains. This presence and degree of exposure to a variety of organisms without documented negative impacts suggests that the product under consideration by EPA is also likely to pose minimal probability of adverse effects to humans and the environment.”*

Feedback – All *Wolbachia* are not created equal, yet those that wish to see it used as a vector control method consistently note that up to ~60% of insects (some estimates of *Wolbachia* penetration are significantly lower) may be infected with it.

The fact they are not equal is supported by the fact that teams interested in *Wolbachia* as a vector control method tested several different *Wolbachia* strains in *Aedes* to get to one that

gave the desired lethality in offspring. Some strains gave no lethality at all, and other strains resulted in less than desired lethality.

More importantly, when *Wolbachia*-infected filarial worms invade the human body through the bites of insects, namely mosquitoes and flies, human immune responses occur which lead to river blindness and lymphatic filariasis that impact the lives of tens of millions of people across the globe. Here are some of the publications that cover *Wolbachia* and these diseases:

- Onchocerciasis: the Role of Wolbachia Bacterial Endosymbionts in Parasite Biology, Disease Pathogenesis, and Treatment
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3131055/>
- The Role of Endosymbiotic Wolbachia Bacteria in the Pathogenesis of River Blindness
<http://www.nature.com/news/2002/020304/full/news020304-9.html>
- Wolbachia bacteria in filarial immunity and disease.
<https://www.ncbi.nlm.nih.gov/pubmed/11472559>
- Short Course, High Dose Rifampicin Achieves Wolbachia Depletion Predictive of Curative Outcomes in Preclinical Models of Lymphatic Filariasis and Onchocerciasis
<http://archive.lstmed.ac.uk/6918/>

Therefore, the logic that the “*presence and degree of exposure to a variety of organisms without documented negative impacts suggests that the product under consideration by EPA is also likely to pose minimal probability of adverse effects to humans and the environment*” should be reconsidered as it is not clear that statement is accurate, especially with respect to these flies and mosquitoes that are the source for the widespread river blindness and lymphatic filariasis diseases.

In the case of wAlbB specifically, what percentage of insects have been infected with it? There are documented cases of this bacterium driving pathogen production higher in the hosts it invades including those listed below that are (1) specific to mosquitoes and (2) also involve the wAlbB strain of *Wolbachia*:

- *Wolbachia* Strain wAlbB Enhances Infection by the Rodent Malaria Parasite *Plasmodium berghei* in *Anopheles gambiae* Mosquitoes
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3294472/>
- *Wolbachia* Enhances West Nile Virus (WNV) Infection in the Mosquito *Culex tarsalis*
<http://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0002965>

EPA Response to Public Comment #2 – “*...while a single report exists in the literature indicating natural infection of *Aedes aegypti**”

Feedback –The report that is cited in the EPA response links to a NCBI Taxonomy page ([here](#)).

There is another paper that was published in 2009 (Klasson et al) that raises concerns regarding natural infection of *Aedes aegypti*:

- Horizontal gene transfer between *Wolbachia* and the mosquito *Aedes aegypti*
<https://bmcbgenomics.biomedcentral.com/articles/10.1186/1471-2164-10-33>

Here is excerpt from this paper by Klasson et al:

- “We have discovered a case of horizontal gene transfer (HGT), involving two adjacent genes, between the genomes of *Wolbachia* and the currently *Wolbachia*-uninfected mosquito *Aedes aegypti*, an important human disease vector. The lower level of sequence identity between *Wolbachia* and insect, the transcription of all the genes involved, and the fact that we have identified homologs of the two genes in another *Aedes* species (*Ae. mascarensis*), suggest that these genes are being expressed after an extended evolutionary period since horizontal transfer, and therefore that the transfer has functional significance. The association of these genes with *Wolbachia* prophage regions also provides a mechanism for the transfer. The data support the argument that HGT between *Wolbachia* endosymbiotic bacteria and their hosts has produced evolutionary innovation.”

Given this publication has unknown implications regarding artificially inserting *Wolbachia* back into *Aedes aegypti*, has EPA been provided test data or other evidence that substantiates or negates its conclusions?

Of note in the 2016 publication by Bordenstein cited earlier - Eukaryotic association module in phage WO genomes from *Wolbachia* <http://www.nature.com/articles/ncomms13155> - the authors stated ‘Among this subset with eukaryotic sequence homology, the protein domains are almost exclusively found in the phage eukaryotic association module (EAM). An EAM has never before been reported in bacteriophage genomes, to our knowledge, possibly because phages of obligate intracellular bacteria occupy a unique eukaryotic-enclosed niche and are relatively understudied’.

This is an important observation, along with other evidence of HGT that indicates there is still a lot to understand about the interaction of *Wolbachia* with its host and the implications.

EPA Response to Public Comment #3 – “The *wAlbB* *Aedes aegypti* strain is not intended to affect the competency of the vector to transmit viral agents. Currently, there is no compelling evidence that *wAlbB* in *Aedes aegypti* does affect the capacity of the vector to transmit disease agents.”

Feedback – Has the vector competency work been completed to establish this? As the EPA comment highlighted, it is known that ‘*Wolbachia* causes very different responses

depending on the host', so any new *Wolbachia* host interaction should be fully investigated including any change in disease vectoring capacity which these publications suggest occurs:

- *Wolbachia* Can Enhance Plasmodium Infection in Mosquitoes: Implications for Malaria Control?
<http://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.1004182>
- *Wolbachia* Enhances West Nile Virus (WNV) Infection in the Mosquito *Culex tarsalis*
<http://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0002965>
- *Wolbachia* increases susceptibility to Plasmodium infection in a natural system
<http://rspb.royalsocietypublishing.org/content/281/1779/20132837>
- *Wolbachia* Strain wAlbB Enhances Infection by the Rodent Malaria Parasite Plasmodium berghei in Anopheles gambiae Mosquitoes
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3294472/>
- *Wolbachia* in a major African crop pest increases susceptibility to viral disease rather than protects.
<https://www.ncbi.nlm.nih.gov/pubmed/22731846>

EPA Response to Public Comment #3 – *“Even with this strategy of deliberate male and female releases, failure to establish Wolbachia-infected populations has occurred in some instances.”*

Feedback – This reference to “failure to establish *Wolbachia*-infected populations” occurring in “some instances” is based on a different clade of *Wolbachia* known as wMel from *D. melanogaster*, whereas MosquitoMate uses a wAlbB strain from *Aedes albopictus*. With this in mind, have there been tests done to show it will not happen specific to the CI approach with wAlbB *Wolbachia* in *Aedes aegypti*?

This is relevant given the entire strategy depends on not releasing infected females, and the consequences are failure of the approach to control the *Aedes aegypti* population and the spreading of a bacterium into the environment in a human biting mosquito with unknown potential adverse effects.

EPA Response to Public Comment #3 – *“Establishing a wAlbB *Aedes aegypti* population is highly unlikely because only males are released with very few potential accidental female releases, i.e., less than 1 female per 250,000 males (U.S. EPA, 2015a and 2015b).”*

Feedback – This equation results in a 99.9996% sex sorting ratio. Publications show sex sorting efficiency in mosquitoes range from 96-99.99%, with some approaches as low as 85% (http://johnwhock.com/wp-content/uploads/2012/09/instr_5412_separator.pdf).

With a proprietary approach Oxitec has achieved 99.99% efficiency at scale. What scale is this reported 99.9996% sex sorting ratio achieved? Is this based on releases of thousands or millions of mosquitoes? Are there validated data demonstrating this level of efficiency that are publicly available? We are aware of no published data showing this sorting efficiency that has been afforded independent review.

EPA Response to Public Comment #3 – *“According to Xi et al. (2005), in caged releases of wAlbB Aedes aegypti females with uninfected males, a minimum of 20% of females needed to be released to establish the Wolbachia infection after seven generations. All releases below 20% in that cage experiment resulted in failure of the wAlbB infection to be established in the population.”*

Feedback: The Xi et al (2005) paper were very small cage trials (100 adults per cage) and do not reflect conditions in the field. Additionally as noted in the EPA response, the Xi et al study did not test for the unintentional release of wAlbB females right next to wAlbB males in the environment, but rather wAlbB females into a population of uninfected males in cages. Given the compatibility between infected wAlbB males and wAlbB females, a single female release could theoretically lead to the persistence of *Wolbachia* in subsequent generations of *Aedes aegypti*.

The entire strategy employed by MosquitoMate depends on not releasing females, and the risk of accidental female release has not been fully assessed. This could result in a failure of the technology to control the *Aedes aegypti* population, and lead to the spread of a bacterium that is not fully understood into the environment and into a pervasive human biting mosquito.

Furthermore, understanding what happens naturally in the environment with respect to the spread of *Wolbachia* is worthy of consideration as opposed to small cage trial results that tested for something completely different than the risk of accidental releases of wAlbB females alongside compatible wAlbB males. Notably, it is impossible that when *Wolbachia* invades a population it does so by infecting over 20% of that population at one time. It starts with a few individuals that somehow get infected with *Wolbachia* (there is still a lot of debate as to how *Wolbachia* spreads between species) and then it spreads through the entire population over time.

EPA Response to Public Comment #3 – *“It may be possible to establish a wAlbB Aedes aegypti population with use of the wAlbB strain. This, however, would only be possible if substantial numbers of females were released into an ecosystem along with repeated male wAlbB Aedes aegypti releases. The release of females is strictly controlled in the quality*

control procedures during mechanical separation of pupae and microscopic inspection of sorted pupae (U.S. EPA, 2015a)."

Feedback – The risk of releasing females increases with the scale of deployment. What are the QC checks in place and can they be scaled reliably? We know of no published data independently validating the sorting efficiency for this strain. As the consequences of female releases are unknown (Will it spread under field conditions? What happens if it spreads? Can it affect vectorial capacity?), the sorting efficiency is of paramount importance and therefore requires utmost scrutiny and validation.

Additionally please see previous response regarding assumption that the establishment of a *wAlbB Aedes aegypti* population is only possible "if substantial numbers of females were released into an ecosystem". This is an assumption based on 5 small cage trials and is not consistent or relevant to how *Wolbachia* naturally invades a species.

EPA Response to Public Comment #3 – *"In addition, UKDE monitors the environment near its rearing facilities for inadvertent release or escape of female Aedes aegypti wAlbB. As with any mechanical separation technique for mosquitoes, continual monitoring and quality assurance measures are paramount for ensuring that only males are released."*

Feedback - How is this accomplished? What sorts of assay are used with what accuracy, and what are the limits of detection? What do you do if you find female *Aedes aegypti* infected with *wAlbB*?

EPA Response to Public Comment #3 – *"Currently, there is no compelling evidence that wAlbB in Aedes aegypti does affect the capacity of the vector to transmit disease agents. A few published manuscripts have discussed West Nile virus (WNV) and Plasmodium titers increasing in Wolbachia-positive strains, but Aedes aegypti are not a natural malaria vector and Aedes aegypti do not generally carry WNV (Hughes et al., 2014a). Because Aedes aegypti are not a natural malaria vector, research showing the effects in Culex pipiens cannot be used to assume this is true for Aedes aegypti. Additionally, Hughes et al. (2012) discusses Plasmodium infections in Anopheles gambiae with wAlbB, and this is not applicable to the situation with Aedes aegypti."*

Feedback – As highlighted in the EPA comment 'Wolbachia causes very different responses depending on the host', therefore every insertion of *Wolbachia* into a new host, as is the case with *Aedes aegypti*, should be fully assessed and tested especially if the interactions are unknown and unpredictable. Have biosafety tests been run by the applicant to confirm *wAlbB* in *Aedes aegypti* does not affect the capacity of the vector to increase pathogen

production and transmit disease agents as various publications suggest?

This is an important question when the following publications that show *Wolbachia* can increase viral load in its hosts are taken into consideration:

- *Wolbachia* Can Enhance Plasmodium Infection in Mosquitoes: Implications for Malaria Control?
<http://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.1004182>
- *Wolbachia* Enhances West Nile Virus (WNV) Infection in the Mosquito *Culex tarsalis*
<http://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0002965>
- *Wolbachia* increases susceptibility to Plasmodium infection in a natural system
<http://rspb.royalsocietypublishing.org/content/281/1779/20132837>
- *Wolbachia* Strain wAlbB Enhances Infection by the Rodent Malaria Parasite Plasmodium berghei in *Anopheles gambiae* Mosquitoes
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3294472/>
- *Wolbachia* in a major African crop pest increases susceptibility to viral disease rather than protects.
<https://www.ncbi.nlm.nih.gov/pubmed/22731846>

EPA Response to Public Comment #5 – *“The likelihood of wAlbB Aedes aegypti survival is considered low given that males are dead end hosts, the small number of potential accidental female releases, and bidirectional cytoplasmic incompatibility. As mentioned in the Response to Public Comment #3, at least 20% of the population of females would need to be released to establish a wAlbB Aedes aegypti constant population.”*

Feedback – Males are dead end hosts only when sex-sorting is 100%. Notably any *Wolbachia* female mosquitoes released will be pre-mated (as adults are released that are over 2 days old), mature, ready to feed on human hosts, and lay eggs that can survive to adulthood.

With respect to the *“at least 20% of the population of females would need to be released to establish a wAlbB Aedes aegypti constant population”*, as mentioned earlier the Xi et al (2005) paper were very small cage trials (100 adults per cage) and do not reflect conditions in the field. Additionally, as noted in the EPA response, the Xi et al study did not test for the unintentional release of wAlbB females right next to wAlbB males, but rather wAlbB females into a population of uninfected males in cages. Given the compatibility between infected wAlbB males and wAlbB females, a single female release could theoretically lead to the persistence of *Wolbachia* in subsequent generations of *Aedes aegypti*.

The entire strategy employed by MosquitoMate depends on not releasing females, and the risk of accidental female release has not been fully assessed. This could result in a complete failure of the technology to control the *Aedes aegypti* population, and lead to the spread of

a bacterium that is not fully understood into the environment via a pervasive human biting mosquito.

Furthermore, understanding what happens in naturally in the environment with respect to the spread of *Wolbachia* is worthy of consideration as opposed to small cage trial results that tested for something completely different than the risk of accidental releases of wAlbB females alongside compatible wAlbB males. Notably, it is impossible that when *Wolbachia* invades a population it does so by infecting over 20% of that population at one time. It starts with a few individuals that somehow get infected with *Wolbachia* (there is still a lot of debate as to how *Wolbachia* spreads between species) and then it spreads through the entire population over time.

EPA Response to Public Comment #7 – *“As discussed in Brelsfoard and Dobson (2009), in Drosophila melanogaster, the wMel strain of Wolbachia may influence the susceptibility of this fly to RNA-type viruses. It is further hypothesized that this phenomenon may occur in other host species harboring Wolbachia; however, no direct evidence is provided. Aedes aegypti reared by UKDE for release of Wolbachia-infected males are checked for the presence of infectious virus particles as part of the manufacturing process. Any significant changes that may occur with respect to favoring the presence of a pathogen would therefore be noted as part of the quality assurance protocols in place.”*

Feedback – Checking for the presence of the virus in a facility where the females are kept in cages and have limited exposure to human viruses (such as Zika, dengue, chikungunya, yellow fever etc.) is not a test for influences on susceptibility.

Has the potential phenomenon of *Wolbachia* impacting susceptibility of RNA-type viruses to hosts such as flies been specifically tested in the *Wolbachia* wAlbB strain of *Aedes aegypti* mosquitoes?

EPA Response to Public Comment #7 – *“Calvitti et al. (2015) showed that wAlbA Aedes albopictus in dense rearing conditions did not decrease the cytoplasmic incompatibility (CI) effect. Islam and Dobson (2006) also showed that rearing Aedes albopictus with Wolbachia under crowded, low food conditions did not impact the CI effect. Yamada et al. (2007) cited by Oxitec, Ltd. refers to the effect in Drosophila, not mosquitoes.”*

Feedback - *Aedes albopictus* has adapted to the presence of wAlbA/B over a long period of time, whereas *Aedes aegypti* has only recently been infected with wAlbB. Hence the example from Yamada et al (2007) is relevant because it suggests that a similar effect may occur in *Aedes aegypti* – that is that males that developed faster had almost complete cytoplasmic incompatibility (CI) whereas those that developed more slowly lost much of the

CI effect. This should be tested for and evaluated properly in *Aedes aegypti* under a range of different rearing conditions and male development time; otherwise there is a risk of releasing males with incomplete CI causing a failure to control the *Aedes aegypti* mosquito population.

In summary, examining these biosafety risks with this strain, in this species of mosquito, and with the relevant disease vectors is a completely possible thing to do. To require that an applicant have done so, prior to being approved for field trials, is not only reasonable but a necessary standard.

This should especially be required in a case, as we have here, in which so many serious scientific journal articles attest to significant risks to human health posed by *Wolbachia*, in other human biting insects and with a variety of disease causing organisms.

Message

From: Roy Bailey [rbailey@gdcillc.com]
Sent: 8/18/2017 2:27:12 AM
To: Beck, Nancy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=168ecb5184ac44de95a913297f353745-Beck, Nancy]
CC: Bennett, Tate [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=1fa92542f7ca4d01973b18b2f11b9141-Bennett, El]; Brown, Byron [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9242d85c7df343d287659f840d730e65-Brown, Byro]
Subject: Re: For your assistance

Nancy,

Thanks so much for your response. I do really appreciate it.

As I understand it, others like Intrexon have already done lengthy research to determine and prove that there is absolutely NO human or environmental impact with their technology application. This was done way before being allowed or considered for field trials.

We just want the same standards applied across the board. It's not too much to ask when it comes to the possible consequences for mankind.

Please know that we will be more than happy to meet with your team of scientists to discuss if helpful.

Have a great weekend.

Best regards

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell Ex. 6
Office Ex. 6
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

On Aug 17, 2017, at 6:13 PM, Beck, Nancy <Beck.Nancy@epa.gov> wrote:

Roy,

I think the important thing to keep in mind that the standards for an EUP (which is what was approved for the Wolbachia) are more lenient than those for a full section 3 registration. The EUP allows for the collection of information that would then be used to inform a full registration. Nevertheless, I should have further details back from staff early next week and would be happy to chat after that.

Regards,
Nancy

Nancy B. Beck, Ph.D., DABT

Deputy Assistant Administrator, OCSPP

P: 202-564-1273

M: **Ex. 6**
beck.nancy@epa.gov

From: Roy Bailey [<mailto:rbailey@gdcillc.com>]

Sent: Wednesday, August 9, 2017 10:59 AM

To: Beck, Nancy <Beck.Nancy@epa.gov>

Cc: Bennett, Tate <Bennett.Tate@epa.gov>; Brown, Byron <brown.byron@epa.gov>

Subject: Re: For your assistance

Nancy,

Good morning, hope all is well.

I am just checking in to see where we stand on our request. How can we assist? Happy to meet with your team if helpful.

All my best regards

Roy W. Bailey

CEO

Giuliani Deason Capital Interests, LLC

Cell **Ex. 6**

Office **Ex. 6**

Rbailey@gdcillc.com

Rbailey@baileystrategicadvisors.com

On Jul 28, 2017, at 4:33 PM, Beck, Nancy <Beck.Nancy@epa.gov> wrote:

Thanks Roy.

I will pass these along to our experts for their review and input. I will get back to you once I have a sense from them regarding how long a review will take.

Regards,
Nancy

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

From: Roy Bailey [<mailto:rbailey@gdcillc.com>]

Sent: Friday, July 28, 2017 5:17 PM

To: Beck, Nancy <Beck.Nancy@epa.gov>; Bennett, Tate <Bennett.Tate@epa.gov>;

Brown, Byron <brown.byron@epa.gov>; Beck, Nancy <Beck.Nancy@epa.gov>

Cc: Roy Bailey <rbailey@gdcillc.com>

Subject: For your assistance

Nancy,

Please find the attachment for you and the team's review. It is a thoughtful and substantive summary of answers and feedbacks to that which was sent to me earlier this week.

I hope you all find this helpful. We are more than happy to get together next week or whenever you think appropriate.

All my respect and regards

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell **Ex. 6**
Office **Ex. 6**
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

Begin forwarded message:

From: "Chris Basta (INTREXON CORP)"
<cbasta7@bloomberg.net>
Date: July 28, 2017 at 3:49:10 PM CDT
To: undisclosed-recipients:;
Subject: Follow-up
Reply-To: Chris Basta <cbasta7@bloomberg.net>

Roy,

With respect to the email you had sent on Tuesday regarding the scientific publications highlighting concerns or risks surrounding Wolbachia, please see the attached document with feedback to the points that were raised.

Hope you have a great weekend.

Best regards,
Chris

Message

From: Roy Bailey [rbailey@gdcillc.com]
Sent: 7/21/2017 10:24:07 PM
To: Bennett, Tate [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=1fa92542f7ca4d01973b18b2f11b9141-Bennett, E]
CC: Beck, Nancy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=168ecb5184ac44de95a913297f353745-Beck, Nancy]
Subject: Re: Revised memo

I'm just checking in - any update ?

Have a great weekend

BTW, I will be with RJ Kirk of Intrexon in DC on Wed for meetings w Sec Perry of DOE. Happy to swing by if you need anything.

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell [Ex. 6]
Office [Ex. 6]
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

On Jul 19, 2017, at 6:39 PM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:

Haven't forgotten you. Will touch base this Friday.

Sent from my iPhone

On Jul 16, 2017, at 8:42 PM, Roy Bailey <rbailey@gdcillc.com> wrote:

Thanks so much Tate

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell [Ex. 6]
Office [Ex. 6]
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

On Jul 16, 2017, at 6:02 PM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:

Thanks Roy- again, we will definitely follow up on the staff level.

Sent from my iPhone

On Jul 16, 2017, at 6:29 PM, Roy Bailey <rbailey@gdcillc.com> wrote:

Administrator,

I have attached a revised memo which we think may be even more compelling and helpful. (sorry that it wasn't included in the previous email.) We are available for a call anytime today or tomorrow that is convenient for your team.

Again, we hope the EPA will consider revoking the field trial permit EUP for the referenced technology until the EPA can complete a full impact study on humans and the environment.

Thanks for your interest and consideration.

Respectfully and best regards

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell **Ex. 6**
Office **Ex. 6**
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

Begin forwarded message:

From: "Bobo, Jack"
<JBobo@intrexon.com>
Date: July 16, 2017 at 3:07:45 PM PDT
To: 'Roy Bailey' <rbailey@gdcillc.com>
Subject: EPA Memo Updated

CONFIDENTIAL TRANSMISSION - To the extent this electronic communication or any of its attachments contain information that is not in the public domain, such information is considered by Intrexon Corporation to be confidential and proprietary. This communication is expected to be read and/or used only by the individual(s) for whom it is intended. If you have received this electronic communication in error, please reply to the sender advising of the error in transmission and delete the original message and any accompanying documents from your system immediately, without copying, reviewing or otherwise using them for

any purpose. Thank you for your
cooperation.

<EPA Improperly Granted the Wolbachia EUP_07
16 17.docx>

Message

From: Roy Bailey [rbailey@gdcillc.com]
Sent: 7/28/2017 2:31:26 PM
To: Beck, Nancy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=168ecb5184ac44de95a913297f353745-Beck, Nancy]
CC: Bennett, Tate [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=1fa92542f7ca4d01973b18b2f11b9141-Bennett, El]; Brown, Byron [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9242d85c7df343d287659f840d730e65-Brown, Byro]; Gay Ludwick [gay@gdcillc.com]
Subject: Re: Wolbachia doc

Nancy

That certainly makes sense, thanks much. I will send you a thorough analysis in the next few days.

All my best

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell: **Ex. 6**
Office: **Ex. 6**
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

On Jul 28, 2017, at 9:11 AM, Beck, Nancy <Beck.Nancy@epa.gov> wrote:

Roy,

Thanks for the heads up. It would probably make sense for the OPP experts to take a look at what will send and digest it a bit before we have a follow-up meeting. Next Tuesday/Wednesday may be a bit too soon, but we can make that call once we have more materials from you.

Regards,
Nancy

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

From: Roy Bailey [<mailto:rbailey@gdcillc.com>]
Sent: Friday, July 28, 2017 9:02 AM
To: Beck, Nancy <Beck.Nancy@epa.gov>
Cc: Bennett, Tate <Bennett.Tate@epa.gov>; Brown, Byron <brown.byron@epa.gov>; Gay Ludwick <gay@gdcillc.com>
Subject: Re: Wolbachia doc

Nancy,

Thanks so much for the responses. There remain serious concerns and I will send you a more substantive reply later today or by the weekend latest.

We will be in DC next week on Tues and Wed and would be happy to sit down to discuss details if helpful. Please let me know.

All my sincere regards

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell: **Ex. 6**
Office: **Ex. 6**
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

On Jul 25, 2017, at 11:04 AM, Beck, Nancy <Beck.Nancy@epa.gov> wrote:

Roy,

Thank you for sending this information.

In response to your comments, our staff checked on whether these concerns were addressed in the response to comments document that was issued August 30 2016.

An overview of responses is below:

Citations 1, 2, 3, 4, and 6: Addressed in [EPA's response to comments Public Comment #3](#).

Citation 5: This research is for a completely different organism, *Spodoptera exempta* (African armyworm), not mosquitoes, and *Wolbachia* causes very different responses depending on the host. This information, while interesting, cannot be used to make predictions about mosquitoes.

Citation 7: Addressed in [EPA's response to comments Public Comment #4](#).

Citations 8, 9, 10, and 11: Addressed in [EPA's response to comments Public Comment #7](#).

Citation 12: With respect to the *Wolbachia* phage encoding a toxin from the black widow spider, this comment is referring to Citation 12 ("Eukaryotic association module in phage WO genomes from *Wolbachia*"). In this study, the WO-B phage in *wAlbB* strain mosquitoes were not studied. Only moth and parasitoid wasp WO phage were researched. *Aedes aegypti wAlbB* strain does have a WO-B phage associated with it; however, phage are specific to their hosts, horizontal gene transfer is happening on evolutionary time scales, there is no indication that the widow spider toxin sequence is expressed in the *Wolbachia* infection, and it is not reported that the WO-B phage in *wAlbB Aedes aegypti* produce the toxin from black widow spider. Also, most importantly, viruses have been shown to incorporate host sequences numerous times, but this is the first report of a virus of an obligate intercellular parasitic bacterium having sequences from both hosts: bacterial and eukaryotic. The widow spider toxin is a huge multimeric toxin with

the entire 150kD monomer needing to be expressed and binding to form a tetramer to have full toxin activity. The sequence detected in the prophage sequence is only the C-terminus (maybe 18 kD) of the entire monomeric protein (150 kD). This C-terminus has been implicated in passage through membranes to release the toxins when produced in the spider. Furthermore, there is no evidence that *Wolbachia* alone are being transferred to animals when a female mosquito bites and takes a blood meal from an animal.

Citation 13, 14, and 15: The *Wolbachia pipientis* strains associated with River blindness and lymphatic filariasis are in different clades than the wAlbB, and the wAlbB strain is not associated with these diseases.

If there are still concerns that you are worried are not adequately addressed, I'm sure we can get our scientific experts together for further discussions.

Regards,
Nancy

Nancy B. Beck, Ph.D., DABT
Deputy Assistant Administrator, OCSPP
P: 202-564-1273

Ex. 6

beck.nancy@epa.gov

From: Roy Bailey [<mailto:rbailey@gdcillc.com>]

Sent: Sunday, July 16, 2017 1:39 PM

To: Bennett, Tate <Bennett.Tate@epa.gov>; Brown, Byron <brown.byron@epa.gov>; Beck, Nancy <Beck.Nancy@epa.gov>

Cc: Roy Bailey <rbailey@gdcillc.com>; Gay Ludwick <gay@gdcillc.com>

Subject: Fwd: Wolbachia doc

Tate,

This additional info may be helpful as well. Thanks so much for your call and attention to the concerns.

Best regards

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell: **Ex. 6**
Office: **Ex. 6**
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

Begin forwarded message:

From: "Basta, Christopher" <CBasta@intrexon.com>

Date: July 16, 2017 at 10:22:45 AM PDT

To: Roy Bailey <rbailey@gdcillc.com>

Cc: "Kirk, Randal J" <RJ.Kirk@intrexon.com>, "Bobo, Jack"

<JBobo@intrexon.com>

Subject: Wolbachia doc

Roy,

RJ asked that I send you this document that provides a Wolbachia overview as well as a list of publications that cover various Wolbachia concerns & potential issues.

Best,

Chris

Christopher Basta

Vice President, Investor Relations

Intrexon Corporation

Work: **Ex. 6**

Cell: **Ex. 6**

www.dna.com

CONFIDENTIAL TRANSMISSION - To the extent this electronic communication or any of its attachments contain information that is not in the public domain, such information is considered by Intrexon Corporation to be confidential and proprietary. This communication is expected to be read and/or used only by the individual(s) for whom it is intended. If you have received this electronic communication in error, please reply to the sender advising of the error in transmission and delete the original message and any accompanying documents from your system immediately, without copying, reviewing or otherwise using them for any purpose. Thank you for your cooperation.

<Wolbachia Overview and Publications Citing Concerns and Risks.docx>

Message

From: Roy Bailey [rbailey@gdcillc.com]
Sent: 7/16/2017 6:19:20 PM
To: Bennett, Tate [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=1fa92542f7ca4d01973b18b2f11b9141-Bennett, E]
CC: Beck, Nancy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=168ecb5184ac44de95a913297f353745-Beck, Nancy]
Subject: Re: Memo

Thanks very much. Enjoy your afternoon.

Best regards

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell **Ex. 6**
Office **Ex. 6**
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

On Jul 16, 2017, at 10:42 AM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:

Thanks! I'll bring her up to speed on our recent conversation. Will report back this week.

Sent from my iPhone

On Jul 16, 2017, at 1:41 PM, Roy Bailey <rbailey@gdcillc.com> wrote:

Yes, we know Nancy is the expert in this area.

Our friends at Intrexon would be happy to jump on a call anytime to give their insight and input if helpful.

Best regards

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell **Ex. 6**
Office **Ex. 6**
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

On Jul 16, 2017, at 10:35 AM, Bennett, Tate <Bennett.Tate@epa.gov> wrote:

Thank you! Nancy is our expert here and I'll huddle with her on this.

On Jul 16, 2017, at 1:34 PM, Roy Bailey <rbailey@gdcillc.com>
wrote:

Thanks so much for the call. I have attached the
memo which should outline the concerns.

Intrexon (OXITEC) execs are pleased to jump on a
call anytime to discuss.

Thanks so much

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell **Ex. 6**
Office **Ex. 6**
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

Begin forwarded message:

From: "Bobo, Jack"
<JBobo@intrexon.com>
Date: July 15, 2017 at 6:59:38 PM
PDT
To: 'Roy Bailey'
<rbailey@gdcillc.com>
Subject: Memo

CONFIDENTIAL TRANSMISSION
- To the extent this electronic
communication or any of its
attachments contain information that
is not in the public domain, such
information is considered by
Intrexon Corporation to be
confidential and proprietary. This
communication is expected to be
read and/or used only by the
individual(s) for whom it is intended.
If you have received this electronic
communication in error, please reply
to the sender advising of the error in
transmission and delete the original
message and any accompanying

documents from your system
immediately, without copying,
reviewing or otherwise using them
for any purpose. Thank you for your
cooperation.

<EPA Improperly Granted the Wolbachia
EUP.DOCX>

Message

From: Roy Bailey [rbailey@gdcillc.com]
Sent: 7/16/2017 5:38:48 PM
To: Bennett, Tate [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=1fa92542f7ca4d01973b18b2f11b9141-Bennett, El]; Brown, Byron [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9242d85c7df343d287659f840d730e65-Brown, Byro]; Beck, Nancy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=168ecb5184ac44de95a913297f353745-Beck, Nancy]
CC: Roy Bailey [rbailey@gdcillc.com]; Gay Ludwick [gay@gdcillc.com]
Subject: Fwd: Wolbachia doc
Attachments: Wolbachia Overview and Publications Citing Concerns and Risks.docx; ATT00001.htm

Flag: Flag for follow up

Tate,

This additional info may be helpful as well. Thanks so much for your call and attention to the concerns.

Best regards

Roy W. Bailey
CEO
Giuliani Deason Capital Interests, LLC
Cell Ex. 6
Office Ex. 6
Rbailey@gdcillc.com
Rbailey@baileystrategicadvisors.com

Begin forwarded message:

From: "Basta, Christopher" <CBasta@intrexon.com>
Date: July 16, 2017 at 10:22:45 AM PDT
To: Roy Bailey <rbailey@gdcillc.com>
Cc: "Kirk, Randal J" <RJ.Kirk@intrexon.com>, "Bobo, Jack" <JBobo@intrexon.com>
Subject: **Wolbachia doc**

Roy,

RJ asked that I send you this document that provides a Wolbachia overview as well as a list of publications that cover various Wolbachia concerns & potential issues.

Best,
Chris

Christopher Basta
Vice President, Investor Relations
Intrexon Corporation
Work Ex. 6

Cell: **Ex. 6**

www.dna.com

CONFIDENTIAL TRANSMISSION - To the extent this electronic communication or any of its attachments contain information that is not in the public domain, such information is considered by Intrexon Corporation to be confidential and proprietary. This communication is expected to be read and/or used only by the individual(s) for whom it is intended. If you have received this electronic communication in error, please reply to the sender advising of the error in transmission and delete the original message and any accompanying documents from your system immediately, without copying, reviewing or otherwise using them for any purpose. Thank you for your cooperation.

OVERVIEW OF WOLBACHIA CONCERNS

Serious and very basic questions remain as to the potential adverse threats that *Wolbachia* poses to human health and the environment.

Wolbachia, a complex bacterium known to biologically alter its hosts, is found in many different insects in nature. Yet that does not make its artificial insertion into *Aedes aegypti* as a population control method “natural” or “safe”. In fact in cases where *Wolbachia* inhabits insects that bite humans such as mosquitoes and flies, negative effects have been documented in several peer-reviewed publications. Therefore using *Wolbachia* as a mosquito control solution may present a significant biosafety risk.

Notably, if *Wolbachia* infected males and females mate it leads to viable offspring and that would result in *Wolbachia*-infected mosquitoes perpetually persisting in the environment. If something goes wrong there will be no recall.

Here are some currently known risks found in human-biting flies and mosquitoes infected with *Wolbachia* include:

- *Wolbachia* holds several key roles in River Blindness which begins with a bite of a blackfly. River Blindness infects up to 25 million people globally and is the second most common infectious cause of blindness;
- *Wolbachia* has been attributed to major lymphatic inflammation associated with Elephantiasis, also known as lymphatic filariasis, which is spread by the bites of infected mosquitoes;
- *Wolbachia* significantly enhances West Nile virus infection in mosquitoes increasing risk of transmission to humans;
- *Wolbachia* enhances malaria parasite infection in mosquitoes increasing risk of transmission to humans; and
- *Wolbachia* has been naturally found in certain mosquitoes (not artificially inserted in a lab), and those infected mosquitoes still are able to transmit dangerous viruses such as dengue and chikungunya.

In addition to these direct and dangerous threats to humans, another concern seems to be overlooked by many. *Wolbachia* transfers genes to its hosts through a process called Horizontal Gene Transfer. This means this insect control method using *Wolbachia* can effectively introduce over 1,000 new genes into its mosquito hosts (as compared to recombinant genetic engineering which typically introduces a few genes or less). This random genetic engineering is not well-defined or understood, yet it is evident that every time *Wolbachia* invades a host the result is a “GMO”.

- Peer review papers show that *Wolbachia* genetically engineers its hosts as it transfers its DNA into insect genomes and these genes are expressed. In the *Aedes aegypti* mosquito there are genes that share high homology to *Wolbachia* suggesting that gene transfer has happened over an evolutionary time scale and that these genes have functional significance; and
- Newly published evidence confirms that *Wolbachia* has a virus that encodes and causes the expression of a toxin from the Black widow spider that is hypothesized to form pores in cell membranes. If mosquitoes that carry *Wolbachia* with this virus are released, the effects of this virus are unknown as are the consequences of these mosquitoes biting people.

The following pages have a list the publications that have cited various concerns/issues/risks with *Wolbachia*.

PUBLICATIONS AND AUTHORS CITING CONCERNS/RISKS AROUND WOLBACHIA:

- **Publications 1 – 11:** Cover pathogen increase, horizontal gene transfer, lack of effect in varying climate environments
 - **Publication 12:** Covers revelation regarding black-widow spider venom gene ending up in a virus that infects Wolbachia
 - **Publications 13 - 15:** Cover Wolbachia's role in River Blindness & Lymphatic Filariasis
1. Wolbachia Can Enhance Plasmodium Infection in Mosquitoes: Implications for Malaria Control?
<http://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.1004182>
 - Excerpt - ***Any potential control strategy devised in regions where more than one parasite species occurs needs to thoroughly investigate the effect of Wolbachia on all parasite species transmitted by the vector, as well as other pathogens such as filarial worms or arboviruses to ensure that Wolbachia-infected mosquitoes do not inadvertently enhance transmission of secondary pathogens.***
 - Authors - Grant L. Hughes, Ana Rivero, Jason L. Rasgon
 2. Wolbachia Enhances West Nile Virus (WNV) Infection in the Mosquito Culex tarsalis
<http://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0002965>
 - Excerpt – ***This is the first observation of Wolbachia-induced enhancement of a human pathogen in mosquitoes, suggesting that caution should be applied before releasing Wolbachia-infected insects as part of a vector-borne disease control program.***
 - Authors - Brittany L. Dodson, Grant L. Hughes, Oluwatobi Paul, Amy C. Matarachiero, Laura D. Kramer, Jason L. Rasgon
 3. Wolbachia increases susceptibility to Plasmodium infection in a natural system
<http://rspb.royalsocietypublishing.org/content/281/1779/20132837>
 - Excerpt - ***These results suggest that naturally Wolbachia-infected mosquitoes may, in fact, be better vectors of malaria than Wolbachia-free ones.***
 - Authors - F. Zélé, A. Nicot, A. Berthomieu, M. Weill, O. Duron, A. Rivero
 4. Wolbachia Strain wAlbB Enhances Infection by the Rodent Malaria Parasite Plasmodium berghei in Anopheles gambiae Mosquitoes
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3294472/>
 - Excerpt - ***Wolbachia, a common bacterial endosymbiont of insects, has been shown to protect its hosts against a wide range of pathogens. However, not all strains exert a protective effect on their host. We show that the wAlbB strain significantly increases P. berghei oocyst levels in the mosquito midgut while wMelPop modestly suppresses oocyst levels. The wAlbB strain is avirulent to mosquitoes while wMelPop is moderately virulent to mosquitoes pre-blood meal and highly virulent after mosquitoes have fed on mice.***

These various effects on P. berghei levels suggest that Wolbachia strains differ in their interactions with the host and/or pathogen...

- Authors - Grant L. Hughes, Joel Vega-Rodriguez, Ping Xue, and Jason L. Rasgon

5. Wolbachia in a major African crop pest increases susceptibility to viral disease rather than protects.

<https://www.ncbi.nlm.nih.gov/pubmed/22731846>

- Excerpt – *Wolbachia have generated considerable recent interest due to the capacity of some strains to protect their insect hosts against viruses and the potential for this to reduce vector competence of a range of human diseases, including dengue. In contrast, here we provide data from field populations of a major crop pest, African armyworm (Spodoptera exempta), which show that the prevalence and intensity of infection with a nucleopolydovirus (SpexNPV) is positively associated with infection with three strains of Wolbachia*

- Authors - Graham RI, Grzywacz D, Mushobozi WL, Wilson K.

6. Temperature alters Plasmodium blocking by Wolbachia.

<https://www.ncbi.nlm.nih.gov/pubmed/24488176>

- Excerpt – *Very recently, the Asian malaria vector (Anopheles stephensi) was stably transinfected with the wAlbB strain of Wolbachia, inducing refractoriness to the human malaria parasite Plasmodium falciparum. However, conditions in the field can differ substantially from those in the laboratory. Our results demonstrate complex effects of temperature on the Wolbachia-malaria interaction, and suggest the impacts of transinfection might vary across diverse environments.*

- Authors - Murdock CC, Blanford S, Hughes GL, Rasgon JL, Thomas MB.

7. Horizontal gene transfer between Wolbachia and the mosquito Aedes aegypti.

<https://www.ncbi.nlm.nih.gov/pubmed/19154594>

- Excerpt – *The evolutionary importance of horizontal gene transfer (HGT) from Wolbachia endosymbiotic bacteria to their eukaryotic hosts is a topic of considerable interest and debate...We have discovered a case of HGT, involving two adjacent genes, between the genomes of Wolbachia and the currently Wolbachia-uninfected mosquito Aedes aegypti, an important human disease vector...The data support the argument that HGT between Wolbachia endosymbiotic bacteria and their hosts has produced evolutionary innovation.*

- Authors - Klasson L, Kambris Z, Cook PE, Walker T, Sinkins SP

8. A case of horizontal gene transfer from Wolbachia to Aedes albopictus C6/36 cell line

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4013104/>

- Excerpt - *Horizontal gene transfer plays an essential role in evolution and ecological adaptation, yet this phenomenon has remained controversial, particularly where it occurs between prokaryotes and eukaryotes. In this study, we report the discovery of a horizontal gene transfer from the endosymbiont Wolbachia in the C6/36 cell line derived from the*

- mosquito Aedes albopictus. Moreover, we report that this horizontally transferred gene displayed high transcription level. This finding and the results of further experimentation strongly suggest this gene is functional and has been expressed and translated into a protein in the mosquito host cells.*
- Authors - Qing Hou , Ji He, Jing Yu, Yuting Ye, Dan Zhou, Yan Sun, Donghui Zhang, Lei Ma, Bo Shen, and Changliang Zhu
9. Widespread lateral gene transfer from intracellular bacteria to multicellular eukaryotes.
<https://www.ncbi.nlm.nih.gov/pubmed/17761848>
- Excerpt – *Although common among bacteria, lateral gene transfer-the movement of genes between distantly related organisms-is thought to occur only rarely between bacteria and multicellular eukaryotes. However, the presence of endosymbionts, such as Wolbachia pipientis, within some eukaryotic germlines may facilitate bacterial gene transfers to eukaryotic host genomes. We found and confirmed transfers into the genomes of four insect and four nematode species that range from nearly the entire Wolbachia genome (>1 megabase) to short (<500 base pairs) insertions.*
 - Authors - Dunning Hotopp JC, Clark ME, Oliveira DC, Foster JM, Fischer P, Muñoz Torres MC, Giebel JD, Kumar N, Ishmael N, Wang S, Ingram J, Nene RV, Shepard J, Tomkins J, Richards S, Spiro DJ, Ghedin E, Slatko BE, Tettelin H, Werren JH.
10. Genome fragment of Wolbachia endosymbiont transferred to X chromosome of host insect
<http://www.pnas.org/content/99/22/14280.full>
- Excerpt – *Here we report an unprecedented case of prokaryote–eukaryote horizontal gene transfer: a genome fragment from the Wolbachia endosymbiont has been transferred to the X chromosome of a beetle.....The adzuki bean beetle, Callosobruchus chinensis, is triple-infected with distinct lineages of Wolbachia endosymbiont, wBruCon, wBruOri, and wBruAus, which were identified by their wsp (Wolbachia surface protein) gene sequences. Whereas wBruCon and wBruOri caused cytoplasmic incompatibility of the host insect, wBruAus did not. Although wBruCon and wBruOri were easily eliminated by antibiotic treatments, wBruAus persisted over five treated generations and could not be eliminated...The study’s results strongly suggest that wBruAus has no microbial entity but is a genome fragment of Wolbachia endosymbiont transferred to the X chromosome of the host insect.*
 - Authors - Natsuko Kondo, Naruo Nikoh, Nobuyuki Ijichi, Masakazu Shimada, and Takema Fukatsu
11. Phylogenetic relationships of the Wolbachia of nematodes and arthropods.
<https://www.ncbi.nlm.nih.gov/pubmed/17040125>
- Excerpt - *Using the wOvo sequence, we identified a lateral transfer event whereby segments of the Wolbachia genome were inserted into the Onchocerca nuclear genome. This event predated the separation of the human parasite O. volvulus from its cattle-parasitic sister species, O. ochengi. The long association between filarial nematodes and*

Wolbachia symbionts may permit more frequent genetic exchange between their genomes.

- Authors - Fenn K, Conlon C, Jones M, Quail MA, Holroyd NE, Parkhill J, Blaxter M

12. Eukaryotic association module in phage WO genomes from Wolbachia

<http://www.nature.com/articles/ncomms13155>

- Excerpt - ***Here we report a metagenomic analysis of purified bacteriophage WO particles of Wolbachia and uncover a eukaryotic association module in the complete WO genome. It harbours predicted domains, such as the black widow latrotoxin C-terminal domain, that are uninterrupted in bacteriophage genomes, enriched with eukaryotic protease cleavage sites and combined with additional domains to forge one of the largest bacteriophage genes to date (14,256 bp). To the best of our knowledge, these eukaryotic-like domains have never before been reported in packaged bacteriophages and their phylogeny, distribution and sequence diversity imply lateral transfers between bacteriophage/prophage and animal genomes. Finally, the WO genome sequences and identification of attachment sites will potentially advance genetic manipulation of Wolbachia.***
- Authors - Sarah R. Bordenstein & Seth R. Bordenstein

13. Onchocerciasis: the Role of Wolbachia Bacterial Endosymbionts in Parasite Biology, Disease Pathogenesis, and Treatment

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3131055/>

- Excerpt - ***Studies with other filarial nematode species have also highlighted a role for Wolbachia in transmission and infection of the mammalian host through a fascinating manipulation of mast cell-mediated vasodilation to enhance infectivity of vector-borne larvae. Wolbachia has also been identified as the principal driver of innate and adaptive Th1 inflammatory immunity, which can either contribute to disease pathogenesis or, with the Wolbachia-mediated recruitment of mast cells, enhance infectivity. The Wolbachia activation of innate inflammation also drives inflammatory adverse events in response to chemotherapy with either diethylcarbamazine (DEC) or ivermectin. In this review we summarize the experimental and field trial data which have uncovered the importance of Wolbachia symbiosis in onchocerciasis.***
- Authors –

14. The Role of Endosymbiotic Wolbachia Bacteria in the Pathogenesis of River Blindness

<http://www.nature.com/news/2002/020304/full/news020304-9.html>

- Excerpt – ***Using a murine model for river blindness in which soluble extracts of filarial nematodes were injected into the corneal stroma, we demonstrated that the predominant inflammatory response in the cornea was due to species to endosymbiotic Wolbachia bacteria. In addition, the inflammatory response induced by these bacteria was dependent on expression of functional Toll-like receptor (TLR4) on host cells.***

- Authors - Amélie v. Saint André, Nathan M. Blackwell, Laurie R. Hall, Achim Hoerauf, Norbert W. Brattig, Lars Volkmann, Mark J. Taylor, Louise Ford, Amy G. Hise, Jonathan H. Lass, Eugenia Diaconu, Eric Pearlman

15. Wolbachia bacteria in filarial immunity and disease.

<https://www.ncbi.nlm.nih.gov/pubmed/11472559>

- Excerpt - ***Lymphatic filarial nematodes are infected with endosymbiotic Wolbachia bacteria. Lipopolysaccharide from these bacteria is the major activator of innate inflammatory responses induced directly by the parasite. Here, we propose a mechanism by which Wolbachia initiates acute inflammatory responses associated with death of parasites, leading to acute filarial lymphangitis and adverse reactions to antifilarial chemotherapy. We also speculate that repeated exposure to acute inflammatory responses and the chronic release of bacteria, results in damage to infected lymphatics and desensitization of the innate immune system. These events will result in an increased susceptibility to opportunistic infections, which cause acute dermatolymphangitis associated with lymphoedema and elephantiasis***
- Authors - Taylor MJ, Cross HF, Ford L, Makunde WH, Prasad GB, Bilo K.

Shimmin, Kaitlyn <shimmin.kaitlyn@epa.gov> Optional
 Cory, Preston (Katherine) <Cory.Preston@epa.gov> Optional
 Baptist, Erik <baptist.erik@epa.gov> Optional

▲ **Time** 8:15 AM – 8:30 AM
Subject Briefing re: Meeting with Roy Bailey
Location Administrator's Office
Show Time As Busy
Attendees

Name <E-mail>	Attendance
(b)(6) Pruitt Cal. <(b)(6) Pruitt Cal. Acct.>	Organizer
Jackson, Ryan <jackson.ryan@epa.gov>	Required

▲ **Time** 8:30 AM – 9:00 AM
Subject Meeting with Roy W. Bailey
Location Administrator's Office
Show Time As Busy
 Topic: Intrexon is a leading life science company and they have the genetically engineered mosquito technology which can eradicate Zika virus and other viruses associated with mosquito bites, (OxiTec), their technology will fall under the purview of the EPA
 Location: Administrator's Office
 Staffing: Ryan
 Attendees: RJ Kirk, Bob Walsh and Roy Bailey
 POC: Gay M. Ludwick; gay@gdcillc.com <mailto:gay@gdcillc.com>

Attendees

Name <E-mail>	Attendance
(b)(6) Pruitt Cal. <(b)(6) Pruitt Cal. Acct.>	Organizer
Jackson, Ryan <jackson.ryan@epa.gov>	Required

▲ **Time** 2:45 PM – 3:15 PM
Subject Daily Personnel Meeting
Location 3402 WJC-N
Show Time As Busy
Attendees

Name <E-mail>	Attendance
Jackson, Ryan <jackson.ryan@epa.gov>	Organizer
Munoz, Charles <munoz.charles@epa.gov>	Required
Allen, Reginald <Allen.Reginald@epa.gov>	Required
Ford, Hayley <ford.hayley@epa.gov>	Optional

Traylor, Patrick <traylor.patrick@epa.gov>	Required
Rodrick, Christian <rodrick.christian@epa.gov>	Required
McMurray, Forrest <mcmurray.forrest@epa.gov>	Required
Shimmin, Kaitlyn <shimmin.kaitlyn@epa.gov>	Optional
Morris, Madeline <morris.madeline@epa.gov>	Required
Baptist, Erik <baptist.erik@epa.gov>	Optional
Letendre, Daisy <letendre.daisy@epa.gov>	Required
Hewitt, James <hewitt.james@epa.gov>	Required
Cory, Preston (Katherine) <Cory.Preston@epa.gov>	Optional
Darwin, Henry <darwin.henry@epa.gov>	Required
Lovell, Will (William) <lovell.william@epa.gov>	Optional

Time 8:15 AM – 8:30 AM
Subject Briefing re: Meeting with Roy Bailey
Location Administrator's Office
Show Time As Busy

Attendees	Name <E-mail>	Attendance
	(b)(6) Pruitt Cal. Acct. <(b)(6) Pruitt Cal. Acct.>	Organizer
	Jackson, Ryan <jackson.ryan@epa.gov>	Required

Time 8:30 AM – 9:00 AM
Subject Meeting with Roy W. Bailey
Location Administrator's Office
Show Time As Busy

Topic: Intrexon is a leading life science company and they have the genetically engineered mosquito technology which can eradicate Zika virus and other viruses associated with mosquito bites, (OxiTec), their technology will fall under the purview of the EPA
Location: Administrator's Office
Staffing: Ryan
Attendees: Mr. RJ Kirk; Lt. Gen. (Ret.) Tom Bostick; Mr. Roy Bailey
POC: Gay M. Ludwick; (b)(6) Gay Ludwick email <mailto:(b)(6) Gay Ludwick email>

Attendees	Name <E-mail>	Attendance
	(b)(6) Pruitt Cal. Acct. <(b)(6) Pruitt Cal. Acct.>	Organizer
	Jackson, Ryan <jackson.ryan@epa.gov>	Required

Time 9:00 AM – 9:15 AM