

EPA-2447

"Mae Thomas"  
 <Mae.Thomas@erg.com>  
 11/30/2009 03:10 PM

To William Perkins  
 cc "Mae Thomas"  
 bcc

Subject Re: Ongoing ERG task list 11/30

Hi Bill, attached is the memo that describes all we did.  
 Thanks  
 Mae

>>> <Perkins.William@epamail.epa.gov> 11/30/2009 2:53 PM >>>

Mae,

Here is what I am tracking for outstanding tasks; please let me know if anything looks inaccurate. As we discussed yesterday, we may need support this weekend, especially on copyediting. Thank you.

Cheers,

Bill

Task	Deadline	Status
Copyediting RTC Volumes	varies	1,2, 3,7, 8,10 done; 11 underway; 5 anticipated today; 4,6,9 tomorrow or Wednesday
Process memo to EPA	today	
Docketing RTC references	12/1	non-copyrighted
uploaded immediately; copyrighted procedure (list and DVDs) underway for 12/2 send to docket		
Master reference list for docket (x2)	12/1	1) Commenter submissions 2) EPA references; ERG preparing for 2nd EPA review
Process new comments + supportives	12/2	ensure that web interface is fully complete and matches everything received (access file given to EPA)
Access file of web database info	12/2	also making pdfs of the category list + for all excerpts by category
2nd round (quick) RTC/TSD copyedit mid-to-late-week		
Docketing new TSD references	complete for now	any additional new TSD references (post-OMB) will be added later this week
Comms material support	TBD	on call for early-to-mid week this week

Bill Perkins  
 Climate Change Adaptation Analyst  
 Climate Science and Impacts Branch  
 Climate Change Division  
 U.S. Environmental Protection Agency  
 perkins.william@epa.gov  
 (O) 202.343.9460  
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 (C) (b)(6)

EPA-EF-003944

(b)(5) Deliberative

GHG Endangerment Project Description\_v6.doc

EPA-2448

William Perkins/DC/USEPA/US  
11/30/2009 03:15 PM

To "Mae Thomas"  
cc  
bcc  
Subject Re: Ongoing ERG task list 11/30

Mae,

Excellent! I should have any comments back by tomorrow morning after I review and cross-walk with what EPA is saying in our documents. Thank you.

Cheers,

Bill

Bill Perkins  
Climate Change Adaptation Analyst  
Climate Science and Impacts Branch  
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perkins.william@epa.gov  
(O) 202.343.9460  
(F) 202.343.2202  
(C) (b)(6)

"Mae Thomas" Hi Bill, attached is the memo that descri... 11/30/2009 03:11:36 PM

From: "Mae Thomas" <Mae.Thomas@erg.com>  
To: William Perkins/DC/USEPA/US@EPA  
Cc: "Mae Thomas" <Mae.Thomas@erg.com>  
Date: 11/30/2009 03:11 PM  
Subject: Re: Ongoing ERG task list 11/30

Hi Bill, attached is the memo that describes all we did.  
Thanks  
Mae

>>> <Perkins.William@epamail.epa.gov> 11/30/2009 2:53 PM >>>

Mae,

Here is what I am tracking for outstanding tasks; please let me know if anything looks inaccurate. As we discussed yesterday, we may need support this weekend, especially on copyediting. Thank you.

Cheers,

Bill

Task	Deadline	Status
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Docketing RTC references	12/1	non-copyrighted

EPA-EF-003946

uploaded immediately; copyrighted procedure (list and DVDs) underway for  
12/2 send to docket  
Master reference list for docket (x2) 12/1 1) Commenter  
submissions 2) EPA references; ERG preparing for 2nd EPA review  
Process new comments + supportives 12/2 ensure that  
web interface is fully complete and matches everything received (access  
file given to EPA)  
Access file of web database info 12/2 also making pdfs  
of the category list + for all excerpts by category  
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Docketing new TSD references complete for now any additional new  
TSD references (post-OMB) will be added later this week  
Comms material support TBD on call for early-to-mid  
week this week

Bill Perkins  
Climate Change Adaptation Analyst  
Climate Science and Impacts Branch  
Climate Change Division  
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perkins.william@epa.gov  
(O) 202.343.9460  
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(C) (b)(6)

[attachment "GHG Endangerment Project Description\_v6.doc" deleted by William Perkins/DC/USEPA/US]

EPA-2449

Michael Kolian/DC/USEPA/US

To Lesley Jantarasami

11/30/2009 03:19 PM

cc

bcc

Subject Re: forestry

Though not explicitly mentioned in the response this paper and others were reviewed. Should I revised the response??

Comment:

(b)(5) Deliberative  
[Redacted]

[Redacted]

[Redacted]

Response:

(b)(5) Deliberative  
[Redacted]

[Redacted]

(b)(5) Deliberative

Lesley Jantarasami Both API and Holland and Hart sub... 11/30/2009 01:50:15 PM

From: Lesley Jantarasami/DC/USEPA/US  
To: Michael Kolian/DC/USEPA/US@EPA  
Date: 11/30/2009 01:50 PM  
Subject: Re: forestry

Both API and Holland and Hart submitted the following reference. (b)(5) Deliberative

Commenter Name: Paul D. Phillips, Robert T. Connery, and James A. Holtkamp  
Commenter Affiliation: Holland & Hart  
Commenter Type:  
Document Control Number: EPA-HQ-OAR-2009-0171-3722R56  
Comment Excerpt Number: 1  
Form Letter? No  
Late Comment? No  
Comment Changed? No  
[View Original Comment Letter](#)

One commenter (3722) submitted the following reference in support of their comments: T. Kitzberger, P.M. Brown, E.K. Heyerdahl, T.W. Swetnam, and T.T. Veblen, "Contingent Pacific-Atlantic Ocean influence on multicentury wildfire synchrony over western North America," Proceedings of the National Academy of Sciences 104, no.2 (2007): 543-548.

Michael Kolian [attachment "RTC\_draft\_Volume\_6\_Fo... 11/30/2009 01:29:53 PM

From: Michael Kolian/DC/USEPA/US  
To: Lesley Jantarasami/DC/USEPA/US@EPA  
Date: 11/30/2009 01:29 PM  
Subject: Re: forestry

[attachment "RTC\_draft\_Volume\_6\_Forestry\_only\_112909[1].doc" deleted by Lesley Jantarasami/DC/USEPA/US]

Lesley Jantarasami Can you send me the version you s... 11/30/2009 01:20:31 PM

From: Lesley Jantarasami/DC/USEPA/US  
To: Michael Kolian/DC/USEPA/US@EPA  
Date: 11/30/2009 01:20 PM  
Subject: forestry

---

Can you send me the version you sent to Ben?

Thanks!

EPA-2450

Darrell Winner/DC/USEPA/US

11/30/2009 03:19 PM

To Ben DeAngelo

cc Anne Grambsch, Chris Weaver, Mike Kolian, Bryan Bloomer  
bcc

Subject Re: Fw: vol 5 (use this version, please) -- CALL AT 2  
TODAY?!

First attempt

(b)(5) Deliberative

TSD p 90 to 91 Ozone insert.doc

more to come

---

Darrell Winner, Ph.D.  
Director, Applied Science Division  
National Center for Environmental Research  
winner.darrell@epa.gov  
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fax 202-233-0677

-----  
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Washington, DC 20460-0001

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FedEx/Courier:  
USEPA/ORD/NCER/ASD  
Room 3111  
1025 F St NW  
Washington, DC 20004

(Woodies Building / metro stop: Metro Center)

Ben DeAngelo Darrell, Anne, Chris, We're looking for... 11/30/2009 11:12:41 AM

---

From: Ben DeAngelo/DC/USEPA/US  
To: Darrell Winner/DC/USEPA/US@EPA, Anne Grambsch/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA  
Cc: Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 11:12 AM  
Subject: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Darrell, Anne, Chris,

We're looking for some guidance to help respond to some comments but also (b)(5) Deliberative

Darrell said he's available at this time. Sorry for the late notice but we're in the final throws of getting everything together.

Can help explain on the phone. Think we're looking for (b)(5) Deliberative

EPA-EF-003951



Thanks.  
-Ben

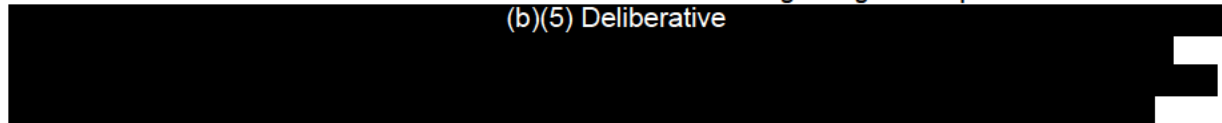
----- Forwarded by Ben DeAngelo/DC/USEPA/US on 11/30/2009 11:01 AM -----

From: Ben DeAngelo/DC/USEPA/US  
To: Darrell Winner/DC/USEPA/US@EPA  
Cc: Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 09:40 AM  
Subject: Fw: vol 5 (use this version, please)

---

Darrell,

Please see the comments below from John Hannon from OGC regarding our responses to comments  
(b)(5) Deliberative



Would you have time today to get on a call to go over this??

Thanks for any help.


-Ben

----- Forwarded by Ben DeAngelo/DC/USEPA/US on 11/30/2009 09:36 AM -----

From: John Hannon/DC/USEPA/US  
To: Jason Samenow/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA, David Chalmers/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, Michael Kolian/DC/USEPA/US@EPA, Bill Perkins <perkins.william@epa.gov>, Rona Birnbaum/DC/USEPA/US@EPA  
Date: 11/29/2009 01:00 PM  
Subject: Re: vol 5 (use this version, please)

---

Here are comments on the rest of volume 5. Not much, except in the area of (b)(5) Deliberative



I think this means two things:

(1) (b)(5) Deliberative


(b)(5) Deliberative

[Redacted]

(2) (b)(5) Deliberative

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[attachment "RTC\_draft\_Volume\_5\_complete\_1128 -jh1129.doc" deleted by Darrell Winner/DC/USEPA/US]

John Hannon  
Office of General Counsel  
U.S. Environmental Protection Agency  
1200 Pennsylvania Ave. NW (MC 2344A)  
Washington, D.C. 20460  
Phone (202) 564-5563  
Fax (202) 564-5603

Jason Samenow Sorry for multiple emails on this....but... 11/28/2009 11:38:10AM

From: Jason Samenow/DC/USEPA/US  
To: Rona Birnbaum/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, John Hannon/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA, Michael Kolian/DC/USEPA/US@EPA, Bill Perkins <perkins.william@epa.gov>, Lesley Jantarasami/DC/USEPA/US@EPA, David

Date: Chalmers/DC/USEPA/US@EPA  
11/28/2009 11:38 AM  
Subject: vol 5 (use this version, please)

---

Sorry for multiple emails on this....but please refer to this version of Volume 5.  
Jason

(Ben and Mike, please check the first comment and response on air quality and make sure both of your edits to that one were appropriately incorporated)

[attachment "RTC\_draft\_Volume\_5\_complete\_1128.doc" deleted by Darrell Winner/DC/USEPA/US]

EPA-2451

**Carol Holmes/DC/USEPA/US**

11/30/2009 03:24 PM

To Lesley Jantarasami

cc

bcc

Subject v11 back at ya

(b)(5) Deliberative

RTC draft Volume New 11 [old 9 - 12] 11 29 09 csh 11 30.doc

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---

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Office of General Counsel  
U.S. Environmental Protection Agency  
1200 Pennsylvania Ave, NW (MC 2344A)  
Washington, DC 20460  
Phone (202) 564-8709  
Fax (202) 564-5603

---

EPA-EF-003955

EPA-2452

**Suzanne  
Kocchi/DC/USEPA/US**  
11/30/2009 03:30 PM

To David Chalmers, Ben DeAngelo, Rona Birnbaum, Jason  
Samenow, Lesley Jantarasami, William Perkins, Michael  
Kolian, Marcus Sarofim, Jeremy Martinich

cc

bcc

Subject RTC review table

sorry it took so long to circulate - i've ben at mtgs. i think this is it although could be slightly out of date given how late in the day it is.

(b)(5) Deliberative

Review Table\_Endangerment 113009.xls

EPA-EF-003956

EPA-2453

Jason  
Samenow/DC/USEPA/US  
11/30/2009 03:33 PM

To William Perkins  
cc "Mae Thomas"  
bcc

Subject Re: Fw: need a study pronto, can't find it in any erg resource  
(ftp/database)

Just found it there... the reason I hadn't seen it was because it was in not in the context of my topic area (health) -- but referenced with respect to valuing amenities in an unrelated chapter.

Jason

William Perkins SAP 4.6. Bill Perkins Climate Change A... 11/30/2009 03:28:42 PM

From: William Perkins/DC/USEPA/US  
To: Jason Samenow/DC/USEPA/US@EPA  
Cc: "Mae Thomas" <Mae.Thomas@erg.com>  
Date: 11/30/2009 03:28 PM  
Subject: Re: Fw: need a study pronto, can't find it in any erg resource (ftp/database)

SAP 4.6.

Bill Perkins  
Climate Change Adaptation Analyst  
Climate Science and Impacts Branch  
Climate Change Division  
U.S. Environmental Protection Agency  
perkins.william@epa.gov  
(O) 202.343.9460  
(F) 202.343.2202  
(C) (b)(6)

Jason Samenow Do you know which assessment repor... 11/30/2009 03:26:27 PM

From: Jason Samenow/DC/USEPA/US  
To:  
Cc: "Mae Thomas" <Mae.Thomas@erg.com>, William Perkins/DC/USEPA/US@EPA  
Date: 11/30/2009 03:26 PM  
Subject: Re: Fw: need a study pronto, can't find it in any erg resource (ftp/database)

Do you know which assessment report by chance? I did not see it.

Jason

"Mae Thomas" It doesn't look like we have it on hand,... 11/30/2009 03:07:44 PM

From: "Mae Thomas" <Mae.Thomas@erg.com>  
To: William Perkins/DC/USEPA/US@EPA  
Cc: Jason Samenow/DC/USEPA/US@EPA, "Mae Thomas" <Mae.Thomas@erg.com>  
Date: 11/30/2009 03:07 PM  
Subject: Re: Fw: need a study pronto, can't find it in any erg resource (ftp/database)

It doesn't look like we have it on hand, but I will get someone to get

EPA-EF-003957

it right away.

It is not on the FTP site because it is cited in one of the Assessment reports.

>>> <Perkins.William@epamail.epa.gov> 11/30/2009 2:50 PM >>>

Mae,

Also, if you find this, please send it directly to Jason to save time. Thank you.

Cheers,

Bil

Bill Perkins  
Climate Change Adaptation Analyst  
Climate Science and Impacts Branch  
Climate Change Division  
U.S. Environmental Protection Agency  
perkins.william@epa.gov  
(O) 202.343.9460  
(F) 202.343.2202  
(C) (b)(6)

----- Forwarded by William Perkins/DC/USEPA/US on 11/30/2009 02:49 PM -----

From: William Perkins/DC/USEPA/US

To: Mae Thomas <Mae.Thomas@erg.com>

Date: 11/30/2009 02:49 PM

Subject: Fw: need a study pronto, can't find it in any erg resource (ftp/database)

Mae,

Do you guys have this or can you get it for us as soon as possible?

It

was cited by commenter 11348 and is on the master reference list but is

not on the journal/DCN list you sent me a few days ago. Presumably (b)(5) [redacted], but if you can find it for us quick-turnaround that would be fantastic. Thank you for your help here.

Cheers,

Bill

Bill Perkins  
Climate Change Adaptation Analyst  
Climate Science and Impacts Branch  
Climate Change Division  
U.S. Environmental Protection Agency  
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(F) 202.343.2202

(C) (b)(6)

----- Forwarded by William Perkins/DC/USEPA/US on 11/30/2009 02:45 PM

-----

From: Jason Samenow/DC/USEPA/US

To: William Perkins/DC/USEPA/US@EPA

Date: 11/30/2009 02:36 PM

Subject: need a study pronto, can't find it in any erg resource  
(ftp/database)

it was cited by commenter 11348

Moore, Thomas G (1998) "Health and Amenity Effects of Global  
Warming"  
Economic Inquiry  
36(3) July: 471-488

the web site for the journal is

<http://www3.interscience.wiley.com/journal/119940811/abstract>

i was able to get earlier versions of this study off google, but i  
gotta  
have the 1998 version from the economic inquiry journal

need this asap.

thanks,  
jason

EPA-EF-003959



EPA-2454

Carol Holmes/DC/USEPA/US

To Lesley Jantarasami

11/30/2009 03:33 PM

cc

bcc

Subject I forgot to add something to V11 re late comments

Perhaps under 11.1

Comment:

(b)(5) Deliberative

Response:

(b)(5) Deliberative

Confidential communication for internal deliberations only; Attorney-client, attorney work product and/or enforcement privilege; Do not distribute outside EPA or DOJ

---

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Washington, DC 20460  
Phone (202) 564-8709  
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---

EPA-EF-003960

EPA-2455

Anne Grambsch/DC/USEPA/US  
11/30/2009 04:05 PM

To Chris Weaver  
cc Ben DeAngelo, Bryan Bloomer, Darrell Winner, Mike Kolian  
bcc  
Subject Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

I concur with Chris.

Only quibble: Is this the first place we use "IA" -- if first use, then sentence should be "The results in the Interim Assessment (IA) demonstrate..."

As I said, it's a quibble...

.a.

Anne Grambsch  
Global Change Research Program  
USEPA-ORD-NCEA  
N7813  
Phone: (703) 347-8521  
Fax: (703) 347-8694

Chris Weaver Hi Darrell. I think that's a very good star... 11/30/2009 03:57:32 PM

From: Chris Weaver/DC/USEPA/US  
To: Darrell Winner/DC/USEPA/US@EPA  
Cc: Anne Grambsch/DC/USEPA/US@EPA, Ben DeAngelo/DC/USEPA/US@EPA, Bryan Bloomer/DC/USEPA/US@EPA, Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 03:57 PM  
Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Hi Darrell. I think that's a very good start. Maybe it's fine as is, even. Anything else needed?  
-Chris

Darrell Winner First attempt more to come 11/30/2009 03:19:56 PM

From: Darrell Winner/DC/USEPA/US  
To: Ben DeAngelo/DC/USEPA/US@EPA  
Cc: Anne Grambsch/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA, Mike Kolian <kolian.michael@epa.gov>, Bryan Bloomer/DC/USEPA/US@EPA  
Date: 11/30/2009 03:19 PM  
Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

First attempt

[attachment "TSD p 90 to 91 Ozone insert.doc" deleted by Chris Weaver/DC/USEPA/US]

more to come

Darrell Winner, Ph.D.  
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National Center for Environmental Research  
winner.darrell@epa.gov  
phone 202-343-9748

EPA-EF-003961

fax 202-233-0677

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1200 Pennsylvania Ave NW  
Washington, DC 20460-0001  
-----

FedEx/Courier:  
USEPA/ORD/NCER/ASD  
Room 3111  
1025 F St NW  
Washington, DC 20004

(Woodies Building / metro stop: Metro Center)

Ben DeAngelo Darrell, Anne, Chris, We're looking for... 11/30/2009 11:12:41 AM

From: Ben DeAngelo/DC/USEPA/US  
To: Darrell Winner/DC/USEPA/US@EPA, Anne Grambsch/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA  
Cc: Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 11:12 AM  
Subject: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Darrell, Anne, Chris,

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Darrell said he's available at this time. Sorry for the late notice but we're in the final throws of getting everything together.

Can help explain on the phone. Think we're looking for (b)(5) Deliberative

Thanks.  
-Ben

----- Forwarded by Ben DeAngelo/DC/USEPA/US on 11/30/2009 11:01 AM -----

From: Ben DeAngelo/DC/USEPA/US  
To: Darrell Winner/DC/USEPA/US@EPA  
Cc: Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 09:40 AM  
Subject: Fw: vol 5 (use this version, please)

Darrell,

Please see the comments below from John Hannon from OGC regarding our responses to comments (b)(5) Deliberative

Would you have time today to get on a call to go over this??

Thanks for any help.

EPA-EF-003962

-Ben

----- Forwarded by Ben DeAngelo/DC/USEPA/US on 11/30/2009 09:36 AM -----

From: John Hannon/DC/USEPA/US  
To: Jason Samenow/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA, David Chalmers/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, Michael Kolian/DC/USEPA/US@EPA, Bill Perkins <perkins.william@epa.gov>, Rona Birnbaum/DC/USEPA/US@EPA  
Date: 11/29/2009 01:00 PM  
Subject: Re: vol 5 (use this version, please)

---

Here are comments on the rest of volume 5. Not much, except in the area of (b)(5) Deliberative

[Redacted]

I think this means two things:

(1) [Redacted] (b)(5) Deliberative

[Redacted]

[Redacted]

(2) [Redacted] (b)(5) Deliberative

[Redacted]

(b)(5) Deliberative

[attachment "RTC\_draft\_Volume\_5\_complete\_1128 -jh1129.doc" deleted by Darrell Winner/DC/USEPA/US]

John Hannon  
Office of General Counsel  
U.S. Environmental Protection Agency  
1200 Pennsylvania Ave. NW (MC 2344A)  
Washington, D.C. 20460  
Phone (202) 564-5563  
Fax (202) 564-5603

Jason Samenow | Sorry for multiple emails on this....but... | 11/28/2009 11:38:10AM

From: Jason Samenow/DC/USEPA/US  
To: Rona Birnbaum/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, John Hannon/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA, Michael Kolian/DC/USEPA/US@EPA, Bill Perkins <perkins.william@epa.gov>, Lesley Jantarasami/DC/USEPA/US@EPA, David Chalmers/DC/USEPA/US@EPA  
Date: 11/28/2009 11:38 AM  
Subject: vol 5 (use this version, please)

---

Sorry for multiple emails on this....but please refer to this version of Volume 5.  
Jason

(Ben and Mike, please check the first comment and response on air quality and make sure both of your edits to that one were appropriately incorporated)

[attachment "RTC\_draft\_Volume\_5\_complete\_1128.doc" deleted by Darrell Winner/DC/USEPA/US]

EPA-2456

**Michael Kolian**

05/12/2010 10:15 AM

To

cc

bcc

Subject UPLOAD C:\Documents and Settings\Owner\My Documents\Ccd\TSD comment period\RTC Document and Outline\Volume 5\December\Section 8a\_tsd 11\_27.doc

(b)(5) Deliberative

- Section 8a\_tsd 11\_27.doc

EPA-2457

Darrell Winner/DC/USEPA/US

11/30/2009 04:12 PM

To Ben DeAngelo

cc Anne Grambsch, Bryan Bloomer, Chris Weaver, Mike Kolian  
bcc

Subject Re: Fw: vol 5 (use this version, please) -- CALL AT 2  
TODAY?!

Second draft, with Ben's sentence on urban areas also inserted to this section of text.

(b)(5) Deliberative

TSD p 90 to 91 Ozone insert.doc

Bryan's suggestion to

(b)(5) Deliberative

maybe something like -

(b)(5) Deliberative

-darrell

---

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fax 202-233-0677

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FedEx/Courier:  
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1025 F St NW  
Washington, DC 20004

EPA-EF-003966

(Woodies Building / metro stop: Metro Center)

Darrell Winner First attempt more to come 11/30/2009 03:19:54 PM

From: Darrell Winner/DC/USEPA/US  
To: Ben DeAngelo/DC/USEPA/US@EPA  
Cc: Anne Grambsch/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA, Mike Kolian <kolian.michael@epa.gov>, Bryan Bloomer/DC/USEPA/US@EPA  
Date: 11/30/2009 03:19 PM  
Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

First attempt

[attachment "TSD p 90 to 91 Ozone insert.doc" deleted by Darrell Winner/DC/USEPA/US]

more to come

---

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National Center for Environmental Research  
winner.darrell@epa.gov  
phone 202-343-9748  
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-----  
Regular mail:  
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1200 Pennsylvania Ave NW  
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-----  
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Room 3111  
1025 F St NW  
Washington, DC 20004

(Woodies Building / metro stop: Metro Center)

Ben DeAngelo Darrell, Anne, Chris, We're looking for... 11/30/2009 11:12:41 AM

From: Ben DeAngelo/DC/USEPA/US  
To: Darrell Winner/DC/USEPA/US@EPA, Anne Grambsch/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA  
Cc: Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 11:12 AM  
Subject: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Darrell, Anne, Chris,

We're looking for some guidance to help respond to some comments but also (b)(5) Deliberative

Darrell said he's available at this time. Sorry for the late notice but we're in the final throws of getting everything together.

EPA-EF-003967



Can help explain on the phone. Think we're looking for (b)(5) Deliberative

Thanks.  
-Ben

----- Forwarded by Ben DeAngelo/DC/USEPA/US on 11/30/2009 11:01 AM -----

From: Ben DeAngelo/DC/USEPA/US  
To: Darrell Winner/DC/USEPA/US@EPA  
Cc: Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 09:40 AM  
Subject: Fw: vol 5 (use this version, please)

Darrell,

Please see the comments below from John Hannon from OGC regarding our responses to comments  
(b)(5) Deliberative

Would you have time today to get on a call to go over this??

Thanks for any help.

-Ben

----- Forwarded by Ben DeAngelo/DC/USEPA/US on 11/30/2009 09:36 AM -----

From: John Hannon/DC/USEPA/US  
To: Jason Samenow/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA, David Chalmers/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, Michael Kolian/DC/USEPA/US@EPA, Bill Perkins <perkins.william@epa.gov>, Rona Birnbaum/DC/USEPA/US@EPA  
Date: 11/29/2009 01:00 PM  
Subject: Re: vol 5 (use this version, please)

Here are comments on the rest of volume 5. Not much, except in the area of (b)(5) Deliberative

I think this means two things:

(1) (b)(5) Deliberative

(b)(5) Deliberative

[Redacted]

(2) (b)(5) Deliberative

[Redacted]

[Redacted]

[Redacted]

[attachment "RTC\_draft\_Volume\_5\_complete\_1128 -jh1129.doc" deleted by Darrell Winner/DC/USEPA/US]

John Hannon  
Office of General Counsel  
U.S. Environmental Protection Agency  
1200 Pennsylvania Ave. NW (MC 2344A)  
Washington, D.C. 20460  
Phone (202) 564-5563  
Fax (202) 564-5603

Jason Samenow Sorry for multiple emails on this....but... 11/28/2009 11:38:10 AM

From: Jason Samenow/DC/USEPA/US  
To: Rona Birnbaum/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, John

Cc: Hannon/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA  
Ben DeAngelo/DC/USEPA/US@EPA, Michael Kolian/DC/USEPA/US@EPA, Bill Perkins  
<perkins.william@epa.gov>, Lesley Jantarasami/DC/USEPA/US@EPA, David  
Chalmers/DC/USEPA/US@EPA  
Date: 11/28/2009 11:38 AM  
Subject: vol 5 (use this version, please)

---

Sorry for multiple emails on this....but please refer to this version of Volume 5.  
Jason

(Ben and Mike, please check the first comment and response on air quality and make sure both of your  
edits to that one were appropriately incorporated)

[attachment "RTC\_draft\_Volume\_5\_complete\_1128.doc" deleted by Darrell Winner/DC/USEPA/US]

EPA-2458

Jason  
Samenow/DC/USEPA/US  
11/30/2009 04:24 PM

To Marcus Sarofim  
cc David Chalmers, s.tracton  
bcc  
Subject Re: water vapor feedback and max temps

Thanks, Marcus... All makes sense.

Steve Tracton-- Please Ignore these emails... you were inadvertently copied. My apologies. Jason

Marcus Sarofim Can we just point out that there is no re... 11/30/2009 04:19:06 PM

From: Marcus Sarofim/DC/USEPA/US  
To: Jason Samenow/DC/USEPA/US@EPA  
Cc: David Chalmers/DC/USEPA/US@EPA, (b)(6)  
Date: 11/30/2009 04:19 PM  
Subject: Re: water vapor feedback and max temps

Can we just point out (b)(5) Deliberative

Hmm. (b)(5) Deliberative

-Marcus

Marcus C. Sarofim, PhD  
phone: 202-343-9993  
fax: 202-343-2202  
1310 L Street 256C  
AAAS Science & Technology Policy Fellow  
with the EPA Climate Division

Jason Samenow Off the top of your head, do you have... 11/30/2009 04:03:34 PM

From: Jason Samenow/DC/USEPA/US  
To: Marcus Sarofim/DC/USEPA/US@EPA  
Cc: David Chalmers/DC/USEPA/US@EPA, (b)(6)  
Date: 11/30/2009 04:03 PM  
Subject: Re: water vapor feedback and max temps

Off the top of your head, do you have some talking points (b) 5 deliberative, or know of papers that might help?

(b)(5) Deliberative

EPA-EF-003971

jason

Marcus Sarofim Oh! Perhaps (b)(5) Deliberative 11/30/2009 11:01:31 AM

From: Marcus Sarofim/DC/USEPA/US  
To: Jason Samenow/DC/USEPA/US@EPA  
Cc: David Chalmers/DC/USEPA/US@EPA  
Date: 11/30/2009 11:01 AM  
Subject: Re: water vapor feedback and max temps

Oh! Perhaps (b)(5) Deliberative

-Marcus

Marcus C. Sarofim, PhD  
phone: 202-343-9993  
fax: 202-343-2202  
1310 L Street 256C  
AAAS Science & Technology Policy Fellow  
with the EPA Climate Division

Jason Samenow ok... i'm going to leave the reference t... 11/30/2009 10:41:44 AM

From: Jason Samenow/DC/USEPA/US  
To: Marcus Sarofim/DC/USEPA/US@EPA  
Cc: David Chalmers/DC/USEPA/US@EPA  
Date: 11/30/2009 10:41 AM  
Subject: Re: water vapor feedback and max temps

ok... i'm going to leave the reference to (b)(5) Deliberative

Jason

Marcus Sarofim On my to-do list is to do (b)(5) Deliberative 11/30/2009 12:32:07 AM

From: Marcus Sarofim/DC/USEPA/US  
To: David Chalmers/DC/USEPA/US@EPA  
Cc: Jason Samenow/DC/USEPA/US@EPA  
Date: 11/30/2009 12:32 AM  
Subject: Re: water vapor feedback and max temps

On my to-do list is to do (b)(5) Deliberative

-Marcus

Marcus C. Sarofim, PhD  
phone: 202-343-9993  
fax: 202-343-2202  
1310 L Street 256C  
AAAS Science & Technology Policy Fellow  
with the EPA Climate Division

EPA-EF-003972

-----David Chalmers/DC/USEPA/US wrote: -----

To: Jason Samenow/DC/USEPA/US@EPA  
From: David Chalmers/DC/USEPA/US  
Date: 11/29/2009 08:06PM  
cc: Marcus Sarofim/DC/USEPA/US@EPA  
Subject: Re: water vapor feedback and max temps

Part of this comment/response used to be in Vol. 4 but Rona thought we should move it to 5. There's currently nothing specific to this issue in the temp section. Please let me know if there's a comment/response you think we should add.

Thanks,

David Chalmers  
ORISE Fellow  
U.S. EPA, Climate Change Division  
202.343.9814

-----Jason Samenow/DC/USEPA/US wrote: -----

To: Marcus Sarofim/DC/USEPA/US@EPA, David Chalmers/DC/USEPA/US@EPA  
From: Jason Samenow/DC/USEPA/US  
Date: 11/29/2009 07:21PM  
Subject: water vapor feedback and max temps

David/Marcus--

See this comment and response on heat-health-- Do we address water vapor and max temp projections in vol 4?

**Comment:**


(b)(5) Deliberative

**Response:**

(b)(5) Deliberative

[Redacted]

(b)(5) Deliberative



EPA-2459

Jason  
Samenow/DC/USEPA/US  
11/30/2009 04:25 PM

To Marcus Sarofim, Jeremy Martinich  
cc  
bcc  
Subject Fw: volume 2 back from ERG

----- Forwarded by Jason Samenow/DC/USEPA/US on 11/30/2009 04:24 PM -----

From: Lesley Jantarasami/DC/USEPA/US  
To: Jason Samenow/DC/USEPA/US@EPA  
Cc: William Perkins/DC/USEPA/US@EPA  
Date: 11/30/2009 12:05 PM  
Subject: volume 2 back from ERG

Jason,

Vol 2 is back from ERG - see below.

----- Forwarded by Lesley Jantarasami/DC/USEPA/US on 11/30/2009 12:04 PM -----

From: "Matthew Mitchell" <Matthew.Mitchell@erg.com>  
To: William Perkins/DC/USEPA/US@EPA, "Sue Eisenfeld" <Sue.Eisenfeld@erg.com>  
Cc: Lesley Jantarasami/DC/USEPA/US@EPA, "Mae Thomas" <Mae.Thomas@erg.com>  
Date: 11/30/2009 12:02 PM  
Subject: volume 2

Hi Bill and Lesley--

Here's the edited Volume 2. The separate reference list is coming soon--Mae and her staff have found a number of the missing entries. (b) 5 deliberative

Oh, also, I'm afraid there's another global fix to be made to the foreword: "principle" should be "principal" in the last paragraph, second sentence. I've fixed this in Volume 2 and we'll fix it going forward.

>>> <Perkins.William@epamail.epa.gov> 11/30/2009 9:40 AM >>>

Sue and Matt,

We now anticipate for 1st-round review:

Volume	Date to ERG
4	12/1
5	11/30
6	12/1 or 12/2
9	12/1 or 12/2

Cheers,

EPA-EF-003975



Bill

Bill Perkins  
Climate Change Adaptation Analyst  
Climate Science and Impacts Branch  
Climate Change Division  
U.S. Environmental Protection Agency  
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(O) 202.343.9460  
(F) 202.343.2202  
(C) (b)(6)

(b)(5) Deliberative

RTC volume 2 113009 mm jt.doc

EPA-2460

"Sue Eisenfeld"  
<Sue.Eisenfeld@erg.com>  
11/30/2009 04:25 PM

To William Perkins, "Matthew Mitchell"  
cc Lesley Jantarasami, "Mae Thomas"  
bcc  
Subject Re: Volume 11 for copyediting/formatting

Hi Bill and Lesley,  
Here is Volume 11 edited and formatted.  
Please continue to email all of us, but Matt will remain the primary point of contact. Thanks.

Sue Eisenfeld  
ERG  
Director of Editorial and Video Services  
2300 Wilson Blvd., Suite 350  
Arlington, VA 22201  
P: 703-841-0504  
F: 703-841-1440  
\*I am usually in the office M, W, F\*

>>> <Perkins.William@epamail.epa.gov> 11/29/2009 9:44 PM >>>

Matt and Sue,

Here is Volume 11. As I noted before, please also include the lines between each comment/response set. Also, as I stated earlier the deadline is not until 0900 on Tuesday for this because we got this to you so late. However, it looks right now like we may have multiple volumes, big ones, coming your way tomorrow; so my advice would be to try to get this to us tomorrow to clear your plate. Thank you and please let me know if you have any questions or concerns.

Cheers,

Bill

(See attached file: RTC Volume 11 to ERG 112909.doc)

Bill Perkins  
Climate Change Adaptation Analyst  
Climate Science and Impacts Branch  
Climate Change Division  
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perkins.william@epa.gov

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(b)(5) Deliberative

(C) (b)(6) RTC Volume 11 to ERG 112909 - se jt\_1.doc

EPA-2461

"Mae Thomas"  
<Mae.Thomas@erg.com>  
11/30/2009 04:29 PM

To William Perkins, Jason Samenow  
cc "Mae Thomas"  
bcc

Subject Re: Fwd: Fw: need a study pronto, can't find it in any erg  
resource (ftp/database)

>>> Jennifer O'Neil 11/30/2009 3:23 PM >>>  
attached

>>> Mae Thomas 11/30/2009 3:08 PM >>>  
Jennifer, can you get this reference for me right away? It is one EPA  
is really wanting.

Thanks  
mae

>>> <Perkins.William@epamail.epa.gov> 11/30/2009 2:50 PM >>>

Mae,

Also, if you find this, please send it directly to Jason to save time.  
Thank you.

Cheers,

Bil

Bill Perkins  
Climate Change Adaptation Analyst  
Climate Science and Impacts Branch  
Climate Change Division  
U.S. Environmental Protection Agency  
perkins.william@epa.gov  
(O) 202.343.9460  
(F) 202.343.2202  
(C) (b)(6)

----- Forwarded by William Perkins/DC/USEPA/US on 11/30/2009 02:49 PM  
-----

From: William Perkins/DC/USEPA/US

To: Mae Thomas <Mae.Thomas@erg.com>

Date: 11/30/2009 02:49 PM

Subject: Fw: need a study pronto, can't find it in any erg  
resource (ftp/database)

EPA-EF-003979

Mae,

Do you guys have this or can you get it for us as soon as possible?

It

was cited by commenter 11348 and is on the master reference list but is

not on the journal/DCN list you sent me a few days ago. Presumably (b)(6)

but if you can find it for us quick-turnaround that would be fantastic. Thank you for your help here.

Cheers,

Bill

Bill Perkins

Climate Change Adaptation Analyst

Climate Science and Impacts Branch

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(C) (b)(6)

----- Forwarded by William Perkins/DC/USEPA/US on 11/30/2009 02:45 PM

-----

From: Jason Samenow/DC/USEPA/US

To: William Perkins/DC/USEPA/US@EPA

Date: 11/30/2009 02:36 PM

Subject: need a study pronto, can't find it in any erg resource (ftp/database)

it was cited by commenter 11348

Moore, Thomas G (1998) "Health and Amenity Effects of Global Warming"

EPA-EF-003980

Economic Inquiry  
36(3) July: 471-488

the web site for the journal is

<http://www3.interscience.wiley.com/journal/119940811/abstract>

i was able to get earlier versions of this study off google, but i  
gotta  
have the 1998 version from the economic inquiry journal

need this asap.

thanks,  
jason



Health and Amenity Effects of Global Warming.pdf

## HEALTH AND AMENITY EFFECTS OF GLOBAL WARMING

THOMAS GALE MOORE\*

*This study shows that climate change would probably reduce mortality in the United States by about 40,000 per year, assuming a 4.5° warmer climate—the IPCC best estimate of temperature change with a doubling of carbon dioxide. Benefits would extend to lower medical costs nationwide. Measuring willingness to pay by wage rates shows that people prefer warm climates and would be willing to give up between \$30 billion and \$100 billion annually for a 4.5° increase in temperatures. (JEL Q25, J17, J31)*

## I INTRODUCTION

Many researchers, environmentalists, and politicians are forecasting that rising world temperatures in the next century will have devastating effects on humans.<sup>1</sup> Although the calamities are barely spelled out, some scholars and writers have pointed to a warmer climate's being less healthful. Referring to the world as a whole, Working Group II of the Intergovernmental Panel on Climate Change asserted [IPCC 1995, SPM-10]: "Climate change is likely to have wide-ranging and mostly adverse impacts on human health, with significant loss of life." The IPCC report feared that increases in heat waves would cause a rise in deaths from cardiorespiratory complications. It also foresaw a rise in vector-borne diseases, such as malaria and dengue and yellow fevers. The report did acknowledge briefly that in colder regions there would be fewer cold-related deaths.

The few studies that have examined the relation between warming and human health or

mortality in depth have focused either on increases in the number of days of very hot weather and the resulting mortality or on the spread of infectious diseases by such vectors as mosquitoes, flies, and snails.<sup>2</sup> Several major studies of the implications of global warming for the United States have neglected or claimed a lack of data on the effects on health or human welfare.<sup>3</sup> This study examines the overall effect of climate and, in particular, temperatures on mortality in the United States and the value people put on a warmer environment.

Rarely has any research explored people's preferences for less chilly weather. Given the circumstantial evidence that people prefer warm climates over cold, it is somewhat surprising that the effects of warming on human well-being have essentially been ignored. We do know that many people upon retiring flee to southern and warmer locales. According to a survey of people turning 50 in 1996, almost 40% plan to move when they retire and the most important criterion in selecting their destination (40%) is a "more favorable climate."<sup>4</sup> Folklore alleges that physicians sometimes recommend that patients escape to a warmer climate, never to a colder one. Presumably retirees, at least, find that higher temperatures improve their welfare. As air-conditioning has mitigated the rigors of hot summers, the population of the United States has been moving South and West, towards climates that enjoy less extreme cold weather. Most Americans

\* I would like to thank Michael S. Bernstam, Milton Friedman, Harry Gilman, Kenneth L. Judd, Edward Lazear, Charles G. Moore, and S. Fred Singer for helpful comments and suggestions on earlier drafts of this paper.

Moore, Senior Fellow, Hoover Institution, Stanford University, Phone 1-650-723-1411, Fax 1-650-723-1687  
E-mail moore@hoover.stanford.edu

1 Committee on Science, Engineering, and Public Policy, et al [1991], Mitchell [1991], Cline [1992], Gore [1992], IPCC [1992].

2 Smith and Tirpak [1989], Kalkstein [1991], Stone [1995].

3 National Research Council [1978], Nordhaus [1991], Cline [1992].

4 *USA Today*, May 13, 1996, B1.

## ABBREVIATIONS

DOT Department of Transportation  
IPCC Intergovernmental Panel on Climate Change  
PSI Pollution Standard Index

and Canadians taking vacations in the winter head to Florida, the Caribbean, Mexico, Hawaii, or southern California. Exceptions crowd the ski slopes, but they are a minority.

To my knowledge, Hoch and Drake [1974] conducted the only study—summarized in the U.S. Department of Transportation (DOT) research described below—that examined the preferences of people for various climates, an important measure of how weather affects human welfare. Many studies that have examined the quality of life in various urban areas, however, have found that warmer climates were correlated with a willingness to accept lower wages.<sup>5</sup> As a gauge of preferences, that research and this paper both use workers' willingness to pay for a better climate as measured by the differential in wages among cities.

## II HEALTH EFFECTS

### *Past Research*

In the early 1970s, the U.S. Department of Transportation sponsored a series of conferences on climate change that examined, among other things, the effect of climate on health care expenditures and on preferences of workers for various climates. At that time, the government and most observers were concerned about possible cooling of the globe. The department organized the meetings because it planned to subsidize the development and construction of a large fleet of supersonic aircraft that environmentalists contended would affect the world's climate.

The third gathering, held in February 1974, examined the implications of climate change for the economy and people's well-being and included a study of the costs to human health from cooling, especially any increased expenses for doctors' services, visits to hospitals, and additional medication.<sup>6</sup> For that meeting, the department asked the researchers to consider a cooling of 2° Celsius (3.6° Fahrenheit) and a warming of 0.5°C (0.9°F). Robert Anderson, Jr., the economist who calculated health care outlays, made no estimate of the costs or savings should the climate warm; but his numbers show that for every 5% reduction in the annual number of heating de-

gree days, a measure of winter's chill, health care costs would fall by \$0.6 billion (1971 dollars).<sup>7</sup> In his paper summarizing the various studies on economic costs and benefits of climate change, Ralph D'Arge [1974], the principal economist involved in the DOT project, indicated that a 10% shift in degree days would be equivalent to a 1.8° change in temperature. Thus the gain in reduced health costs from a warming of 4.5° would be on the order of \$3.0 billion in 1971 dollars or \$21.7 billion in 1994 dollars, adjusting for population growth and price changes (using the price index for medical care).

A more recent set of studies has focused on excessive mortality related to heat spells in major cities.<sup>8</sup> These studies have typically found a rise in deaths during periods of very hot weather for certain cities. The results have not, however, applied to all hot spells or to all cities. Work concerned with "killer" heat waves has generally ignored the reduction in mortality that warmer winter months would bring.

Interestingly cities with the highest average number of summer deaths are found in the Midwest or Northeast while those with the lowest number are in the South.<sup>9</sup> Typically researchers have failed to find any relationship between excess mortality and temperature in southern cities, which experience the most heat. Moreover, Kalkstein and Davis [1989] reported without explanation that the "threshold" between temperatures that lead to excess deaths and those that have no effect, varies significantly among the cities. Nor have they found a correlation between premature deaths and air pollution (Kalkstein and Davis [1989], Kalkstein [1991]). Little attention has been devoted to whether any excess deaths represented only premature mortality of a few days of the old or sick or whether the excess deaths shortened lives significantly.

7 Each degree that the average temperature for a day falls below 65° F produces one heating degree day. If the mean temperature on a particular day were 60°, for example, the number of degree days would be five. If the high for a day were 60° and the low 40°, the average would be 50° and the number of degree days would be 15.

8 Bridger and Helfand [1968]; Oechsl and Buechley [1970]; Ellis [1972], Ellis et al [1975], Weiner [1984], Kalkstein and Davis [1989], World Health Organization [1990], Kalkstein [1991].

9 Smith and Tirpak [1989, 224–5].

5 For example see Hoch [1974, 1977], Cropper and Arriaga-Salinas [1980], Cropper [1981], Roback [1982, 1988], Gyourko and Tracy [1991].

6. Anderson [1974].



These studies have found that those most susceptible to heat related deaths are elderly.<sup>10</sup> Kalkstein [1992] has reported that researchers have attributed the absence of heat related deaths in southern cities to acclimatization and the prevalence of housing that shields residents from high temperatures. If temperatures rise slowly over the next century by 2° to 6.3°, as is currently predicted [IPCC WG II 1995, SPM-2], people can become acclimated and housing can and, in the normal cycle, will be replaced. After all, half the housing stock in the United States has been built in the last 25 years.<sup>11</sup>

Earlier work, on the other hand, had found a negative relationship between temperature and mortality and/or a correlation between season and death rates.<sup>12</sup> Bull and Morton [1978], for example reported that deaths from myocardial infarction, strokes and pneumonia fell the higher the temperature in England and Wales. In New York, however, they fell only until the temperature reached 68° and then rose with the heat. Momiya [1963] found that deaths followed a seasonal path but that in the United States this pattern had been reduced in the period from 1920s to 1960s. Even though a pattern of increased deaths in the winter is apparent for all portions of the United States, England and Wales, and Japan, many subsequent researchers have emphasized summer deaths due to high temperatures.

Other studies of the influence of climate change on human health have examined a rather narrow set of potential medical areas. The underlying research has generally referred to Lyme disease, malaria, dengue and yellow fevers, and encephalitis, none of which is a major health problem in the United States. The IPCC [1995, SPM-10] has asserted that the “geographical zone of potential malaria transmission in response to world temperature increases at the upper part of the IPCC-projected range (5° to 9° by 2100) would increase from approximately 45% of the world population to approximately 60% by the latter half of the next century.” On the other hand, the

World Health Organization [1990, 21] notes that

until recent times, endemic malaria was widespread in Europe and parts of North American and that yellow fever occasionally caused epidemics in Portugal, Spain and the USA. Stringent control measures ... and certain changes in life-style following economic progress, have led to the eradication of malaria and yellow fever in these areas.

Concern about tropical and insect-spread diseases seems overblown. Inhabitants of Singapore, which lies almost on the equator, and of Hong Kong and Hawaii, which are also in the tropics, enjoy life spans as long as or longer than those of people living in Western Europe, Japan, and North America. Both Singapore and Hong Kong are free of malaria, but that mosquito-spread disease ravages nearby regions. Modern sanitation in advanced countries prevents the spread of many scourges found in hot climates. Such low tech and relatively cheap devices as window screens can slow the spread of insect vectors.

Insect-spread diseases might or might not increase under the stimulus of a warmer climate. Many of the hosts or insects themselves flourish within a relatively small temperature or climatic range. Plague, for example, spreads when the temperature is between 66° and 79° with relatively high humidity but decreases during periods of high rainfall.<sup>13</sup> Conditions for an increase in encephalitis, however, improve with higher temperatures and more rainfall. Parasitic diseases can usually be controlled through technology, good sanitary practices, and educating the public. Malaria-bearing mosquitoes flourish under humid conditions with temperatures above 61° and below 95°. Relative humidity below 25% causes either death or dormancy.

Even without warming, it is certainly possible that dengue fever or malaria could invade North America. Unfortunately, some of the government’s well meaning environmental policies may make the vector more likely. The preservation of wetlands, although useful in conserving species diversity, also provides prime breeding ground for mosquitoes that can carry these diseases. If the United States does in the future suffer from such insect-borne scourges, the infestation may have less

<sup>10</sup> Kalkstein and Davis [1989, 54], Kalkstein [1991, 147]

<sup>11</sup> *Statistical Abstract* [1995, table 1227]

<sup>12</sup> Momiya and Katayama [1967, 1972], Momiya [1963], Bull and Morton [1978].

<sup>13</sup> White [1985, 7.7.3]

to do with global warming than with the preservation of swampy areas.

### *Seasonal Effects*

The climate models generally predict that nighttime and winter temperatures will increase the most while daytime and summer highs will rise the least.<sup>14</sup> Many observers have pointed out that this will lengthen the growing season. It should also be beneficial to human health. The IPCC reports that over this century the weather in much of the world has been consistent with such a pattern: winter and night temperatures have risen while summer temperatures have fallen.<sup>15</sup>

A warmer globe would likely result in the polar jet stream's retreating towards higher latitudes; in the Northern Hemisphere the climate belt would move North.<sup>16</sup> Thus an average annual 6.7° increase in temperature for New York City, for example, would give it the climate of Atlanta. NYC's summertime temperatures, however, would not go up commensurably: the average high temperature in Atlanta during June, July, and August is only 4° warmer than New York City's and the latter city has on record a higher summer temperature than does the capital of Georgia. Summer temperatures generally differ less than winter temperatures on roughly the same longitude and differ less than average temperatures

A sample of 45 metropolitan areas in the United States shows that for each increase of a degree in the average annual temperature, July's average temperatures go up by only 0.5° while January's average temperatures climb by 1.5°.<sup>17</sup> Since warming will likely exert the maximum effect during the coldest periods but have much less effect during the hottest months, the climate change should reduce deaths even more than any summer increase might boost them.

In addition, as Table I documents, even deaths traceable to parasitic and infectious diseases are somewhat higher in the winter than in the summer. Respiratory and heart dis-

eases, which kill many more people annually and which the IPCC Working Group II Summary singled out [1995, SPM-10] as increasing under a warmer climate, peak during winter months, not summer months. The table shows that respiratory problems, such as pneumonia and influenza, are a particular problem in cold months (this is true in both the northern and southern hemisphere), but even the leading causes of death—diseases of the circulatory system—kill more people in the winter. Except for accidents, suicides, and homicides, which are slightly higher in the summer, death rates from virtually all other major causes rise in winter months; overall mortality in the three years 1985 to 1990 was 16% greater when it was cold than during the warm season. Other years show similar patterns. Rather than increasing mortality, these data suggest that warmer weather should reduce it; but this possibility is rarely discussed.

Earlier studies have reported the relationship between season and death rates. Professor F. Ellis of the Yale University School of Medicine reported that deaths in the United States between 1952 and 1967 were 13% higher on a daily basis in the winter than in the summer [1972, based on Table II, 15]. This difference is smaller than experienced during the 1985–1990 years, a period which included some of the hottest summers on record. Ellis's study covered a time during which recorded average temperatures in the United States were somewhat lower than during the 1985–1990 period tabulated in Table I. If hot weather were detrimental to life, the differential between summer and winter death rates should have been smaller, not larger, during the later period.

Before the early or middle part of this century, deaths during the summer months were much higher relative to winter than is currently the case.<sup>18</sup> The increase in average temperatures during this century has apparently been accompanied by a decline in hot weather deaths relative to winter mortality. Perhaps the decline of physical labor, which is afflicted with a much higher rate of fatal accidents than office work, explains the change. Momiyama [1977], however, reports that for

14. Gates et al. [1992]

15. Folland et al. [1992]

16. See Lamb [1972, 117–118], Giles [1990]

17. The data were collected from the Department of Commerce, National Climatic Data Center, 1979.

18. Momiyama [1977]

**TABLE I**  
Cause of Death by Season  
(1985–1990)

Cause of Death	Percent of All Deaths (December–February)	Percent Winter Over June–August*
Diseases of the respiratory system	10%	153%
Mental disorders	1%	123%
Diseases of the nervous system and sense organs	2%	125%
Diseases of the circulatory system	46%	123%
Endocrine and metabolic diseases and immunity disorders	3%	123%
Diseases of the genitourinary system	2%	121%
Diseases of the digestive system	3%	113%
Infectious and parasitic diseases	2%	113%
Neoplasms	21%	103%
Homicides	4%	86%
Suicides	1%	94%
Accidents	1%	90%
All Causes	100%	116%

\*Adjusted for differences in the number of days in each month

Source The National Center for Health Statistics, *Vital Statistics of the United States*, various years

most advanced countries, such as the United States, Japan, United Kingdom, France, and Germany, mortality is now concentrated in the winter.

A number of recent studies, as indicated above, have examined death rates on a daily basis. This allows the authors to compare extreme temperatures with mortality. Although the research has shown that it is typically the elderly or the very sick that are affected by temperature extremes, the analysis ignores whether this shortens life by more than a few days or a few weeks. That cities in the south fail to show any relationship of deaths to high temperatures suggests that the correlation in the north may stem from deaths of the most vulnerable when the weather turns warm. One way to parse out whether climate extremes shorten lives by only a few days or whether they lead to more serious reductions in the life span, is to consider longer periods. Monthly data on deaths and temperatures, for example, should on average measure whether any shortening is longer than a couple of weeks. A reduction in life shorter than that should wash out in the monthly data. Annual data would be even better but temperature fluctuations

from year to year are too small to produce significant variation in death rates. A cross section examination of cities with different annual temperatures, however, would show whether high heat leads to a significant reduction in life expectancies. Below I have employed both monthly data and annual data to measure the impact of climate on mortality.

To examine more closely the relationship of temperature to mortality on a monthly basis, I regressed various measures of warmth on deaths in Washington, D.C., from January 1987 through December 1989. The results support the proposition that climate influences mortality. Washington was chosen because the National Center for Health Statistics publishes monthly data on deaths only by state, but the Center treats the nation's capital as a state. Since temperatures are recorded for major urban areas only, it is impossible to compare these numbers with monthly state death rates, except for the District of Columbia.

Using a city has an advantage in that many demographic variables affecting the death rate, such as age, race, income, and religion, are held reasonably constant over a three-year

**TABLE II**  
 Regression of Monthly Death Rates on Monthly Temperatures in Washington, D.C.  
 (January 1987 through December 1989)

	1	2	3	4	5	6
Average Low Temperature	-0.032 (-5.56)					
Mean Monthly Temperature		-0.032 (-5.64)			-0.029 (-2.46)	
Average High Temperature			-0.031 (-5.73)			-0.029 (-2.56)
Hours of Daylight				-0.240 (-4.67)	-0.026 (-0.26)	-0.019 (-0.19)
R <sup>2</sup>	0.476	0.484	0.491	0.390	0.485	0.492
F-Statistic	30.94	31.86	32.79	21.78	15.53	15.95

t-statistics in parentheses

Data Sources *Vital Statistics of the United States, 1987-1989* and *Climatological Data Virginia, 1987-1989*

period. Moreover, it seems likely that many environmental factors also remain fixed during much of the same period. Seasonal changes, especially warm weather, do, of course, affect smog levels. Warm summers producing ozone could partially outweigh any beneficial effects of heat by itself. Since we are interested in the net effect of warming on human mortality, however, it is desirable to include any effect temperature had on creating high levels of ozone that might add to deaths.

I adjusted the reported monthly number of deaths for the number of days in the month and then divided by Washington's estimated population for that month to produce a death rate per day series. Yearly population figures, which declined for the three years, were calculated on the basis that the population declined linearly between each June population estimate. Regressing the death rate in the nation's capital for each month from 1987 through 1989 on the average maximum, minimum or mean monthly temperatures measured at National Airport for those 36 months showed that mortality declined with rising temperatures. All three temperature measures, shown in Table II, give similar results; but the variable for the average high temperature gives a slightly better fit. Since 1987 and especially 1988 were very hot summers in Washington, with the average high temperature during July 1987 and 1988 being 4.3°F and 4.5°F above normal, if heat waves were

real killers, those summers should have biased the coefficient towards zero. Moreover, ozone becomes a much greater problem in hotter weather, which should also have raised the coefficient of temperature towards the positive.

Although deaths peak in the winter, factors other than cold, such as less sunlight, could induce the higher mortality. The peaking itself does not prove that warming would lengthen lives; it could be that the length of the day affects mortality. The day's length is closely correlated with temperature, of course, but the latter variable varies from year to year. As regression (4) in Table II shows, the length of the day is correlated with the death rate but is less significant than temperature. Moreover, if temperature measures are combined with the length of the day—regressions (5) and (6)—the latter variable loses its statistical significance, although the sign of the coefficient is still negative. Temperature remains the most significant variable.

The relationship of deaths to temperature is probably underestimated since some elderly from the Capital winter in warm climates and die there. Nevertheless, using the coefficients for any one of the temperature measures implies that a 4.5°F rise—this is the IPCC's [1992, 16] "best estimate" under CO<sub>2</sub> doubling—would cut deaths for the country as a whole by about 37,000 annually.

### *Climatic Effects*

If death rates were lower in warm climates, however, that would provide further support for the proposition that a rise in average temperature would reduce mortality. Moreover, as mentioned above, employing annual data shows whether the effect of temperature is simply to reduce life by a short period or whether the effect is more substantial. Clearly many factors affect mortality. Within any population the proportion that is old affects death rates. Since African-Americans have lower life expectancies than whites, the proportion that is black affects mortality rates. Income and education are also closely related to life expectancy. As is well known, smoking shortens lives. Severe air pollution has pushed up mortality, at least for short periods.

Although ideally death rates should be age and race adjusted to examine the effect of climate, the data to do so are not readily available. In addition the data should be adjusted for income and/or schooling as these factors affect life expectancy. Moreover, simply including variables for the proportion over 65 and black in a regression adjusts for most of the variance related to the distribution of age and race. To examine further the relationship between climate and mortality, therefore, I regressed the death rate in 89 large counties—those with over 2,000 deaths in 1979 that made up all or a portion of the 50 largest metropolitan areas in 1979—on the percent of the population which was over 65 in 1980; the percent black in 1980; the percent with 16 years or more of schooling; the median household income in 1979; per capita income in 1979; various health inputs, such as hospital beds and physicians per 100,000; and various weather variables.<sup>19</sup> The weather variables were the actual average temperatures during 1979, the highest temperature in the summer, the lowest temperature during the winter, the number of heating degree days during 1979, and the number of cooling degree days.<sup>20</sup> To examine whether it was temperature or sun-

light that reduced mortality, I used the latitude and the elevation of the counties as well as the proportion of the sky that was cloudy (82 counties).

The health inputs, the latitude, the elevation, and the cloudiness were not statistically different from zero, added nothing to the results, and are not shown here. It would be useful to include data on smoking rates, but there is no such data by counties or even metropolitan areas circa 1979. State data, however, exist for 1955 and 1985; they show that smoking rates are higher in the south.<sup>21</sup> Thus smoking should be positively correlated with temperature and bias the temperature variables towards zero.

Assuming that the smoking rates of people in each of the counties matched those of the state as a whole and that smoking in 1985 was a good measure of smoking rates in 1979, I included a smoking variable in the regression. The latter assumption would seem to be reasonably valid as smoking rates vary only slowly over time, despite the trend downward in male smoking. Since the territories included in this study consist of the counties with the largest populations in the 50 largest metropolitan areas, they represent in most cases a significant portion of the state's population. Thus the smoking rate for the state as a whole may be a fair proxy for the county smoking rate. The results show that while the smoking rate is positively correlated with the death rate, statistically it is insignificantly different from zero. More important from the point of view of this study, inclusion of this measure of smoking leaves the size and significance of the other variables virtually unaffected.

Although data for all 89 counties on air pollution were unavailable, the *Statistical Abstract* [1982–1983, Table 352] has published data on the Pollutant Standard Index (PSI)—a measure of air pollutants that affect health—for a group of standard metropolitan statistical areas.<sup>22</sup> From this group I collected data on

<sup>19</sup> The data are for 1979 or 1980 because the Stanford University Library had annual weather data for urban areas only for 1975 to 1979.

<sup>20</sup> Cooling degree days are similar to heating degree days. For each day the average temperature differs from 65° the difference in number of degrees is equal to the heating or the cooling degree days for that day. The total for the year is the reported variable.

<sup>21</sup> Cohen and Colditz [1994]

<sup>22</sup> This index is based on five pollutants: CO, SO<sub>2</sub>, total suspended particulates, O<sub>3</sub>, and NO<sub>2</sub>. The PSI index rises above 100 when any one of the pollutants at only one station reaches a level judged to have adverse effects on human health. A level of 200 to 300 is considered very unhealthy and above 300, hazardous.

days in which PSI exceeded 200 for a sample of 22 of the counties<sup>23</sup> The results failed to show any significant effect of pollution on mortality, a result consistent with earlier studies.

As expected, Tables IIIa and IIIb show that the proportion over 65 and the proportion black are highly significant in explaining death rates across counties. Regression (1) and regression (2) are the same except that the first employs a measure of education while the second uses median household income. Median income gives the best fit and, as expected, higher incomes reduce deaths. It is interesting to note that, at the mean, the elasticity of death rates with respect to median income is  $-0.26$ ; that is, a 10% rise in income would reduce death rates by 2.6%. On the other hand, the elasticity of death rates with respect to percent of the population with 16 years of education is only  $-0.06$ . Evidently it is better to be rich than well educated. In both these regressions the average temperature in 1979 is highly significant (more so in the income regression) and shows unambiguously that warmer weather leads to lower deaths. Regression (2) explains 95% of the variance in death rates.

Regression (3), which includes temperatures squared—variable highly correlated with temperature—is intended to test whether the rate at which deaths are reduced falls at higher temperatures. Given the multicollinearity, neither variable is significant at the 5% level and the signs are reversed. Regression (4) simply substitutes per capita income for median household income. The result is less significant than the regression with household income. The remaining regressions use other measures of climate and demonstrate that warmer is healthier or at least extends life expectancies—once the age structure is held constant there is a well established direct relationship between death rates and life expectancies. Equation (5) substitutes heating degree days in 1979 for average temperature and finds that the *colder* the winter, the *higher* the death rate. Regression (6) employs cooling degree days and finds that the *hotter* the summer, the *lower* the death rate

23. Any day that the PSI exceeded 300 counted as two days

Regression (7) employs both variables together. While their significance goes down as a result of multicollinearity, the signs still indicate that warmer winters and warmer summers reduce deaths. Regressions (8), (9), and (10) use the extremes recorded during the year—the highest temperature and the lowest temperature—and find the same pattern evinced by the degree day data, that is, warmer temperatures reduce mortality in both the winter and the summer (note that the higher the lowest temperature, the lower the death rate)

Since the objective is to measure the effect of a warmer climate, it is simplest to use regression (2) because its measure of temperature is the mean during the year. (It is also the regression with the highest F-Statistic and the largest  $R^2$ .) The coefficient for average temperature implies that if the United States were enjoying temperatures  $4.5^\circ$  warmer than today, mortality would be 41,000 less. This savings in lives is quite close to the number estimated based on the Washington, D.C., data for the period 1987 through 1989.

In summary, the monthly figures for Washington, D.C., between 1987 and 1989, indicate that a climate warmer by about  $4.5^\circ$  would reduce deaths nationwide by about 37,000, the regressions on 89 counties for 1979 point towards a saving in lives of about 41,000. These data sets produce roughly the same conclusion—a warmer climate would reduce mortality by about the magnitude of highway deaths, although the latter deaths are more costly in that they probably involve a much higher proportion of young men and women.

#### *Morbidity*

Presumably, if a warmer climate reduced deaths, it would also cut disease. Unfortunately data on health care costs do not exist by county. However, the *County and City Data Book* publishes figures on physicians and hospital beds per 100,000. Since medical facilities tend to be concentrated, these numbers have a lot of random noise. Some counties in a region may have a considerable concentration of hospitals and attendant physicians while nearby counties may have only a few. Nevertheless, I regressed hospital beds per 100,000 and physicians per 100,000 on household income, percent black, percent

**TABLE IIIa**  
Death Rates for 89 Counties  
(1979)

	1	2	3	4
Percent Over 65 years 1980	49.84 (28.47)	45.27 (25.87)	46.32 (25.55)	50.00 (29.67)
Percent Black 1980	4.35 (9.55)	2.92 (6.25)	2.73 (5.80)	4.05 (8.71)
Percent with 16 years of Schooling	-2.76 (-2.72)			
Median Household Income 1979 (\$000)		-0.119 (-6.12)	-0.119 (-6.24)	
Per capita Income 1979 (\$000)				-0.156 (-3.22)
Average Temperature in 1979	-0.094 (-3.37)	-0.112 (-4.61)	0.160 (1.09)	-0.099 (-3.59)
Average Annual Temperature Squared			-0.016 (-1.87)	
R <sup>2</sup>	0.929	0.946	0.949	0.931
F-Statistic	274.41	371.44	306.67	284.08

Source: *Vital Statistics of the United States, 1979*, Vol II-Mortality, Part A, Table 1-17, *Annual Climatological Data, National Summary*, Vol 30, No 13, NOAA 1979, metric units, Bureau of the Census, *County and City Data Book*, 1983

**TABLE IIIb**  
Death Rates for 89 Counties  
(1979)

	5	6	7	8	9	10
Percent Over 65 years 1980	44.92 25.46	45.33 (25.07)	45.37 (25.64)	42.56 (24.13)	44.76 (24.92)	43.46 (24.13)
Percent Black 1980	2.89 6.10	2.85 (5.96)	2.93 (6.23)	2.91 (6.14)	2.79 (5.80)	2.92 (6.27)
Median Household Income 1979 (\$000)	-0.117 (-5.96)	-0.118 (-5.91)	-0.119 (-6.10)	-0.114 (-5.80)	-0.116 (-5.79)	-0.117 (-6.03)
Highest Temperature Summer 1979				-0.178 (-4.30)		-0.130 (-2.66)
Lowest Temperature Winter 1979					-0.040 (-3.81)	-0.023 (-1.90)
Heating Degree Days 1979 (1000s)			0.145 (2.17)			
Cooling Degree Days 1979 (1000s)		-0.451 (-3.99)	-0.239 (-1.63)			
R <sup>2</sup>	0.945	0.944	0.947	0.945	0.943	0.947
F-Statistic	360.50	351.52	294.59	361.02	346.41	298.52

t-statistics in parentheses.

**TABLE IV**  
Hospital and Physicians per 100,000  
(89 counties in 1980)

	Hospital Beds per 100,000	Hospital Beds per 100,000	Physicians per 100,000
Median Household Income (\$000)	-28 99 (-2 77)	-32 52 (-3 80)	-2 10 (-0 42)
Percent Black	636 95 (2 53)	583 15 (2 49)	337 68 (2 82)
Percent over 65	557.24 (0 59)		541 86 (1.21)
Average Annual Temperature	-35 69 (-2 71)	-34 22 (-2 66)	-10 71 (-1 71)
R <sup>2</sup>	0 303	0 300	0 158
F-Statistic	9 13	12 14	3 95

t-statistics in parentheses

over 65, and average annual temperature. The results are given in Table IV above.

Although these regressions do not have the statistical significance of the regressions on death rates, the hospital bed regressions and the coefficients for temperature in those regressions are significant at better than one in a thousand. The physicians regression is significant at the 99% level but the temperature variable is significant only at the 90% level. Nevertheless, all the temperature coefficients have a negative sign. The elasticity of hospital beds and physicians at the mean with average temperatures is -0.39 and -0.33. Assuming that the number of hospital beds and physicians reflected correctly the health care needs of their communities in 1979 and are an index of health care costs, the numbers suggest that private expenditures on health care would have been lower by \$22 or \$19 billion in 1994 had the climate been warmer. These numbers are remarkably close to the updated figures reported by Robert Anderson [1974] of \$22 billion. They also understate the benefits of warming since they do not include gains from the reduction in suffering or from a reduction in working days lost from disease. Nor do they include any lowering of government expenditures on health care

### III HUMAN WELL-BEING

In *The Wealth of Nations*, Adam Smith [1937, 100-18] pointed out that workers must

be paid more to work in an unpleasant place or to do nasty jobs. A casual examination of the job market illustrates the truth of that proposition. Oil companies must pay their workers premiums to cope with the climate on the North Slope of Alaska. Even in central and southern Alaska, labor commands higher wages than it does in the lower 48 states. These differentials reflect the desirability of jobs in one area over another. For example, those who have the least distaste for cold and darkness can be lured for the smallest premium to Prudhoe Bay, Alaska, to work in the oil fields. The differential in this case reflects the marginal valuation of the unpleasantness of work in that harsh environment of those with the least aversion to the conditions.

#### *Theory of Amenity Values*

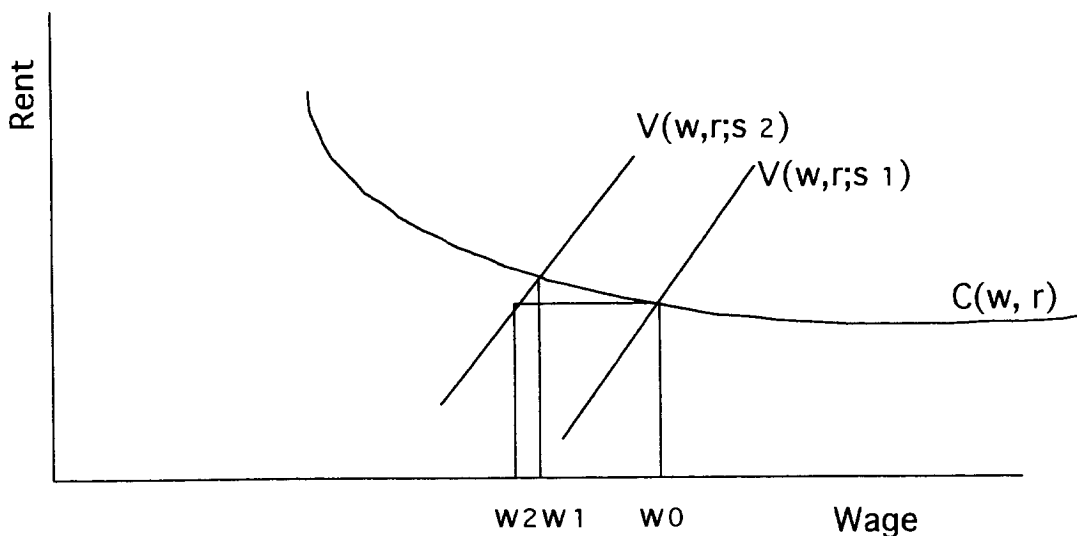
There is a large and growing economic literature on such amenity values.<sup>24</sup> Locational advantage can be reflected in the willingness of workers to accept lower wages or in the bidding up by business and home owners of land values.<sup>25</sup> If land values are raised enough, wages could even be forced higher to maintain real incomes. However, it is likely

<sup>24</sup> See e.g. Hoch [1977], Rosen [1979], Cropper and Arriaga-Salinas [1980], Graves [1980], Cropper [1981], Roback [1982, 1988], Blomquist et al [1988], Graves and Waldman [1991], Gyourko and Tracy [1991]

<sup>25</sup> See Roback [1982] for a full discussion



FIGURE 1



that if workers willingly work for less in a region with positive amenity values, this sum *understates* the benefits of the location. Some benefits have probably been capitalized into land values and are reflected in rents. Thus living costs are raised, making the reduction in wages that workers will accept smaller.

A simple algebraic model based on Roback's [1982] paper may clarify the relationship. Assume workers have identical tastes and skills and that their utility is a function of wages ( $w$ ), rents ( $r$ ), and amenity values ( $S$ ), with  $\delta U / \delta w > 0$ ,  $\delta U / \delta r < 0$ , and  $S_2 > S_1$ . Assume also that firms are indifferent to the amenity but face the usual production function with land and labor. Their cost is a function of  $w$  and  $r$ . Figure 1 shows a firm's constant cost as a function of wages and rents and the worker's equilibrium conditions for two cities with differing amenity values. Wages and rents adjust so that workers and employers have no incentive to move. As can be seen, rents will be higher and wages lower for the city with the better amenity. The distance  $W_0 - W_2$  measures the amount of wages the worker would be willing to give up to receive  $S_2$  over  $S_1$ , while the measured wage

reduction would be only  $W_1 - W_0$ , since the employee must also pay a higher rent. The lower value of the wages will, therefore, *underestimate* the value of the amenity.

The relationship of wages to amenity values becomes more complicated if the amenity value affects the costs of the firm either positively or negatively. If  $S_2$  raises the costs of the firm over  $S_1$ , wages will be lower in equilibrium but the effect on rents will be ambiguous. In effect, workers must accept a lower wage to induce employers to locate in the city that imposes higher costs on them. Alternatively, if the amenity lowers costs for the firm, rents will rise enough to discourage both employers and employees from locating in that favorable environment with an uncertain effect on equilibrium wages.

#### *Studies of the Effect on Rents*

Roback [1982, Table 3] found that none of the climate variables had any statistically significant relationship to land values, although heating degree days had a positive coefficient. Blomquist et al. [1988] reported that precipitation, humidity, heating degree days, and

cooling degree days were negatively related to housing expenditures—a proxy for land values—while wind speed, sunshine, and being close to the coast were positively related. Even though statistically significant, both cooling and heating degree days had very small effects on housing expenditures. Taking into account the effects of heating and cooling days on both wages and housing costs, the full implicit price of these variables was trivial. Gyourko and Tracy [1991] reported that the more precipitation, the greater the number of cooling degree days, the more heating degree days, and the higher the wind speed, the lower their measure of housing expenditures. On the other side, they also found that the higher the relative humidity and the closer to the coast ( $t = 1.94$ ), the higher the housing costs.

In sum existing studies have reported mixed correlations between housing costs and weather-related amenity values. Gyourko and Tracy [1991, 784] conclude their analysis of amenities by finding that “for many city traits, the full price largely reflects capitalization in the labor rather than in the land market.” The rest of this paper, therefore, will assume that climate amenities do not affect production costs and, as a result, any wage reduction underestimates the benefits from warming, although most of the amenity values do appear in the labor market.

### *Studies of the Effect on Wages*

The DOT’s third conference on global climate change, referred to above, used differences in occupational wages among urban areas to estimate the value of climate to humans. One of the tables, presented by D’Arge [1974, 569] in his overview of the economic research, drew on the work of Irving Hoch to supply estimates of the costs and benefits of a 0.5° Celsius (0.9°F) warming. Hoch’s work [1974] implies that a rise in temperature would have bestowed on workers an implicit gain of \$1.6 billion in 1971 dollars. In other words, adjusting for 1995’s level of wages and salaries and assuming that the temperature/wage relationship is linear, workers in 1995 would have been willing to accept about \$47 billion less in wages for working in a 4.5°F warmer climate.

Roback [1982] found that heating degree days, total snowfall, and the number of cloudy

days were positively correlated with wages, suggesting these are disamenities. As expected, the number of clear days was negatively correlated with wages. In her 1988 paper, she also found that the colder the winter (heating degree days), the higher the wages.

Cropper [1981] found that July temperature was inversely correlated with wages for a variety of one-digit occupations. Not all of the regressions for the occupations found statistically significant temperature coefficients, but with the exception of Sales Workers, all had negative coefficients. Of the eight different occupations, four were significant at the 1% level and one was significant at the 5% level. The regression for all earners found a statistically significant correlation at the 1% level. In an earlier paper with Arriaga-Salinas [1980], they report that the coefficient for July temperature was also negatively related to wages.

Gyourko and Tracy [1991, Table 1] reported that heating degree days were positively correlated with weekly hedonic wages. The coefficient for cooling degree days was also positive but not significantly different from zero. Both precipitation and wind speed were significantly negatively correlated with the hedonic wage variable, a somewhat puzzling result. Blomquist et al. [1988, Table 1], on the other hand, found that both heating degree days and cooling degree days were negatively correlated with their hourly wage equation, implying that workers prefer both cold and hot weather.

All the studies show that hotter summers—more cooling degree days or higher July temperatures—are related to lower wages. On the one hand, all of the studies using heating degree days to measure winter cold, except Blomquist, found that the colder, the higher the wage. On the other hand, the warmer the January temperature, the higher the wage.

### *Data*

To confirm and update Hoch’s work [1977], I collected data for 1987 from the Bureau of Labor Statistics on wage rates for a handful of occupations in metropolitan areas. Except for Hoch, most of the other studies of amenity values have employed data on individuals and attempted to hold human capital

constant. Hoch and this paper employ wage rates for a narrow group of occupations. Although there are advantages in utilizing the census data on individuals (sample size), measures to capture human capital are never perfect. In addition, hourly wages are typically estimated from annual earnings divided by estimates of hours worked during the year. In attempting to capture human capital, the hedonic wage regression typically involves a substantial number of variables. Not only do these equations include such poorly measured attributes of workers as education; but they employ a host of variables, such as occupation, industry, labor union affiliation, marital status, gender, and race, designed to eliminate all wage differentials except those related to amenity values. It is my opinion that reported wage rates for specific occupations from major urban areas, when the jobs are carefully defined and in general demand, measure compensating differentials more accurately.

The BLS reported data from 49 cities for secretaries, auto mechanics, and computer programmers; and on word processors (43 cities) and tool and die makers (36 cities). The Area Wage Survey published some of these earnings as weekly and others as hourly; moreover, some require more human capital and earn more annually. Consequently, I converted all earnings to percentage differences from the mean. In other words, for each occupation the percent earnings in each city was expressed as a percent of the mean earnings for that occupation in all cities. After eliminating areas without any published temperatures, there were 224 observations of earning differentials. Average annual temperatures existed for only 221 observations.<sup>26</sup>

### *Empirical Results*

The equations that fit the data the best employed as independent variables one of the measures of annual temperature, together with

<sup>26</sup> Atlanta, Baltimore, Boston, Charlotte, N C , Chicago, Cincinnati, Cleveland, Columbus, Ohio, Dallas-Ft Worth, Denver-Boulder, Detroit, Houston, Jackson, Mass , Kansas City, Los Angeles, Louisville, Memphis, Miami-Hialeah, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Phoenix, Pittsburgh, Portland, Oreg , Richmond, Va , San Diego, Seattle, St Louis, Washington, D C , Wilmington, Del -Md., Corpus Christi, Tex , Fresno, Calif , Huntsville, Ky , Newark, N J., Rochester, N Y, South Bend, Tampa, Worcester, Mass -Conn , and San Francisco

the log of the population of the metropolitan area in 1990 and the difference between the average maximum temperature in July and the average minimum temperature in January (Seasonal Change). To measure differences in the rate of growth of demand by cities, I included the change in population from 1980 to 1990 but found that it added nothing to the results. In addition, a number of independent variables that might plausibly affect the desirability of various metropolitan regions were tried, including the crime rate, days that the city was in violation of EPA's ozone standard, heating days, cooling days, proportion of the population in the central city that was black, annual precipitation, plus a dummy variable for the south. None of these was significant. Table V gives the results for the various regressions.

To test whether it was appropriate to combine all the occupations into one regression, dummy values for each occupation were added to regression 1 for the normal annual temperature. The results, given in Appendix Table A1, are not significantly different from those in Table V.

These regressions indicate that workers prefer warm climates to cool and that they also prefer climates with substantial seasonal changes in temperatures. Annual temperatures appear to be more significant than summer (cooling days) or winter (heating days), although regressions with those variables have slightly higher R squares. The overall significance, as measured by the F-statistic, is higher with annual temperatures than with cooling days. Although not shown in Table V, these regressions were also run using average July temperatures and average January temperatures with similar but less significant results. Precipitation has a small and marginally significant effect in the cooling and heating equations. The last line in the table presents the gains from a warming of 4.5°, assuming that seasonal variation and precipitation remain unchanged. As may be seen, the gains might be as low as \$30 billion or as high as \$100 billion. Hoch's work, as reported above, implies a gain of about \$50 billion, a figure well within the range predicted.

Should warming lead to a bigger boost in winter temperatures and a smaller rise in summer, as suggested above, the gain from higher temperatures would be offset in part by a de-

**TABLE V**  
**Regression Results of Amenity Benefits**  
**(Percent Wages of Average 1987)**

	1	2	3	4	5	6	7
Seasonal Variation (Avg July-Avg January)	-0.004 (-7.87)	-0.004 (-6.75)	-0.004 (-7.72)				
Normal Annual Temperatures	-0.007 (-7.35)	-0.006 (-6.46)					
Elasticity	-0.378	-0.343					
Annual Precipitation		-0.001 (-1.90)					
Log of Annual Temperatures			-0.868 (-7.11)				
Elasticity			-0.363				
Log of Population	0.110 (7.76)	0.103 (7.09)	0.111 (7.77)	0.092 (6.59)	0.092 (6.64)	0.090 (6.48)	0.094 (6.89)
Log of Cooling Days				-0.113 (-7.28)	-0.066 (-1.53)		
Elasticity				-0.048	-0.027		
Log of Heating Days					0.085 (1.26)	0.181 (7.55)	0.190 (8.07)
Elasticity					0.035	0.075	0.079
Log of Precipitation				-0.075 (-2.94)	-0.51 (-1.90)	-0.045 (-1.69)	
Log Seasonal Variation (Avg July-Avg January)				-0.157 (-3.43)	-0.242 (-2.35)	-0.383 (-8.27)	-0.417 (-9.87)
R <sup>2</sup>	0.403	0.413	0.395	0.418	0.428	0.422	0.415
Adjusted R <sup>2</sup>	0.395	0.402	0.386	0.407	0.415	0.412	0.407
F-Statistic	46.60	36.30	45.09	39.33	32.66	39.98	51.92
Number of Observations	211	211	211	224	224	224	224
1994 Gains (Billions)	\$96.90	\$88.49	\$93.70	\$29.08	\$39.12	\$46.97	\$49.22

t-statistics in parentheses

cline in seasonal variation, leading to a smaller dollar benefit. If all the rise in temperatures came in the nighttime (9°F), thus boosting winter lows with no rise in the day, seasonal variation would fall by 9° and average temperatures would rise by 4.5°. In that case, based on regression (1), workers would be worse off by around \$10 billion. On the other hand, if the rise in temperatures reflected the current relationship of average temperature to average winter temperature (rises by 1.5° for every degree the annual mean goes up) and average summer temperature (rises by only 0.9°) as mentioned above, using regression (1) in Table V indicates a gain of \$10 billion annually.

#### *Analysis of Results*

As the first part of this paper has demonstrated, a warmer climate would reduce deaths. At a minimum, these amenity values may simply reflect premiums workers are willing to pay to reduce their risks of premature mortality. If it were currently warmer by 4.5° with a resulting reduction in deaths of 40,000 annually, as predicted above, and if these amenity values reflect workers' valuation of reduced mortality, they would be valuing lives at between \$750 thousand and \$2.5 million, a somewhat lower figure than others have estimated. Since most of the weather-related deaths, however, are probably among the elderly or the very young, workers may not

value the reduction in deaths greatly. Compare these values with the *Statistical Abstract of the United States* [1994, Table 138] report of an average value of life based on their future earnings for all people in the United States of only \$113,487

Moreover, in all likelihood these estimates of the amenity value of climate substantially underestimate the tradeoff workers would make for warmer temperatures. If a warmer climate reduces costs to business, for example, by lowering transportation expenses, rents will have to be bid up to achieve equilibrium. People attempting to locate in preferred areas raise land values as well. These higher rents mean that workers must be paid more to compensate. Thus this estimate of the value of a less frigid climate may be much too low. In addition, well paid individuals prefer to live in pleasant climates, typically raising average incomes even of those less skilled in the area.

#### IV. CONCLUDING REMARKS

Although it is impossible to measure the gains exactly, a moderately warmer climate would be likely to benefit Americans in many ways, especially in health and in satisfying people's preferences for more warm weather. Most people would enjoy higher temperatures, and the evidence supports the proposition that humans would live longer and avoid some sickness. Less cold weather would mean less snow shoveling, fewer days of driving on icy roads, lower heating bills, and reduced outlays for clothing

No doubt many drawbacks to global warming exist, the most notable being the possibility of a rising sea level. In addition, the beneficial results described above apply strictly only to the United States, although it seems likely that advanced industrial countries in the middle latitudes would benefit as well. These regressions provide no information on the effect of warming on health or mortality in tropical or poor countries, which might suffer health impairment from warming. It would be useful to extend this analysis to the entire globe, but that would be very difficult. Not only does the climate vary greatly and incomes, which are difficult to compare, differ hugely, but cultural traits, including diet, are significantly different. Hong Kong, for example, has the longest life expectancy in the world. Is that because it is tropical, because it is rich, or because of its diet?

Moreover, it should be stressed that the evidence presented here is for a *moderate* rise in temperatures. If warming were to continue well beyond 4.5°, the costs would mount and at some point the health and welfare effects would undoubtedly turn negative.<sup>27</sup> Contrary to many dire forecasts, however, the temperature increase predicted by the IPCC under a doubling of greenhouse gases would yield both health and welfare benefits for Americans.

<sup>27</sup> Adding minimum temperature squared or average temperature squared to regressions produced coefficients that were not only negative but insignificantly different from zero.

**APPENDIX TABLE A1**  
Regressions with Dummies for Occupations

	Coefficient	Standard Error	t Stat
Intercept	1 1885	0 0832	14.28
Ann Temp-Secretaries	-0 0065	0 0009	-7 15
Ann Temp-Word Processors	-0 0066	0 0009	-7 16
Ann Temp-Comp Programer	-0 0065	0 0009	-7 07
Ann Temp-Tool & Die	-0 0067	0 0009	-7 28
Ann Temp-Vehicle Mechanic	-0 0066	0 0009	-7 23
Seasonal Variation	-0 0044	0 0006	-7 80
Log of Population	0 1113	0 0144	7 75
R <sup>2</sup>	0 406		
Adjusted R <sup>2</sup>	0 386		
F-Statistic	19 82		

486

## ECONOMIC INQUIRY

## APPENDIX TABLE A2

1979 County Variables

	Death Rates	Percent Over 65*	Percent Black*	Median Household Income	Mean Temperature
Mean	8.65	11.2%	15.3%	\$18,966	55.5
Standard Error	0.22	0.4%	1.4%	\$405	0.79
Median	8.5	10.9%	11.7%	\$18,364	54.1
Standard Deviation	2.04	0.038	0.135	3819.7	7.41
Minimum	4.1	4.5%	0.75%	\$10947	43.3
Maximum	16.5	30.7%	70.24%	\$30011	75.7
Standard Dev/Mean	0.24	0.34	0.88	0.20	0.13
Count	89	89	89	89	89
	Cooling Degree Days	Heating Degree Days	Percent with 16 Years of Schooling	Lowest Temp	Highest Temp
Mean	698	2546	19.6%	1.9	95.6
Standard Error	54	116	0.7%	1.8	0.4
Median	583	2657	18.8%	-2.0	95.0
Standard Deviation	510.98	1093.9	0.062	17.37	4.22
Minimum	69	108	6.8%	-27.9	88.0
Maximum	2344	4679	42.8%	42.1	117.0
Standard Dev/Mean	0.73	0.43	0.32	9.29	0.04
Count	89	89	89	89	89

## APPENDIX TABLE A3

Amenity Regression Data for 48 Cities

	Percent of Mean Earnings	Normal Annual Temp	Cooling Degree Days	Heating Degree Days	Seasonal Change
Mean	100%	56.9	1325	4183	39.2
Standard Error	0.012	1.07	140.7	289.6	1.70
Median	99.4%	54.77	1089	4686	43.9
Standard Deviation	0.085	7.42	975.1	2006.5	11.78
Sample Variance	0.007	55.09	950773	4025887	138.83
Minimum	85.6%	44.06	115	199	13.5
Maximum	120.9%	75.56	4095	8007	61.9
Count	48	48	48	48	48

**APPENDIX B**

## Data Resources

A. *Wage Data*

Bureau of Labor Statistics, *Area Wage Surveys, Specific Metropolitan Areas, 1987* The data are for all industries.

B. *Weather and Climate Data*

James Ruffner and Frank E. Bair, eds. *Weather of U.S. Cities*, Third Edition, Detroit: Gale Research Co 1987.

U.S. Department of Commerce, NOAA, National Climatic Data Center, *Climatological Data Virginia*. January 1987–December 1989, Vol 97, No 1–Vol 99, No 12, Washington National WSCMO AP, Average Maximum, Average Minimum, Average Temperatures; and *National Summary*, Annual Summary 1979, Vol. 30, No 13.

*Statistical Abstract of the United States*, 1991.

C. *Death Rates*

The National Center for Health Statistics, *Vital Statistics of the United States*, 1979, 1987, 1988, and 1989

D. *Demographic Variables*

*Statistical Abstract of the United States*, 1983, 1984, 1987, 1991 and 1994

*County and City Data Book* 1983 and 1988

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EPA-2462

Darrell Winner/DC/USEPA/US  
11/30/2009 04:34 PM

To Ben DeAngelo  
cc Anne Grambsch, Bryan Bloomer, Chris Weaver, Mike Kolian  
bcc  
Subject Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Here is the updated attachment -

(b)(5) Deliberative

TSD p 90 to 91 Ozone insert.doc

-darrell

---

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Darrell Winner      Second draft, with Ben's sentence on u...      11/30/2009 04:12:33 PM

---

From: Darrell Winner/DC/USEPA/US  
To: Ben DeAngelo/DC/USEPA/US@EPA  
Cc: Anne Grambsch/DC/USEPA/US@EPA, Bryan Bloomer/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA, Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 04:12 PM  
Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Second draft, with Ben's sentence on urban areas also inserted to this section of text.

[attachment "TSD p 90 to 91 Ozone insert.doc" deleted by Darrell Winner/DC/USEPA/US]

Bryan's suggestion to (b)(5) Deliberative

maybe something like -

(b)(5) Deliberative

EPA-EF-004000

(b)(5) Deliberative

-darrell

---

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(Woodies Building / metro stop: Metro Center)

Darrell Winner

First attempt more to come

11/30/2009 03:19:54 PM

---

From: Darrell Winner/DC/USEPA/US  
To: Ben DeAngelo/DC/USEPA/US@EPA  
Cc: Anne Grambsch/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA, Mike Kolian  
<kolian.michael@epa.gov>, Bryan Bloomer/DC/USEPA/US@EPA  
Date: 11/30/2009 03:19 PM  
Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

First attempt

[attachment "TSD p 90 to 91 Ozone insert.doc" deleted by Darrell Winner/DC/USEPA/US]

more to come

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EPA-EF-004001

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Ben DeAngelo Darrell, Anne, Chris, We're looking for... 11/30/2009 11:12:41 AM

From: Ben DeAngelo/DC/USEPA/US  
To: Darrell Winner/DC/USEPA/US@EPA, Anne Grambsch/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA  
Cc: Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 11:12 AM  
Subject: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Darrell, Anne, Chris,

We're looking for some guidance to help respond to some comments but also (b)(5) Deliberative

Darrell said he's available at this time. Sorry for the late notice but we're in the final throws of getting everything together.

Can help explain on the phone. Think we're looking for (b)(5) Deliberative

Thanks.  
-Ben

----- Forwarded by Ben DeAngelo/DC/USEPA/US on 11/30/2009 11:01 AM -----

From: Ben DeAngelo/DC/USEPA/US  
To: Darrell Winner/DC/USEPA/US@EPA  
Cc: Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 09:40 AM  
Subject: Fw: vol 5 (use this version, please)

Darrell,

Please see the comments below from John Hannon from OGC regarding our responses to comments (b)(5) Deliberative

Would you have time today to get on a call to go over this??

Thanks for any help.

-Ben

----- Forwarded by Ben DeAngelo/DC/USEPA/US on 11/30/2009 09:36 AM -----

From: John Hannon/DC/USEPA/US  
To: Jason Samenow/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA, David Chalmers/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, Michael Kolian/DC/USEPA/US@EPA, Bill Perkins <perkins.william@epa.gov>, Rona Birnbaum/DC/USEPA/US@EPA  
Date: 11/29/2009 01:00 PM  
Subject: Re: vol 5 (use this version, please)

---

Here are comments on the rest of volume 5. Not much, except in the area of (b)(5) Deliberative

[Redacted]

I think this means two things:

(1) [Redacted] (b)(5) Deliberative

[Redacted]

[Redacted]

(2) [Redacted] (b)(5) Deliberative

[Redacted]

(b)(5) Deliberative

[attachment "RTC\_draft\_Volume\_5\_complete\_1128 -jh1129.doc" deleted by Darrell Winner/DC/USEPA/US]

John Hannon  
Office of General Counsel  
U.S. Environmental Protection Agency  
1200 Pennsylvania Ave. NW (MC 2344A)  
Washington, D.C. 20460  
Phone (202) 564-5563  
Fax (202) 564-5603

Jason Samenow [Sorry for multiple emails on this....but...](#) 11/28/2009 11:38:10AM

From: Jason Samenow/DC/USEPA/US  
To: Rona Birnbaum/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, John Hannon/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA, Michael Kolian/DC/USEPA/US@EPA, Bill Perkins <perkins.william@epa.gov>, Lesley Jantarasami/DC/USEPA/US@EPA, David Chalmers/DC/USEPA/US@EPA  
Date: 11/28/2009 11:38 AM  
Subject: vol 5 (use this version, please)

---

Sorry for multiple emails on this....but please refer to this version of Volume 5.  
Jason

(Ben and Mike, please check the first comment and response on air quality and make sure both of your edits to that one were appropriately incorporated)

[attachment "RTC\_draft\_Volume\_5\_complete\_1128.doc" deleted by Darrell Winner/DC/USEPA/US]

EPA-2463

Michael Kolian/DC/USEPA/US  
11/30/2009 04:38 PM

To Darrell Winner, Chris Weaver  
cc Ben DeAngelo  
bcc  
Subject Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Thanks for the quick response on the language.

Can you guys review this one I separated from the response to comments document and take a crack at responding to John's comments?

Thanks,  
Mike

(b)(5) Deliberative

Comment from John 3411.1\_3347.3.doc

Darrell Winner Here is the updated attachment - -darrell 11/30/2009 04:34:22 PM

From: Darrell Winner/DC/USEPA/US  
To: Ben DeAngelo/DC/USEPA/US@EPA  
Cc: Anne Grambsch/DC/USEPA/US@EPA, Bryan Bloomer/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA, Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 04:34 PM  
Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Here is the updated attachment -  
[attachment "TSD p 90 to 91 Ozone insert.doc" deleted by Michael Kolian/DC/USEPA/US]

-darrell

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EPA-EF-004005

Darrell Winner Second draft, with Ben's sentence on u... 11/30/2009 04:12:33 PM

From: Darrell Winner/DC/USEPA/US  
To: Ben DeAngelo/DC/USEPA/US@EPA  
Cc: Anne Grambsch/DC/USEPA/US@EPA, Bryan Bloomer/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA, Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 04:12 PM  
Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Second draft, with Ben's sentence on urban areas also inserted to this section of text.

[attachment "TSD p 90 to 91 Ozone insert.doc" deleted by Darrell Winner/DC/USEPA/US]

Bryan's suggestion to (b)(5) Deliberative

maybe something like -

(b)(5) Deliberative

-darrell

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-----  
FedEx/Courier:  
USEPA/ORD/NCER/ASD  
Room 3111  
1025 F St NW  
Washington, DC 20004

(Woodies Building / metro stop: Metro Center)

EPA-EF-004006

Darrell Winner First attempt more to come 11/30/2009 03:19:54 PM

From: Darrell Winner/DC/USEPA/US  
To: Ben DeAngelo/DC/USEPA/US@EPA  
Cc: Anne Grambsch/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA, Mike Kolian <kolian.michael@epa.gov>, Bryan Bloomer/DC/USEPA/US@EPA  
Date: 11/30/2009 03:19 PM  
Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

First attempt

[attachment "TSD p 90 to 91 Ozone insert.doc" deleted by Darrell Winner/DC/USEPA/US]

more to come

---

Darrell Winner, Ph.D.  
Director, Applied Science Division  
National Center for Environmental Research  
winner.darrell@epa.gov  
phone 202-343-9748  
fax 202-233-0677

-----  
Regular mail:  
USEPA/ORD/NCER/ASD (8726F)  
1200 Pennsylvania Ave NW  
Washington, DC 20460-0001

-----  
FedEx/Courier:  
USEPA/ORD/NCER/ASD  
Room 3111  
1025 F St NW  
Washington, DC 20004

(Woodies Building / metro stop: Metro Center)

Ben DeAngelo Darrell, Anne, Chris, We're looking for... 11/30/2009 11:12:41 AM

From: Ben DeAngelo/DC/USEPA/US  
To: Darrell Winner/DC/USEPA/US@EPA, Anne Grambsch/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA  
Cc: Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 11:12 AM  
Subject: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Darrell, Anne, Chris,

We're looking for some guidance to help respond to some comments but also (b)(5) Deliberative

Darrell said he's available at this time. Sorry for the late notice but we're in the final throws of getting everything together.

Can help explain on the phone. Think we're looking for (b)(5) Deliberative

EPA-EF-004007



Thanks.  
-Ben

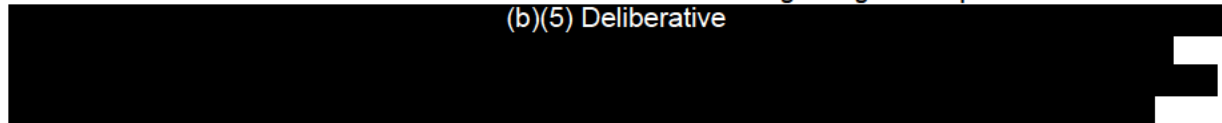
----- Forwarded by Ben DeAngelo/DC/USEPA/US on 11/30/2009 11:01 AM -----

From: Ben DeAngelo/DC/USEPA/US  
To: Darrell Winner/DC/USEPA/US@EPA  
Cc: Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 09:40 AM  
Subject: Fw: vol 5 (use this version, please)

---

Darrell,

Please see the comments below from John Hannon from OGC regarding our responses to comments  
(b)(5) Deliberative



Would you have time today to get on a call to go over this??

Thanks for any help.


-Ben

----- Forwarded by Ben DeAngelo/DC/USEPA/US on 11/30/2009 09:36 AM -----

From: John Hannon/DC/USEPA/US  
To: Jason Samenow/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA, David Chalmers/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, Michael Kolian/DC/USEPA/US@EPA, Bill Perkins <perkins.william@epa.gov>, Rona Birnbaum/DC/USEPA/US@EPA  
Date: 11/29/2009 01:00 PM  
Subject: Re: vol 5 (use this version, please)

---

Here are comments on the rest of volume 5. Not much, except in the area of (b)(5) Deliberative



I think this means two things:

(1) (b)(5) Deliberative


(b)(5) Deliberative

[Redacted]

(2) (b)(5) Deliberative

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[attachment "RTC\_draft\_Volume\_5\_complete\_1128 -jh1129.doc" deleted by Darrell Winner/DC/USEPA/US]

John Hannon  
Office of General Counsel  
U.S. Environmental Protection Agency  
1200 Pennsylvania Ave. NW (MC 2344A)  
Washington, D.C. 20460  
Phone (202) 564-5563  
Fax (202) 564-5603

Jason Samenow Sorry for multiple emails on this....but... 11/28/2009 11:38:10AM

From: Jason Samenow/DC/USEPA/US  
To: Rona Birnbaum/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, John Hannon/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA, Michael Kolian/DC/USEPA/US@EPA, Bill Perkins <perkins.william@epa.gov>, Lesley Jantarasami/DC/USEPA/US@EPA, David

Date: Chalmers/DC/USEPA/US@EPA  
11/28/2009 11:38 AM  
Subject: vol 5 (use this version, please)

---

Sorry for multiple emails on this....but please refer to this version of Volume 5.  
Jason

(Ben and Mike, please check the first comment and response on air quality and make sure both of your edits to that one were appropriately incorporated)

[attachment "RTC\_draft\_Volume\_5\_complete\_1128.doc" deleted by Darrell Winner/DC/USEPA/US]

EPA-2464

**Lesley Jantarasami**  
04/01/2010 03:52 PM

To  
cc  
bcc

Subject UPGOAD C:\Documents and Settings\ljantara\My Documents\Endangerment\02\_Comments and Responses\Vol 9 and 12 stuff\RTC draft Volume New 11 (old 9 - 12) 11 29 09 csh 11 30.doc

(b)(5) Deliberative

- RTC draft Volume New 11 (old 9 - 12) 11 29 09 csh 11 30.doc

EPA-EF-004011

EPA-2465

Jason  
Samenow/DC/USEPA/US  
11/30/2009 04:56 PM

To Ben DeAngelo  
cc Erin Birgfeld, Lesley Jantarasami, Rona Birnbaum, William Perkins  
bcc  
Subject Re: fact sheet for OPA - quick look if you can

looks good to me.

jason

Ben DeAngelo Some edits/suggestions: 11/30/2009 01:19:29 PM

From: Ben DeAngelo/DC/USEPA/US  
To: Rona Birnbaum/DC/USEPA/US@EPA  
Cc: Erin Birgfeld/DC/USEPA/US@EPA, Jason Samenow/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, William Perkins/DC/USEPA/US@EPA  
Date: 11/30/2009 01:19 PM  
Subject: Re: fact sheet for OPA - quick look if you can

---

Some edits/suggestions:

[attachment "Fact Sheet for Final Findings 113009 BJD.doc" deleted by Jason Samenow/DC/USEPA/US]

Rona Birnbaum I made a few changes. (b)(5) Deliberative 11/30/2009 12:41:01 PM

From: Rona Birnbaum/DC/USEPA/US  
To: Ben DeAngelo/DC/USEPA/US@EPA, Jason Samenow/DC/USEPA/US@EPA  
Cc: William Perkins/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, Erin Birgfeld/DC/USEPA/US@EPA  
Date: 11/30/2009 12:41 PM  
Subject: fact sheet for OPA - quick look if you can

---

I made a few changes. (b)(5) Deliberative

[attachment "Fact Sheet for Final Findings 113009.doc" deleted by Ben DeAngelo/DC/USEPA/US]

EPA-EF-004012

EPA-2466

Marcus  
Sarofim/DC/USEPA/US  
11/30/2009 05:09 PM

To Jason Samenow  
cc  
bcc  
Subject alaska

I'm working on the volume 4 Alaska comment, and found commenter 3136.1 they referenced Hartmann and Wendler (2005):

"Thus, the actual observed climate is not going to be well-replicated or fortuitously so. In Alaska, for instance, there has been no temperature rise since 1976, but large apparent trend from 1950-present. This temperature pattern has been driven largely by the PDO (e.g. Hartmann and Wendler (2005), "<http://climate.gi.alaska.edu/ResearchProjects/Hartmann%20and%20Wendler%202005.pdf>)"

We might need to [REDACTED] (b)(5) Deliberative

I'll send you what I come up with for the Volume 4 response,

-Marcus

**Comment:**

[REDACTED] (b)(5) Deliberative

**Response:**

[REDACTED] (b)(5) Deliberative

[REDACTED]

Marcus C. Sarofim, PhD  
phone: 202-343-9993  
fax: 202-343-2202  
1310 L Street 256C  
AAAS Science & Technology Policy Fellow  
with the EPA Climate Division

EPA-EF-004013

EPA-2467

Lesley  
Jantarasami/DC/USEPA/US  
11/30/2009 05:16 PM

To Dina Kruger  
cc Rona Birnbaum, Suzanne Kocchi  
bcc  
Subject ERG formatted version of vol 11

Dina,

On the off chance that you have not yet made any edits to the electronic version of vol 11, I have attached a new version that has been formatted by ERG and has new edits and responses from Carol. One is in track changes if you'd like to see specifically where Carol made edits, and the other is a clean version if you prefer.

(b)(5) Deliberative

(b)(5) Deliberative

RTC Volume 11 to ERG 11 30 09 ERG formatted CLEAN.doc RTC Volume 11 to ERG 11 30 09 ERG formatted.doc

Thanks,

Lesley

Lesley Jantarasami  
US EPA, Climate Change Division  
Climate Science & Impacts Branch  
202.343.9929  
202.343.2202 (fax)  
Jantarasami.Lesley@epa.gov

EPA-EF-004014

EPA-2468

Steven Silverman/DC/USEPA/US  
11/30/2009 05:26 PM

To John Hannon  
cc Carol Holmes, Lesley Jantarasami, Rebecca White, Robin Moran  
bcc  
Subject Re: Fw: endangerment finding response to comments

I actually thought that this was a comment to the vehicle rule .....

John Hannon that makes sense to me. John Hannon 11/30/2009 05:20:45 PM

From: John Hannon/DC/USEPA/US  
To: Robin Moran/AA/USEPA/US@EPA  
Cc: Carol Holmes/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, Rebecca White/DC/USEPA/US@EPA, Steven Silverman/DC/USEPA/US@EPA  
Date: 11/30/2009 05:20 PM  
Subject: Re: Fw: endangerment finding response to comments

that makes sense to me.

John Hannon  
Office of General Counsel  
U.S. Environmental Protection Agency  
1200 Pennsylvania Ave. NW (MC 2344A)  
Washington, D.C. 20460  
Phone (202) 564-5563  
Fax (202) 564-5603

Robin Moran John, should we then add this commen... 11/30/2009 04:40:43 PM

From: Robin Moran/AA/USEPA/US  
To: John Hannon/DC/USEPA/US@EPA  
Cc: Carol Holmes/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, Rebecca White/DC/USEPA/US@EPA, Steven Silverman/DC/USEPA/US@EPA  
Date: 11/30/2009 04:40 PM  
Subject: Re: Fw: endangerment finding response to comments

John, should we then add this comment to the GHG vehicle rule docket, so that it gets addressed properly through our response to comments?

John Hannon Robin, this is a comment on the endan... 11/30/2009 04:31:54 PM

From: John Hannon/DC/USEPA/US  
To: Steven Silverman/DC/USEPA/US@EPA  
Cc: Lesley Jantarasami/DC/USEPA/US@EPA, Rebecca White/DC/USEPA/US@EPA, Robin Moran/AA/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA  
Date: 11/30/2009 04:31 PM  
Subject: Re: Fw: endangerment finding response to comments

Robin, this is a comment on the endangerment proposal, but it asks us to defer taking final action on the vehicle standard setting proposal. That means it is really a comment on the vehicle proposal and should be referred to that rulemaking. (b)(5) Deliberative

I think other comments have also come in on the vehicle rule asking us to delay that rule or at least delay the effective date of the rule. We should respond

EPA-EF-004015



to this and related comments in the vehicle rule, not here. I suggest we say:

(b)(5) Deliberative

John Hannon  
Office of General Counsel  
U.S. Environmental Protection Agency  
1200 Pennsylvania Ave. NW (MC 2344A)  
Washington, D.C. 20460  
Phone (202) 564-5563  
Fax (202) 564-5603

Steven Silverman This comment is misplaced. First, E... 11/30/2009 03:09:08 PM

From: Steven Silverman/DC/USEPA/US  
To: Robin Moran/AA/USEPA/US@EPA  
Cc: John Hannon/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, Rebecca White/DC/USEPA/US@EPA  
Date: 11/30/2009 03:09 PM  
Subject: Re: Fw: endangerment finding response to comments

*This comment is misplaced. First,* (b)(5) Deliberative ACP

*Second,* (b)(5) Deliberative ACP

(b)(5) Deliberative ACP

**(b)(5) Deliberative ACP**

Robin Moran      Rebecca & Lesley, here's a draft respo...      11/27/2009 11:40:10AM

From: Robin Moran/AA/USEPA/US  
To: Rebecca White/DC/USEPA/US@EPA  
Cc: Lesley Jantarasami/DC/USEPA/US@EPA, Steven Silverman/DC/USEPA/US@EPA, John Hannon/DC/USEPA/US@EPA  
Date: 11/27/2009 11:40 AM  
Subject: Re: Fw: endangerment finding response to comments

---

Rebecca & Lesley, here's a draft response to this comment. I adapted this from the recent SEPW Administrator Q&A's . I've cc'd OGC so they can weigh in:

Comment:

**(b)(5) Deliberative**

Response:

**(b)(5) Deliberative**

Robin Moran  
Senior Policy Advisor  
Assessment and Standards Division  
U.S. EPA, Office of Transportation and Air Quality  
2000 Traverwood Dr.  
Ann Arbor, MI 48105  
(734) 214-4781

EPA-EF-004017

(734) 214-4821 (fax)

Rebecca White Rebecca White EPA Office of Transpor... 11/24/2009 04:23:27 PM

From: Rebecca White/DC/USEPA/US  
To: Robin Moran/AA/USEPA/US@EPA  
Date: 11/24/2009 04:23 PM  
Subject: Fw: endangerment finding response to comments

Rebecca White  
EPA Office of Transportation and Air Quality  
202-564-5949

----- Forwarded by Rebecca White/DC/USEPA/US on 11/24/2009 04:23 PM -----

From: Lesley Jantarasami/DC/USEPA/US  
To: Rebecca White/DC/USEPA/US@EPA  
Date: 11/24/2009 04:17 PM  
Subject: Re: endangerment finding response to comments

Hi Rebecca,

We're hoping to send a draft of this volume OGC by the end of the week, so if you are able to get us something (even if very draft language) by tomorrow or Friday, that would be fantastic. You'll have a chance to review and edit this comment and others from this volume that you may be interested in early next week.

Thanks so much,

Lesley

Lesley Jantarasami  
US EPA, Climate Change Division  
Climate Science & Impacts Branch  
202.343.9929  
202.343.2202 (fax)  
Jantarasami.Lesley@epa.gov

Rebecca White Hi: Sure, when do you need input by? 11/24/2009 02:45:41 PM

From: Rebecca White/DC/USEPA/US  
To: Lesley Jantarasami/DC/USEPA/US@EPA  
Date: 11/24/2009 02:45 PM  
Subject: Re: endangerment finding response to comments

Hi:

Sure, when do you need input by?

Lesley Jantarasami Hello Rebecca, I work with Rona o... 11/24/2009 10:49:35 AM

From: Lesley Jantarasami/DC/USEPA/US  
To: Rebecca White/DC/USEPA/US@EPA  
Cc: Rona Birnbaum/DC/USEPA/US@EPA  
Date: 11/24/2009 10:49 AM  
Subject: endangerment finding response to comments

EPA-EF-004018

Hello Rebecca,

I work with Rona on the endangerment finding's response to public comments document. Regarding the comment below, we were wondering if [REDACTED] (b)(5) Deliberative

[REDACTED] We would like to get your input in developing a response to ensure that we are consistent with you. Thanks so much!

Comment:

[REDACTED] (b)(5) Deliberative

Best,

Lesley

Lesley Jantarasami  
US EPA, Climate Change Division  
Climate Science & Impacts Branch  
202.343.9929  
202.343.2202 (fax)  
Jantarasami.Lesley@epa.gov

EPA-2469

**Jeremy  
Martinich/DC/USEPA/US**  
11/30/2009 05:29 PM

To David Chalmers  
cc  
bcc  
Subject Volume 4

Hey dude,

Lets talk about this when you're in tomorrow.

(b)(5) Deliberative

For Section 4.doc

Jeremy

\*\*\*\*\*

Jeremy Martinich  
USEPA, Climate Change Division  
202-343-9871

EPA-2470

**Lesley Jantarasami/DC/USEPA/US**  
11/30/2009 05:33 PM

To Robin Moran  
cc Carol Holmes, Christopher Lieske, John Hannon, Rebecca White, Steven Silverman, Tad Wysor  
bcc  
Subject Re: Fw: endangerment finding response to comments

Sure, here you go - it's from the American Chemistry Council. The comment is in Section III on page 10.



EPA-HQ-OAR-2009-0171-3322.2.pdf

available at  
regulations.gov

Thanks,

Lesley

Lesley Jantarasami  
US EPA, Climate Change Division  
Climate Science & Impacts Branch  
202.343.9929  
202.343.2202 (fax)  
Jantarasami.Lesley@epa.gov

Robin Moran      Lesley, can you get me a full copy of thi...      11/30/2009 05:26:09 PM

From: Robin Moran/AA/USEPA/US  
To: John Hannon/DC/USEPA/US@EPA  
Cc: Carol Holmes/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, Rebecca White/DC/USEPA/US@EPA, Steven Silverman/DC/USEPA/US@EPA, Tad Wysor/AA/USEPA/US@EPA, Christopher Lieske/AA/USEPA/US@EPA  
Date: 11/30/2009 05:26 PM  
Subject: Re: Fw: endangerment finding response to comments

Lesley, can you get me a full copy of this comment letter, so that we can add it to the GHG vehicle rule docket? thanks.

John Hannon      that makes sense to me. John Hannon      11/30/2009 05:20:46 PM

From: John Hannon/DC/USEPA/US  
To: Robin Moran/AA/USEPA/US@EPA  
Cc: Carol Holmes/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, Rebecca White/DC/USEPA/US@EPA, Steven Silverman/DC/USEPA/US@EPA  
Date: 11/30/2009 05:20 PM  
Subject: Re: Fw: endangerment finding response to comments

that makes sense to me.

John Hannon  
Office of General Counsel  
U.S. Environmental Protection Agency  
1200 Pennsylvania Ave. NW (MC 2344A)  
Washington, D.C. 20460  
Phone (202) 564-5563

EPA-EF-004021

Fax (202 564-5603)

Robin Moran John, should we then add this commen... 11/30/2009 04:40:43 PM

From: Robin Moran/AA/USEPA/US  
 To: John Hannon/DC/USEPA/US@EPA  
 Cc: Carol Holmes/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, Rebecca White/DC/USEPA/US@EPA, Steven Silverman/DC/USEPA/US@EPA  
 Date: 11/30/2009 04:40 PM  
 Subject: Re: Fw: endangerment finding response to comments

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From: John Hannon/DC/USEPA/US  
 To: Steven Silverman/DC/USEPA/US@EPA  
 Cc: Lesley Jantarasami/DC/USEPA/US@EPA, Rebecca White/DC/USEPA/US@EPA, Robin Moran/AA/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA  
 Date: 11/30/2009 04:31 PM  
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I think other comments have also come in on the vehicle rule asking us to delay that rule or at least delay the effective date of the rule. We should respond to this and related comments in the vehicle rule, not here. I suggest we say:

(b)(5) Deliberative

John Hannon  
 Office of General Counsel  
 U.S. Environmental Protection Agency  
 1200 Pennsylvania Ave. NW (MC 2344A)  
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 Phone (202) 564-5563  
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From: Steven Silverman/DC/USEPA/US  
 To: Robin Moran/AA/USEPA/US@EPA  
 Cc: John Hannon/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, Rebecca White/DC/USEPA/US@EPA  
 Date: 11/30/2009 03:09 PM  
 Subject: Re: Fw: endangerment finding response to comments

*This comment is misplaced. First, (b)(5) Deliberative ACP*

EPA-EF-004022

(b)(5) Deliberative ACP

Second, (b)(5) Deliberative ACP

(b)(5) Deliberative ACP

Robin Moran      Rebecca & Lesley, here's a draft respo...      11/27/2009 11:40:10 AM

From: Robin Moran/AA/USEPA/US  
To: Rebecca White/DC/USEPA/US@EPA  
Cc: Lesley Jantarasami/DC/USEPA/US@EPA, Steven Silverman/DC/USEPA/US@EPA, John Hannon/DC/USEPA/US@EPA  
Date: 11/27/2009 11:40 AM  
Subject: Re: Fw: endangerment finding response to comments

Rebecca & Lesley, here's a draft response to this comment. I adapted this from the recent SEPW Administrator Q&A's . I've cc'd OGC so they can weigh in:

Comment: (b)(5) Deliberative

Response: (b)(5) Deliberative



(b)(5) Deliberative

Robin Moran  
Senior Policy Advisor  
Assessment and Standards Division  
U.S. EPA, Office of Transportation and Air Quality  
2000 Traverwood Dr.  
Ann Arbor, MI 48105  
(734) 214-4781  
(734) 214-4821 (fax)

Rebecca White    Rebecca White EPA Office of Transpor...    11/24/2009 04:23:27 PM

From:            Rebecca White/DC/USEPA/US  
To:                Robin Moran/AA/USEPA/US@EPA  
Date:             11/24/2009 04:23 PM  
Subject:          Fw: endangerment finding response to comments

Rebecca White  
EPA Office of Transportation and Air Quality  
202-564-5949

----- Forwarded by Rebecca White/DC/USEPA/US on 11/24/2009 04:23 PM -----

From:            Lesley Jantarasami/DC/USEPA/US  
To:                Rebecca White/DC/USEPA/US@EPA  
Date:             11/24/2009 04:17 PM  
Subject:          Re: endangerment finding response to comments

Hi Rebecca,

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Thanks so much,

Lesley

EPA-EF-004024

Lesley Jantarasami  
US EPA, Climate Change Division  
Climate Science & Impacts Branch  
202.343.9929  
202.343.2202 (fax)  
Jantarasami.Lesley@epa.gov

Rebecca White Hi: Sure, when do you need input by? 11/24/2009 02:45:41 PM

From: Rebecca White/DC/USEPA/US  
To: Lesley Jantarasami/DC/USEPA/US@EPA  
Date: 11/24/2009 02:45 PM  
Subject: Re: endangerment finding response to comments

Hi:

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Lesley Jantarasami Hello Rebecca, I work with Rona o... 11/24/2009 10:49:35 AM

From: Lesley Jantarasami/DC/USEPA/US  
To: Rebecca White/DC/USEPA/US@EPA  
Cc: Rona Birnbaum/DC/USEPA/US@EPA  
Date: 11/24/2009 10:49 AM  
Subject: endangerment finding response to comments

Hello Rebecca,

I work with Rona on the endangerment finding's response to public comments document. Regarding the comment below, we were wondering if [REDACTED] (b)(5) Deliberative [REDACTED] We would like to get your input in developing a response to ensure that we are consistent with you. Thanks so much!

Comment:

[REDACTED] (b)(5) Deliberative [REDACTED]

Best,

Lesley

Lesley Jantarasami  
US EPA, Climate Change Division  
Climate Science & Impacts Branch  
202.343.9929  
202.343.2202 (fax)  
Jantarasami.Lesley@epa.gov

EPA-2471

**Lesley Jantarasami**  
04/01/2010 03:52 PM

To  
cc  
bcc

Subject UPGRADE C:\Documents and Settings\ljantara\My Documents\Endangerment\02\_Comments and Responses\Vol 9 and 12 stuff\RTC Volume 11 to ERG 112909 - se jt\_1.doc

(b)(5) Deliberative

 - RTC Volume 11 to ERG 112909 - se jt\_1.doc

EPA-EF-004026

EPA-2472

**Lesley Jantarasami**  
04/01/2010 03:52 PM

To  
cc  
bcc

Subject UPGOAD C:\Documents and Settings\ljantara\My Documents\Endangerment\02\_Comments and Responses\Vol 9 and 12 stuff\RTC draft Volume New 11 (old 9 - 12) 11 30 09.doc

(b)(5) Deliberative

- RTC draft Volume New 11 (old 9 - 12) 11 30 09.doc

EPA-EF-004027

EPA-2473

**Lesley Jantarasami**  
04/01/2010 03:52 PM

To  
cc  
bcc

Subject UPGRADE C:\Documents and Settings\ljantara\My Documents\Endangerment\02\_Comments and Responses\Vol 9 and 12 stuff\RTC Volume 11 to ERG 11 30 09 ERG formatted.doc

(b)(5) Deliberative

- RTC Volume 11 to ERG 11 30 09 ERG formatted.doc

EPA-EF-004028

EPA-2474

**Rona**  
**Birnbaum/DC/USEPA/US**  
11/30/2009 06:28 PM

To Carol Holmes  
cc Marcus Sarofim, David Chalmers, Lesley Jantarasami  
bcc  
Subject Vol 4

Carol, sections 3-7 revised attached here. Marcus is working to complete the revisions to the other sections and will forward that to all on this email when ready. Thanks. Rona

(b)(5) Deliberative

RTC draft Volume 4 MASTER 113009.doc

EPA-EF-004029

EPA-2475

Jason  
Samenow/DC/USEPA/US  
11/30/2009 06:39 PM

To Marcus Sarofim  
cc  
bcc  
Subject what we're saying about alaska

I updated this a little bit. I don't have real cause to challenge a dataset which has been used in a Journal of Climate study, from a regional climate center.

---

(b)(5) Deliberative



EPA-2476

**William  
Perkins/DC/USEPA/US**  
11/30/2009 07:00 PM

To Rona Birnbaum  
cc Lesley Jantarasami  
bcc

Subject Science fact sheet and FAQs -- way forward

Rona,

Enclosed are the two documents from the spring. As we discussed, the Q&A doc was very brief, and the science fact sheet was 2 pages and might be tweaked slightly if anything to strengthen some of the statements in there. This should not be too big a challenge to produce these; the hardest part I think will probably be deciding the couple of big questions that we want to focus on in the Q&As and then the review aspect.

I spoke with Lesley and we can go ahead by tomorrow and take a crack at the science fact sheet. For the Q&A doc, we wondered if you think it might be a good idea for the three of us to talk for 5 mins after the branch meeting tomorrow about your ideas for the top couple of questions to focus on there?

Thank you.

Cheers,

Bill

(b)(5) Deliberative

(b)(5) Deliberative

ScienceFactSheet.pdf EndangermentFAQs.pdf

Bill Perkins  
Climate Change Adaptation Analyst  
Climate Science and Impacts Branch  
Climate Change Division  
U.S. Environmental Protection Agency  
perkins.william@epa.gov  
(O) 202.343.9460  
(F) 202.343.2202  
(C) (b)(6)

EPA-EF-004031



EPA-2477

**Ben DeAngelo**

04/06/2010 04:56 PM

To

cc

bcc

Subject UPLOADED C:\Documents and Settings\owner\My Documents\Endangerment\Response to Public Comments\Review Table\_Endangerment 113009.xls

(b)(5) Deliberative

- Review Table\_Endangerment 113009.xls

EPA-EF-004032

EPA-2478

Gina McCarthy/DC/USEPA/US

To Dina Kruger

11/30/2009 07:56 PM

cc Brian Mclean, Jackie Krieger

bcc

Subject Re: Endangerment update

Friday is best. I have alerted Seth to the speech issue. Just a reminder that I am still waiting for my one-pager on the six gases issue....

Dina Kruger

Got the final set of comments from OM...

11/30/2009 05:53:32 PM

From: Dina Kruger/DC/USEPA/US  
To: gina mccarthy, Brian Mclean/DC/USEPA/US@EPA  
Cc: Jackie Krieger/DC/USEPA/US@EPA  
Date: 11/30/2009 05:53 PM  
Subject: Endangerment update

Got the final set of comments from OMB today and had a good meeting with Heidi and CEQ on how to handle them. We can resolve all issues easily; they were constructive and are making the package stronger.

Two questions came up at the end. First, (b)(5) Deliberative

[REDACTED]

Also, she mentioned that (b)(5) Deliberative

[REDACTED]

So all is well on this end. Everyone still working hard -

Dina

Dina Kruger  
Director, Climate Change Division  
USEPA

202-343-9039 (phone)  
202-343-2290 (fax)

EPA-EF-004033

EPA-2479

**Lesley Jantarasami**  
04/01/2010 03:51 PM

To  
cc  
bcc

Subject UPLOADED C:\Documents and Settings\ljantara\My Documents\Endangerment\02\_Comments and Responses\Vol 6 stuff\Addtl Ag and Forestry Comments.doc

(b)(5) Deliberative

[REDACTED] - Addtl Ag and Forestry Comments.doc

EPA-EF-004034

EPA-2480

**Rona**  
**Birnbaum/DC/USEPA/US**  
11/30/2009 08:16 PM

To William Perkins, Lesley Jantarasami  
cc  
bcc  
Subject FAQs --a draft

I was on a roll. Here is a draft. I felt [REDACTED] (b)(5) Deliberative  
[REDACTED] What do you think?

(b)(5) Deliberative  
[REDACTED]

Endangerment FAQs.11.30.09doc.doc

EPA-2481

**Carol Holmes/DC/USEPA/US**

11/30/2009 08:51 PM

To Rona Birnbaum

cc David Chalmers, Lesley Jantarasami, Marcus Sarofim

bcc

Subject Re: Vol 4

Here are my comments on section 3-7. I admit, I lost a little steam at the end!

(b)(5) Deliberative

RTC draft Volume 4 MASTER 113009 csh 11 30 pm.doc

Confidential communication for internal deliberations only; Attorney-client, attorney work product and/or enforcement privilege; Do not distribute outside EPA or DOJ

---

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Washington, DC 20460  
Phone (202) 564-8709  
Fax (202) 564-5603

---

Rona Birnbaum

Carol, sections 3-7 revised attached he...

11/30/2009 06:29:01 PM

---

From: Rona Birnbaum/DC/USEPA/US  
To: Carol Holmes/DC/USEPA/US@EPA  
Cc: Marcus Sarofim/DC/USEPA/US@EPA, David Chalmers/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA  
Date: 11/30/2009 06:29 PM  
Subject: Vol 4

---

Carol, sections 3-7 revised attached here. Marcus is working to complete the revisions to the other sections and will forward that to all on this email when ready. Thanks. Rona

[attachment "RTC draft Volume 4 MASTER 113009.doc" deleted by Carol Holmes/DC/USEPA/US]

EPA-EF-004036

EPA-2482

**Carol Holmes/DC/USEPA/US**

11/30/2009 08:51 PM

To Rona Birnbaum

cc David Chalmers, Lesley Jantarasami, Marcus Sarofim

bcc

Subject Re: Vol 4

PS -- looked good overall!

Confidential communication for internal deliberations only; Attorney-client, attorney work product and/or enforcement privilege; Do not distribute outside EPA or DOJ

---

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Washington, DC 20460  
Phone (202) 564-8709  
Fax (202) 564-5603

---

Rona Birnbaum

Carol, sections 3-7 revised attached he...

11/30/2009 06:29:01 PM

From: Rona Birnbaum/DC/USEPA/US  
To: Carol Holmes/DC/USEPA/US@EPA  
Cc: Marcus Sarofim/DC/USEPA/US@EPA, David Chalmers/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA  
Date: 11/30/2009 06:29 PM  
Subject: Vol 4

---

Carol, sections 3-7 revised attached here. Marcus is working to complete the revisions to the other sections and will forward that to all on this email when ready. Thanks. Rona

[attachment "RTC draft Volume 4 MASTER 113009.doc" deleted by Carol Holmes/DC/USEPA/US]

EPA-EF-004037

EPA-2483

**Michael Kolian/DC/USEPA/US** To Michael Kolian  
11/30/2009 10:04 PM cc Ben DeAngelo  
bcc  
Subject Re: Fw: AQ latest - i'll stop by

(b)(5) Deliberative

RTC\_draft\_Volume\_5\_complete\_1128 -jh1129\_AQ kolian.doc

Michael Kolian ignore that one..... ----- Forwarded by... 11/30/2009 09:17:46 PM

From: Michael Kolian/DC/USEPA/US  
To: Ben DeAngelo/DC/USEPA/US@EPA  
Date: 11/30/2009 09:17 PM  
Subject: Fw: AQ latest - i'll stop by

---

ignore that one.....

----- Forwarded by Michael Kolian/DC/USEPA/US on 11/30/2009 09:17 PM -----

From: Michael Kolian/DC/USEPA/US  
To: Ben DeAngelo/DC/USEPA/US@EPA  
Date: 11/30/2009 09:16 PM  
Subject: AQ latest - i'll stop by

---

[attachment "RTC\_draft\_Volume\_5\_complete\_1128 -jh1129\_AQ kolian.doc" deleted by Michael Kolian/DC/USEPA/US]

EPA-EF-004038

EPA-2484

**Ben DeAngelo**

04/06/2010 04:57 PM

To

cc

bcc

Subject UPGOAD C:\Documents and Settings\owner\My Documents\Endangerment\Response to Public Comments\RTC\_draft\_Volume\_6\_Forestry\_only\_112909[1].doc

(b)(5) Deliberative

- RTC\_draft\_Volume\_6\_Forestry\_only\_112909[1].doc

EPA-EF-004039



EPA-2485

**Suzanne  
Kocchi/DC/USEPA/US**  
12/01/2009 09:23 AM

To  
cc Ben DeAngelo, David Chalmers, Jason Samenow, Jeremy  
Martinich, Lesley Jantarasami, Marcus Sarofim, Michael  
Kolian, Rona Birnbaum, William Perkins, Carol Holmes, John  
Hannon  
bcc  
Subject latest RTC tracking table

here is where we are as of 9 am this morning. 3 volumes (4, 5, 6) will be ready for 2nd round of Dina/Rona/OGC review today.

(b)(5) Deliberative

Review Table\_Endangerment 120109.xls

EPA-2486

Michael Kolian/DC/USEPA/US

To Doug Grano

12/01/2009 09:41 AM

cc Ben DeAngelo

bcc

Subject Re: volume 5 Human Health and Air Quality (EPA only)

I think your right on the control measures. We do refer commenters to this section in certain cases:

(b)(5) Deliberative

However, we could more explicit in the responses.

I think your right too on attainment vs non-attainment areas. We have just added the following language to Section 8(a) of the TSD which sort of addresses your point. You can work from this if you think additional information is necessary and not too hard to pull together.

(b)(5) Deliberative

Section 8a\_tsd 11\_27.doc

Doug Grano

Mike-- Two comments on the draft pag...

11/30/2009 05:02:50 PM

From: Doug Grano/RTP/USEPA/US  
To: Michael Kolian/DC/USEPA/US@EPA  
Date: 11/30/2009 05:02 PM  
Subject: Re: volume 5 Human Health and Air Quality (EPA only)

Mike--

Two comments on the draft pages you faxed.

last paragraph on page 72

(b)(5) Deliberative

last paragraph on page 73 (also on page 64)

(b)(5) Deliberative

--Doug

Michael Kolian

Yes. This is the relevant part of the find...

11/25/2009 10:49:34 AM

From: Michael Kolian/DC/USEPA/US  
To: Doug Grano/RTP/USEPA/US@EPA  
Date: 11/25/2009 10:49 AM  
Subject: Re: volume 5 Human Health and Air Quality (EPA only)

Yes. This is the relevant part of the finding at Section IV.B which discusses how the administrator weighs the evidence. Also note the section that provides examples from commenters and our interpretation/treatment of the these.

Cheers, Mike

EPA-EF-004041

FYI: I may have a cleaner version of the volume 5 AQ to send soon.

Doug Grano      Thanks--got pages 59-74 --Doug      11/25/2009 10:43:13 AM

From: Doug Grano/RTP/USEPA/US  
To: Michael Kolian/DC/USEPA/US@EPA  
Date: 11/25/2009 10:43 AM  
Subject: Re: volume 5 Human Health and Air Quality (EPA only)

Thanks--got pages 59-74  
--Doug

Michael Kolian      Doug, on the way.....      11/25/2009 10:11:58 AM

From: Michael Kolian/DC/USEPA/US  
To: Doug Grano/RTP/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA  
Date: 11/25/2009 10:11 AM  
Subject: Re: volume 5 Human Health and Air Quality (EPA only)

Doug, on the way.....

Doug Grano      Your note mentioned (b)(5) Deliberative      11/25/2009 08:19:59 AM

From: Doug Grano/RTP/USEPA/US  
To: Michael Kolian/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA  
Date: 11/25/2009 08:19 AM  
Subject: Re: volume 5 Human Health and Air Quality (EPA only)

Your note mentioned (b)(5) Deliberative

If yes, my fax # is 919-541-5598  
--Doug

Michael Kolian      Hi Doug et al, I have incorporated your...      11/09/2009 06:17:55 PM

From: Michael Kolian/DC/USEPA/US  
To: Doug Grano/RTP/USEPA/US@EPA  
Cc: Anne Grambsch/DC/USEPA/US@EPA, Ben DeAngelo/DC/USEPA/US@EPA, Dale Evarts/RTP/USEPA/US@EPA, Darrell Winner/DC/USEPA/US@EPA, Erika Sasser/RTP/USEPA/US@EPA, Rona Birnbaum/DC/USEPA/US@EPA  
Date: 11/09/2009 06:17 PM  
Subject: Re: volume 5 Human Health and Air Quality (EPA only)

Hi Doug et al,  
I have incorporated your comments along with others (thank you!).

- 1) (b)(5) Deliberative
- 2) I have attached a track changes version of the volume containing changes to the AQ section since it was created and a clean copy as of today.
- 3) It is still being reviewed and expect more changes so you will continue to get subsequent opportunities to review, etc... One thing going forward is we'll have (b)(5) Deliberative

[attachment "RTC draft Volume 5 HH and AQ 110909.doc" deleted by Doug Grano/RTP/USEPA/US]  
[attachment "RTC draft Volume 5 HH and AQ 110909 clean.doc" deleted by Doug Grano/RTP/USEPA/US]

Cheers,  
Mike

Doug Grano I've re-reviewed the AQ section and res... 11/06/2009 03:24:28 PM

From: Doug Grano/RTP/USEPA/US  
To: Michael Kolian/DC/USEPA/US@EPA  
Cc: Anne Grambsch/DC/USEPA/US@EPA, Ben DeAngelo/DC/USEPA/US@EPA, Darrell Winner/DC/USEPA/US@EPA, Rona Birnbaum/DC/USEPA/US@EPA, Erika Sasser/RTP/USEPA/US@EPA, Dale Evarts/RTP/USEPA/US@EPA  
Date: 11/06/2009 03:24 PM  
Subject: Re: volume 5 Human Health and Air Quality (EPA only)

I've re-reviewed the AQ section and responded to the comments/questions/style suggestions (attached).

(b)(5) Deliberative

Darrell should take a look at that portion of the RTC document (in 2 comment/responses). Any word on next steps for the RTC? I'm assuming we will have more chances to go over the AQ section; e.g., once OGC review is completed.

--Doug

[attachment "RTC draft Volume 5 HH and AQ 110409a-DG.doc" deleted by Michael Kolian/DC/USEPA/US]

Michael Kolian Hi Doug and Darrell, We have combine... 11/04/2009 12:26:42 PM

From: Michael Kolian/DC/USEPA/US  
To: Doug Grano/RTP/USEPA/US@EPA, Darrell Winner/DC/USEPA/US@EPA, Anne Grambsch/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA, Rona Birnbaum/DC/USEPA/US@EPA  
Date: 11/04/2009 12:26 PM  
Subject: volume 5 Human Health and Air Quality (EPA only)

Hi Doug and Darrell,

(b)(5) Deliberative

It would be great if you and your team could re-review the AQ section. There are a few outstanding minor comments/questions in the AQ section in particular. We anticipate additional comments/edits to the section (in red-line) from other reviewers so I'll will keep you in the loop.

Hi Anne,

I wonder if you could review the human heath section if you have the time. Any feedback would be great.

We're shooting for consistency in and among the various volumes by following some general guidelines (attached). It would be great if you could turn this around by the end of the week (preferably sooner). Please let me know if you have any questions.

Many thanks,  
Mike

[attachment "RTC draft Volume 5 HH and AQ 110409a.doc" deleted by Doug Grano/RTP/USEPA/US]  
[attachment "Reminders on Style and Wording v2.doc" deleted by Doug Grano/RTP/USEPA/US]

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1200 Pennsylvania Avenue, NW (6207J)  
Washington, DC 20460  
Phone: (202) 343-9261  
Email: kolian.michael@epa.gov

EPA-EF-004043

EPA-2487

Darrell Winner/DC/USEPA/US

12/01/2009 09:53 AM

To Michael Kolian

cc Ben DeAngelo, Chris Weaver

bcc

Subject Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Here is my attempt to clarify and simplify -

(b)(5) Deliberative

Comment from John 3411.1\_3347.3 daw 120109.doc

-darrell

---

Darrell Winner, Ph.D.  
Director, Applied Science Division  
National Center for Environmental Research  
winner.darrell@epa.gov  
phone 202-343-9748  
fax 202-233-0677

-----  
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-----  
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USEPA/ORD/NCER/ASD  
Room 3111  
1025 F St NW  
Washington, DC 20004

(Woodies Building / metro stop: Metro Center)

Michael Kolian      Thanks for the quick response on the la...      11/30/2009 04:38:33 PM

---

From: Michael Kolian/DC/USEPA/US  
To: Darrell Winner/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA  
Date: 11/30/2009 04:38 PM  
Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Thanks for the quick response on the language.

Can you guys review this one I separated from the response to comments document and take a crack at responding to John's comments?

Thanks,  
Mike

[attachment "Comment from John 3411.1\_3347.3.doc" deleted by Darrell Winner/DC/USEPA/US]

EPA-EF-004044

Darrell Winner Here is the updated attachment - -darrell 11/30/2009 04:34:22 PM

From: Darrell Winner/DC/USEPA/US  
To: Ben DeAngelo/DC/USEPA/US@EPA  
Cc: Anne Grambsch/DC/USEPA/US@EPA, Bryan Bloomer/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA, Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 04:34 PM  
Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Here is the updated attachment -  
[attachment "TSD p 90 to 91 Ozone insert.doc" deleted by Michael Kolian/DC/USEPA/US]

-darrell

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Director, Applied Science Division  
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-----  
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Washington, DC 20004

(Woodies Building / metro stop: Metro Center)

Darrell Winner Second draft, with Ben's sentence on u... 11/30/2009 04:12:33 PM

From: Darrell Winner/DC/USEPA/US  
To: Ben DeAngelo/DC/USEPA/US@EPA  
Cc: Anne Grambsch/DC/USEPA/US@EPA, Bryan Bloomer/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA, Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 04:12 PM  
Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Second draft, with Ben's sentence on urban areas also inserted to this section of text.

[attachment "TSD p 90 to 91 Ozone insert.doc" deleted by Darrell Winner/DC/USEPA/US]

Bryan's suggestion to [redacted] (b)(5) Deliberative

maybe something like -

[redacted] (b)(5) Deliberative

(b)(5) Deliberative

-darrell

---

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1025 F St NW  
Washington, DC 20004

(Woodies Building / metro stop: Metro Center)

Darrell Winner	First attempt more to come	11/30/2009 03:19:54 PM
----------------	----------------------------	------------------------

---

From: Darrell Winner/DC/USEPA/US  
To: Ben DeAngelo/DC/USEPA/US@EPA  
Cc: Anne Grambsch/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA, Mike Kolian <kolian.michael@epa.gov>, Bryan Bloomer/DC/USEPA/US@EPA  
Date: 11/30/2009 03:19 PM  
Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

First attempt

[attachment "TSD p 90 to 91 Ozone insert.doc" deleted by Darrell Winner/DC/USEPA/US]

more to come

---

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-----

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Room 3111  
1025 F St NW  
Washington, DC 20004

(Woodies Building / metro stop: Metro Center)

Ben DeAngelo Darrell, Anne, Chris, We're looking for... 11/30/2009 11:12:41 AM

From: Ben DeAngelo/DC/USEPA/US  
To: Darrell Winner/DC/USEPA/US@EPA, Anne Grambsch/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA  
Cc: Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 11:12 AM  
Subject: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Darrell, Anne, Chris,

We're looking for some guidance to help respond to some comments but also (b)(5) Deliberative

Darrell said he's available at this time. Sorry for the late notice but we're in the final throws of getting everything together.

Can help explain on the phone. Think we're looking for (b)(5) Deliberative

Thanks.  
-Ben

----- Forwarded by Ben DeAngelo/DC/USEPA/US on 11/30/2009 11:01 AM -----

From: Ben DeAngelo/DC/USEPA/US  
To: Darrell Winner/DC/USEPA/US@EPA  
Cc: Mike Kolian <kolian.michael@epa.gov>  
Date: 11/30/2009 09:40 AM  
Subject: Fw: vol 5 (use this version, please)

Darrell,

Please see the comments below from John Hannon from OGC regarding our responses to comments (b)(5) Deliberative

Would you have time today to get on a call to go over this??

EPA-EF-004047



Thanks for any help.

-Ben

----- Forwarded by Ben DeAngelo/DC/USEPA/US on 11/30/2009 09:36 AM -----

From: John Hannon/DC/USEPA/US  
To: Jason Samenow/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA, David Chalmers/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, Michael Kolian/DC/USEPA/US@EPA, Bill Perkins <perkins.william@epa.gov>, Rona Birnbaum/DC/USEPA/US@EPA  
Date: 11/29/2009 01:00 PM  
Subject: Re: vol 5 (use this version, please)

---

Here are comments on the rest of volume 5. Not much, except in the area of (b)(5) Deliberative

[Redacted]

I think this means two things:

(1) [Redacted] (b)(5) Deliberative

[Redacted]

[Redacted]

(2) [Redacted] (b)(5) Deliberative

[Redacted]

(b)(5) Deliberative

[attachment "RTC\_draft\_Volume\_5\_complete\_1128 -jh1129.doc" deleted by Darrell Winner/DC/USEPA/US]

John Hannon  
Office of General Counsel  
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1200 Pennsylvania Ave. NW (MC 2344A)  
Washington, D.C. 20460  
Phone (202) 564-5563  
Fax (202) 564-5603

Jason Samenow    Sorry for multiple emails on this....but...    11/28/2009 11:38:10 AM

From: Jason Samenow/DC/USEPA/US  
To: Rona Birnbaum/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, John Hannon/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA, Michael Kolian/DC/USEPA/US@EPA, Bill Perkins <perkins.william@epa.gov>, Lesley Jantarasami/DC/USEPA/US@EPA, David Chalmers/DC/USEPA/US@EPA  
Date: 11/28/2009 11:38 AM  
Subject: vol 5 (use this version, please)

---

Sorry for multiple emails on this....but please refer to this version of Volume 5.  
Jason

(Ben and Mike, please check the first comment and response on air quality and make sure both of your edits to that one were appropriately incorporated)

[attachment "RTC\_draft\_Volume\_5\_complete\_1128.doc" deleted by Darrell Winner/DC/USEPA/US]

EPA-2488

William  
Perkins/DC/USEPA/US  
12/01/2009 10:01 AM

To Rona Birnbaum  
cc Lesley Jantarasami  
bcc  
Subject Fw: Science fact sheet and FAQs -- way forward

Rona,

Enclosed are Lesley's and my edits and suggestions. We will have a draft science fact sheet to you today. Thank you.

Cheers,

Bill

(b)(5) Deliberative

Endangerment FAQs.11.30.09 LCJ BP.doc  
Bill Perkins  
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Climate Science and Impacts Branch  
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U.S. Environmental Protection Agency  
perkins.william@epa.gov  
(O) 202.343.9460  
(F) 202.343.2202  
(C) (b)(6)

----- Forwarded by William Perkins/DC/USEPA/US on 12/01/2009 09:59 AM -----

From: Lesley Jantarasami/DC/USEPA/US  
To: William Perkins/DC/USEPA/US@EPA  
Date: 12/01/2009 09:44 AM  
Subject: Re: Science fact sheet and FAQs -- way forward

My edits:

Rona Birnbaum sounds good. 11/30/2009 07:05:50 PM

From: Rona Birnbaum/DC/USEPA/US  
To: William Perkins/DC/USEPA/US@EPA  
Cc: Lesley Jantarasami/DC/USEPA/US@EPA  
Date: 11/30/2009 07:05 PM  
Subject: Re: Science fact sheet and FAQs -- way forward

sounds good.

William Perkins Rona, Enclosed are the two documents... 11/30/2009 07:00:35 PM

From: William Perkins/DC/USEPA/US  
To: Rona Birnbaum/DC/USEPA/US@EPA

EPA-EF-004050

Cc: Lesley Jantarasami/DC/USEPA/US@EPA  
Date: 11/30/2009 07:00 PM  
Subject: Science fact sheet and FAQs -- way forward

---

Rona,

Enclosed are the two documents from the spring. As we discussed, the Q&A doc was very brief, and the science fact sheet was 2 pages and might be tweaked slightly if anything to strengthen some of the statements in there. This should not be too big a challenge to produce these; the hardest part I think will probably be deciding the couple of big questions that we want to focus on in the Q&As and then the review aspect.

I spoke with Lesley and we can go ahead by tomorrow and take a crack at the science fact sheet. For the Q&A doc, we wondered if you think it might be a good idea for the three of us to talk for 5 mins after the branch meeting tomorrow about your ideas for the top couple of questions to focus on there?

Thank you.

Cheers,

Bill

[attachment "ScienceFactSheet.pdf" deleted by Rona Birnbaum/DC/USEPA/US] [attachment "EndangermentFAQs.pdf" deleted by Rona Birnbaum/DC/USEPA/US]

Bill Perkins  
Climate Change Adaptation Analyst  
Climate Science and Impacts Branch  
Climate Change Division  
U.S. Environmental Protection Agency  
perkins.william@epa.gov  
(O) 202.343.9460  
(F) 202.343.2202  
(C) (b)(6)

EPA-2489

**Ben DeAngelo**

04/06/2010 04:56 PM

To

cc

bcc

Subject UPGOAD C:\Documents and Settings\owner\My Documents\Endangerment\Response to Public Comments\Review Table\_Endangerment 120109.xls

(b)(5) Deliberative

- Review Table\_Endangerment 120109.xls

EPA-2490

**Lesley Jantarasami**  
04/01/2010 03:52 PM

To  
cc  
bcc  
Subject UPGOAD C:\Documents and Settings\ljantara\My Documents\Endangerment\04\_Schedule\Review Table\_Endangerment 120109.xls

(b)(5) Deliberative

- Review Table\_Endangerment 120109.xls

EPA-2491

**Ben DeAngelo/DC/USEPA/US**

12/01/2009 10:20 AM

To Jason Samenow

cc Mike Kolian

bcc

Subject AQ as of now

(b)(5) Deliberative

RTC\_draft\_Volume\_5\_complete\_1128 -jh1129\_AQ kolian.doc

EPA-2492

**Marcus Sarofim**

04/01/2010 08:01 PM

To

cc

bcc

Subject UPGRADE C:\Documents and Settings\msarofim\My Documents\WorkFolder\Tsd\_Anpr\ResponseToComments\Volumes\RTC draft Volume 4 + DINA (part 2)-mcs.doc

(b)(5) Deliberative

- RTC draft Volume 4 + DINA (part 2)-mcs.doc



EPA-2493

**Rona**  
**Birnbaum/DC/USEPA/US**  
12/01/2009 10:54 AM

To Erin Birgfeld  
cc William Perkins, Lesley Jantarasami  
bcc  
Subject FAQs

hi Erin, here is a draft FAQs for you to share with Andrea. At some point, we'll need to prepare a package of all these materials for Dina. Can you please make the change needed in the second FAQ in the attached as I know that Dina had commented specifically on how we refer to the DOT standards and I did not see how that turned out to make sure we use that text here and in all places?  
Otherwise, this is ready to go.

thanks, Rona

(b)(5) Deliberative

Endangerment FAQs.12.1.09.doc

EPA-2494

Michael Kolian/DC/USEPA/US

To Chris Weaver

12/01/2009 11:01 AM

cc Ben DeAngelo, Darrell Winner

bcc

Subject Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Point taken. I think [REDACTED] (b)(5) Deliberative

Chris Weaver

Hi, I'm at a conference off-site today a...

12/01/2009 10:57:38 AM

From: Chris Weaver/DC/USEPA/US  
To: Michael Kolian/DC/USEPA/US@EPA  
Cc: Darrell Winner/DC/USEPA/US@EPA, Ben DeAngelo/DC/USEPA/US@EPA  
Date: 12/01/2009 10:57 AM  
Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Hi,

I'm at a conference off-site today and don't have access to Fig. 3-11 other than cutting it from the report as you attempted. I could get it to you tomorrow if that was okay.

As far as putting the figure in the TSD, the finding, or the response to comments, with or without an [REDACTED] (b)(5) Deliberative

-Chris

-----Michael Kolian/DC/USEPA/US wrote: -----

To: Darrell Winner/DC/USEPA/US@EPA  
From: Michael Kolian/DC/USEPA/US  
Date: 12/01/2009 10:25AM  
cc: Ben DeAngelo/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA  
Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Terrific. Can you or Chris provide us with Figure 3-11? I can't seem to pull it from the pdf report. Also, not sure where we ended up regarding this figure along with the non-attainment areas.

Darrell Winner---12/01/2009 09:53:14 AM---Here is my attempt to clarify and simplify - -darrell

From: Darrell Winner/DC/USEPA/US

To: Michael Kolian/DC/USEPA/US@EPA

Cc: Ben DeAngelo/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA

Date: 12/01/2009 09:53 AM

Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

EPA-EF-004057

Here is my attempt to clarify and simplify -

[attachment "Comment from John 3411.1\_3347.3 daw 120109.doc" deleted by Michael Kolian/DC/USEPA/US]

-darrell

---

Darrell Winner, Ph.D.  
Director, Applied Science Division  
National Center for Environmental Research  
winner.darrell@epa.gov  
phone 202-343-9748  
fax 202-233-0677

-----  
Regular mail:  
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1200 Pennsylvania Ave NW  
Washington, DC 20460-0001

-----  
FedEx/Courier:  
USEPA/ORD/NCER/ASD  
Room 3111  
1025 F St NW  
Washington, DC 20004

(Woodies Building / metro stop: Metro Center)

Michael Kolian---11/30/2009 04:38:33 PM---Thanks for the quick response on the language. Can you guys review this one I separated from the res

From: Michael Kolian/DC/USEPA/US  
To: Darrell Winner/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA  
Date: 11/30/2009 04:38 PM  
Subject: Re: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

Thanks for the quick response on the language.

Can you guys review this one I separated from the response to comments document and take a crack at responding to John's comments?

Thanks,  
Mike

[attachment "Comment from John 3411.1\_3347.3.doc" deleted by Darrell Winner/DC/USEPA/US]

EPA-EF-004058

Darrell Winner---11/30/2009 04:34:22 PM---Here is the updated attachment - -darrell

From Darrell Winner/DC/USEPA/US

:

To: Ben DeAngelo/DC/USEPA/US@EPA

Cc: Anne Grambsch/DC/USEPA/US@EPA, Bryan Bloomer/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA, Mike Kolian <kolian.michael@epa.gov>

Date: 11/30/2009 04:34 PM

Subject: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

ct:

Here is the updated attachment -  
[attachment "TSD p 90 to 91 Ozone insert.doc" deleted by Michael Kolian/DC/USEPA/US]

-darrell

---

Darrell Winner, Ph.D.  
Director, Applied Science Division  
National Center for Environmental Research  
winner.darrell@epa.gov  
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1025 F St NW  
Washington, DC 20004

(Woodies Building / metro stop: Metro Center)

Darrell Winner---11/30/2009 04:12:33 PM---Second draft, with Ben's sentence on urban areas also inserted to this section of text. Bryan's sugg

From Darrell Winner/DC/USEPA/US

:

To: Ben DeAngelo/DC/USEPA/US@EPA

EPA-EF-004059

Cc: Anne Grambsch/DC/USEPA/US@EPA, Bryan Bloomer/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA, Mike Kolian <kolian.michael@epa.gov>

Date: 11/30/2009 04:12 PM

Subject: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!  
ct:

Second draft, with Ben's sentence on urban areas also inserted to this section of text.

[attachment "TSD p 90 to 91 Ozone insert.doc" deleted by Darrell Winner/DC/USEPA/US]

Bryan's suggestion to [REDACTED] (b)(5) Deliberative

maybe something like -

[REDACTED] (b)(5) Deliberative

-darrell

---

Darrell Winner, Ph.D.  
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National Center for Environmental Research  
winner.darrell@epa.gov  
phone 202-343-9748  
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1025 F St NW  
Washington, DC 20004

(Woodies Building / metro stop: Metro Center)

Darrell Winner---11/30/2009 03:19:54 PM---First attempt more to come

From Darrell Winner/DC/USEPA/US  
:

To: Ben DeAngelo/DC/USEPA/US@EPA

Cc: Anne Grambsch/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA, Mike Kolian  
<kolian.michael@epa.gov>, Bryan Bloomer/DC/USEPA/US@EPA

Date: 11/30/2009 03:19 PM

Subject: Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!  
ct:

First attempt

[attachment "TSD p 90 to 91 Ozone insert.doc" deleted by Darrell Winner/DC/USEPA/US]

more to come

---

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(Woodies Building / metro stop: Metro Center)

Ben DeAngelo---11/30/2009 11:12:41 AM---Darrell, Anne, Chris, We're looking for some guidance to help respond to some comments but also to

EPA-EF-004061

From: Ben DeAngelo/DC/USEPA/US

To: Darrell Winner/DC/USEPA/US@EPA, Anne Grambsch/DC/USEPA/US@EPA, Chris Weaver/DC/USEPA/US@EPA

Cc: Mike Kolian <kolian.michael@epa.gov>

Date: 11/30/2009 11:12 AM

Subject Fw: vol 5 (use this version, please) -- CALL AT 2 TODAY?!

:

Darrell, Anne, Chris,

We're looking for some guidance to help respond to some comments but also (b)(5) Deliberative

Darrell said he's available at this time. Sorry for the late notice but we're in the final throws of getting everything together.

Can help explain on the phone. Think we're looking for (b)(5) Deliberative

Thanks.

-Ben

----- Forwarded by Ben DeAngelo/DC/USEPA/US on 11/30/2009 11:01 AM -----

From: Ben DeAngelo/DC/USEPA/US

To: Darrell Winner/DC/USEPA/US@EPA

Cc: Mike Kolian <kolian.michael@epa.gov>

Date: 11/30/2009 09:40 AM

Subject: Fw: vol 5 (use this version, please)

Darrell,

Please see the comments below from John Hannon from OGC regarding our responses to comments

(b)(5) Deliberative

Would you have time today to get on a call to go over this??

Thanks for any help.

-Ben

----- Forwarded by Ben DeAngelo/DC/USEPA/US on 11/30/2009 09:36 AM -----

EPA-EF-004062

From: John Hannon/DC/USEPA/US  
m:

To: Jason Samenow/DC/USEPA/US@EPA

Cc: Ben DeAngelo/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA, David  
Chalmers/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA,  
Michael Kolian/DC/USEPA/US@EPA, Bill Perkins <perkins.william@epa.gov>, Rona  
Birnbaum/DC/USEPA/US@EPA

Date: 11/29/2009 01:00 PM  
e:

Subject: vol 5 (use this version, please)

Here are comments on the rest of volume 5. Not much, except in the area of the impact on  
(b)(5) Deliberative

I think this means two things:

(1) (b)(5) Deliberative

(2) (b)(5) Deliberative



(b)(5) Deliberative

[REDACTED]

[REDACTED]

[REDACTED]

[attachment "RTC\_draft\_Volume\_5\_complete\_1128 -jh1129.doc" deleted by Darrell Winner/DC/USEPA/US]

John Hannon  
Office of General Counsel  
U.S. Environmental Protection Agency  
1200 Pennsylvania Ave. NW (MC 2344A)  
Washington, D.C. 20460  
Phone (202) 564-5563  
Fax (202) 564-5603

Jason Samenow---11/28/2009 11:38:10 AM--- Sorry for multiple emails on this....but please refer to this version of Volume 5.

Fro Jason Samenow/DC/USEPA/US  
m:

To: Rona Birnbaum/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, John Hannon/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA

Cc: Ben DeAngelo/DC/USEPA/US@EPA, Michael Kolian/DC/USEPA/US@EPA, Bill Perkins <perkins.william@epa.gov>, Lesley Jantarasami/DC/USEPA/US@EPA, David Chalmers/DC/USEPA/US@EPA

Dat 11/28/2009 11:38 AM  
e:

Subjvol 5 (use this version, please)  
ect:

EPA-EF-004064

Sorry for multiple emails on this...but please refer to this version of Volume 5.  
Jason

(Ben and Mike, please check the first comment and response on air quality and make sure both of your edits to that one were appropriately incorporated)

[attachment "RTC\_draft\_Volume\_5\_complete\_1128.doc" deleted by Darrell Winner/DC/USEPA/US]

EPA-2495

Suzanne  
Kocchi/DC/USEPA/US  
12/01/2009 11:02 AM

To Dina Kruger  
cc  
bcc  
Subject Re: latest from OMB

got it. do you want me to tell heidi? or will you mention to her at this 11 am?

Dina Kruger Yes ----- 12/01/2009 10:59:13 AM

From: Dina Kruger/DC/USEPA/US  
To: Suzanne Kocchi/DC/USEPA/US@EPA  
Date: 12/01/2009 10:59 AM  
Subject: Re: latest from OMB

Yes

-----  
Sent by EPA Wireless E-Mail Services

Suzanne Kocchi

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

From: Suzanne Kocchi  
Sent: 12/01/2009 10:54 AM EST  
To: Dina Kruger  
Subject: Re: latest from OMB

wants clearance on fri?

Dina Kruger (b) 5 deliberative 12/01/2009 10:52:47 AM

From: Dina Kruger/DC/USEPA/US  
To: Suzanne Kocchi/DC/USEPA/US@EPA  
Date: 12/01/2009 10:52 AM  
Subject: Re: latest from OMB

(b)(5) Deliberative

-----  
Sent by EPA Wireless E-Mail Services

Suzanne Kocchi

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

From: Suzanne Kocchi  
Sent: 12/01/2009 10:15 AM EST  
To: Carol Holmes  
Cc: Ben DeAngelo; Dina Kruger; John Hannon; Rona Birnbaum  
Subject: latest from OMB

Just spoke with Heidi: Got the edits for OMB #7 (b)(5) Deliberative  
I will try to do that and highlight when I do so Ben et al can judge if the edits are appropriate. Heidi said she is happy to get on the phone to discuss any we want to push back on.

She also said that they are ok to clear (b)(5) Deliberative

I mentioned (b)(5) Deliberative

(b)(5) Deliberative She understood. Her message to Cass is that "we are all working together" to clear it as soon as possible.

Carol Holmes Thanks Suzie -- I had three more on m... 12/01/2009 10:04:47 AM

From: Carol Holmes/DC/USEPA/US  
To: Suzanne Kocchi/DC/USEPA/US  
Cc: Ben DeAngelo/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, John Hannon/DC/USEPA/US@EPA, Rona Birnbaum/DC/USEPA/US@EPA  
Date: 12/01/2009 10:04 AM  
Subject: Re: Fw: Please find attached a summary of additional interagency working comments under EO 12866

Thanks Suzie -- I had three more on my list (see below)

Confidential communication for internal deliberations only; Attorney-client, attorney work product and/or enforcement privilege; Do not distribute outside EPA or DOJ

---

Carol S. Holmes  
Office of General Counsel  
U.S. Environmental Protection Agency  
1200 Pennsylvania Ave, NW (MC 2344A)  
Washington, DC 20460  
Phone (202) 564-8709  
Fax (202) 564-5603

---

Suzanne Kocchi I will take the pen on the preamble no... 12/01/2009 09:56:27 AM

From: Suzanne Kocchi/DC/USEPA/US  
To: John Hannon/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, Rona Birnbaum/DC/USEPA/US@EPA  
Date: 12/01/2009 09:56 AM  
Subject: Re: Fw: Please find attached a summary of additional interagency working comments under EO 12866

I will take the pen on the preamble now to do some of the minor editing. Next person who needs it, just let me know.

To do list as far as my notes go:

- OMB 1: John (Done)
- OMB 2: Carol
- OMB 3: Ben
- OMB 4: No action
- OMB 5: Suzie to talk to Heidi today - Ben to do
- OMB 6: Suzie
- OMB 7: Suzie
- OMB 8: Ben
- OMB 9: Carol
- OMB 10: Suzie
- OMB 11: Ben
- OMB 12: John (Done- partially)
- OMB 13: John (Done - partially)
- OMB 14: John
- OMB 15: John
- OMB 16: John

OMB 17: Suzie/Lesley

OMB 18: John

OMB 19: Ben/Carol

OMB 20-26: Suzie (John did some of these already, I think only 23 is left and I want to think about that).

Other edits:

(b)(5) deliberative  
[Redacted]

John Hannon here is a revised version of the preamb... 12/01/2009 09:08:55 AM

From: John Hannon/DC/USEPA/US  
To: Suzanne Kocchi/DC/USEPA/US@EPA  
Cc: Ben DeAngelo/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, Rona Birnbaum/DC/USEPA/US@EPA  
Date: 12/01/2009 09:08 AM  
Subject: Re: Fw: Please find attached a summary of additional interagency working comments under EO 12866

here is a revised version of the preamble. It is what we had yesterday night plus responses to various OMB comments:

OMB 1 - I made changes to (b)(5) Deliberative  
[Redacted]

OMB 12, 13 (made changes where they noted, still need to check other places they did not note), 14 -16, 18, 20-22, 24 - 26.

(b)(5) Deliberative  
[Redacted]

One OMB/DOJ comment was (b)(5) Deliberative  
[Redacted]

[attachment "Endangerment Findings Master\_track changes \_113009pm -jh1201.doc" deleted by Suzanne Kocchi/DC/USEPA/US]

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Phone (202) 564-5563  
Fax (202) 564-5603

Suzanne Kocchi Quotes from DOJ that Heidi wants us t... 11/30/2009 06:08:10 PM

From: Suzanne Kocchi/DC/USEPA/US  
To: John Hannon/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA, Rona Birnbaum/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA, Ben DeAngelo/DC/USEPA/US@EPA  
Date: 11/30/2009 06:08 PM  
Subject: Fw: Please find attached a summary of additional interagency working comments under EO 12866

---

Quotes from DOJ that Heidi wants us to add.

----- Forwarded by Suzanne Kocchi/DC/USEPA/US on 11/30/2009 06:07 PM -----

From: "King, Heidi R." (b)(6)  
To: Suzanne Kocchi/DC/USEPA/US@EPA  
Cc: "Mancini, Dominic J." (b)(6)  
Date: 11/30/2009 05:59 PM  
Subject: RE: Please find attached a summary of additional interagency working comments under EO 12866

---

Suzie,

Attached is a summary of additional additional interagency comments!

I hope you have a good evening,

heidi

**From:** King, Heidi R.  
**Sent:** Monday, November 30, 2009 12:09 PM  
**To:** 'Kocchi.Suzanne@epamail.epa.gov'  
**Cc:** Mancini, Dominic J.  
**Subject:** Please find attached a summary of additional interagency working comments under EO 12866

Suzie,

Attached is a summary of additional interagency comments.

Best,

heidi

**From:** King, Heidi R.  
**Sent:** Wednesday, November 25, 2009 4:09 PM  
**To:** 'Kocchi.Suzanne@epamail.epa.gov'  
**Cc:** Mancini, Dominic J.  
**Subject:** Please find attached a summary of interagency working comments under EO 12866

Suzie,

Attached is a summary of the interagency comments received on EPA's draft language for the final Endangerment Finding. I expect that a few more comments may follow on Friday / Monday, and I will send them as soon as possible to allow you time to consider them.

Please contact me if you have any questions, and have a good holiday!

Best,

heidi[attachment "Summary of Interagency Working Comments under EO 12866\_120109.pdf" deleted by John Hannon/DC/USEPA/US]

EPA-2496

Marcus  
Sarofim/DC/USEPA/US  
12/01/2009 11:02 AM

To Reid Harvey  
cc  
bcc

Subject Endangerment response to comments check

Hi Reid - Dina wanted me to pass this comment & response by you,

-Marcus

**Comment:**

(b)(5) Deliberative

**Response:**

(b)(5) Deliberative

[Redacted]

[Redacted]

[Redacted]



EPA-2497

**Jason**  
**Samenow/DC/USEPA/US**  
12/01/2009 11:03 AM

To William Perkins, Ben DeAngelo, Michael Kolian, Dina Kruger,  
John Hannon, Rona Birnbaum, David Chalmers, Rona  
Birnbaum  
cc Carol Holmes, Lesley Jantarasami, Suzanne Kocchi  
bcc

Subject The latest Volume 5

We've made quite a few edits to Volume 5 to respond to John's comments and strengthen arguments to the extent possible. There are undoubtedly still unresolved issues to work through, but this is getting closer. Comment bubbles remain in the margins where we have issues to address (though it's possible in a few cases we actually addressed the comment but neglected to delete the bubble).

Please find the Volume attached.

Thanks for everyone's collective efforts on working through this challenging, and lengthy volume.

Jason

(b)(5) Deliberative

RTC Vol 5 120109.doc

EPA-EF-004072

EPA-2498

Lesley  
Jantarasami/DC/USEPA/US  
12/01/2009 11:09 AM

To mae.thomas  
cc William Perkins  
bcc

Subject found one commenter number for vol 11

Hi Mae,

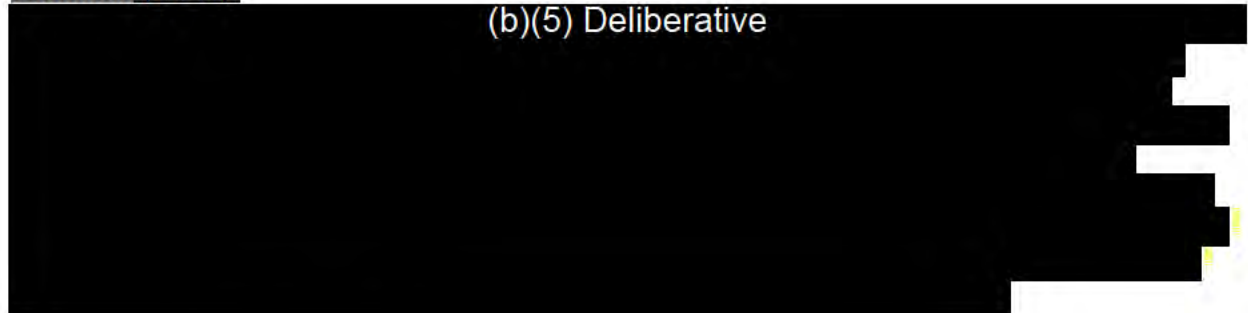
We found a commenter number for the comment 11-24, so the only one missing now is from 11-22 (copied below). Carol, the author of the comment, thinks this came from ANPR comments. If you'd like to see the latest version of vol 11, I've attached it.

Thanks,

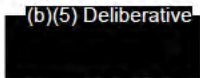
Lesley

**Comment (11-22):**

(b)(5) Deliberative



(b)(5) Deliberative



RTC Volume 11 to ERG 11 30 09 ERG formatted CLEAN.doc

Lesley Jantarasami  
US EPA, Climate Change Division  
Climate Science & Impacts Branch  
202.343.9929  
202.343.2202 (fax)  
Jantarasami.Lesley@epa.gov

EPA-2499

**Ben DeAngelo**

04/06/2010 04:57 PM

To

cc

bcc

Subject UPLoad C:\Documents and Settings\owner\My Documents\Endangerment\Response to Public Comments\RTC\_draft\_Volume\_5\_complete\_1128 -jh1129\_AQ kolian.doc

(b)(5) Deliberative

- RTC\_draft\_Volume\_5\_complete\_1128 -jh1129\_AQ kolian.doc

EPA-EF-004074

EPA-2500

**Lesley**  
**Jantarasami/DC/USEPA/US**  
12/01/2009 11:20 AM

To Matthew Mitchell, Sue Eisenfeld  
cc mae.thomas, William Perkins  
bcc  
Subject Volume 5 for copyediting/formatting

Hello Matt and Sue,

Please find attached Vol 5 for copyediting/formatting. Please do not number the summaries/responses now (they will be changing), but we would like you to add lines between the sets of summaries/responses. This volume will also need a close QA/QC of the references list, following the 3 steps we talked about last time with regard to Vol 2. Please let me know if you have any questions.

Thanks,

Lesley

(b)(5) Deliberative

RTC Vol 5 120109.doc

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EPA-EF-004075

EPA-2501

**William  
Perkins/DC/USEPA/US**  
12/01/2009 11:40 AM

To Lesley Jantarasami  
cc  
bcc  
Subject Re: Volume 5 for copyediting/formatting

Lesley,

Thank you for coordinating directly with them on the volume edits. Since you are the master coordinator of the volumes it probably makes more sense anyway and saves me having to be the go-between with no value-added in this particular case.

Cheers,

Bill

Bill Perkins  
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(C) (b)(6)

Lesley Jantarasami Hello Matt and Sue, Please find att... 12/01/2009 11:20:27 AM

From: Lesley Jantarasami/DC/USEPA/US  
To: Matthew Mitchell <Matthew.Mitchell@erg.com>, Sue Eisenfeld <Sue.Eisenfeld@erg.com>  
Cc: mae.thomas@erg.com, William Perkins/DC/USEPA/US@EPA  
Date: 12/01/2009 11:20 AM  
Subject: Volume 5 for copyediting/formatting

Hello Matt and Sue,

Please find attached Vol 5 for copyediting/formatting. Please do not number the summaries/responses now (they will be changing), but we would like you to add lines between the sets of summaries/responses. This volume will also need a close QA/QC of the references list, following the 3 steps we talked about last time with regard to Vol 2. Please let me know if you have any questions.

Thanks,

Lesley

[attachment "RTC Vol 5 120109.doc" deleted by William Perkins/DC/USEPA/US]

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EPA-EF-004076

EPA-2502

**Ben DeAngelo/DC/USEPA/US**  
12/01/2009 11:44 AM

To John Hannon  
cc Mike Kolian, Rona Birnbaum  
bcc

Subject AQ inserts for TSD, and use in RTC and possibly Findings

John,

Here are additions we got from ORD to better explain results from their underlying report largely in response to your comments on a previous version of the RTC for air quality.

This language is now in the updated RTC on health/air quality you just received from Jason.

-Ben

(b)(5) Deliberative

TSD p 90 to 91 Ozone insert.doc

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EPA-EF-004077

EPA-2503

**Michael Kolian**  
05/12/2010 10:13 AM

To  
cc  
bcc

Subject UPGRADE C:\Documents and Settings\Owner\My Documents\Ccd\TSD comment period\RTC Document and Outline\Volume 5\November 23\RTC\_draft\_Volume\_5\_complete\_1128 -jh1129\_AQ kolian.doc

(b)(5) Deliberative

- RTC\_draft\_Volume\_5\_complete\_1128 -jh1129\_AQ kolian.doc

EPA-EF-004078

EPA-2504

**Ben DeAngelo**

04/06/2010 04:56 PM

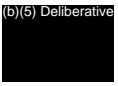
To

cc

bcc

Subject UPGLOAD C:\Documents and Settings\owner\My Documents\Endangerment\Response to Public Comments\RTC Vol 5 120109.doc

(b)(5) Deliberative

 - RTC Vol 5 120109.doc

EPA-EF-004079



EPA-2505

**Michael Kolian**  
05/12/2010 10:13 AM

To  
cc  
bcc

Subject UPGRADE C:\Documents and Settings\Owner\My Documents\Ccd\TSD comment period\RTC Document and Outline\Volume 5\November 23\RTC\_draft\_Volume\_5\_complete\_1128 -jh1129\_AQ kolian2.doc

(b)(5) Deliberative

- RTC\_draft\_Volume\_5\_complete\_1128 -jh1129\_AQ kolian2.doc

EPA-EF-004080

EPA-2506

**Lesley Jantarasami**  
04/01/2010 03:52 PM

To  
cc  
bcc

Subject UPGRADE C:\Documents and Settings\ljantara\My Documents\Endangerment\02\_Comments and Responses\Vol 9 and 12 stuff\RTC Volume 11 to ERG 11 30 09 ERG formatted CLEAN.doc

(b)(5) Deliberative

- RTC Volume 11 to ERG 11 30 09 ERG formatted CLEAN.doc

EPA-EF-004081

EPA-2507

Marcus  
Sarofim/DC/USEPA/US  
12/01/2009 11:57 AM

To David Chalmers  
cc  
bcc  
Subject Fw: Vol 2 for review and copy editing

Marcus C. Sarofim, PhD  
phone: 202-343-9993  
fax: 202-343-2202  
1310 L Street 256C  
AAAS Science & Technology Policy Fellow  
with the EPA Climate Division

----- Forwarded by Marcus Sarofim/DC/USEPA/US on 12/01/2009 11:57 AM -----

From: Carol Holmes/DC/USEPA/US  
To: Jason Samenow/DC/USEPA/US@EPA  
Cc: Dina Kruger/DC/USEPA/US@EPA, Jeremy Martinich/DC/USEPA/US@EPA, John Hannon/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, Marcus Sarofim/DC/USEPA/US@EPA, Rona Birnbaum/DC/USEPA/US@EPA, William Perkins/DC/USEPA/US@EPA  
Date: 11/29/2009 06:40 PM  
Subject: Re: Vol 2 for review and copy editing

Here are my comments on v2. Again, overall quite good, (b)(5) Deliberative

[Redacted]

Also, as I mentioned before, (b)(5) Deliberative

[Redacted]

(b)(5) Deliberative

I do suggest combining the two comment/responses into one.

THANKS

PS -- when can I expect volume 4?

(b)(5) Deliberative

RTC volume 2 112809 csh 11 29.doc

EPA-EF-004082

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---

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---

Jason Samenow Team-- Here is the latest and greatest... 11/28/2009 08:22:03 PM

From: Jason Samenow/DC/USEPA/US  
To: Rona Birnbaum/DC/USEPA/US@EPA, John Hannon/DC/USEPA/US@EPA, Carol Holmes/DC/USEPA/US@EPA, Dina Kruger/DC/USEPA/US@EPA  
Cc: Marcus Sarofim/DC/USEPA/US@EPA, Jeremy Martinich/DC/USEPA/US@EPA, Lesley Jantarasami/DC/USEPA/US@EPA, William Perkins/DC/USEPA/US@EPA  
Date: 11/28/2009 08:22 PM  
Subject: Vol 2 for review and copy editing

---

Team--

Here is the latest and greatest version of Vol 2, ready for review. It's another long one, nearly 70 pages (not including citations).

A few notes...

OGC-- Please pay particular attention to (b)(5) Deliberative

Bill-- Recommend that ERG, in addition to copy editing this, (b)(5) Deliberative

Also, please remind them not to include comment numbers yet.

Lesley-- There are a few comments from Dina on your responses that I forgot to send to you (physical and biological systems). Can you please address those?

Thanks to Marcus and Jeremy for their help in responding to the last round of edits.

Jason

[attachment "RTC volume 2 112809.doc" deleted by Carol Holmes/DC/USEPA/US]  
[attachment "Volume 2 References v2.doc" deleted by Carol Holmes/DC/USEPA/US]

EPA-2508

Carol Holmes/DC/USEPA/US  
12/01/2009 11:57 AM

To Lesley Jantarasami  
cc  
bcc

Subject Fw: 115 in Endangerment RTC

can you make this change when you get it back from Dina? I can help if it isn't obvious. thanks!

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---

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---

----- Forwarded by Carol Holmes/DC/USEPA/US on 12/01/2009 11:57 AM -----

From: Patricia Embrey/DC/USEPA/US  
To: Carol Holmes/DC/USEPA/US@EPA  
Date: 12/01/2009 11:45 AM  
Subject: Fw: 115 in Endangerment RTC

---

A small additional edit to the 115 write up in the RTC from Sonja.

(b)(5) Deliberative

EPA-EF-004084

EPA-2509

**Ben DeAngelo/DC/USEPA/US**  
12/01/2009 12:19 PM

To Mike Kolian  
cc Lesley Jantarasami, Rona Birnbaum, Jeremy Martinich  
bcc  
Subject Revised forestry volume

Now turning to Ag.

I think one of the larger issues here is t (b)(5) Deliberative

[Redacted]

I also (b)(5) Deliberative

[Redacted]

-Ben

(b)(5) Deliberative  
[Redacted]

RTC\_draft\_Volume\_6\_Forestry\_only 120109 BJD.doc

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EPA-2510

**William  
Perkins/DC/USEPA/US**  
12/01/2009 12:25 PM

To Mae Thomas  
cc Lesley Jantarasami  
bcc  
Subject Fw: mental health reference

Mae,

Lesley has found some references on the FTP site today in Section 2.7 that are miscategorized. This is one of them; would it be possible to move to human health? Thank you.

Cheers,

Bill

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----- Forwarded by William Perkins/DC/USEPA/US on 12/01/2009 12:24 PM -----

From: Lesley Jantarasami/DC/USEPA/US  
To: Jason Samenow/DC/USEPA/US@EPA  
Cc: William Perkins/DC/USEPA/US@EPA  
Date: 12/01/2009 12:23 PM  
Subject: mental health reference

---

Jason,

Here is the mental health paper I mentioned. Bill - this paper is miscategorized under section 2.7 (2007) on the FTP site. We may want to tell ERG to move into the health section.



Weems\_150439.pdf

Thanks,

Lesley

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EPA-EF-004086

## BRIEF REPORTS

Predisaster Trait Anxiety and Negative Affect Predict Posttraumatic Stress  
in Youths After Hurricane KatrinaCarl F. Weems  
University of New OrleansArmando A. Pina  
Arizona State UniversityNatalie M. Costa, Sarah E. Watts, Leslie K. Taylor, and Melinda F. Cannon  
University of New Orleans

On the basis of theory and previous research, it was hypothesized that predisaster child trait anxiety would predict disaster-related posttraumatic stress symptoms and generalized anxiety disorder symptoms, even after controlling for the number of hurricane exposure events. Results support this hypothesis and further indicate that predisaster negative affect predicted disaster-related posttraumatic stress symptoms and generalized anxiety disorder symptoms. Also, Katrina-related posttraumatic stress disorder symptoms were predicted by the number of hurricane exposure events and sex (being female). Predisaster generalized anxiety disorder symptoms predicted postdisaster generalized anxiety disorder symptoms, and predisaster trait anxiety predicted postdisaster depressive symptoms. Findings are discussed in terms of their relevance for developing interventions to mitigate the impact of disasters in youths.

*Keywords:* posttraumatic stress, trait anxiety, negative affect, disasters

Hurricane Katrina was a physically and emotionally devastating event, and it has been estimated that it will be the most costly natural disaster in U.S. history (Bacon, 2005). As Katrina made headlines across the United States and abroad, it became apparent that the traumatic stress wrought by the storm would have a substantial effect on the mental health of many survivors. The effect of the devastation on youths' mental health and developmental trajectories over time has been a major concern for researchers and policymakers (Gard & Ruzek, 2006). Research indicates, however, that whereas some youths are severely impaired by exposure to a disaster, others cope much more effectively (La Greca & Silverman, 2006). It is thus important to identify predictors of youths' psychosocial functioning in response to trauma. The present study draws on past research and a unique opportunity to test the viability of predisaster variables for predicting posttraumatic stress (PTS) reactions in youth survivors of Hurricane Katrina.

Research suggests that exposure to natural disasters, such as Hurricane Katrina, is associated with PTS symptoms in youths

(e.g., La Greca, Silverman, Vernberg, & Prinstein, 1996; Lonigan, Shannon, Taylor, Finch, & Sallee, 1994; Vernberg, La Greca, Silverman, & Prinstein, 1996). The most commonly investigated symptoms are those associated with the diagnosis of posttraumatic stress disorder (PTSD) and include negative reexperiencing, avoidance, emotional numbing, and hyperarousal (American Psychiatric Association, 1994). In addition to PTSD symptoms, other PTS reactions are common; in particular, symptoms of anxiety (e.g., Lonigan et al., 1994; Yule et al., 2000) as well as symptoms of depression are thought to be common among youths following natural disasters (e.g., Bolton, O'Ryan, Udwin, Boyle, & Yule, 2000; McDermott & Palmer, 2002; Nolen-Hoeksema & Morrow, 1991). Unfortunately, evidence suggests that for many youths these reactions may not be transitory (Yule et al., 2000) and that a substantial number will meet diagnostic criteria for anxiety or depressive disorders over time (see La Greca & Silverman, 2006).

Given the potential negative impact of natural disasters on youths, it is important to identify factors associated with negative outcomes, as such information has the potential to inform prevention efforts. For instance, research suggests that the level of PTS symptoms a child experiences is related to the number of hurricane exposure events the youth experiences (La Greca, Silverman, & Wasserstein, 1998; Silverman & La Greca, 2002). Consequently, those experiencing more frequent and more intense hurricane-related events are more likely to have more severe PTS reactions. However, in addition to the extent of exposure, a number of studies indicate that preexisting propensities for anxiety and other negative affect states also are significant risk factors for postdisaster PTS symptoms (Asarnow et al., 1999; Earls, Smith, Reich, & Jung, 1988; La Greca et al., 1998; Lonigan et al., 1994; Nolen-

---

Carl F. Weems, Natalie M. Costa, Sarah E. Watts, Leslie K. Taylor, and Melinda F. Cannon, Department of Psychology, University of New Orleans; Armando A. Pina, Department of Psychology, Arizona State University.

This research was made possible in part by National Institute of Mental Health Grant MH067572 to Carl F. Weems and a grant from the Institute for Social Science Research to Armando A. Pina and Carl F. Weems.

Correspondence concerning this article should be addressed to Carl F. Weems, Department of Psychology, University of New Orleans, New Orleans, LA 70148. E-mail: cweems@uno.edu



Hoeksema & Morrow, 1991). For example, Lonigan et al. (1994) found that trait anxiety was the strongest predictor of PTS reactions in a large ( $N = 5,687$ ) sample of youths assessed following Hurricane Hugo. In this study, however, PTS and trait anxiety data were both collected after the storm, and this limits conclusions about predisaster functioning.

The unpredictable nature of most natural disasters makes prospective studies examining predisaster and postdisaster data rare and difficult to conduct. In essence, researchers have to rely on serendipity. For example, a few studies have been able to report on pretrauma psychological functioning because of the chance collection of data before an unexpected disaster. For instance, using a sample of 66 youths (ages 9–19 years) from Los Angeles, Asarnow et al. (1999) found that preexisting anxiety disorders predicted earthquake-related PTS reactions 1 year following the disaster. Earls et al. (1988) found that preexisting anxiety disorders predicted flood-related PTS reactions in their sample of 32 youths from Missouri (ages 6–17 years). Research by Nolen-Hoeksema and Morrow (1991) suggests that predisaster levels of depression, stress symptoms, and ruminations also predict disaster reactions. Taken together, the research points to anxiety and negative affect states as potential predictors of PTS reactions.

Turning specifically to research on youth hurricane survivors, we note that La Greca et al. (1998) represents the only child study that used predisaster data. La Greca and colleagues examined stress reactions in a sample of children (in fourth to sixth grade) assessed 3 ( $n = 92$ ) and 7 months ( $n = 74$ ) postdisaster (pretrauma data were collected 15 months prior to Hurricane Andrew's landfall in South Florida) and found that trait anxiety was the strongest and most consistent predictor of youths' PTS reactions (e.g., trait anxiety predicted PTS symptoms even when controlling for level of exposure and demographic characteristics). Theoretically, preexisting trait anxiety is thought to impact the way children are able cope with and process the traumatic event (La Greca et al., 1996; Vernberg et al., 1996). Those with elevated trait anxiety are theorized to be less able to positively cope and are more likely to have elevated PTS symptoms even with relatively low exposure experiences (La Greca et al., 1998).

Drawing on the theoretical perspective developed by La Greca and colleagues (e.g., La Greca et al., 1996, 1998; Vernberg et al., 1996), we sought to increment knowledge on the role of preexisting trait anxiety on youths' reactions to trauma. We predicted that predisaster (pre-Katrina) child trait anxiety would be predictive of PTSD symptoms following the disaster, even after controlling for the number of hurricane exposure events. In this study we also sought to extend previous research by examining the role of predisaster PTS symptoms. For example, it is reasonable to argue that the reason trait anxiety has been found to be related to PTS symptoms may be due to previous exposure to trauma and predisaster PTS symptoms (i.e., that trait anxiety is simply a marker for existing PTSD symptoms). In this study, our sample also was screened for PTS symptoms pre-Katrina, and thus this is the first study, to our knowledge, to be able to control for preexisting PTS symptoms in testing La Greca and colleagues' model. In addition, research from disasters other than hurricanes indicates that factors that tap negative affect may also be predictive of reactions to trauma (Nolen-Hoeksema & Morrow, 1991); therefore, we hypothesized that negative affect pre-Katrina would predict post-Katrina PTS symptoms. Finally, in addition to PTS symptoms as

the outcome variable, we examined the prediction of major depression symptoms post-Katrina, because research has shown these to be a possible reaction to disaster. We also examined the prediction of generalized anxiety disorder symptoms post-Katrina, because previous research has provided limited information on the more cognitive (i.e., worry) aspects of anxiety disorder symptoms that may develop in the wake of disaster.

## Method

### Participants

The sample was composed of 52 youths (mean age = 11.35 years,  $SD = 3.6$ ): 30 boys (58%) and 22 girls (42%). Sixty-four percent were European American ( $n = 33$ ), 29% were African American ( $n = 15$ ), and 7% reported "other" ( $n = 4$ ) as their ethnic background. In terms of income, 24% ( $n = 13$ ) of youths came from families with annual incomes of less than \$21,000, for 31% ( $n = 16$ ) incomes ranged from \$21,000 to \$51,000, and for 45% ( $n = 23$ ) incomes were above \$51,000. All 52 youths had participated in a series of studies at the University of New Orleans (e.g., Weems & Costa, 2005; Weems, Zakem, Costa, Cannon, & Watts, 2005) on average 17 months before the storm, and all were residing in the greater New Orleans area at the time of the storm. Data also were collected on 173 youths before the hurricane, but because of the extensive devastation caused by the natural disaster it was impossible to recontact these participants for the immediate post-Katrina assessment (6 to 7 months after the disaster). Comparison of the 52 youths who completed the pre- and post-Katrina assessment versus the 173 youths who completed the pre-Katrina assessment revealed no statistically significant differences on most pre-Katrina variables. Only significant differences in terms of family income were found between the two groups. Specifically, this study's sample ( $N = 52$ ) had higher family income.

### Measures

The Child Posttraumatic Stress Disorder Checklist (PTSD checklist; Amaya-Jackson, McCarthy, Newman, & Cherney, 1995) was used to assess pre- and post-Katrina PTSD symptoms. The PTSD checklist consists of 28 items that inquire about symptoms corresponding to each of the major PTSD symptoms (reexperiencing, avoidance, emotional numbing, and hyperarousal) specified in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*; American Psychiatric Association, 1994). Previous research has reported alpha reliability coefficients ranging from .91 to .72. In the present study, alpha reliabilities for the Time 1 and Time 2 administrations were .95 (95% confidence interval [CI] = .93, .96) and .87 (95% CI = .82, .92).

The State-Trait Anxiety Inventory for Children—Trait version (STAIC-T; Spielberger, 1973) was used to assess trait anxiety pre-Katrina. The Trait version of the STAIC is a 20-item self-report instrument designed to measure relatively stable individual differences in the tendency to experience anxiety states. Spielberger reported retest reliabilities ranging from .65 to .71. Alpha reliability for the STAIC-T was .81 (95% CI = .73, .88).

The Revised Child Anxiety and Depression Scale (RCADS; Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000) was used to assess pre- and post-Katrina symptoms of generalized anxiety

disorder and depression. The RCADS Generalized Anxiety Disorder scale (GAD) has 6 items, and the Major Depression scale (MD) has 10 items. The GAD and MD scales were chosen as a focus of this study to reduce item overlap with other scales used in this study. Chorpita et al. reported alpha reliabilities of .80 for the GAD scale and .76 for the MD scale. Alpha reliability for the Time 1 and Time 2 administrations of the GAD scale were .70 (95% CI = .54, .81) and .78 (95% CI = .66, .85) and for the MD scale were .78 (95% CI = .67, .86) and .83 (95% CI = .75, .89), respectively.

The Positive and Negative Affect Schedule—Child version (PANAS-C; Laurent et al., 1999) was used to assess negative affect (NA) pre-Katrina. The PANAS-C consists of positive affects (e.g., interested, excited, strong, enthusiastic, proud, alert) and negative affects (e.g., distressed, upset, guilty, hostile, nervous, jittery, and afraid). NA is assessed via 15 items. Laurent et al. reported an alpha reliability of .94. Alpha reliability estimate for the PANAS-C NA in the present study was .92 (95% CI = .88, .95).

### Procedure

Informed consent was obtained from the parent and assent from the child before the pre-Katrina assessment. Consent (assent for child) was obtained for both data collections (i.e., pre- and post-Katrina). Written consent (assent for child) was obtained at Time 1 and included a clause to recontact participants and conduct follow-ups. At Time 2, parents were contacted and verbal consent (assent for child) was obtained over the phone prior to the administration of the follow-up assessment. The predisaster assessment battery included the PTSD checklist, STAIC-T, RCADS, and PANAS-C. Youths were assisted, as necessary, by a trained research assistant who either read aloud the questions to younger children or monitored completion of the assessment battery. After the disaster, trained research assistants attempted to recontact all families who completed the pre-Katrina assessment, and 52 were located. Each of the 52 youths and their families recontacted and located after the disaster then participated in a post-Katrina telephone interview. Procedures for conducting the phone interviews were similar to those described by Asarnow et al. (1999). Phone interviews lasted approximately 30 min with each child and included a survey of exposure to hurricanes and their aftermath. This survey was similar to the one used by La Greca et al. (1998), and sample items included “During the storm did you see windows and doors breaking?” and “During the storm did you hear about tornadoes in your area?” Respondents indicated “yes” or “no” with respect to whether they were exposed to each event. For the present study, the number of hurricane-related events was computed by adding the number of “yes” responses. The telephone interview also included administration of the PTSD checklist and RCADS.

### Results

Means and standard deviations for each of the pre- and post-Katrina measures are presented in Table 1. Examination of the scores’ ranges and skew indicated acceptable levels for the planned analyses.<sup>1</sup> As shown in Table 1, participants were exposed to a wide range and large number of potentially stressful hurricane-

related events. Results of paired-samples *t* tests on the number of PTSD symptoms, RCADS-GAD symptoms, and RCADS-MD symptoms indicated no significant differences in mean scores from pre- to post-Katrina (PTSD 95% CI for the mean difference = -7.0, 2.9, Cohen’s *d* = 0.16; GAD 95% CI for the mean difference = -0.9, 1.2, Cohen’s *d* = 0.04; and MD 95% CI for the mean difference = -1.1, 2.6, Cohen’s *d* = 0.16). Intercorrelations between the study’s focal variables are presented in Table 1, and as shown in the table, the number of hurricane-related events was significantly related to the number of post-Katrina PTSD symptoms. In addition, pre-Katrina STAIC-T and PANAS-C scores were significantly related to post-Katrina PTSD, GAD, and MD symptoms.

Before selecting demographics for inclusion in the regression models, we examined age, gender, ethnicity, and income levels as predictors of the outcomes (post-Katrina PTSD checklist, GAD, and MD symptoms); however, only gender was associated with these variables. Because, age, ethnicity, and income levels were not associated with outcome, as suggested by Tabachnick and Fidell (2001) in an effort to preserve degrees of freedom given the relatively small sample size, age, ethnicity, and income were not included in the regression analyses.

Next, a series of hierarchical regression analyses were conducted to determine if pre-Katrina trait anxiety and negative affect predicted post-Katrina PTSD, GAD, and MD symptoms. In the first model, post-Katrina PTSD symptoms were entered as the criterion variable, and pre-Katrina PTSD symptoms were added in the first step.<sup>2</sup> Next, the number of hurricane-related events was entered in Step 2, followed by sex in Step 3, and pre-Katrina STAIC-T scores in Step 4. Results are summarized in Table 2 and indicated that sex (being female), number of hurricane-related events, and STAIC-T scores predicted elevated post-Katrina PTSD symptoms, with STAIC-T scores accounting for 7% additional variance.<sup>3</sup> A similar regression was conducted using pre-Katrina PANAS-C NA scores in Step 4, and results indicated that the step was significant (11% additional variance). In both regressions, the overall model was significant ( $p < .01$ ).

In the second model predicting post-Katrina GAD symptoms, pre-Katrina GAD symptoms were entered in Step 1, and the number of hurricane-related events was entered in Step 2, followed by sex in Step 3, and pre-Katrina STAIC-T scores in Step 4. Results are summarized in Table 2 and indicated that GAD symptoms, sex (being female), and STAIC-T scores predicted post-Katrina GAD symptoms, with STAIC-T scores accounting for 11% additional variance. A similar regression was run using pre-

<sup>1</sup> PTSD checklist symptoms before Katrina were skewed (expectedly) because many youths had not experienced a traumatic event. Consequently, we checked our results regarding this variable using nonparametric tests (e.g., Spearman’s rho correlations), and these provided identical conclusions. The most common traumatic events reported by youths before Katrina were motor vehicle accidents and community crime and violence.

<sup>2</sup> Because of their correlation, STAIC-T and PANAS-C scores were run in separate models to reduce the effects of multicollinearity in interpreting the results (Tabachnick & Fidell, 2001). When entered together in Step 4, the step produced a significant change in  $R^2$ , but neither variable was individually significant in each of the three models and tolerance was low.

<sup>3</sup> The order of steps was chosen by drawing on the study of La Greca et al. (1998) to provide consistency across studies.

Table 1

Means, Standard Deviations, and Zero-Order Correlations for Measures Pre- and Post-Hurricane Katrina (N = 52) and Percentage of Participants Experiencing Various Hurricane-Related Events

Variable	M	SD	%	1	2	3	4	5	6	7	8	9
1. Number of hurricane-related experiences	6.56	2.9		—								
2. PTSD checklist–pre	15.49	16.5		.09	—							
3. STAIC–T–pre	35.30	6.4		.01	.46**	—						
4. PANAS–C NA–pre	29.14	12.0		.02	.40**	.58**	—					
5. RCADS–GAD–pre	11.40	3.5		.07	.52**	.39**	.38**	—				
6. RCADS–MD–pre	17.37	5.0		–.07	.40**	.45**	.55**	.44**	—			
7. PTSD checklist–post	13.58	5.7		.44**	.09	.37**	.35*	.30*	.04	—		
8. RCADS–GAD–post	11.21	3.2		.18	.24	.46**	.47**	.40**	.18	.69**	—	
9. RCADS–MD–post	16.48	4.7		.26	.09	.44**	.32*	.18	.10	.62**	.54**	—
Type of hurricane-related experiences												
Lost contact with friends			60									
Relocated to another city			58									
Saw trees being damaged			44									
Home damaged or destroyed			35									
Witnessed others sick, hurt, or die			19									
Friend or family member died			10									

Note. PTSD checklist = Child Posttraumatic Stress Disorder Checklist; STAIC–T = State–Trait Anxiety Inventory for Children—Trait version; PANAS–C NA = Positive and Negative Affect Schedule—Child version, Negative Affect; RCADS = Revised Child Anxiety and Depression Scale; GAD = generalized anxiety disorder symptoms; MD = major depression symptoms.

\*  $p < .05$ . \*\*  $p < .01$ .

Katrina PANAS–C NA scores in Step 3, and results indicated that the step was significant, accounting for 10% additional variance. In both regressions, the overall model was significant ( $p < .01$ ).

In the third model predicting post-Katrina MD symptoms, pre-Katrina MD symptoms were entered in Step 1, and the number of hurricane-related events was entered in Step 2, followed by sex in Step 3, and pre-Katrina STAIC–T scores in Step 4. Results are summarized in Table 2 and indicated that sex (being female) and STAIC–T scores predicted post-Katrina MD symptoms with STAIC–T score accounting for 10% additional variance. A similar regression was run using pre-Katrina PANAS–C NA scores in Step 3, and results indicated that the step did not reach statistical significance (5% additional variance,  $p = .089$  for the step). In both regressions, however, the overall model was significant ( $p \leq .05$ ).

## Discussion

Results indicated that trait anxiety was a predictor of negative stress responses in the wake of Hurricane Katrina, and these findings were highly consistent with the theorizing and conclusions of La Greca et al. (1998). Findings extend the previous research by controlling for preexisting PTSD symptoms. This study's findings also showed that youths with elevated negative affect are at risk for the development of PTSD symptoms after a disaster; however, this may be due to shared variance. Prevention trials designed to mitigate the impact of disasters on youths might benefit from specifically considering elevated trait anxiety or negative affect as part of the efficacy evaluation. This may be important because it would show whether this segment of youths seems to benefit from PTS inoculation efforts. The clinical importance of identifying targets for prevention is highlighted by the growing realization that response to trauma is not one-dimensional and that some interventions not only are ineffective but may be detrimental (McNally, Bryant, & Ehlers, 2003). Trait anxiety may thus be an

important target for posttrauma interventions, as anxiety reduction strategies have not been shown to have iatrogenic effects.

The present study also sought to examine the prediction of worry or GAD symptoms as well as the prediction of depressive symptoms. Worry symptoms assessed after the disaster were predicted by both predisaster trait anxiety and negative affect but were not predicted by the number of disaster-related events experienced. One reason may be that GAD symptoms are more stable or less reactive to disaster exposure. PTSD, GAD, and depressive symptoms did not show statistically significant increases nor decreases (i.e., the mean scores in the sample pre- to post-Katrina were roughly the same). These findings are highly consistent with previous research findings; for example, La Greca et al. (1998) found little change in mean scores pre- to post-Hurricane Andrew. One reason for this may be found in research suggesting that, in general, anxiety symptoms decline over time and in older age groups in youths (Weems & Costa, 2005). What may be happening in youths exposed to disasters is that the normative reductions in levels over time do not occur. However, the differences across regression models may also be due in part to the low power (i.e., small sample size) in this study.

Depression symptoms were predicted by trait anxiety and not hurricane events or negative affect. The finding also may be due to this study's limited sample size, as the obtained significance levels were marginal ( $ps < .09$ ). Another plausible explanation is that depression emerges after initial anxious–hyperarousal reactions because hyperarousal symptoms give way to features of depression such as emotional numbing in youths exposed to trauma (see Weems, Saltzman, Reiss, & Carrion, 2003). As such, depression may be a secondary disorder arising from such factors as bereavement and unresolved PTS (Vernberg & Varela, 2001). Prospective studies assessing children at multiple time points and examining the likely multiple and varied developmental trajectories of symptoms postdisaster in larger samples are needed.

Table 2  
*Summary of Hierarchical Regression Analyses for Variables Predicting Post-Hurricane Katrina Symptoms*

Step	Model $R^2$	Change in $R^2$	$\beta$	$t$	$p$
Model 1: Predicting PSTD symptoms post-Katrina					
1 PTSD checklist–pre	.01	.01	.09	0.6	.529
2 Hurricane events	.17**	.16**	.40	2.8	.007
3 Sex	.25**	.11*	-.34	-2.5	.018
4 STAIC–T	.32**	.07*	.33	2.1	.040
4 PANAS–C	.36**	.11*	.37	2.6	.012
Model 2: Predicting generalized anxiety post-Katrina					
1 GAD–pre	.14**	.14**	.37	2.7	.009
2 Hurricane events	.16*	.02	.16	1.2	.245
3 Sex	.24**	.08*	-.28	-2.1	.043
4 STAIC–T	.35**	.11*	.41	2.7	.009
4 PANAS–C	.34**	.10*	.35	2.6	.013
Model 3: Predicting depression post-Katrina					
1 MD–pre	.01	.01	.09	0.6	.526
2 Hurricane events	.08	.07	.27	1.9	.061
3 Sex	.19*	.11*	-.33	-2.5	.017
4 STAIC–T	.30**	.11*	.42	2.6	.013
4 PANAS–C	.24*	.05	.28	1.7	.089

*Note.* All full models were significant at  $p \leq .05$ . PTSD checklist = Child Posttraumatic Stress Disorder Checklist; STAIC–T = State-Trait Anxiety Inventory for Children—Trait version; PANAS–C = Positive and Negative Affect Schedule—Child version; GAD = generalized anxiety disorder symptoms; MD = major depression symptoms.

\*  $p < .05$ . \*\*  $p < .01$ .

Last, our models predicting postdisaster PTSD, GAD, and depressive symptoms showed girls were at greater risk for developing these maladaptive PTS reactions than boys. In the child trauma literature, child gender has been an inconsistent predictor (La Greca & Silverman, 2006). In community samples, girls have generally been found to report more anxiety, worry, and fear than boys (see Vasey & Dadds, 2001, for reviews), but few explanations have been empirically tested, making it difficult to draw any firm conclusions concerning gender differences. Overall, the sample was composed of an ethnically diverse group of youths; however, caution should be made in drawing too wide a generalization from the findings, as the sample was biased toward upper income families.

The present study is limited by its sample size. Because the power to detect significant effects was low in this study, results of no significant findings should be interpreted with caution. In addition, the small sample size precluded conducting more complex analyses (e.g., structural equation modeling) to tease out the relative contribution of the predictors to the various outcome variables. In addition, the study relied on youths' self-reports. It might be the case that reports from other sources (such as parents) would result in additional information about the prediction of PTS reactions in youths. However, youths have been consistently found to be valid reporters of their own internalizing distress (see, e.g., Weems et al., 2005). Another limitation of the present study concerns the clinical severity of youths' symptoms, which could have been ascertained by using a *DSM-IV* Axis V domain measure. Unfortunately, most studies in the child trauma literature do

not report these data and rely on PTS symptom counts, as does the present study. An additional limitation of this study is that we had little control over the postdisaster time frames examined. The extent of devastation made reassessment of youths immediately following Hurricane Katrina impossible. Data collected in various time frames following the storm could have helped clarify the temporal associations of youths' symptom reactions.

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