**Toxicology Excellence for Risk Assessment**

**TERA**

*a nonprofit corporation dedicated to the best use of toxicity data for risk values*

June 10, 2009



Representative Paul Broun, M.D.
Subcommittee on Investigations and Oversight
Committee on Science and Technology
U.S. House of Representatives
394 Ford House Office Building
Washington, DC 20515

Dear: Dr. Broun

I strongly encourage, without reservation, broad scientific collaboration in order for EPA's IRIS process to meet the needs of the 21st century. Specifically, based on my experience,[1] training, and discussions with EPA staff, as well as scientists from many interested groups, I highly recommend that EPA:

- Clarify the process of involvement with the scientific community; the process for resolving scientific disagreements among interested parties needs to be explicit.
- Work with outside groups with appropriate conflict restrictions to bring in data, opinions, and solutions to complex problems. EPA does not have all the answers. Balancing our individual and group biases will yield better science.
- Allow sufficient time and opportunities for discussion of scientific issues, for example, a 60-day comment period (as in rulemaking) for all parties; EPA should recognize that resolution of scientific issues will take longer.
- Enhance training of EPA staff in dose response assessment techniques, and mentors its younger staff to the artisan and expert levels; many EPA staff do not know basic dose response assessment information.
- Develop safe dose values by scientific consensus among EPA offices and fellow federal agencies, and outside experts as appropriate.

[1] Prior to working at Toxicology Excellence for Risk Assessment (*TERA*) for 15 years, I worked for 15 years at the U.S. Environmental Protection Agency (EPA), holding several leadership roles on specific key projects, including the creation of EPA's IRIS.

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### *A Brief History of IRIS*

IRIS is a national treasure, held in trust by the EPA for all of us.[2]

It has not always been this way, however.

IRIS first started in 1986, as a mechanism to harmonize "safe" dose values[3] among EPA program offices, after it was found that 39 of 40 values for chemicals derived by separate program offices were different from each other. Only one chemical had similar values developed by different program offices; however, this single instance of congruence happened by luck, not by scientific reasoning. This dismal record of 0 for 40 was due in part to the enormous workload of staff and the general lack of communication among EPA offices doing safe dose assessment work.

Within 5 years, EPA had created IRIS to house unanimous consensus information for 500 chemicals. This remarkable turnaround came about through collaborative work among senior EPA scientific staff on two agency peer review work groups,[4] and the commitment of EPA management. Different EPA offices proposed risk values, which were reviewed in monthly internal meetings; values with which everyone agreed were loaded on IRIS. Senior scientific staff among EPA offices interacted on numerous safe dose deliberations prior to work group review and younger staffers had training in preparation for agency work group meetings.

During the early 1990s the influence of IRIS grew and the risk values were being used in many regulatory and enforcement situations; states, industries, and other interested parties petitioned EPA to reconsider many values based on newer data and analysis. Unfortunately, EPA had few dedicated resources for such reconsiderations,[5] and as a result, EPA's polite letters of reply were often followed by years of EPA inactivity.

Due to this intense scrutiny and the receipt of resources in the latter 1990s, EPA management began a process of IRIS consolidation. One of the casualties of this consolidation was the abandonment of the successful work groups, and the dwindling of collaborative spirit among agency offices soon followed. Several reorganizations of the IRIS process have been proposed since the late 1990s, the latest is under discussion today.

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[2] Dourson M. and J. Patterson. 2004. The Integrated Risk Information System: Challenges and Opportunities. Risk Policy Report. 11(5): 29-31.

[3] "Safe" doses within EPA go by the name of Reference Dose or (RfD) for noncancer toxicity oral exposures, Reference Concentration (RfC) for noncancer toxicity inhalation exposures, or Oral Slope Factors (OSF) for cancer toxicity oral exposures or Inhalation Unit Risk for cancer inhalation exposures.

[4] The RfD/RfC work group for noncancer toxicity, and the Carcinogen Risk Assessment Verification Endeavor (CRAVE) work group for cancer toxicity.

[5] In the early 1990s, 75 requests for reconsideration were pending. Each request was estimated to require the use an average of $10,000 in extramural funds and 0.1 FTE, or total funds of $750,000 and 7.5 FTE. In contrast, EPA had a total of 0.3 FTE in dedicated resources and no extramural funds (M. Dourson, personal recollections).

**But IRIS as a repository representing the best Agency safe doses has been lost.**

Fully one quarter of all IRIS values do not reflect the latest EPA safe doses.[6] In particular, the Office of Pesticide Programs (OPP) of EPA has developed or revised risk values based on the most recent available data for numerous substances, yet these newer values are not available on IRIS. Developing a process that provides for timely development of risk values, while allowing for full engagement by representatives from the relevant program offices, will allow IRIS to resume its former place as the comprehensive site for EPA risk values.

**2009 IRIS Process**

The 2009 IRIS process has the advantages of a tightened time frame and clearer entry points for deliberations, and will serve well for many of the chemicals assessed within the program that have limited scientific issues and environmental impact (e.g., a chemical is found at only a few Superfund sites). However, the proposed 2009 process will not work for chemicals with major scientific issues and environmental impact (e.g., dioxin) without a significant increase in the timeline, as EPA acknowledges. In such cases, EPA's process must:

- Allow time in the schedule when key studies are ongoing, planned, or, under development; for example, we now have much better knowledge of perchlorate's toxicity due to over 5 million dollars of research since 1997; this knowledge has lead to a more credible safe dose.
- Ensure that the public listening session is directly tied to the external peer review, and that peer reviewers are present or aware of the points raised.
- Define criteria for use of EPA's Science Advisory Board or the NAS reviews; also, these panels need to include a sufficient number of erudite risk assessment scientists, and preferably be chaired by one of them.

More importantly, EPA's IRIS staff needs to listen.

The single, most intense frustration on the IRIS process, made by many erudite scientists, both inside and outside EPA, is that EPA's IRIS staff will not listen to, or is not capable of understanding, their scientific comments. Several of these folks have told me that they see no point in further research on mode of action (MOA) because it will not be fully, or even partially, considered by EPA IRIS staff. This is particularly worrisome, since EPA's well-written cancer risk assessment guidelines[7] emphasizes MOA understanding in cancer assessments.

The process for resolving scientific disagreements within the agency and between EPA and other agencies is not clear in the current reorganized process. Are key decisions made by consensus, or will one scientist have the final say? Most scientists have a bias one way or

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[6] See EPA IRIS list of substances and focus on files with OPP Reregistration documentation at www.epa.gov/iris.

[7] U.S. Environmental Protection Agency. 2005. Guidelines for carcinogen risk assessment. Washington D.C. EPA/630/P-03/001B.

another (for example, as a toxicologist, I am biased when reviewing epidemiology studies in one direction). Thus, if a decision is made only by one scientist then it will likely be bias in one direction. It is only in the collective balancing of biases that the best science can be brought forward, much like the intersection of multiple events in a Venn diagram.

In contrast, the resolution of disagreements in the EPA 2008 IRIS reorganization seemed more clear with a very deliberative process for chemicals of high impact to environmental protection. For example, the safe dose for perchlorate was eventually determined by a panel of scientists from the National Academy of Sciences to be 25 times higher than what EPA proposed. But this panel only came about after a more deliberative process involving several federal agencies, and several years of intense work, including numerous research studies, similar to what the 2008 IRIS reorganization suggested.

**Do reorganizations matter?**

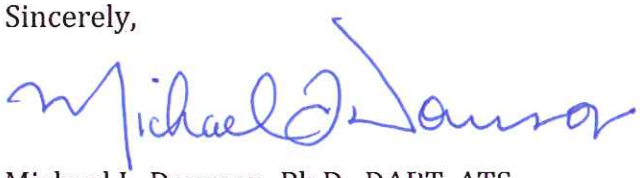
Perhaps more important than any reorganization, however, is the incorporation of flexibility in the overall process based on the determination of working relationships among all participants. In the early days of IRIS, the EPA program and research offices communicated poorly. Forcing discussions among EPA offices soon fostered a scientific, collaborative spirit, which not only built IRIS to 500 chemicals in 5 years but also trained younger staff to be better risk assessment scientists. A key aspect of this process was that the scientists from different offices discussed the assessments and reached resolution on key recurring issues. This collaboration also assisted the development of EPA-wide risk assessment guidelines and research to improve the basis of risk assessments.

While the 2009 process, suitably amended, will provide opportunities for EPA and other scientific agencies and outside parties to discuss scientific issues, it does not appear to provide similar opportunities for discussion within the EPA among different offices. Direct communication and collaboration amongst EPA staff is also essential to insure that the best science is incorporated into the IRIS assessments. The fact that the current IRIS process is not looked upon favorably by many EPA staff attests to this failure within EPA to communicate.

Scientific collaboration with all interested parties, could propel EPA's IRIS process, and the science and practice of risk assessment, forward to meet the needs of the 21st century. I strongly encourage, without reservation, such a collaborative spirit; for it is only in our collective efforts that we will best protect the public's health.

Nothing less should be expected of us.

Sincerely,



Michael L. Dourson, Ph.D., DABT, ATS
President
Toxicology Excellence for Risk Assessment (*TERA*)[8]

[8] Toxicology Excellence for Risk Assessment (*TERA*) is a non-profit, 501(c)(3) corporation that develops partnerships among government, industry and other interested groups to address risk assessments of high visibility (such as formaldehyde, perchlorate, and soluble nickel) and cooperative ventures such as the Voluntary Children's Chemical Exposure Program (VCCEP), the International Toxicity Estimates for Risk (*ITER*) database, the Risk Information Exchange (RiskIE) database, and the Alliance for Risk Assessment (*ARA*). *TERA's* funding sources are primarily government agencies (such as EPA, NIOSH, FDA, Health Canada, and U.S. States---at 67% in 2008). *TERA* also accepts funding from DoD and industry, if the sponsors accept its conditions of publication.

See also http://toxnet.nlm.nih.gov/ for *ITER*, and http://www.allianceforrisk.org/ for RiskIE and the *ARA*.

# *TERA* Statement of Purpose

Toxicology Excellence for Risk Assessment (***TERA***) is a non-profit, 501(c)(3) corporation organized for scientific and educational purposes. Our mission is to protect public health by developing and communicating risk assessment information, improving risk methods through research, and educating the public on risk assessment issues. Some specific activities of ***TERA*** are listed below.

- Establish high-quality risk assessment values based on the latest scientific data and methods through the **Verifiable Estimates for Risk Assessment** (***VERA***) program
- Provide a unique side-by-side comparison of hazard values, information and dose response from organizations and independent parties worldwide through the **International Toxicity Estimates for Risk** (***ITER***) Database
- Conduct **research** to improve the underlying methods for human and ecological risk assessment
- **Peer Review and Consultation** of risk information, methods and study designs through an independent and public process
- **Educate** diverse groups on risk assessment issues, through training courses, scientific support and the State Hazard Evaluation Lending Program (**State HELP**)
- Improve the practice of **risk assessment** through independent and objective guidance and advice

***TERA*** is a non-profit corporation organized under section 1702.01 of the Ohio Revised Code, and is classified as a **501(c)(3) organization** under the Internal Revenue Service Code. Corporations, companies, associations, individuals and foundations may support the work of ***TERA*** through tax-deductible contributions.

# Committee on Science and Technology
# U.S. House of Representatives

## Witness Financial Disclosure Form

Please complete this form to the best of your ability, and return it to the Committee on Science and Technology at least 48 hours prior to the hearing at which you will testify.

Under Committee Rules, you are required to disclose both the source and amount of any financial interest. However, you need only disclose financial interests relevant to the subject matter of your testimony or the subject matter of the hearing at which you will testify. If you need additional space, please continue your responses on a separate sheet of paper.

**Name:** Michael Leonard Dourson, Ph.D, DABT, ATS

**Relevant Government or Non-Government Research Grants:**

I have none.

**Relevant Government Contracts with You or Your Employer:**

Please see attach list.

**Stock or Stock Options in Relevant Publicly Traded or Privately Held Companies*:**

I and my better half do not own any stocks or options.

**Payment or Compensation From Relevant Government or Non-Government Entity:**

I am remunerated only by TERA.

**Other:** None.

**Signature:** Michael L Dourson **Date:** 6.8.9

*Individual holdings in managed accounts, such as retirement accounts, need not be disclosed.

Creator

# TERA COI & Project Tables

Project Entry COI Project Database

Project Database

## Project Database * More Actions ▼

Add Bulk Edit Duplicate Delete Search Filter : -- -- -- -- All -- -- 1 - 29 of 29 100 per page

| | Project Description | Chemical | Sponsor | Sponsor Contact | Dollar Value | Begin Date | Completion Date | TERA Lead | Written Contract Number | Work Assignm |
|---|---|---|---|---|---|---|---|---|---|---|
| | Contains | Contains | Contains | Contains | Contains | Is | Is | Contains | Contains | Contains |
| | IRIS | | | | | | | | | |
| Edit \| View | Develop IRIS Toxicology Review and Summary Sheets for triallate | Triallate (2303-17-5) | Tetrahedron, Inc. | Waqi Alam | $5,050 | 01-Nov-~~2008~~ 1998 | | Maier | Subcontract Agreement | |
| Edit \| View | Participate on peer review panel for noncancer IRIS assessment of benzene | Benzene | AIBS (American Institute of Biological Sciences) | Noel Eldridge | $1,920 | 18-Sep-1998 | | Haber | letter | |
| Edit \| View | IRIS Cover Sheet for Soluble Nickel Salts & Tox. Review Profile Doc | Soluble Nickel Salts | Science Applications Int. Corp. | Barbara Chinn | | | | Haber | W.A. 3-124 | |
| Edit \| View | Expert peer review of the Acetaldehyde IRIS Doc. | Acetaldehyde (75-07-0) | Versar | David Bottimore | | 01-Feb-2000 | | Dourson | | |
| Edit \| View | IRIS human health assessment of benzo[a]pyrene | Benzo[a]pyrene | Oak Ridge Associated Universities | | $45870 $1000 | | | Maier | P.O. 11-8013 P.O. 11-8013-Mod 1 | |
| Edit \| View | Review Vinyl chloride IRIS file | Vinyl chloride (75-01-4) | SRC | Pat McGinnis | $4,680 | 01-Jun-1997 | | Dourson | Subcontract agreement F0187/SC14 | |
| Edit \| View | Support for Evaluation of IRIS -Evaluation of the IRIS Pilot Program. Interviewed participants and prepared report. | | US EPA –ORD | Amy Mills/ | $17,563 | 01-Feb-1997 | 30-Aug-1997 | | 7W-0454-NASA | |
| Edit \| View | Developed an IRIS toxicological support document for soluble nickel salts, including RfD, RfC, and oral and inhalation cancer assessments; jointly sponsored by U.S. EPA, Health Canada and the MFASC (See also Science Applications Int. Corp) | Nickel (soluble salts) | Metal Finishing Assoc (see also Health Canada, SAIC and U.S. EPA) | M. Dean High | $90,000 | 01-Jan-1998 | 30-Jun-1998 | Haber | Agreement for Consulting services | |
| Edit \| View | In a project jointly sponsored by U.S. EPA, Health Canada and the MFASC, developed an IRIS toxicological support document for soluble nickel salts. | Nickel (7440-02-0) | U.S. EPA (See also SAIC, Health Canada and MFSAC) | Anthony Zoetis/ | 35,300 | 01-Jan-1998 | 30-Jul-1998 | Haber | Subcontract 4500001775 | |
| Edit \| View | In a project jointly sponsored by U.S. EPA, Health Canada and the MFASC, developed an IRIS toxicological support document for soluble nickel salts. This document evaluated the epidemiological and toxicological data to assess cancer and noncancer toxicity. TERA developed an RfD and RfC and completed a cancer assessment following the 1996 and 1986 USEPA cancer guidelines | Nickel (7440-02-0) | Science Applications Int. Corp. (See also Health Canada, U.S. EPA and MFASC) | Anthony Zoetis | 35,300 | 01-Jan-1998 | 30-Jul-1998 | | Subcontract 4500001775 | |
| Edit \| View | Preparation and | Acrylonitrile (107-13-1) | ACN Group | Jack Murray | $40,460 | 06-Jun-1996 | 01-Aug-1998 | | | |



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|---|---|---|---|---|---|---|---|---|---|
| | presentation of ACN file for ITER review; preparation of final document; preparation of IRIS file for EPA submission; preparation of SOT poster; preparation of manuscript | | | | | | | | |
| Edit \| View | IRIS Assessment of the drinking water disinfectant byproducts: Bromate, chlorine dioxide and chloride | Bromate (15541-45-4); chlorine dioxide (10049-04-4)? (SRC was sub) | Science Applications Int. Corp./EPA | Rosemary Gustafson | $28675 ($8488 was bromate) | 01-May-1998 | 30-Sep-1998 | Strawson | Subcontract 4400002793 EPA contract 68-C7-0011 |
| Edit \| View | Reviewed Info prepared for USEPA on styrene toxicity and risk assessment; attend 1-day IRIS Subgroup on styrene | Styrene (100-42-5) | SIRC | Betsy Shirley | $2,877 | 01-May-1999 | 30-Aug-1999 | | Gentlepersons agreement |
| Edit \| View | Development of IRIS toxicological support document for phenol, including RfC, RfD, and cancer assessment | Phenol (108-95-2) | US EPA-OSW | Monica Barron | $13,000 $17,000 | 01-May-1999 | 30-Jan-2000 | Haber | PO 9W-1764-NNSX (RfC) PO 9W-1756-NNSX (RfD + cancer) |
| Edit \| View | IRIS assessment of bromate- prepare revisions in response to EPA comments | Bromate (15541-45-4) | Science Applications Int. Corp./EPA contract 68-C7-0011 W.A. 2-43 | Christina Hudson, WAM | $5,400 | 01-Apr-2000 | 30-Jun-2000 | Strawson | 68-C7-0011, WA 2-43 |
| Edit \| View | Peer Review of EPA's IRIS Summary Sheets and Toxicological Review of Quinoline | Quinoline (91-22-5) | Versar/EPA | David Bottimore | $500 | 01-Aug-2000 | 30-Sep-2000 | | Contract 68-C-98-238, Task Order 17 |
| Edit \| View | Complete IRIS Assessment of Bromate | Bromate (15541-45-4) | Science Applications Int. Corp./EPA contract 68-C7-0011 W.A. 3-43 | Ambika Bathija/WAM (OW) | $2,450 | 01-Nov-2000 | 31-Mar-2001 | | 68-C7-0011 3/1/1943 |
| Edit \| View | Evaluate assessments by peer reviewers and make necessary changes to EPA's tox. rev doc (IRIS) | Phenol (108-95-2) | US EPA-OSW | Monica Baron | $25,000 | 01-Jun-2001 | 30-Jul-2001 | Haber | PO 1W-0104-NANA |
| Edit \| View | Versar IRIS Acrolein Review | Acrolein (107-02-8) | Versar | David Bottimore | $600 | 18-Feb-2002 | 15-Mar-2002 | | Contract 4902.065 |
| Edit \| View | In a project jointly sponsored by U.S. EPA, Health Canada and the MFASC, developed an IRIS toxicological support document for soluble nickel salts. This document evaluated the epidemiological and toxicological data to assess cancer and noncancer toxicity. TERA developed an RfD and RfC and completed a cancer assessment following the 1996 and 1986 USEPA cancer guidelines | Nickel soluble salts | Health Canada | Bette Meek | $6,582 | 11-Oct-2002 | 31-Oct-2002 | Dourson | Contract H4045-8SB231 |
| Edit \| View | Provide scientific written peer review of the draft toxicological review and IRIS summary for ethylene dibromide | Ethylene dibromide | Versar | | $850 | 05-Nov-2002 | 27-Nov-2002 | | W.A. 77 |
| Edit \| View | Peer review of IRIS document on dichlorobenzenes (ORAU-DCB) | dichlorobenzenes | Oak Ridge National Laboratory | Rachel Smith | $2,975 | 01-Dec-2003 | 31-Mar-2004 | Haber | P.O. 7-8431, Task No. 702170.0013.06 |
| Edit \| View | Review of Zinc IRIS | Zinc | Versar/U.S. EPA | David Bottimore | $1,800 | 01-Feb-2004 | 30-Apr-2004 | Haber | Contract 68-C-02-061 |
| Edit \| View | Prepare and revise IRIS Toxicological review and IRIS rsummary on manganese. ("Only literature search was completed for this project, due to EPA internal changes.") | | RTI (Research Triangle Institute) | Steve Beaulieu | $74,615 | 01-Dec-2003 | 30-Jun-2004 | Haber | 5-92U-8860 and Prime contract # 68-W-03-042 |
| Edit \| View | Peer Review for Toxicological Review and IRIS Summary for Mirex | Mirex | Versar/U.S. EPA | Dave Bottimore | $3,475 | 01-Jun-2004 | 30-Jun-2004 | Dourson | EPA 68-C-02-061, Versar Job #11.0667.1000.031, Task order 31 |
| Edit \| View | Provide services as required and requested by | naphthalene | Oak Ridge Associated Universities/ORISE | Wanda Olson Brian Herndon | Up to $100,000 $4000 | 01-Jun-2004 | 30-Aug-2004 | Maier | P.O. 7-8919C |



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| | ORAU Releases for Literature Search and Preparation of IRIS documents for chemical substances Chair a peer review meeting for naphthalene as part of the IRIS process | | | | | | | | |
| Edit \| View | Draft IRIS tox review of decabromodiphenyl ether | DBDE (Decabromodiphenyl ether 1163-19-5) | U.S. EPA-OW/OST/HECD | J. Donohue/ Hend Galal-Gorchev | $25,940 | 01-Jun-2004 | 31-Dec-2004 | Zhao | P.O. 4W-1550-NATX |
| Edit \| View | Research how state agencies prioritize chemicals for assessment; inquire regarding economic and public health issues and metrics; develop a white paper comparing these processes with EPA's IRIS and address the possible 2 new criteria: economic and public health issues | IRIS | Versar/U.S. EPA | David Bottimore | $2,500 | 18-Jul-2005 | 29-Aug-2005 | Dourson | Versar Job No. 110667.1000.015 EPA #68-C-02-061; task order #015 P.O. 003151 |
| Edit \| View | Develop Tox. Review for cyanide using the Drinking Water Criteria document previously prepared, and develop a summary of the toxicity, speciation and environmental stabilities of all cyanide compounds including the metallo-cyanides. IRIS Toxicological Review and Summary of Cyanide IRIS Toxicological Review and Summary of Cyanide | Cyanide | ICF-IRIS | Bonnie Stern | $38548 $8574 $12320 $9940 | 01-Dec-2002 | 01-Nov-2006 | Haber | EPA Contract 68-C-02-009, WA 1-29 EPA Contract 68-C-02-009, W.A. 3-29 EPA Contract 68-C-02-009, W.A. 4-29 |

* All Times are in CDT

End



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