



**Emergency Management Issues
Special Interest Group**

**Subcommittee on Consequence
Assessment and Protective Actions**

2009 ANNUAL MEETING

**San Francisco, CA
May 7, 2009**

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EXECUTIVE SUMMARY

The Department of Energy (DOE) Subcommittee on Consequence Assessment and Protective Actions (SCAPA) convened its annual meeting at the Mark Hopkins Hotel in San Francisco, California, on Thursday, May 7, 2009, in conjunction with the Emergency Management Issues Special Interest Group (EMI SIG) meeting. Almost fifty individuals from the public and private sectors participated in this year's SCAPA meeting, although not all indicated their attendance, nor stayed the entire day.

The primary purpose of the annual SCAPA meeting is to provide a forum for the almost 200 SCAPA participants to review its accomplishments, products, and projects and to discuss its present and future missions. A total of 20 technical presentations of interest to the membership, including those from the five (5) active SCAPA Working Groups and the National Atmospheric Release Advisory Capability User Group, were delivered.

Dave Freshwater, NA-41 SCAPA Federal Official, welcomed everyone and provided a brief overview of SCAPA and its future vision.

Carl Mazzola reviewed the important points that were discussed and decisions that were made during the 2008 Reston (Virginia) SCAPA Meeting and briefly discussed the report that documented the highlights of the meeting. The 2008 SCAPA Meeting Report is posted on the SCAPA web site.

Carl also mentioned that the fourth SCAPA Annual Report was developed for the May 2008–April 2009 period, which included the activities of 78 individuals associated with the program. Cliff Glantz had earlier presented the highlights of that report to the EMI SIG Steering Committee and it was well-received. Carl then reviewed the status of the remaining four open action items and their proposed disposition.

Additional presentations during the rest of the day on SCAPA working group (WG) addressed activities and other topics of interest to the SCAPA membership. Speakers included guests from the State of California and Lawrence Berkeley National Laboratory (LBNL).

The five SCAPA WGs will continue their work in the coming year and each will report on its activities at the next SCAPA meeting. That meeting is scheduled for May 6, 2010, in conjunction with the next EMI SIG meeting. The location of that meeting will be determined by the EMI SIG Steering Committee.

1.0 OVERVIEW AND WELCOME FROM NA-41

A meeting of SCAPA convened in the Mark Hopkins Hotel, San Francisco, California, at 8:00 a.m. on Thursday, May 7, 2009. This meeting was held to present and discuss new DOE Office of Emergency Management (OEM) (i.e., NA-41) and SCAPA initiatives with its membership and associates, and to share the progress and results of recent SCAPA work products and accomplishments.

Twenty (20) technical presentations were made to SCAPA members and its associates. The agenda and the meeting logistics are located in Appendix A.

Dave Freshwater, NA-41 SCAPA Federal Official, welcomed all of the attendees and briefly discussed the SCAPA program and its future vision.

The following table identifies the forty-one (41) individuals who signed the attendance roster for the meeting and their respective company affiliations (Additional DOE and EMI SIG members were in attendance for portions of the meeting but did not sign the roster). All individuals were given a brief opportunity to introduce themselves, discuss their background, and relate the role they play in the SCAPA program.

Table 1-1: SCAPA 2009 Meeting attendees (from the attendance roster)

Last	First	Company	E-mail Address
Alai	Maureen	Lawrence Livermore National Lab (LLNL), National Atmospheric Release Advisory Capability (NARAC)	alai1@llnl.gov
Armstrong	Dennis	Washington Safety Management Solutions (WSMS)-Aiken	denny.armstrong@wsms.com
Baumann	Brian	Fluor-Hanford	brian_l_baumann@rl.gov
Bond	Jayne-Anne	Advanced Technology Laboratories (ATL) International	jbol@atlintl.com
Ciolek	John	Alpha-TRAC Incorporated	jciolek@alphatrac.com
Cohen	Dorothy	Oak Ridge Institute for Science and Education (ORISE)	dorothy.cohen@orise.orau.gov
Craig	Doug	ATL International	cragdk@earthlink.net
Davis	Wayne	Washington Safety Management Solutions (WSMS)-Aiken	Wayne.davis@wsms.com
DuTeaux	Shelley	State of California	sduteaux@arb.ca.gov
Freshwater	Dave	DOE/NA-41	David.freshwater@nnsa.doe.gov
Gibeault	Gerald	Battelle Energy Alliance (BEA)-Idaho Falls	gerald.gibeault@inl.gov
Glantz	Cliff	Pacific Northwest National Laboratory (PNNL)	Cliff.glantz@pnl.gov
Hickey	Eva	(PNNL)	Eva.hickey@pnl.gov
Homann	Steve	LLNL NARAC	homann1@llnl.gov

Last	First	Company	E-mail Address
Hunter	Chuck	Savannah River National Laboratory (SRNL)	Chuck.hunter@srnl.doe.gov
Jamison	Jim	Science Applications International Corporation (SAIC)	Jamisonj@saic.com
Jivelekas	Aprill	WSMS-Mid-America	aprill.jivelekas@wsms.com
Johnson	Deborah	DOE/HS-12	deborah.a.johnson@hq.doe.gov
Kabela	Erik	SRNL	Erik.kabela@srnl.doe.gov
Long	Jeff	Oak Ridge National Laboratory (ORNL)	longja@ornl.gov
Lorenzetti	David	Lawrence Berkeley National Laboratory (LBNL)	dmlorenzetti@lbl.gov
Lu	Po-Yung	ORNL	lupy@ornl.gov
Marsick	Daniel	DOE/HS-31	dan.marsick@hq.doe.gov
Martin	Greg	SAIC	martingr@saic.gov
Mazzola	Carl	Shaw Environmental Incorporated (SEI)	Carl.mazzola@shawgrp.com
McDonnell	Mister	National Security Technologies (NSTec)	mcdonnmt@nv.doe.gov
McDougall	Vernon	ATL International	vmcdougall@atlintl.com
Nasstrom	John	NARAC	John.nasstrom@llnl.gov
Petrocchi	Rocky	URS, Washington Group International,	rocky.petrocchi@wgint.com
Possidente	Bill	NSTec	possidw@nv.doe.gov
Powers	Jim	DOE/NA-41	jim.powers@nnsa.doe.gov
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Rives	Chuck	Pantex Plant	crives@pantex.com
Roberto	Frank	Idaho National Laboratory (INL)	Francisco.roberto@inl.gov
Rodi	Diane	Argonne National Laboratory (ANL)	drodi@anl.gov
Thomas	Richard	Intercet	rthomas@intercet.com
Thornton	Melissa	WSMS-Mid-America	melissa.thornton@wsms.com
Tuccinardi	Tom	ATL International	ttuccinardi@adelphia.net
Wolfram	Michele	WSMS-Mid-America)	Michele.wolfram@wsms.com
Young	Ken	LLNL	young11@llnl.gov
Yu	Xiao-Ying	PNNL	xiaoying.yu@pnl.gov

2.0 REPORTS ON SCAPA PROGRAM INITIATIVES AND OTHER MATTERS OF INTEREST

2.1 SCAPA 2008 Annual Report (Carl Mazzola)

Carl Mazzola reviewed discussions and decisions made during the May 2008 SCAPA Meeting in Reston, Virginia. This meeting, another very successful and productive encounter, was attended by fifty (50) professionals. The 2008 SCAPA Meeting Report and the PowerPoint presentations from that meeting are posted on the SCAPA web page.

At the 2008 SCAPA Meeting no action items (AIs) were opened. During previous meetings (San Francisco, California (May 2000); Las Vegas, Nevada (October 2000); Augusta, Georgia (April 2001); Richland, Washington (November 2001); Charleston, South Carolina (May 2002); Las Vegas, Nevada (May 2003); Washington, DC (May 2004); New Orleans, Louisiana (May 2005); Las Vegas, Nevada (May 2006); and Reston, Virginia (May 2007)) several AIs were opened. Over the past year, due to new efficiencies in the SCAPA program, many of these AIs were brought to closure.

During the 2008 SCAPA Meeting, multiple presentations were made by members of the Chemical Exposures Working Group (CEWG), Chemical Mixtures Working Group (CMWG), Consequence Assessment Modeling Working Group (CAMWG), Biosafety Working Group (BWG), and Source Term Working Group (STWG).

Carl then reviewed the SCAPA achievements from May 2008 –April 2009. These include the presentation of the SCAPA 2008 Annual Report to the EMI SIG Steering Committee, the conduct of the 2008 SCAPA Meeting and the facilitation of five teleconferences in which 78 DOE/NNSA professionals participated.

Carl discussed the accomplishments during that period, which include several web page postings and the closure of two AIs; leaving only four open AIs, as follows:

- 05-03 (CEWG/CMWG): SQA Plan for PAC-TEEL/CMM Software.
- 06-01 (CAMWG): Central Registry SQA Toolbox/SCAPA Toolbox Implementation.
- 06-06 (BWG): Transport & Dispersion of Biological Agents/Toxins for Biosafety EMG.
- 07-14 (CMWG): HCN Technical Paper.

Carl's presentation is accessible in Appendix B.

2.2 Source Term Working Group Report (Michele Wolfgram)

Michele Wolfgram presented the Source Term Working Group (STWG) Report.

Michele indicated that STWG is composed of 23 members representing 16 different DOE/NNSA sites and organizations. In addition to meetings and conference calls, the STWG communicates through its listserv.

Michele stated that bimonthly teleconferences are now conducted regularly; the first teleconference was held on December 16, 2008. Nine attendees participated in that teleconference to discuss various source-term-related technical issues. The second teleconference was held on March 19, 2009, with 17 attendees. Teleconferences are scheduled every second Wednesday of odd months with the exception of May.

Michele presented some of the items that the STWG is addressing. The first area is the use of the DOE Transuranic (TRU) waste standard in Emergency Preparedness Hazards Assessments (EPHAs). A White Paper is in review and a status presentation was given at the STWG meeting. The second area is the analysis of mixed waste where the STWG is investigating this in conjunction with the Hazards Assessment Subcommittee (HASubC). A task group is being formed to work on this matter.

Michele shared some new items that were suggested at the STWG meeting. These include criticality source terms, characterizing ball-milled Pu-238, analyzing respirable versus non-respirable source terms, developing generic Leak Protection Factors (LPFs) for ordinary building types, and the use of DE Curies. Michele closed her talk by presenting the STWG path forward over the next several years.

Michele's presentation is accessible in Appendix C.

2.3 Chemical Exposure Working Group and TAG Briefing (Tom Tuccinardi)

Tom Tuccinardi provided a brief report on the activities and program direction of the CEWG, CMWG, and TAG¹. Over the past year, these groups addressed whether to withdraw the PAC/TEEL for ricin and the development of a protocol for PAC/TEELs for biotoxins.

Tom also indicated that the TAG was also involved in the resolution of various HCN development issues. Tom's presentation is accessible in Appendix D.

2.4 A Time Switch for TEELS: A Jump from 15 to 60 Minutes (Jayne-Anne Bond; Tom Tuccinardi)

Jayne-Anne Bond and Tom Tuccinardi jointly presented, "The Future Calls. Is it Time for an Upgrade in the TEEL Development Process?"

Jayne-Anne began the talk with a presentation of the history of the TEELs. She mentioned that in 1991, the Savannah River Site (SRS) developed exposure limits for approximately 77 chemicals. Since then there are 23 revisions of that work and the number of chemicals encompassed is almost 3,400. During this time, the development process changed from Excel spreadsheet-based to computer-based calculations. With the addition of Acute Exposure Guideline Levels (AEGl) and

¹ Although the TAG is an NA-41 working group that is not part of SCAPA; guidance provided by the TAG impacts the work of several SCAPA working groups and is therefore reported at SCAPA meetings.

Emergency Response Planning Guidelines (ERPGs), the database is now known as the Protective Action Criteria (PAC) database.

PACs are identified in DOE Order 151.1C in order of preference: (1) Acute Emergency Exposure Guideline Levels (AEGs) promulgated by the Environmental Protection Agency (EPA); (2) Emergency Response Planning Guidelines (ERPGs) published by the American Industrial Hygiene Association (AIHA); and, (3) Temporary Emergency Exposure Limits (TEELs) developed by DOE/NA-41. Most of the 3,400 chemicals in the database have TEELs, not AEGs or ERPGs.

Jayne-Anne stated that more people and agencies from outside the DOE complex are taking an interest in TEELs and their development. This includes both national and international groups, governments, and stakeholders. Since they fill a knowledge gap, the use of TEELs and PACs has probably expanded well-beyond its original emergency management use.

Jayne-Anne presented the TEEL methodology and indicated that changes have accumulated for a decade and a half. Recently, questions were raised about the use of the 15-minute exposure period in the TEEL development. Questions like this one lead others to ask if it is time to re-evaluate the entire methodology to determine if it is still relevant as it is presently structured. One of the proposed modifications is to change an automatic calculation that adjusts some toxicity data to a 60-minute exposure. If that change is implemented, it will cause a considerable number of the TEEL values to decrease by a factor of 2 to 4.

Jayne-Anne stated that in October 2008, the TAG met and recommended that TEELs for biological toxins be developed using a different protocol. Currently there are 10 biological toxins with PAC values and an additional 20 are requested. The TEEL values for one biological toxin in the Revision 24 Workbook are presently under review. Jayne-Anne presented a list of 15 biotoxins for which TEELs are requested. The list includes cholera toxin, microcystin, shigatoxin, staphylococcal enterotoxins, tetanus toxin and volkensin.

She shared the proposed TEEL methodology for biotoxins, which includes the use of primary literature citations. RTECS will be used as a resource to find articles and citations; also journals that specialize in infectious disease research will be consulted.

With regard to a big picture evaluation, NA-41 is tasking an outside review team to examine the steps in the current TEEL methodology and provide recommendations. The team will be composed of a minimum of two toxicologists who are independent of the SCAPA TEEL Development Team.

Jayne-Anne closed the talk by stating that automatic or default methodologies will be examined which may include using processes similar to those used in ERPG and AEGL development. One potential change is the development of a web-based central location of the PAC workbook with restricted access.

Jayne-Anne's and Tom's presentation is accessible in Appendix E.

2.5 PAC/TEEL Database Status and Plans (Vern McDougall)

Vern McDougall presented the online data resources of the PACs and listed the top 10 countries and the top 10 states that have used the online TEEL database. Vern also listed the chemicals of most interest to the user community. These included chlorine, ammonia, benzyl chloride, activated charcoal, hydrogen fluoride, formaldehyde, nitric acid, 2-hexanone and benzene.

Vern shared some of the technical issues that are currently being considered. These include PACs for biotoxins, and the time-basis for TEELs changing from 15 minutes to 60 minutes.

Vern stated that in the future, there is a proposal to convert the Excel PAC/TEEL workbook to a web-enabled, relational database application and to query end users about their use of PAC/TEEL data to learn how we can enhance its utility.

Vern's presentation is accessible in Appendix F.

2.6 PAC/TEEL Dataset: Technical Development and QA Update (Doug Craig; Po-Yung Lu)

Doug Craig and Po-Yung Lu reported on the PAC/TEEL revisions being developed by the CEWG and gave an update on the Quality Assurance (QA) efforts.

Doug indicated that the changes for the Revision 25 PAC/TEELs include a date that the PAC/TEELs were first derived for all chemicals, as well as the National Fire Protection Association (NFPA) Health Hazard Rating (HHR) or equivalent, if available. In addition, the last column of Table 2 will be changed to "Comments" to provide information relevant to PAC/TEEL derivation. A new column will be added to Table 3 to provide information on changes in PAC/TEEL values since the previous revision.

Doug then shared some of the contemplated changes, stating that many of the TEEL values in the PAC dataset were developed using a TEEL-derivation methodology that focused on a comparison of concentration-limit and toxicity data with ERPG values.

However, starting with Revision 21, the TEEL development methodology changed so that AEGLs became the first choice for deriving PAC values. Therefore, it is logical to update TEEL data to reflect the new methodology. However, this requires a detailed analysis of TEEL and AEGL values.

Doug also indicated that soon, the time basis for inhalation toxicity data may change from 15 to 60 minutes. The principal difference is to change the factors applied to reduce toxicity data to TEELs.

Doug mentioned that the PAC/TEEL derivation methodology for Revision 25 is unchanged from what the 3,356 chemicals in Revision 24 are based on. Macro changes are minor, mainly implemented to automate formatting such as bolding of AEGL values and row height adjustments. Since most of the EPA non-screened chemicals are addressed, the few chemicals added in the Revision 25 effort are mainly for chemicals requested by Sandia National Laboratory (SNL).

Doug opined on the major changes anticipated for next revision. The concentration-limits/regulatory values of PAC database to 2008 data sources will be updated, as well as the toxicity data of the oldest group of chemicals in PACs. This task was approved in April 2008 and Tabitha Thompson, a graduate school intern, began work in May 2008 and completed the task in January 2009. Revision 25 (with updated PAC/TEELs) has a publication target date of June 30, 2009. Key references are the PACs Input Worksheet, DKC-08-0003, and TEELs for Chemicals: Methods and Practice, DOE-HDBK-1046-2008.

Doug closed the talk indicating that there is a selection of 2,298 relevant chemicals for further evaluation (i.e., chemicals having PEL-, TLV-, REL-, WEEL- or MAK-TWA, -STEL and -C, LOC or IDLH value, etc.), as these are concentration-based. Only 754 chemicals need to be updated.

Doug and Po-Yung's presentation is accessible in Appendix G.

2.7 AEGL and ERPG Development Update – A Quick Summary (Richard Thomas)

Richard Thomas discussed the status of AEGL and ERPG development and provided a summary on recent AEGL and Emergency Response Planning (ERP) Committee meetings.

Richard mentioned that the National Advisory Committee (NAC) met April 14–16, 2009, in Alexandria, Virginia, and will meet again in September 2009. The ERP Committee met March 19–20, 2009, in Baltimore, Maryland, and on June 11, 2009, will hold a teleconference.

Richard indicated that at the present time there are 38 chemicals with final AEGLs and 189 chemicals with interim AEGLs that compose the 227 chemicals with PAC/TEELs. There are also 17 chemicals with proposed AEGLs, 33 chemicals in holding pattern and 30 chemicals remain to be addressed before the EPA AEGL program ends. All of these values are posted on EPA Website: <http://www.epa.gov/oppt/aegl/>.

Richard stated that there are currently 138 ERPG values incorporated into 56 chemicals with PAC/TEELs. In 2008, 16 new and updated ERPGs were published. Originally the ERPG values were posted on the (no longer operational) AIHA Website, but currently are documented in AIHA's yearly handbook.

Richard's presentation is accessible in Appendix H.

2.8 Use of PAC/TEELs: A State Perspective (Shelly Du Teaux)

Shelly Du Teaux of the Emergency Response Team, Air Resources Board (ARB) for Chemical Releases in California gave a talk on TEELs in emergency preparedness and response in California. Shelly noted that suspected acts of chemical terrorism from 1975–2000 numbered 207 and that chemical spills so far in 2009 already number 3,396. Therefore, chemical emergency response is a very active area in California.

Shelly described the emergency preparedness activities of the State of California “Left of Boom,” or prior to an emergency event. She described the California Risk Management Plan (RMP) which includes Business Plans, Emergency Response Plans, Emergency Notification Requirements, Accidental Release Prevention, and an Accidental Release Program (i.e., CalARP). This program requires the knowledge of toxic endpoints and the PAC/TEELs prove very useful to the implementation of this State program.

Shelly shared the mission of the California Air Response Planning Alliance (CARPA), which has the following goals:

- Promote and facilitate preparedness, training, and coordination of public health issues that arise during major air releases.
- Better understanding of using air quality data and health-based action levels to make rapid decisions about health and safety during emergencies.

Shelly then discussed how the PAC/TEELs were used “Right of Boom” which is the emergency response.

In both cases, PAC/TEELs provide the State of California the needed consistency in its emergency preparedness and emergency response decision-making. The AEGLs are the preferred health-based standards for use in major air quality and chemical emergencies, but the State considers Protective Action Levels (PALs) depending on duration of exposure. Other standards (i.e., IDLH, ERPGs, TEELs, STELs) may be used depending on the circumstance.

Shelly's presentation is accessible in Appendix I.

2.9 Chemical Mixture Methodology Status and QA Program Report (Rocky Petrocchi, Xiao-Ying)

Rocky Petrocchi presented the CEWG activities which includes all work associated with the Chemical Mixture Methodology (CMM). He indicated that the CMM Workbook is published with the Health Code Numbers (HCNs) for 1,010 chemicals as developed to make them current with PAC/TEELs Revision 24. This work captures new chemicals from PAC/TEEL Revisions 20–24 and eliminates the large backlog. However, the work is not yet posted due to

unresolved biotoxin HCN issues which are scheduled for resolution during this EMI SIG meeting.

Rocky then presented a status on updating the CMM workbook for PAC/TEEL Revision 25 chemicals, which will include HCNs for approximately 20 new chemicals, new and revised PAC/TEELs in Revision 25, updated HCNs for some chemicals. These will be posted on the SCAPA website shortly after PAC/TEEL Revision 25 (i.e., July 2009).

Rocky then reported on the HCN Update Project which will update HCNs for “older” chemicals. This project is similar to the PAC/TEEL update project that Doug Craig discussed. About 2,350 chemicals from 1999–2008 need to be updated with the oldest addressed first. This project started in mid-February 2009 and about 70 have been updated (i.e., 3%) to date. The Team consists of a new DOE summer intern, Philip Bouslaugh from Washington State University (WSU), Donna Trott (a WSU graduate student), Xiao-Ying Yu, Jayne-Anne Bond and Rocky Petrocchi. The goal is to update 50% of the 2,350 remaining chemicals by December 2009 and to perform a detailed QA review of 10%–15% of the updated chemicals.

Rocky moved on to the CMM QA Project which will test each macro with a 30-chemical mixture, verify results including input and output and compare with previous results. In addition, there will be an independent test by a second professional. The goal of this project is to comply with the Software Quality Assurance (SQA) requirements of DOE Order 414.1C and DOE Guide 414.1–4.

Lastly, Xiao-Ying discussed the CMM research article which will provide the first CMM updates since the 1999 article by Craig et al., including advances in HCN development and CMM real-world applications. Candidate journals for this article include the Journal of Applied Toxicology and the Journal of Applied Occupational and Environmental Hygiene. The first draft of this research article is anticipated for September 2009 with submission to the selected journal by January 2010.

Rocky and Xiao-Ying’s presentations are accessible in Appendix J.

2.10 Emergency Preparedness Application of CMM (John Ciolek)

John Ciolek gave a presentation on using the SCAPA CMM for emergency response consequence assessment. The objective of the task is to project consequences, simulate the real source, and then run a dispersion model at multiple locations to compare the consequences against the criteria.

John presented an illustrative example of an instantaneous release 20 meters above ground level. The meteorological conditions were neutral stability at 6 meters/second wind speed for a release of 4 chemicals: (1) 85.0 kg chlorine; (2) 9.10 kg arsine; (3) 8.00 kg phosgene; and, (4) 1,000 kg ammonia. A straight-line Gaussian model was used.

John first examined the worst of the chemicals in the more conventional way and concluded there were no projected concentrations above the PAC. Then,

using the CMM surrogate source term and his simplified method, he concluded that the PAC was exceeded. This technique requires a single run of the dispersion model rather than four different runs and it works for all codes including complex-terrain Lagrangian three-dimensional mass-consistent models. This is because you can divide each source term by the PAC, and sum the ratios for use as a surrogate source term in any model.

John's presentation is accessible in Appendix K.

2.11 Use of CMM at the Hanford Site (Jim Jamison)

Jim Jamison presented an analysis of the chemical components of mixed waste using the CMM. He first discussed the background indicating that previous EPA analyses by the Nuclear Safety Analysis (NSA) group which had used source terms from Documented Safety Assessments (DSAs) and technical basis documents where radiological and non-radiological impacts were calculated for each scenario. The classification and emergency planning was then based on the greatest impact where the radiological source terms dominated.

Jim showed in his analysis that the sum-of-fractions (SOF) Hazard Index (HI) was used for chemical impacts, with the five-factor formula used for volumetric radiological source terms. For the chemical source terms, Jim used the concentration of each chemical divided by the applicable PAC value to establish a unitless fraction and the sum of the unitless fractions was made equivalent to the total SOF. Afterwards, the chemicals contributing to more than 95% of total SOF were then used in the consequence calculations. For the chemical source terms, the CMM was used to determine the amount released and the EPICODE chemical dispersion model was used to calculate concentrations. Lastly, concentrations at 100 meters downwind were entered in the CMM workbook input page.

Jim stated that the goal of the analysis was to downplay the significance of chemical calculations in the EPA since the tank waste is highly radioactive, and would not have been screened-in based on its chemical properties. Jim concluded that assigning the same HCNs to different constituents results in limiting $HI \sim SOF$. He then recommended that the analyst should not analyze materials that should be screened out.

Jim closed his talk with a quote from Freeman on Ptolemy's astronomy, "While his models were all flawed, in that his basic assumptions were wrong, the intellectual achievement was magnificent: extraordinary for the rigor of its mathematical arguments, for the range of data encompassed and the comprehensiveness of the results proposed." The point of the quote is that a rigorous evaluation with flawed assumptions results in a rigorously flawed result. It is of vital importance to ensure that the principles underlying the analysis represent sound reasoning.

Jim's presentation is accessible in Appendix L.

2.12 Biosafety Working Group Report (Frank Roberto, Diane Rodi, Dan Marsick)

Frank Roberto briefed the meeting attendees on the recently conducted Biosafety Working Group (BWG) meeting where more than 15 professionals attended. During that meeting, Frank reviewed the 2008 BWG accomplishments and provided a status of the BWG Action Items.

In addition to Frank's review, Diane Rodi presented a status of the work of the Federal Biosecurity Working Group. The DOE/NNSA biosurety and nanotechnology policy was presented by Dan Marsick, DOE/NNSA.

This presentation is accessible in Appendix M.

2.13 Federal Biosafety Working Group Report (Diane Rodi)

Diane Rodi presented the activities of the BWG that was established on January 9, 2009, by an Executive Order (EO) on "Strengthening the Biosecurity of the United States." The group is addressing issues in both the transportation and oversight and inspections areas.

Diane first discussed the chronology of the task force which has its roots in Congressional and Public Interest in higher-risk Biosafety Laboratories (i.e., BSL-3 and BSL-4) and in the proliferation of high containment facilities. The Task Force has five working groups (i.e., physical and facility, oversight and inspections, transportation, personnel security and reliability). A timeline, stages of analysis, and draft recommendations were presented for each working group. In order to conduct its work, each working group searched Federal databases for the security risk assessments conducted under the Select Agent Program.

Diane opined that the personnel security and reliability gap considerations are under discussion and a public consultation meeting will be conducted in the Washington (DC) area, May 13-14, 2009, with a final report due to President Obama by July 9, 2009.

Diane's presentation is accessible in Appendix N.

2.14 Nanotechnology and Biosurety Policies (Dan Marsick)

Dan Marsick provided an overview of the nanotechnology and biosurety policy at the Department of Energy.

Dan identified the Biosurety Executive Committee (BEC) which has representatives from NNSA-HQ, LLNL, LANL, DOE Office of Science, the Deputy Secretary's Office, HS (as a consultant), and other consultants, as necessary. The mission of this committee is to develop a directive which will leverage existing stakeholder knowledge, existing laws and codes, and knowledge of highly hazardous work for others. Once the draft is developed, DOE will obtain concurrences and publish the directive. Presently, this directive is in Departmental review and will then go through the RevCom process. All essential comments must be resolved before it can be issued.

Dan moved on to the DOE Notice on nanotechnology that was published on January 5, 2009. All notices have a one-year sunset. This notice addresses requirements for Federal laboratories in the Contractor Requirements Document (CRD) segment and must be added to all DOE/NNSA contracts.

Dan next presented the work on a policy for DOE research laboratories using select agents and toxins to protect BSL workers and the public. This policy involves both safety and security aspects. DOE needs a biosurety policy to oversee BSL-3 labs at NNSA sites, evaluate the costs of inappropriate design, establish a Work for Others (WFO) linkage, evaluate liability and risk, and provide for worker safety and training.

Dan reviewed early Federal biosurety efforts beginning with the “Antiterrorism and Effective Death Penalty Act of 1996,” which led to 42 CFR 72. In February 2001, an Inspector General (IG) Report was published followed in October 2001 by a Biosafety Notice (i.e., N 450.7). Finally, in December 2001, a new Biosurety Group was established. This group established a biosurety policy which indicated that there would be no BSL-4 facilities at DOE/NNSA sites; established added requirements for BSL-3 facilities, if needed; developed a long-term strategy; and identified the costs and liability in WFO projects.

Dan closed his discussion by indicating that DOE is pursuing a nanotechnology policy since it has critical interests in the nanotechnology area, and a major role in the federal research and development initiative. DOE user facilities provide state-of-the-art resources to the science and technology community via peer-reviewed allocation of instrument time, staff support, and collaboration.

Dan’s presentation is accessible in Appendix O.

2.15 Indoor Air Quality Modeling: CONTAM and COMIS (David Lorenzetti)

Dave Lorenzetti presented a talk on two indoor air quality multi-zone models (i.e., CONTAM, COMIS). For each model, he presented its strengths and weaknesses, how it is implemented and some sample applications.

Dave mentioned that in these models airflows are pressure-driven, largely by Heating Ventilation and Air Conditioning (HVAC) or by thermal effects. The pollutant disperses rapidly throughout building with mixing times within a room of approximately 1 to 10 minutes and within a ventilation zone of approximately 10 to 20 minutes. Full replacement of indoor air with outdoor air takes approximately 30 minutes to as long as 3 hours. Dave also indicated that mixing can be incomplete, especially in large or tall rooms. These models treat a building as a collection of zones, linked by flow paths which include doors, ducts, fans, and cracks; and the zones are instantaneously well-mixed. There are other transport mechanisms such as deposition and filtration which also must be accounted for in these models.

The more comprehensive codes involve CFD which solves the governing Navier-Stokes equations, and are not based on engineering correlations. These are expensive relative to set-up time, runtime, and verification and validation (V & V). Moreover, the modeling of a whole-building using CFD is not practical.

“Box” models which correlate the whole-building indoor-outdoor exchange are reasonably fast, can be tuned to match $\pm 20\%$. The correlations can approximate many uncertain effects, and there is a good level of detail that remains. However, there are several weaknesses including the well-mixed assumption, limits to steady airflows only, and they offer the temptation to “over-model” to unreasonable levels of detail.

Dave then moved onto the CONTAM code which is sponsored by the National Institute of Standards and Technology (NIST). This code has a nice graphical user interface (GUI) and some capabilities that COMIS lacks (i.e., transport delays, controls). There is no cost associated with this code as it can be downloaded for free. However, there is a difficulty in systematically exploring parameter space. The COMIS code is international and sponsored by LBNL. It has a strong European user base but no longer is supported by the United States. However, its input file format is easier to decipher than CONTAM.

Dave's presentation is accessible in Appendix P.

2.16 Consequence Assessment Modeling Working Group (Jeremy Rishel)

Jeremy Rishel presented the results of the recently conducted CAMWG meeting where more than 20 professionals attended. The working group reviewed the DOE/HS Central Registry toolbox codes and discussed safety software and safety-basis software. Present codes in the DOE/HS Central Registry toolbox include ALOHA, EPICODE, GENII, MACCS2, MELCOR, CFAST, and IMBA, with HOTSPOT 2.07 soon to be added as the 8th code.

The CAMWG also reviewed the candidate SCAPA toolbox codes which are associated with safety-related software SQA requirements since they are not directly involved in nuclear safety applications. SCAPA toolbox candidates are NARAC, APGEMS, DUSTAN, RASCAL, ARCON96, CAPARS, PUFF-PLUME, RAMS/LPDM, AREAEVAC, CHARM, MDIFF, RSAC-7, HPAC, 2DPUF, CAP-88PC and several others that are in use at various NNSA/DOE sites.

Jeremy then briefly discussed the future agenda of the CAMWG. The primary focus of the working group is to identify which models will go into the SCAPA toolbox, to formalize its SQA requirements and process for populating the toolbox. Completion of population is targeted for the end of FY09.

Jeremy's presentation is accessible in Appendix Q.

2.17 SQA Guidance for Safety-Related Software and SCAPA Toolbox (Cliff Glantz)

Cliff Glantz presented SQA guidance for safety-related software and the SCAPA Toolbox.

Cliff provided a background to this effort. In 2005, DOE issued an Order and Guide establishing SQA requirements for safety software. However, with that order and guide there was no guidance provided for safety-related software.

He indicated that consequence assessment models are safety software if they are used for hazards assessment and safety planning purposes, and for emergency response purposes that provide a direct hazard control function (i.e., make protection action recommendations). Otherwise, they fall into the safety-related software category.

Cliff then elaborated on the safety-related software SQA guidance that is being developed to populate the SCAPA toolbox. Cliff also briefly discussed the parallel Energy Facilities Contractor Group (EFCOG) effort associated with the DOE Central Registry toolbox. The SCAPA toolbox was then described and a path forward was presented.

Cliff's presentation is accessible in Appendix R.

2.18 HOTSPOT Version 2.07: A Technical Focus for Consequence Assessment Modelers (Steve Homann)

Steve Homann presented the new HotSpot 2.07 percentile dose capability. HotSpot 2.07 provides quick dose estimates for radiological releases and nuclear explosions.

Steve mentioned that the NA-41-sponsored Hotspot 2.07 percentile dose capability allows site-specific meteorological data to be input into HotSpot for calculation of the 95th percentile dose values. There is a single meteorological data input file option where 1–5 years of sequential hourly data in MACCS2 code format can be processed.

Output options include the ability to evaluate Total Effective Dose (TED) for Each Hourly Observation and provide an intermediary Joint Frequency Distribution (JFD) and output of 50th, 90th, 95th, 99th and 99.5th default percentile dose values for each of the 16-sector radial distances (e.g. site boundary distances). In addition, user-defined percentile values can also be used.

Steve explained the direction-independent option (e.g., percentile dose at select radial distances using all sequential hourly wind speed and stability data regardless of wind direction) which addresses the final critical recommendation needed for inclusion of HotSpot 2.07 into the DOE Safety Software Central Registry.

Steve's presentation is accessible in Appendix S.

2.19 Developments in Chemical Modeling at NARAC (Maureen Alai)

Maureen Alai presented developments in Chemical Modeling at NARAC. These include changes on the NARAC web-user interface. These changes include the list of chemicals, scenarios, chemical solutions, and differences in modeling specific chemical solutions. Maureen also discussed changes in the central system.

She reviewed other recent or imminent NARAC presentations, including:

- Monday May 4, 2:30–4:30 PM: NARAC User Group Meeting.
- Tuesday, May 5: 3:00–4:30 PM, Session 1C-Recent Improvements to HotSpot for the DOE Safety Software Toolbox.
- Thursday, May 7: SCAPA Meeting, 8:00 AM–5:00 PM, SCAPA Meeting, Presentation: HotSpot Version 2.07: A Technical Focus for Consequence Assessment Modelers.
- Thursday, May 7: SCAPA Meeting, 3:50 AM–4:15 PM, SCAPA Meeting, Presentation: Developments in Chemical Modeling at NARAC.
- Friday, May 8: 8:00 AM–5:00 PM, HotSpot 2.07 Workshop (Presenters: C. Mazzola, S. Homann).
- September 2–4 2008: DOE NARAC Training Course at LLNL, with User's Group Meeting and Webcast, September 4.

Maureen's presentation is accessible in Appendix T.

2.20 SCAPA Web Page Status and Updates (Cliff Glantz)

Cliff Glantz described the SCAPA Homepage and the Emergency Management Update (EMU) link.

Cliff's presentation is accessible in Appendix U.

3.0 SCAPA ROUNDTABLE DISCUSSION

Carl Mazzola and Cliff Glantz planned to conduct a brief roundtable discussion of SCAPA program priorities but there was not enough time left for the roundtable.

Carl indicated that the next SCAPA meeting will continue to be conducted in conjunction with the next EMI SIG meeting. No firm location has yet been set for the next EMI-SIG meeting.

4.0 ACRONYMS

2DPUF An atmospheric transport and dispersion model

A

AEGL Acute Exposure Guideline Level

AI Action Item

AIHA American Industrial Hygiene Association

ALOHA Areal Locations of Hazardous Atmospheres, an atmospheric transport and dispersion model

ANL Argonne National Laboratory

APGEMS An atmospheric transport and dispersion model

ARB Air Resources Board

ARCON96 An atmospheric transport and dispersion model

ARL Air Resources Laboratory

ATL Advanced Technology Laboratory

B

BEC Biosurety executive Committee

BNL Brookhaven National Laboratory

BSL Bio Safety Level

BWG Biosafety Working Group

C

CA California

CAMWG Consequence Assessment Modeling Working Group

CAPARS An atmospheric transport and dispersion model

CAP-88PC An atmospheric transport and dispersion model

CEWG Chemical Exposure Working Group

CFD Computational Fluid Dynamics

CFR Code of Federal Regulations

CMM Chemical Mixture Methodology

CMWG Chemical Mixtures Working Group

COMIS Indoor Air Quality model

CONTAM Indoor Air Quality model

CRD Contractor Requirements Document

D

DC District of Columbia

DMCC DOE Meteorological Coordinating Council

DoD Department of Defense

DOE Department of Energy

DSA Documented Safety Analysis

E

EFCOG Energy Facilities Contractors Group

EMG Emergency Management Guide

EMI Emergency Management Issues

EMU Emergency Management Update

EO Executive Order

EOC Emergency Operations Center

EPHA Emergency Preparedness Hazard Assessment

EPICODE An atmospheric transport and dispersion model

ERPG Emergency Response Planning Guidelines

F

FR Federal Register

G

G Guide

GENII An atmospheric transport and dispersion model

GIS Geographical Information System

GUI Graphics User Interface

H

HASubC Hazards Assessment Subcommittee

HCN Health Code Number

HHR Health Hazard Ratings

HI Hazard Index

HOTSPOT An atmospheric transport and dispersion model

HPAC An atmospheric transport and dispersion model

HQ Headquarters
HS Health Safety and Security
HVAC Heating Ventilation and Air Conditioning

I

iClient A NARAC system
IDLH Immediately Dangerous to Life and Health
INL Idaho National Laboratory

J

JFD Joint Frequency Distribution

K

L

LANL Los Alamos National Laboratory
LBNL Lawrence Berkeley National Laboratory
LLNL Lawrence Livermore National Laboratory
LOC Level of Concern
LPF Leak Protection Factor

M

M & O Management & Operating
MACCS2 An atmospheric transport and dispersion model
MD Maryland

N

NA-41 DOE Office of Emergency Management
NARAC National Atmospheric Release Advisory Capability
NFPA National Fire Protection Association
NIST National Institute of Standards Technology
NNSA National Nuclear Security Administration
NOAA National Oceanic and Atmospheric Administration
NSA Nuclear Safety Analysis
NTS Nevada Test Site
NV Nevada

O

O	Order
OEM	Office of Emergency Management
ORISE	Oak Ridge Institute for Science and Education
ORNL	Oak Ridge National Laboratory

P

PAC	Protective Action Criteria
PAL	Protective Action Level
PAR	Protective Action Recommendation
PEL	Permissive Exposure Limit
PNNL	Pacific National Northwest Laboratory

Q

QA	Quality Assurance
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R

RAMS-LPDM	An atmospheric transport and dispersion model
RASCAL	An atmospheric transport and dispersion model
RF	Respirable Fraction
RMP	Risk Management Plan
RSAC	An atmospheric transport and dispersion model
RTECS	

S

SAIC	Science Applications Incorporated International
SC	South Carolina
SCAPA	Subcommittee on Consequence Assessment and Protective Actions
SEI	Shaw Environmental Incorporated
SIG	Special Interest Group
SME	Subject Matter Expert
SNL/CA	Sandia National Laboratory/California
SNL/NM	Sandia National Laboratory/New Mexico
SOF	Sum of Fractions
SORD	Special Operations and Research Division

SQA Software Quality Assurance
SRNL Savannah River National Laboratory
SRS Savannah River Site
STEL Short Term Exposure Limit
STWG Source Term Working Group

I

TAG TEEL Advisory Group
TED Total Effective Dose
TEEL Temporary Emergency Exposure Level
TLV Threshold Limit Value
TN Tennessee
TRU Transuranic
TX Texas

U

URS

V

V & V Verification & Validation
VA Virginia
VCS Voluntary Consensus Standard

W

WA Washington
WFO Work for Others
WG Working Group
WSMS Washington Safety Management Solutions
WSU Washington State University

X-Z

4.0 APPENDICES

Since a proceeding of the meeting presentations was not developed prior to the meeting, this section documents the presentations and other relevant documentation made at this meeting. The presentations are as follows:

- A SCAPA 2009 Meeting Agenda
- B SCAPA 2008 Meeting Highlights
- C STWG Report
- D TAG Report
- E The Future Calls. Is it Time for an Upgrade in the TEEL Development Process?
- F PAC/TEEL Database Status and Plans
- G PAC/TEEL Dataset: Technical Development and QA Update
- H AEGL & ERPG Development Update—A Quick Summary
- I Use of PAC/TEELs: A State Perspective
- J CMM Status and QA Program Report
- K Emergency Preparedness Application of CMM
- L Use of CMM at the Hanford Site
- M BWG Report
- N Federal Biosafety Working Group Report
- O Nanotechnology and Biosurety Policies
- P Indoor Air Quality Modeling: CONTAM and COMIS
- Q CAMWG Report
- R SQA Guidance for Safety-Related Software and SCAPA Toolbox
- S HOTSPOT Version 2.07: A Technical Focus for Consequence Assessment Modelers
- T Developments in Chemical Modeling at NARAC
- U SCAPA Web Page Status and Updates

These presentations are posted on the SCAPA web page.

APPENDIX A

SCAPA 2009 Meeting Agenda

PART I: WELCOME AND SCAPA PROGRAM REPORT

- 8:00 AM – 8:05 AM Introductions and Review of Meeting Agenda (Glantz/PNNL)
- 8:05 AM – 8:10 AM Welcome and Brief Update on DOE/NA-41 Activities (Freshwater /NA-41)
- 8:10 AM – 8:20 AM SCAPA 2008 Annual Report (Mazzola/Shaw Environmental)

PART II: SOURCE TERMS AND CHEMICAL EXPOSURE (PAC/TEELS)

- 08:20 AM – 08:35 AM Source Term Working Group Report (Wolfgram/WSMS)
- 08:35 AM – 08:45 AM Chemical Exposure Working Group and TAG Briefing (Tuccinardi/ATL)
- 08:45 AM – 09:15 AM “The Future Calls. Is it a Time to Upgrade the TEEL Development Process?”
(Bond, Craig, Tuccinardi/ATL)
- 09:15 AM – 09:25 AM PAC/TEEL Database: Status and Plans (McDougall or Bond/ATL)
- 09:25 AM – 09:45 AM PAC/TEEL Dataset: Technical Development and QA Update (Lu/ORNL and Craig/ATL)
- 09:45 AM – 10:00 AM AEGL & ERPG Development Update – A Quick Summary (Lu/ORNL and Thomas/Intercet)

10:10AM – 10:20 AM MORNING BREAK

- 10:20 AM – 10:50 AM Use of PAC/TEELS: A State Perspective (DuTeaux, State of California)

PART III: CHEMICAL MIXTURE METHODOLOGY (CMM) AND SOURCE TERMS

- 10:50 AM – 11:10 AM CMM Status and QA Program Report (Petrocchi/WSI; Yu/PNNL)
- 11:10 AM – 11:40 AM Emergency Preparedness Application of CMM (Ciolek/Alpha-TRAC)
- 11:40 AM – Noon Use of the CMM at the Hanford Site (Jamison/SAIC)

Noon – 1:30 PM LUNCH ON YOUR OWN

SCAPA 2009 Meeting Agenda (Continued)

PART IV: BIOSAFETY AND NANOTECHNOLOGY

- 1:30 PM – 1:40 PM Biosafety Working Group Report (Roberto/INL)
- 1:40 PM – 2:00 PM Strategy for Implementing EPHAs (Matz/LANL)
- 2:00 PM – 2:15 PM Federal Biosafety Working Group Update (Rodi/ANL)
- 2:15 PM – 2:35 PM Nanotechnology and Biosurety Policies (Marsick/DOE-HSS)
- 2:35 PM – 2:55 PM Indoor Air Quality Modeling: CONTAM and COMIS (Lorenzetti/LBNL)

PART V: CONSEQUENCE ASSESSMENT MODELING

- 2:55 PM – 3:00 PM CAM Working Group Report (Rishel/PNNL)
- 3:00 PM – 3:10 PM SQA Guidance for Safety-Related Software and SCAPA Toolbox (Glantz/PNNL)
- 3:10 PM – 3:30 PM HOTSPOT Version 2.07: A Technical Focus for Consequence Assessment Modelers (Homann/LLNL)

3:30 PM – 3:50 PM AFTERNOON BREAK

- 3:50 PM – 4:15 PM Developments in Chemical Modeling at NARAC (Alai, LLNL)

PART VI: MISCELLANEOUS TOPICS

- 4:15 PM – 4:20 PM SCAPA Web Page Update (Glantz/PNNL)
- 4:20 PM – 4:50 PM SCAPA Round Robin (Facilitator: Mazzola/Shaw Environmental)
- 4:50 PM – 5:00 PM Closing Remarks (Freshwater/NA-41)

APPENDIX B

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Mazzola.pdf

APPENDIX C

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Wolfgram.pdf

APPENDIX D

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Tuccinardi_TAG.pdf

APPENDIX E

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Craig_Bond_Tuccinardi.pdf

APPENDIX F

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_McDougall.pdf

APPENDIX G

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Craig_Lu.pdf

APPENDIX H

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Thomas_Lu.pdf

APPENDIX I

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_DuTeaux.pdf

APPENDIX J

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Petrocchi_Yu.pdf

APPENDIX K

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Ciolek.pdf

APPENDIX L

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Jamison.pdf

APPENDIX M

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Roberto.pdf

APPENDIX N

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Rodi.pdf

APPENDIX O

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Marsick.pdf

APPENDIX P

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Lorenzetti.pdf

APPENDIX Q

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Rishel.pdf

APPENDIX R

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Glantz_SQA.pdf

APPENDIX S

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Homann.pdf

APPENDIX T

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Alai.pdf

APPENDIX U

http://orise.orau.gov/emi/events/recent/2009/presentations/SCAPA_Glantz_Web.pdf