Biota Dose Assessment Committee

1999 Annual Topical Committee Meeting
August 18-20, 1999
Washington, D.C.

Summary Report

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Department of Energy
Office of Environmental Policy
and Assistance, Air, Water
and Radiation Division

EXECUTIVE SUMMARY

The Biota Dose Assessment Committee (BDAC) is a topical committee established under the DOE Technical Standards Program. The first annual meeting of the BDAC was held in Washington, D.C. on August 18-20, 1999. This report provides a summary of the purpose and objectives of the meeting, highlights of presentations made at the meeting, and recommendations resulting from general and break-out discussions. Representatives from DOE program and field offices, national laboratories, state and federal agencies, and international agencies participated in the meeting. The meeting provided BDAC members with an important opportunity to pilot (using site-supplied data) the biota dose evaluation methods and implementation guidance contained in DOE's draft Technical Standard, "A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota (Project ENVR0011)".

Presentations were made regarding the basis for DOE's current and proposed requirements for protection of biota, the technical derivation and user application of the DOE graded approach, the status of international activities, site-specific biota dose assessment methods and lessons learned from their application, current biota dose assessment technical issues, and radioecological research. Detailed presentation materials were provided in the BDAC Meeting Notebook, which was distributed at the meeting. These presentations, and this Summary Report, can be downloaded from the BDAC Web Site (http://tis-nt.eh.doe.gov/oepa/public/bdac).

Comments and feedback from meeting participants (e.g., the user community) regarding the technical derivation of the biota dose evaluation methodology and application of the DOE graded approach were very favorable. Recommendations provided during the meeting, particularly on the example applications of the methodology using site-supplied data, and resulting from group break-out discussions, produced additional implementation guidance and refinements to the technical methodology which will be incorporated into the final DOE Technical Standard. Stephen Domotor (EH-412) can be contacted for further information concerning the BDAC and the development of the DOE Technical Standard for evaluating radiation doses to biota.

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1. SUMMARY OF MEETING PURPOSE AND OBJECTIVES

The first annual meeting of the Biota Dose Assessment Committee (BDAC) was hosted and chaired by the Department of Energy's Office of Environmental Policy and Assistance, Air, Water and Radiation Division (EH-412). Representatives from DOE program and field offices, national laboratories, state (Washington State Dept. of Health) and federal (U.S. Environmental Protection Agency; U.S. Army Corps of Engineers) agencies, and international (International Atomic Energy Agency; Atomic Energy of Canada, Ltd.) agencies participated in the meeting. A list of attendees is provided in Appendix A of this report.

The goals and objectives for the meeting included: (1) working towards finalizing the DOE Technical Standard for evaluating radiation doses to biota; (2) giving BDAC members an important opportunity to pilot the screening and analysis methodologies and refine the methods in response to their input; (3) sharing information on requirements and guidance for protection of biota - and learning from each other relative to site-specific biota dose assessment needs, lessons learned from existing methods implementation, international initiatives, an environmental parameters database, and ongoing radioecological research; and (4) creating a path forward for finalizing the DOE Technical Standard, and for FY2000 BDAC activities. The meeting agenda is provided in Appendix B of this report.

Dr. David Michaels (DOE, Assistant Secretary for Environment, Safety and Health) was looking forward to addressing the group, but urgent issues required his attention so he was unable to welcome the attendees. Mr. Ray Berube (DOE, Deputy Assistant Secretary for Environment) provided welcoming remarks, thanked BDAC members for their participation and "pioneering spirit", and expressed his support of the BDAC's efforts to develop the methodology for evaluating doses to biota.

This was the first formal meeting of the full Biota Dose Assessment Committee since its establishment in June 1998 (see Appendix C for the BDAC Charter). The BDAC has also been using conference calls and the BDAC Web Site for coordination, discussing and resolving technical issues, and developing draft chapters of the biota dose evaluation method. The principal theme for this first annual meeting was "*Requirements and Guidance for Evaluating Doses to Biota*". DOE has been very active in this area for the last several years, particularly in the last year when this topical committee was formed to help the Department formulate a screening methodology and graded approach for evaluating doses to biota. The DOE Technical Standard, "A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota (Project ENVR 0011)", is being produced using a consensus-based process through the BDAC. Once finalized, it will be submitted to the DOE Technical Standards Program (DOE-TSP) for formal

review and approval. This voluntary DOE Technical Standard will be available for use in evaluating doses for comparison to DOE's existing and proposed dose limits for biota, and for conducting ecological assessments of radiological impact. An overview of the DOE Technical Standards Program and the role of DOE Technical Standards is provided in Appendix D of this report.

2. SUMMARY OF PRESENTATIONS

The following sections provide brief summary points from presentations made at the BDAC meeting. They are intended to be representative and not all inclusive. Detailed presentation materials are provided in the BDAC Meeting Notebook, which was distributed at the meeting. These presentations, and this Summary Report, can be downloaded from the BDAC Web Site (http://tis-nt.eh.doe.gov/oepa/public/bdac) by clicking on the "1999 Workshop" button and selecting the desired materials.

2.1 The Need for Requirements and Guidance for Protection of Biota: Basis for DOE's Biota Dose Limits and Guidance *(S. Domotor, DOE EH-412)*

A fundamental reason that there is a move to prepare biota dose standards, and methods and guidance for how to demonstrate compliance with existing and proposed dose standards, is that there is a belief that past practices, equating protection of human health to protection of biota, may not be adequate.

Radiation as a stressor is being increasingly considered in ecological risk assessments under the CERCLA process. There is also a great deal of interest in biota dose assessment at the DOE site level, by stakeholders (e.g., Native Americans interested in doses to culturally valued wildlife), and by international agencies.

DOE currently has in place a dose limit of 1 rad/day for aquatic organisms (Order DOE 5400.5), and is considering proposing dose limits of 1 rad/day for aquatic animals, 1 rad/day for terrestrial plants, and 0.1 rad/day for terrestrial animals (Subpart F, Proposed Rule 10 CFR Part 834, "Radiation Protection of the Public and the Environment"). These dose limits are intended to protect populations of organisms. The scientific basis for these DOE biota dose limits was reviewed, to include: IAEA Report 172, ICRP recommendations, NCRP Report 109, IAEA Report 332, a 1995 DOE Workshop, and a 1996 UNSCEAR Report.

Many of the comments on proposed rule 10 CFR Part 834 expressed the need for guidance on how to demonstrate compliance with the proposed biota dose limits. The comments suggested that DOE establish screening criteria and a consistent methodology, along with flexibility built in to allow use of site-specific methods. The DOE Technical Standard on evaluating radiation doses to biota has been designed to be responsive to these recommendations.

An introduction to the IAEA efforts regarding requirements and guidance for protection of biota was provided. It was also noted that the Canadian Nuclear Safety Commission of Canada (formerly the Atomic Energy Control Board of Canada) is preparing guidance criteria for protection of biota. Canada's proposed criteria for protection of biota are to be available for peer review in late 1999.

2.2. International Atomic Energy Agency Initiatives Regarding Requirements and Guidance for Protection of Biota *(C. Robinson, IAEA)*

The International Atomic Energy Agency (IAEA) consists of a consortium of 128 countries and 800 professional personnel headquartered in Vienna, Austria. The organization's functions include the verification of the peaceful uses of atomic energy, promotion of safety, and the transfer of technology. Part of the safety function is to establish standards for safety and to provide criteria for their application.

IAEA recognizes the need to develop international consensus standards aimed toward protecting biota and developing methods for showing compliance with them. There are methods under development in several member countries. There are several international conventions that address radiation protection to biota. Factors affecting the future development of specific criteria for environmental protection were discussed, including the definition of "harm," scientific uncertainties, and the ability to demonstrate compliance.

An IAEA Technical Committee recently produced the IAEA TECDOC, " Protection of the Environment from the Effects of Ionizing Radiation: A Report for Discussion (IAEA-TECDOC-1091)", which was distributed at the BDAC meeting. The IAEA wants to be proactive in this area, so it is following developments in the United States, Canada, and European Union. The IAEA wants to provide a forum where member countries can get together to discuss their progress on criteria and implementation guidance for protecting biota. A series of IAEA workshops is being planned to take place in Vienna; the first tentatively scheduled for the second half of 2000.

2.3 Presentations Providing an Overview and Technical Derivation of Methods for Evaluating Doses to Biota

2.3.1 The DOE Technical Standard, "A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota" *(S. Domotor, DOE EH-412; K. Higley, Oregon State University)*

DOE began the development of the graded approach methodology to demonstrate compliance with DOE's existing and proposed biota dose standards, but the method also has applications for eco-risk assessments conducted within DOE and for other federal agencies and processes. The DOE graded approach was designed to be easy to use,

technically sound, utilize existing generic and site-specific data, address multiple media, (soils, sediments, and water), and incorporate an eco-risk framework where appropriate.

The DOE Technical Standard (i.e., Biota Manual) was developed by DOE through the Department's Biota Dose Assessment Committee. Members of the BDAC Core Team responsible for preparing the Biota Manual include: Ernie Antonio and Gordon Bilyard of Pacific Northwest National Laboratory (PNNL), Stephen Domotor of DOE, Gary Friday of Westinghouse Savannah River Company (WSRC), Kathy Higley of Oregon State University (OSU), Dan Jones and Dave Kocher of Oak Ridge National Laboratory (ORNL), and Brad Sample of CH2M Hill.

The DOE graded approach consists of a three-step process which guides the user from an initial, prudently conservative set of screening values to, if needed, a more rigorous analysis using site-specific information. The three-step process includes: (1) *data assembly*, where measured maximum or mean radionuclide concentration data are assembled for subsequent screening; (2) a *general screening phase*, where measured radionuclide concentrations in environmental media are compared with a set of Biota Concentration Guides (BCGs). Each radionuclide-specific BCG represents the limiting radionuclide concentration in environmental media which would not cause the biota dose limits to be exceeded; and (3) an *analysis phase*, which consists of three increasingly more detailed steps of analysis: (3a) a site-specific screen, using site-representative parameters instead of default parameters; (3b) a site-specific analysis, employing a kinetic modeling tool; and (3c) performing an actual site-specific biota dose assessment within an ecological risk assessment framework, which would involve a problem formulation, analysis, and risk characterization protocol similar to that recommended by the US EPA. This three-tiered scheme helps to ensure that the magnitude of the evaluation effort is scaled to the likelihood and severity of potential environmental impacts.

Selected outside reviews (including state regulatory agencies, technical experts from academia, and international agencies) early-on in the development process contributed to the "ground-truthing" and refinement of the technical methodology. Discussions with other federal agencies are being coordinated through the Interagency Steering Committee on Radiation Standards (ISCORS). The goal is to have this DOE Technical Standard entered into the formal DOE Technical Standards review and approval process in 1999, with the parallel publishing of several peer-reviewed technical papers in the open literature.

Detailed descriptions of the technical derivation of the screening and analysis methodologies were presented, to include: assumptions, organism types, equations and parameters used to derive the BCGs; spreadsheet development; and determination of default parameters using empirical data and probabilistic analysis tools (e.g., Monte Carlo analysis; sensitivity analysis).

2.3.2 ORNL Radiological Benchmarks for Effects on Aquatic Biota *(D. Jones, ORNL)*

Several hazardous waste sites at the Oak Ridge Site required ecological risk assessments; often times radionuclides needed to be addressed in these assessments. The Risk Assessment Council (within the Oak Ridge Operations Environmental Management Program) sponsored the development of radiological benchmarks for aquatic systems. This organization also sponsored the development of aquatic and wildlife benchmarks for hazardous contaminants. The Council wanted to develop radionuclide screening values similar to those developed for other chemicals, for determining the extent of any potential effects and to identify the need for any additional site-specific investigation. The radionuclide screening values were not developed to conduct a definitive site biota dose assessment.

Detailed descriptions of the technical derivation of the screening benchmarks were presented, to include: assumptions, equations, and parameters used to derive the benchmarks; determination of default parameters. The application of the ORNL screening benchmarks is similar to that of the DOE Technical Standard BCGs for screening: failing the screen means additional analysis may be required, and not that a cleanup is necessary. The Oak Ridge screening benchmarks apply to aquatic animals; many of the assumptions and dose equations applied are similar to those used in the BDAC Technical Standard methodology.

Summary points made on the application of the screening benchmarks: (1) These are screening values only; (2) these values are for assessing populations, not for individuals; and (3) these are not remediation values - this requires more sophisticated analysis. The ORNL screening benchmarks are available through the ORNL (http://www.hsrd.ornl.gov/ecorisk/ecorisk) and the BDAC (http://tis-nt.eh.doe.gov/oepa/public/bdac) Web Sites.

2.3.3 DOE-West Valley Biota Dose Assessment Methodology *(M. McGarry, DOE-West Valley Project; P. Clifford, Dames and Moore)*

The biota dose assessment activities at DOE-West Valley came about as the result of comments by the Department of Interior (DOI) on a draft Environmental Impact Statement (EIS) related to decontamination, decommissioning, and site closure activities. The EIS is looking at site closure with dual lead agencies, DOE and New York State. The DOI indicated that it did not generally accept the assumptions and analysis that risks to humans which were determined to be protective were also an indication that the biota would be protected (e.g., if man is protected then biota are also adequately protected). DOE-West Valley decided to conduct an ecological risk assessment covering all five closure alternatives included in the EIS.

The assumptions, derivation, and application of the DOE-West Valley methodology for estimating potential doses to biota and assessing these doses was presented. The presenters pointed out that many of the equations used in the DOE-West Valley methodology are similar to those used in the DOE graded approach and ORNL methodologies.

No new data was collected for this effort. The data came from the DOE-West Valley environmental monitoring program (e.g., site baseline surveys and site environmental reports). Several animals removed as a result of animal control activities were bioassayed and used in field validation of the modeling effort. Some field validation of the modeling has been performed, and it looks fairly good. Some discrepancies are undergoing further investigation.

Regarding calculation of site use factors for species of biota: a mid-point of the foraging ranges presented in the literature was used, and it was assumed that habitat quality off of the immediately affected area and on the immediately affected area were similar. The foraging area was used as a numerator divided by the total area of the site. This method is part of the documentation.

2.3.4 Biota Dose Assessment Methods Used at INEEL *(R. VanHorn, INEEL; R. Morris, Environmental Science and Research Foundation)*

The basic size, facilities, ecology, and mission of the Idaho National Engineering and Environmental Laboratory (INEEL) was reviewed as an introduction to the INEEL biota dose assessment methodology. Currently, all preliminary CERCLA evaluations have been performed on all nine Waste Area Groups (WAGs). Ecological risk assessments were first requested in 1995. There was a need to quickly implement an eco-risk process, to include biota dose assessment. A guidance manual was developed which provided ecologically-based screening values that could be used as benchmarks to rapidly screen the INEEL facilities. Details concerning the assumptions, derivation of dose calculation equations, and other aspects of methods development were presented. Much of the presentation covered material (e.g., assumptions; dose equations) which was consistent with the other biota dose assessment methods presented at the meeting. The recommended dose limit for protection of biota was 0.1 rad/day for populations of terrestrial animals and 1 rad/day for populations of terrestrial plants. A quality factor of 20 for alpha emitters was chosen because this value was used by the IAEA.

A negotiated process which involved multiple stakeholders served as the basis for the biota dose assessment. Many of the decisions were not solely based on science, but also included considerations which were qualitative in nature. For example, a safety factor of 10 was applied to the dose limits for evaluating organisms (e.g., culturally important) of concern to some stakeholders. This was purely a qualitative judgement - made through consensus within the assessment group, which included the stakeholders. Data which

was already collected and available to support human health risk assessments - and determined to be adequate for biota - served as a basis for the biota assessment; there was little new data collected.

The question of how to delineate the "area of assessment or concern" was discussed, both within the INEEL presentation and in a group discussion following the presentation. Several Records of Decisions (RODs) are already in place at INEEL, and it appears that future decisions may continue to be made separately for each WAG and sub-WAG. This piece-meal approach may be less favorable, but it is based on what can be done under CERCLA. There is no evidence to date that ecological risk assessments are driving any of the cleanup decisions. If an eco-risk assessment indicates that a species is endangered at WAG X, but nowhere else, you may have to take an action to clean up WAG X to protect that species. Under site-wide assessments, one could define areas of evaluation in such a way that an indication of stress may be "averaged out" over a large area containing both clean and contaminated areas. However, individual areas may still require remediation if they are shown to cause harm or stress at the protection benchmarks. One must be careful because the effect of remediation may be worse than leaving the WAG as is with the contaminants in place.

2.3.5 Example Applications of the DOE Graded Approach Methodology (Screening and Analysis) using Site-Supplied Data *(E. Antonio, PNNL; K. Higley, Oregon State University)*

Environmental radionuclide concentration data (from 1997) published in the 1998 Hanford Site Environmental Surveillance Report was used to demonstrate the DOE graded approach methodology. Data from surface soil samples collected at 60 soil sampling locations in the vicinity of Hanford operational areas (and off-site), Columbia River sediment data, and water data (collected on-site from seeps and springs, ponds, and the Columbia River) were used in examples highlighting the use of the BCGs, sum of fractions calculational spreadsheets, and kinetic modeling spreadsheets.

The examples stimulated group discussions and resulted in recommendations from meeting participants regarding technical and implementation improvements that should be made prior to finalizing the methodology. For example, site use factors for biota will be added as an adjustable parameter to the final spreadsheets. Reset buttons for many of the parameters and calculations within the spreadsheets will also be included in the final versions. Once finalized these spreadsheets will be available through the BDAC Web Site, and on CD-ROM.

2.4 Radioecological Research: Determining Significant Endpoints for Ecological Risk Analyses *(T. Hinton, SREL)*

This presentation reviewed the status of ongoing research at the Savannah River Ecology Laboratory (SREL) and DOE Savannah River Site. The research is being funded through DOE's Environmental Management Science Program (EMSP).

Human risk assessment focusses on an endpoint of lifetime cancer risk to an individual. For ecological risk assessment the endpoints are more uncertain. For example, does one look at effects within individuals, populations, communities, or ecosystems? Should we be looking at cellular or sub-cellular effects, impacts on reproduction and fecundity rates, or mortality?

The basic hypothesis of the subject research is that molecular damage leads to a change in metabolic rate and energy allocation, leading to a change in population parameters such as age-specific survivorship, reproductive output, age at maturity, and longevity. This research is measuring chromosome damage in turtles as a response to radiation, where the frequency of damage is a function of dose. It has been shown that metabolic rates increase with other types of stressors. This has not been shown for radiation as a stressor. Fifty mesocosms are being used to maintain populations of turtles that will be exposed to radiation at three levels of continuous exposure. The experiments with the turtles are non- destructive.

The experiments will have a 10-year duration because turtles mature at 7-9 years, which means that chronic exposure data will be relevant in about 10 years. Interim reports - perhaps after 2 years - will be forthcoming.

2.5 Selecting an Appropriate RBE Factor for Alpha-Emitters - for Use in Biota Dose Assessment *(D. Kocher, ORNL)*

Radiological protection criteria for biota are currently expressed in terms of absorbed dose. These protection criteria are based on studies of biological effects resulting from exposure to photons (i.e., low-LET radiation). Absorbed dose may not be sufficient to relate energy absorbed in an organism to the biological effects or responses for high-LET radiation. The question arises: in radiation protection of biota, what value or factor for relative biological effectiveness (RBE) should be used to calculate absorbed dose due to alpha particles? One assumption for protection of populations of biota is that the critical endpoint (e.g., impairment of reproductive capability) appears to be deterministic, rather than stochastic.

Some investigators (e.g., IAEA) have used a RBE factor of 20 for alpha particles. This approach assumes that the radiation weighting factor recommended by ICRP for use in radiation protection of humans should be used in protection of biota. Other investigators

have not used a RBE factor for alpha particles. For example, it was not used in some biota dose models because there was already a high degree of conservatism built into the methodology, which would compensate for exclusion of the RBE factor.

A summary of RBE values (their basis; stochastic vs deterministic effects) for high-LET radiation was provided, to include examples of data summarized in NCRP Report No. 104 and ICRP Publication 58.

The following points were offered:

- The assumption of an RBE factor of 20 (typically used for humans) which is currently applied in biota dose assessments is likely incorrect. Relevant data suggest that a more appropriate value for use in biota dose evaluations may be in the range of about 5 - 10.

- Expert groups and regulatory authorities need to establish a reasonable RBE factor for alpha particles for use in protection of biota.

- RBE factor is important in determining allowable concentrations of alpha-emitting radionuclides in water and soil when internal exposure is significant.

- As an interim measure, DOE's Technical Standard will use a RBE factor of 20 for alpha particles. The DOE spreadsheets allow for a user to change this default RBE value (if they can provide justification that the value of 20 is inappropriate for their application), and re-calculate the BCGs. Therefore, the methodology has "built-in" flexibility for subsequent changes to this default value. This value will be subject to change as expert groups and regulatory authorities develop consensus on appropriate RBE factors. In this regard, the BDAC will closely coordinate with and keep current on efforts within other countries (e.g., Canada) and agencies (e.g., IAEA) to select RBE factors for use in environmental protection frameworks for biota.

A paper discussing the RBE factor for biota and proposing appropriate values is being prepared for journal publication. The paper is being prepared by D. Kocher (ORNL) and is being coordinated through the BDAC Core Team.

2.6 Risk Management Options Following an Indication of Adverse Impact Resulting from an Eco-Risk Assessment *(J. Bascietto, DOE EH-413)*

This presentation discussed ecological risk management and actions typically taken if it is determined that there is an adverse ecological effect resulting from a stressor. Information used by risk managers to make ecological risk management decisions

(primarily through EPA processes), issues that stakeholders have said are of value to them, and issues that risk managers are concerned with were reviewed.

Risk management options following an indication of adverse impact center around three choices: (1) monitor the situation; (2) perform some sort of response action; or (3) take no action. Key considerations which are factored into selecting a risk management option include: the type of goals or decisions to be supported; the ecological values of concern; policy considerations; and the level of uncertainty in the elements of the eco-risk assessment. Based on consideration of these issues and risk management options, a matrix of risk management options was presented for: regional populations of native species and habitats; wetlands and stream corridors; endangered ecosystems; and groups of native or migratory species under acute threat.

2.7 Vertical Transport of Radionuclides by Plants: Considerations for Soil Sampling to Support Biota Dose Evaluations *(G. Bilyard, PNNL; D. Jones, ORNL)*

This presentation highlighted an important issue which surfaced during the course of weekly BDAC Core Team conference calls for refining the biota screening and analysis methodologies. This presentation addressed appropriate soil sampling to support terrestrial biota dose evaluations, and the need to consider subsurface sampling under certain scenarios. Specifically, the hidden hazard of buried contamination was addressed. Subsurface soils are usually not sampled, but may be contaminated by subsurface sources (e.g., groundwater; buried waste). Plant roots may penetrate through clean soils into contaminated subsurface soils. This is a concern because plants can transport radionuclides vertically from the roots to the biomass above ground. As a result, contamination in plant tissues may not be suspected based on surface soil samples.

In response to this issue, data on average rooting depths for various vegetation types were compiled and summarized in tabular and graphic form, for inclusion in the DOE Biota Manual. It is intended to be used as a guide for determining if subsurface soil sampling may be needed, given the presence of deep-rooting vegetation in an evaluation area where subsurface contamination (e.g., through groundwater or buried waste) is suspected. This information, and its application, was reviewed in the presentation.

It was suggested that plant tissues are the best integrators of subsurface contamination, and that - in areas where subsurface contamination is suspected - sampling and analysis of plant tissue may be the most time and cost-effective approach rather than conducting actual subsurface sampling. In addition, information obtained from plant tissue analysis may be useful in determining if significant subsurface contamination exists. For example, subsurface hazards are likely where concentrations of radionuclides in plant tissues are higher than would be expected from co-located plant and surface soil samples

(e.g., when compared to published uptake factors). This material will be included in an appendix to the final Biota Manual.

2.8 The Biota Dose Assessment Database of Environmental Parameters; Biota Dose Assessment Committee Web Site *(F. Baes, ORNL; K. Higley, Oregon State University)*

The Biota Dose Assessment Database (BDAD) of Environmental Parameters was presented electronically via direct internet access and use of the BDAC Web Site, where the database currently resides. The database was developed to support the screening and analysis methodologies contained in DOE's graded approach for evaluating doses to biota. The database contains environmental parameter data (e.g., bioconcentration factors; sediment and soil distribution coefficients; and their source references) typically used in environmental modeling of radionuclide fate, effects, and doses, both for human and biota dose assessment. Thus, the database should also serve as a valuable tool to support other dose models and methodologies.

As part of this web-based system, input screens have been developed to allow users to enter and edit environmental data directly from the web. Users can search for parameter data by multiple attributes (e.g., nuclide; parameter; taxonomic group; organism type; soil or sediment type; reference). The system, when finalized, will be accessible from virtually any point in the world. Data, and documents scanned as PDF files, are also being added from the "grey" technical literature. The use of PDF allows entire articles to be provided to the user. This approach provides universal access to technical literature that may not otherwise be available to many users. This source documentation is typically requested by regulators in order to verify the appropriateness of those environmental parameters selected and applied by the user in their ecological and human risk assessments.

Considerable time was spent on touring the BDAC Web Site and demonstrating its features. The BDAC Web Site, and many of its innovative features such as the electronic "Chalkboard" for exchanging and reviewing draft Biota Manual chapters and review comments, is being extensively used in the development of the DOE Technical Standard. The BDAC will continue to use the Web Site as a primary communication and information dissemination tool as the DOE Technical Standard is implemented within the Department.

3. GROUP BREAK-OUT DISCUSSIONS ON BIOTA DOSE EVALUATION TOPICS AND ISSUES

Summaries of recommendations made during several break-out group discussions are provided. The technical and implementation recommendations made by BDAC members during these break-out group discussions will be incorporated, as appropriate, into the final DOE Technical Standard.

3.1 Topic Selection and Break-Out Discussion Process *(S. Domotor, DOE EH-412; G. Bilyard, PNNL)*

Following two days of agenda presentations and group discussions regarding these individual presentations, a full group discussion was held to determine key topical areas and issues that should be focussed on in smaller, break-out discussions. One of the goals for the break-out discussions was to identify technical or implementation issues that needed to be addressed to support the finalization of the DOE Technical Standard. Meeting participants were also encouraged to identify any topics that they thought needed attention, based on their expertise and experience in biota dose evaluation, and on what they heard and discussed at the BDAC meeting.

Several areas and specific comments which came up during this full group discussion included:

- What are appropriate uses of the Biota Manual? Under what scenarios?

- Could the DOE screening and analysis methodologies be applied to assess impacts to biota during an accident scenario? For predictive analyses such as that under NEPA?

- Could the DOE methodology be used to generate actual dose calculations for biota?

- Can the DOE methodology be used to assess impacts to threatened and endangered species?

- How is the "area of concern" or "area to be evaluated" determined?

- How is the population of organisms being evaluated defined? What do we mean by "population"?

- How can the BDAC Web Site and Environmental Parameters Database continue to evolve in meeting user needs and expectations?

Following this group discussion, the following three topical areas were selected by group consensus:

1. Application Considerations.

- Area of concern (i.e., over what area of a site?)
- Population/representative individuals being evaluated.

2. Where should / should not the method be applied?

- Equilibrium vs non-equilibrium conditions?
- Accidents?
- T&E Species?
- NEPA?
- Acute vs Chronic?
- RI/FS - CERCLA?

3. BDAC Database and Web Site.

- Existing uses and tools
- Enhancements
- Populating the BDAC environmental parameters database with additional data, and facilitating its use within and outside of DOE

Following selection of these topical areas, meeting participants separated into their selected break-out groups for open discussion. Break-out groups were given a set of questions to help in framing the discussions and reports back to the full committee:

- What is the problem/issue being discussed?
- What are the major factors or variables in the problem?
- What are the near-term recommendations or guidance?
- What are the long-term recommendations or guidance?
- What guidance would you recommend for the final Biota Manual?
- Are there any R&D needs associated with the problem?

3.2 Results of Break-Out Discussions

3.2.1 Group 1: Application Considerations

3.2.1.1 Notes from Internal Group Discussions

The following is a summary of the general discussions within the Group 1 break-out session.

The question of how to define a population relative to the area of evaluation was discussed. Over what area should the DOE screening methodology (BCGs) be applied, assuming no endangered species present or ranging into the region? One thought was to incorporate population into the contaminated area. Identify the footprint of contamination and species over that area. But what area - the entire site? Habitat may be a way to define the affected area. It would be inappropriate to make decisions on very small areas.

The issue of using actual organism tissue concentrations to evaluate biota dose was discussed. The argument against using this measure is that "representative" samples of a population (e.g., a statistically designed sampling program to ensure that sampled organisms are "representative" of the total population of organisms in the area of concern or evaluation) are not typically collected through routine environmental surveillance programs. Typically, tissue concentration data are from opportunistic sampling (e.g., road kills; hunting). Conversely, several members of the break-out group thought that use of tissue data from on-site organisms should be encouraged, rather than use of models alone, if you can justify that they are representative samples.

The suggestion that habitats be used to delineate areas of evaluation - with the Biota Manual providing some guidelines for defining the area of the habitat to be considered - garnered considerable discussion. The group thought it would be correct to average over habitats that have similar types of contamination. An example might be the 100 area at Hanford. This is the area along the Columbia River where all of the production reactors are located. One would expect species in this large habitat (e.g., 40 miles or so) to see similar exposures from similar operating units. The habitats may not be contiguous, but still may be averaged (e.g., similar wetlands that have the potential for similar contamination and are populated by the same species). This theme provided the basis for the presentation to the full committee.

3.2.1.2 Group 1 Presentation to the Full Committee *(Presenter: D. Kocher, ORNL)*

After considerable group discussion it became apparent that the group was focusing on a specific problem. The first step of the DOE graded approach compares available media concentrations with the BCGs for screening purposes. This first step should be done with the maximum concentrations available for the particular environment (e.g., representing the worst case). If you pass the BCGs, the issue of area of concern is moot. It is an issue only if worst case data does not pass the BCGs.

The next step of the methodology is to do some type of averaging over measured environmental media concentrations. The problem: over what area is averaging allowable after the first step of the screening?

Several recommendations from the group were offered:

1. Averaging ***is*** allowed.

2. Averaging over the entire site ***is not*** allowed. There may be cases where averaging over large areas is allowable, where conditions are similar, but in general averaging over areas of dissimilar habitat is not supportable. Conversely, applying the BCGs to a very small area does not make sense either.

3. A recommended approach would be to first define similar areas of contamination. Within these areas of contamination, one could then apply the BCGs to areas of similar habitat. The areas of concern or areas for evaluation would then be those at the conjunction of the areas of contamination and the habitats. You are not allowed to average outside of the habitats. The group also thought that, even though the areas may be 50 miles apart, similar habitats may be averaged. This recommendation generated several questions of appropriateness.

4. The Biota Manual needs some guidance on how to apply this area of concern technique. You cannot apply a "cook book" methodology because every site is different, but a general process should be developed to define the conjunction between areas of contamination and habitats. Perhaps a logic flow diagram that guides the user in defining the area to be considered would be appropriate. An appendix might be added with several real-world examples to demonstrate how the flow diagram logic is used.

5. Judgement is the key. Judgement must include an analysis of uncertainties, be documented, and justifiable.

Actions/Recommendations:

Previous drafts of the Biota Manual did not include specific guidance to help the user define over what area data should be averaged. Break-out group one suggested that the Biota Manual have language up front, to include guidance (not a recipe or cook book) such as a flow diagram, or questions that a user would answer one at a time, to help one think through this issue. Examples should be included either in the text of the Biota Manual, or in an appendix. One can’t leave it up to professional judgement alone because there will be outside pressures to have some consistency.

3.2.1.3 Discussions following the Group 1 Presentation

After the presentation the floor was open to questions and comments:

There was concern expressed that the judgement used to define the conjunction of habitat and contamination must be tied together (i.e., similar logic applied) for every site. In addition, there should be some flexibility to deal with regulators concerning this conjunction. Another concern is that the methodology not preclude negotiation with the regulators over defining the extent of the area of concern.

By default, each of the areas chosen represents the exposed population and range of habitat. Population is defined by what is in the area of concern. In addition, the site use factors and fraction of the year on site for a population are adjustable parameters elsewhere in the model. The method (e.g., at the screening phase) does not take into

account specific species at this point; that is left for more detailed analysis (e.g., in the site-specific analysis step of the graded approach which uses a kinetic model).

One comment during the discussion involved the use of GIS for defining the distribution of contamination and habitat. Most sites manage their information on GIS now. It could be a valuable tool for defining areas of contamination, and habitat.

Use of the screening or analysis phases of the DOE graded approach should not "force" a mandatory decision (e.g., if there is an indication of stress greater than 1 rad/day, then remediate the area). It only points to the need or lack of need for additional analysis.

3.2.2 Group 2: Where Should the DOE Graded Approach be Applied?

3.2.2.1 Notes from Internal Group Discussions

The following is a summary of the general discussions within the Group 2 break-out session. A variety of topics were discussed regarding the applicability of the BDAC method. The discussions were initiated with the questions: “are there any problems with widespread application of the BDAC method; and "how can we encourage the wide applicability of the model without placing too many restrictions on it"?

The point was made that the method, as a general screening tool, may not be appropriate for calculating a "true" dose to biota. Conversely, several participants noted that, once you are in the site-specific analysis phase of the DOE graded approach, the method does provide a very conservative or "upper bound" dose estimate, and thus didn't see a problem with using it for this purpose.

As for other screening-type benchmarks (e.g., those developed for hazardous contaminants), there was some concern that the DOE dose evaluation method might be used to back-calculate levels for clean-up based on the expected radiological dose (e.g., 1 rad/day; 0.1 rad/day) identified in the dose assessment method. It was pointed out that the DOE graded approach methodology is intended to support the requirements in existing DOE Orders, and requirements being considered in proposed rule 10 CFR 834. As such, it may not be appropriate to speculate on how or the degree to which it might be used for regulatory compliance (clean-up levels) under non-DOE regulatory frameworks. The method offers a tool to measure where you are in relation to the dose standards for biota, which has already been established. Exceeding the biota dose limits should only be an indication that you need to initiate some form of more detailed risk assessment or analysis, and ultimately some form of risk management, which can be any number of mitigation measures, not necessarily remediation.

The group then discussed what was believed to be the “Remediation” logic:

- This will be the best dose assessment method available
- People will use it for remediation applications
- There needs to be some kind of disclaimer on uses beyond those that are intended
- There needs to be a clear statement about what the intended uses

There was quite a bit of discussion about the effect of putting in a negative disclaimer in the manual (e.g., “This method is not intended for...”) as opposed to including a positive disclaimer (e.g., “This method is intended for ...”). The concern expressed was that using a negative disclaimer may preclude legitimate uses of the method that could be justified on a case by case basis by the user. The method should be applicable for CERCLA (RI/FS) because it is a risk assessment tool: for screening ecological risk assessment (ERA) - use of default parameters and BCGs; for definitive ERA - if customized to site/receptor using site-specific analysis phase.

The group worked through the development of an "Applications Matrix", which was included in the group’s summary presentation.

3.2.2.2 Group 2 Presentation to the Full Committee *(Presenter: L. Meyers-Schone, IT Corp.)*

Problem: How can we encourage the wide applicability of the model without placing too many restrictions on it? We know the method will be applied across the DOE complex and used for purposes other than those that pertain to our immediate scope. What uses are appropriate and what are not?

Factors affecting application of the BDAC method:

- No other widely accepted models
- It will be used for compliance/remediation
- The tool is a very conservative dose estimation model
- Need a disclaimer/statement to address potential uses

Default Assumption:

The BDAC - DOE graded approach methodology is a default screening tool for ecological risk assessment. If customized (i.e., using the site-specific analysis phase and applying site-specific parameters), the tool can be used in a definitive risk assessment.

The following Applications Matrix identifies the group's expectations for the uses that could be made of the DOE graded approach:

Applications Matrix

Use	Yes	No
Non-equilibrium (linked to use for "acute exposure," see below)		Assumption is equilibrium
Accidents	Long-term potential	Accidents are typically non-equilibrium (not applicable to short-term)
T&E Species	Could be used if customized to individual level	Not intended
Clean up standards (risk management)		Not intended
NEPA	• Comparison of alternatives • Screen for issues for analysis • Use for defining significance criteria • Use for Mitigation Action Plan	
Chronic exposure	Yes	
Acute exposure (linked to non-equilibrium condition)		Not applicable to short-term
RCRA (risk assessment)	Yes	
RI/FS CERCLA & EE/CA (risk assessment)	Yes	
RCRA: Mixing Zones/Alternate Concentration Limits (ACLs)	Yes - Risk assessment will be required for ACLs	
Fresh Water	Yes - Need to be careful about data sources	

Use	Yes	No
Marine	Yes - Need to be careful about data sources	

Actions/Recommendations:

Near-term: caveats in the document

Long-term: appendix for each application (e.g., T&E Species).

R & D Needs/Future Work:

How can you customize the tool for each of the listed potential applications? Additional refinements to the spreadsheets and implementation guidance.

3.2.2.3 Discussions Following Group 2 Presentations

After the presentation the floor was open to questions and comments:

A statement should be made in the Biota Manual that says concentrations above the BCGs do not necessarily indicate adverse impacts. It is not a bright line. It is an indication that further investigation is necessary. You have to make it clear what this methodology is and what it is not. The responsibility must be placed with the user.

Perhaps an additional column should be added to the Applications Matrix. The column could be labeled "detailed analysis". For many of the items in the table, the screening phase of the methodology is inappropriate. But the model can be used as a site- specific analysis tool using detailed site data (e.g., the site-specific analysis phase of the DOE methodology).

The BDAC Core Team commented that it would include this Applications Matrix in the guidance for application of the method in the final DOE Technical Standard.

3.2.3 Group 3: BDAC Database and Web Site

3.2.3.1 Group 3 Presentation to the Full Committee *(Presenter: S. Hoier, SNL)*

Group 3 considered several issues that DOE faces in administering the Environmental Parameters Database developed through BDAC. They include the following:

1. Group 3 spent considerable time on the credibility of the data parameter values entered (e.g., each Kd and Biv), and their associated source or reference. The conclusion of the group is that each value, and associated reference, should be given a rating that indicates what level of confidence is placed in its validity. The quality of the source of data should also be identified. Together, this would provide a user with a sense of the "pedigree" of the data. For example, references could be identified as peer reviewed, published compilation, an internal report, or lab notebook data. Let the user then decide what credibility to place in the data presented.

2. Eventually the database will be open to the world. People will be able to upload data. The database needs a mandatory I.D. for each person uploading the data, so that DOE can get back to the person providing the data. This is true even if the data comes from published sources. It is expected that people posting data may not be those who published the work. An e-mail address should be required of all who upload data to the database. Optional information required should be a phone number and mailing address.

3. A second issue is how to manage the QA/QC of uploaded data. We want people to contribute, but the act of uploading should not necessarily add the information to the database. Someone will have to review what is uploaded. We will have to filter the data to officially approve it. Redundancy (data is already in the database), conflicting data, and “junk” data uploaded are three areas where intervention may be necessary. This could be very labor intensive. A "draft data" site could be available for uploading data, separate from the "master" database. Annually, the draft data site would be QA'ed, the data reviewed, and all acceptable data then moved to the master database for open access.

4. An on-line help and definitions page or glossary for the database is needed. How do we define terms?

5. Near-term emphasis should be on populating the database to show its usability. Priority should be on readily available, peer-reviewed environmental parameter data. We should also include some of the available "grey literature" parameter values - and the PDF files for “gray literature" sources or references for this data.

6. Users are telling us that there is a need for this type of environmental parameter data *right now*. Other parameters (e.g., F1 parameters, biological elimination rates) should also be added to the database. We need to identify additional core parameters to add to the database.

7. Coordination with EM-40 and the EM Center for Risk Excellence (EM-CRE) is needed. It was noted that this coordination has been initiated. There are other efforts for other databases (human health) that might be overlapping with the BDAC database.

8. We should add additional fields and streamline scripts to avoid crashes. User feedback is necessary to provide suggestions for improvements to database functionality. There should be some quality control performed on the data already in the pilot database, prior to making it available for open access outside of the BDAC.

3.3 Miscellaneous Comments from Open Discussion Following All Break-Out Presentations

The following points were made:

1. The issue of naturally occurring isotopes and background should be addressed somewhere. The current dose limits are incremental, i.e., from DOE-derived activity. If we are concerned with deterministic effects to biota, then the only thing that matters is the total dose. In practice, DOE would have to add substantial multiples of background to cause a problem. Some caveat should be provided that if you are using the methodology in an area of high background, then this should be noted and factored into the interpretation of analysis results.

   One of the exercises early-on in the process of preparing this method was comparing our numbers to background. It would be nice to have background included in the BDAC environmental parameters database from different parts of the U.S. It would be nice to know fallout levels for various radionuclides from the various sites across the nation. This would be a great addition to the BDAC database. It would be nice to have a compilation of background data across the DOE complex.

2. Can sites use measured tissue concentrations in organisms?
   - QA issues
   - Should we allow sites to do this if properly justified?
   - Manual should give permission to do this
   - Cannot assume that tissue data are higher quality than media (water, soil) data. As an example, discussions continued relative to using deer (obtained through hunting; road kills) as a data source. There is no guarantee that the deer being measured did not just wander onto the site, and thus never been exposed to site conditions.

3. Consider use of gross alpha and beta data for screening. This approach is not isotope-specific, and may be even more conservative. The advantage: if you pass the screening phase (BCGs), this would save time and expense of doing analysis to get isotope-specific data (if not currently available from sampling program).

4. What are the recommendations in the Biota Manual regarding the adequacy of representing temporal exposures? For example, there seems to be an assumption by biota dose assessors that site fish data are always better than media concentration data. This may not always be true.

APPENDIX A: BDAC MEETING ATTENDANCE LIST

BDAC 1999 Annual Topical Committee Meeting

ATTENDANCE LIST
August 18-20, 1999

NAME	DOE EMPLOYEE?	OFFICE/ AFFILIATION	PHONE NUMBER	FAX NUMBER	E-MAIL ADDRESS
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APPENDIX B: BDAC MEETING AGENDA

Biota Dose Assessment Committee (BDAC)
1st Annual Meeting
August 18 – 20, 1999

U.S. Department of Energy
Forrestal Building, Room 1E-245
Washington, DC

-- AGENDA --

Wednesday, August 18th

8:15 - 9:00	On-Site Registration
9:00 - 9:30	Welcome and Introductions Meeting Goals and Objectives Session Introduction: Biota Standards, Dose Assessment Needs, and Methodologies (S. Domotor, BDAC Chairperson, DOE)
9:30 - 9:45	Welcoming Remarks and Meeting Perspectives (Dr. David Michaels, Assistant Secretary for Environment, Safety and Health)
9:45 - 10:00	Need for Requirements and Guidance for Protection of Biota: Basis for DOE's Biota Dose Limits and Guidance (S. Domotor, DOE)
10:00 - 10:15	Biota Dose Standards and Guidance: International Activities Concerning Protection of the Environment from Ionizing Radiation (C. Robinson, IAEA)
10:15 - 10:30	Break
10:30 - 10:45	DOE's Graded Approach for Evaluating Radiation Doses to Biota: Overview of Approach and Development Process (S. Domotor, DOE)
10:45 - 11:30	DOE's Graded Approach for Evaluating Radiation Doses to Biota: Derivation of Screening and Analysis Methodologies (K. Higley, Oregon State Univ.)
11:30 - 1:00	Lunch
1:00 - 1:45	ORNL Radiological Benchmarks for Effects on Aquatic Biota (D. Jones, ORNL)
1:45 - 2:30	West Valley Biota Dose Assessment Methodology (M. McGarry, Dames & Moore)
2:30 - 2:45	Break
2:45 - 3:30	Biota Dose Assessment Methods Used at INEEL (R. Morris, ESRF; R. Van Horn, LMITCO)
3:30 - 5:00	Group Discussions on Session Presentations - Responsiveness to DOE needs - Derivation & Implementation Considerations - Applications and Lessons Learned

BDAC Meeting
August 18 – 20, 1999

-- AGENDA --

Thursday, August 19th

8:30 - 8:45	Session Introductions & Housekeeping (S. Domotor, DOE)
8:45 - 10:00	Working Session on the DOE Graded Approach: Example Applications Using Site-Supplied Data (E. Antonio, PNNL; G. Bilyard, PNNL; K. Higley, Oregon State Univ.) - Data Assembly - General Screening - Site-Specific Screening - Site-Specific Analysis - Site-Specific Biota Dose Assessment
10:00 - 10:15	Break
10:15 - 11:30	Continue with Example Application; Summarize Issues and Areas Needing Clarification
11:30 - 1:00	Lunch
1:00 - 1:30	Radioecology Program and Ongoing Research at Savannah River Ecology Laboratory; National Council on Radiation Protection and Measurements (NCRP) Initiatives (T. Hinton, Univ. GA & SREL)
1:30 - 1:45	Selecting an Appropriate RBE Weighting Factor for Alpha-Emitters (D. Kocher, ORNL)
1:45 - 2:00	Risk Management Options Following an Indication of Adverse Impact Resulting from an Eco-Risk Assessment (J. Bascietto, DOE)
2:00 - 2:15	Vertical Transport of Radionuclides by Plants: Considerations for Soil Sampling to Support Biota Dose Evaluations (G. Bilyard, PNNL; D. Jones, ORNL)
2:15 - 2:45	The Biota Dose Assessment Database of Environmental Parameters: Overview of Structure, Content, and Application (F. Baes, ORNL; K. Higley, Oregon State Univ.)
2:45 - 3:00	Break
3:00 - 5:00	Group or Break-out Discussions / Re-visit Working Session Examples of the DOE Graded Approach Applications as needed
5:30	Group Dinner (planned)

BDAC Meeting
August 18 – 20, 1999

-- AGENDA --

Friday, August 20th

8:30 - 8:45	Session Introductions and Housekeeping (S. Domotor, DOE)
8:45 - 9:00	Identify Key Recommendation and Issue Areas; Prioritize and Select Issues for Break-out Discussions
9:00 -10:00	Continue with Break-Out Discussions
10:00 -10:15	Break
10:15 -11:00	Reports from Break-Out Discussions; Summarize Recommendations
11:00 -11:45	Create a Path Forward - BDAC Charter and use of Web Site - Recommended Actions and Investments for the Future - Schedule for Completion and Distribution of the DOE Technical Standard
11:45 -12:00	Closing Remarks
12:00	Committee Meeting Adjourns
1:00 - 3:00	BDAC Core Team Extended Lunch Meeting to Discuss Path Forward

APPENDIX C: BDAC CHARTER

Charter

Biota Dose Assessment Committee

PURPOSE -

The Biota Dose Assessment Committee (BDAC) is a topical committee within the Department of Energy (DOE) Technical Standards Program (TSP). The purpose of the BDAC is to:

1. Assist the Department in conceiving, developing, and promoting technical standards and associated guidance for DOE-wide application in assessing radiation doses to biota.

2. Serve as a major forum within DOE for obtaining technical assistance, discussing technical and policy issues, and sharing lessons learned regarding biota dose standards and assessment methods.

VALUE STATEMENT -

The Department needs a forum for sharing information on the development and application of easy, standardized methods for conducting preliminary assessments of doses to aquatic and terrestrial biota. The BDAC will provide a major forum within DOE for obtaining technical assistance, discussing and coordinating positions on technical and policy elements of biota dose standards and biota dose assessment methods. and sharing information and lessons learned from DOE site-specific biota dose assessment efforts.

The development of methods for evaluating radiation doses to biota and implementing site-specific biota dose assessments requires a diverse set of scientific disciplines. The BDAC brings together the expertise in health physics, ecology, radioecology, environmental monitoring, and risk assessment that is needed to serve the Department as an effective resource to meet the purpose and objectives identified in this Charter.

OBJECTIVES -

1. Serve as the DOE focal point for biota dose assessment technical standards issues.

2. Function as the Preparing Activity/Reviewing Activity for developing biota dose assessment technical standards. In this capacity the committee will provide assistance to the DOE Office with the primary interest for coordination of newly-published technical standards.

3. Provide review and comment, and help establish the DOE-wide position on DOE, non-DOE government. and non-government consensus biota dose assessment technical standards published or in comment coordination.

4. Assist. consistent with DOE needs, in national or international biota dose assessment technical standards development.

5. The BDAC will assist in the Department's efforts to develop a cost-effective, easy-to-implement screening methodology for assessing radiation doses to biota which can be used in demonstrating compliance with DOE and internationally-recommended biota dose standards.

6. Serve as an advisory and technical assistance resource to DOE Program and Operations Offices in the application of biota dose assessment technical standards. and in the design and technical review of site-specific biota dose assessments.

7. Establish and maintain liaison with other DOE topical committees having mutual interests through the Technical Standards Program Office (TSPO). The committee shall advise all other DOE technical committees on the preparation of standards related in subject matter and the correlation and consolidations of similar standards prepared by these committees, and promote cooperation between these technical committees in areas of common interest.

8. Partner and interface with counterparts in standards development organizations (i.e., American National Standards Institute, American Nuclear Society) and other Federal agencies in the development and review of national and international technical standards.

9. Participate with representatives of other topical committees and the TSP manager to establish guidance and protocols for topical committee operations under the TSP.

10. Foster continuous improvement in biota dose assessment methods and guidance.

11. Share information and lessons learned from DOE site-specific biota dose assessment efforts.

12. Share and exchange information on technical, policy, and research needs for consideration by DOE when interacting with Federal and International Agencies on biota dose standards and assessment methods.

MEMBERSHIP -

Membership in the BDAC is open to DOE employees and DOE contractors who have interest in or responsibility for biota dose assessments through environmental and radiological protection programs and environmental risk assessment activities. Representation from each interested Program and Operations Office is a membership objective of the BDAC. The BDAC Steering Committee may set guidelines on the size of the BDAC to allow for work processes within the committee to be effective.

STEERING COMMITTEE -

The BDAC will be chaired by Mr. Stephen Domotor. DOE. Office of Environmental Policy and Assistance (EH-41), Air, Water and Radiation Division (EH-412). A Steering Committee, comprised of six representatives having the technical expertise needed for developing methods and guidance for biota dose assessment, has been established for the BDAC. The BDAC will be governed by the Steering Committee and the Chairperson (or a designated representative).

SPONSORSHIP -

The BDAC. formed in March 1998, is a technical standards topical committee organized under the DOE Technical Standards Program (TSP). The following principles will govern its operation:

Collaboration and Innovation: The BDAC will use and promote partnerships to leverage resources, expertise. and information on biota dose technical standards. The BDAC will use innovative tools and approaches to make biota dose assessment methods. guidance and expertise available to our customers.

Openness: The BDAC will take a consensus-based approach when developing technical standards for screening methodologies for biota dose assessment. The BDAC will be open to all persons who are directly and materially affected by the activity.

Balance of Interests: All technical standards development activities undertaken by the BDAC will include representatives of all categories of interest that relate to the subject matter. The composition of the BDAC Steering Committee reflects this principle.

Due Process: The BDAC will ensure that any individual or organization within DOE who believes that an action or inaction of the committee causes unreasonable hardship or potential harm is provided the opportunity to have a fair hearing of his/her concerns. A formal review process will be applied to all biota dose assessment standard methods and guidance developed through the BDAC.

Reporting: The BDAC Chair and/or Steering Committee will report on BDAC activities to the DOE TSPO on a regular basis. BDAC members will foster two-way communication within their organization by providing informal updates on the activities of the BDAC and bringing informal issues and recommendations back to the BDAC for consideration.

MEETINGS -

The BDAC Steering Committee will meet via teleconference as frequently as needed to complete work on specific tasks or milestones. The full BDAC will meet on an as-needed basis via teleconference and annually in-person at a formal meeting or workshop. The BDAC will seek to operate in a cost-effective and efficient manner. and will use innovative approaches to share information on issues, guidance and technical tools, and reviews of draft products through the BDAC Web Site.

This Charter was adopted on:

June 12, 1998

Approved:

Andrew Wallo III
Director
Air, Water and Radiation (EH-412)

Approved:

Stephen L. Domotor
Chairman
Biota Dose Assessment Committee

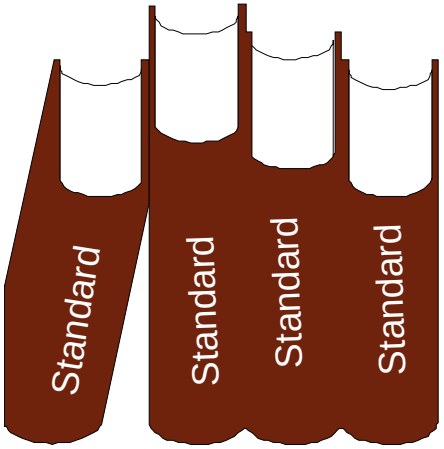
Approved by the DOE Technical Standards Program (TSP) Office:

Richard J. Serbu

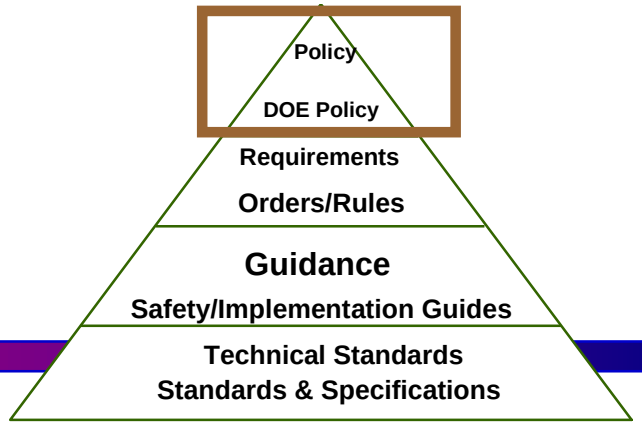
APPENDIX D: OVERVIEW OF DOE TECHNICAL STANDARDS

DOE Technical Standards Program

The Department is continuing its transition from expert-based operations to standards-based operations

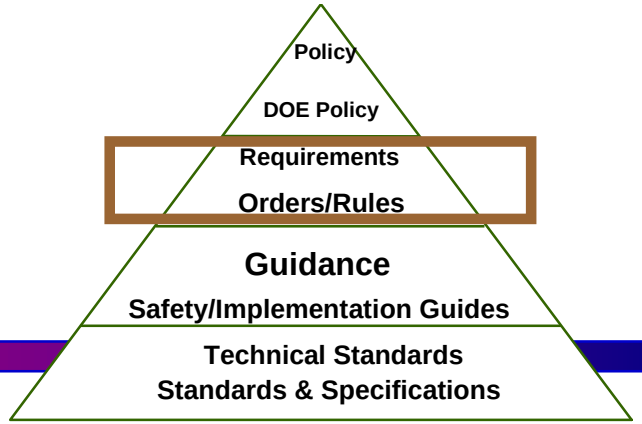


Policy



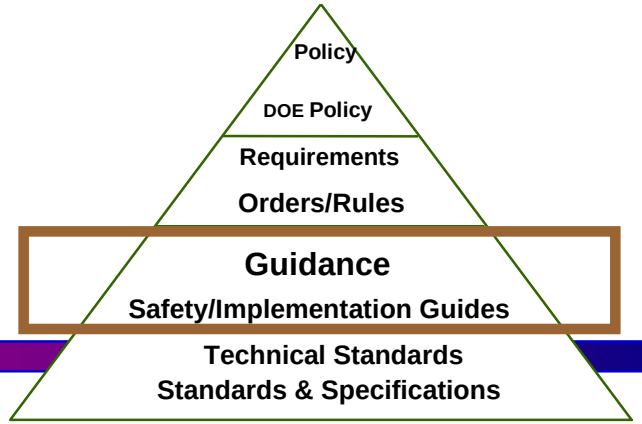
- **Policy documents describe the philosophy and fundamental values of the Department--the "why we do it" statements.**
- **All requirements and guidance flow from, and must be consistent with, policy.**

Requirements



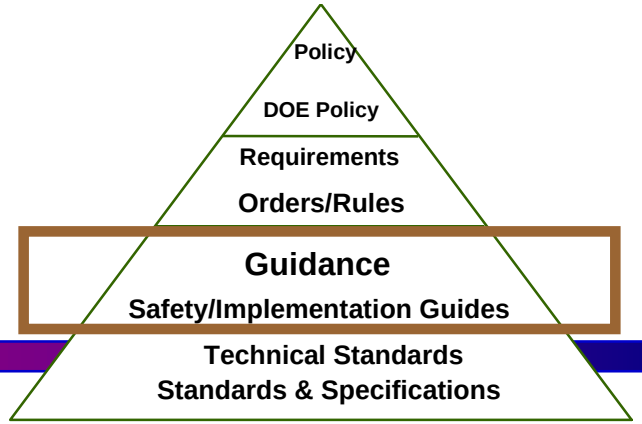
- Requirements documents, such as orders and rules, describe "what must be done."
- These documents set expectations that must be met to ensure safe and reliable facility operations.
- They do not provide information on how to do work.

Guidance



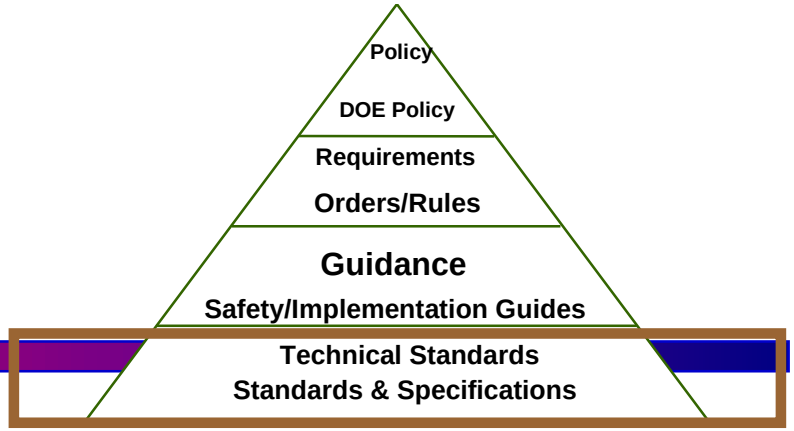
- Guidance documents (Safety and Implementation Guides) provide general information and methodologies that DOE finds acceptable to meet the Department's requirements.
- In practice, the Safety and Implementation Guides provide a link between the requirements and technical standards.

Guidance



- **Issued to guide contractors…**
  - on acceptable methods for implementing rules and orders
  - in delineating DOE's techniques for evaluating problems and events
- **May reference technical standards**
- **Not a substitute for rules or orders**
- **Provide a bridge between Requirements and Technical Standards**

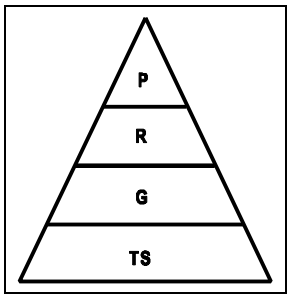
Technical Standards



- **Technical Standards provide specific methods and techniques on "how to" implement the Department's requirements.**
- **Technical Standards are the foundation upon which the DOE documents hierarchy is based.**

1. The Department of Energy (DOE) Technical Standards Program

The DOE Directives System includes a hierarchy of documents that describe how the Department does work. There are four levels of documents in the hierarchy. The top level is policy. Policy documents (P) describe the philosophy and fundamental values of the Department the "why we do it" statements. The next level, requirements documents (R), such as Orders and rules, identifies "what must be done." These documents set expectations or specify criteria that must be met to ensure safe and reliable facility operations. They do not provide information on how to do work. Guides (G), the next level, provide general information and methodologies that DOE finds acceptable to meet the Department's requirements. In practice, the guides provide a link between the requirements and technical standards. The bottom level, technical standards (TS), provides specific methods and techniques on "how to" implement the Department's requirements. Technical standards are the foundation upon which the DOE documents hierarchy is based. This hierarchy is fully described in the "Directives System Manual," DOE M (Manual) 251.1. The activities of the Technical Standards Program are described in the Technical Standards Program Procedures (TSPPs) and the latest revision of DOE Order (O) 1300.2, "Department of Energy Technical Standards Program." (Note: as of April 15, 1998, work continues toward replacing Order 1300.2 with DOE O 252.1, "Technical Standards Program", and Guide (G) DOE G-252.1-1, "Implementation Guide for the Technical Standards Program.")



Technical standards are available from a number of different sources. For DOE, the preferred source of technical standards is from the non-Government standards community [note that throughout the TSPPs, two sets of terms are used interchangeably: (1) non-Government standards and voluntary consensus standards, and (2) non-Government standards bodies and voluntary consensus standards bodies]. The non-Government standards community includes international and national standards developing organizations, such as the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), the Institute of Electrical and Electronics Engineers (IEEE), the American Society for Testing and Materials (ASTM), the American Nuclear Society (ANS), and the American Society of Mechanical Engineers (ASME). Other sources of technical standards include Federal standards, such as those issued by the General Service Administration (GSA), and Government standards, which are prepared and maintained by agencies of the Federal Government (i.e., Department of Defense, etc.).

Technical standards are used to transfer technology and standardize work processes to produce consistent acceptable results. They provide specific methods and techniques on how to implement DOEs requirements. The methods and techniques addressed in technical standards involve a range of activities, including the following: (1) common and repeated use of rules, conditions, guidelines or characteristics for products or related processes and production methods, and related management systems practices, and (2) the definition of terms; classification of components; delineation of procedures; specification of dimensions, materials, performance, designs, or operations; measurement of quality and quantity in describing materials, processes, products, systems, services, or practices; test methods and sampling procedures; or descriptions of fit and measurements of size or strength. Through the proper selection and use of technical standards, DOE and its

contractors can avoid costly duplication of effort and rework. Consequently, when searching for and selecting the right technical standards for a given application, DOE/contractor personnel are to first make use of existing non-Government standards or work with the appropriate standards writing body to have a non-Government standard developed or revised to meet DOEs needs. If no existing non-Government standard is adequate, an existing Federal or Government standard that meets the need should be used. When an adequate non-Government or Government standard neither exists nor can developed on a schedule consistent with Department priorities, a DOE technical standard should be prepared. However, when a DOE technical standard is developed, DOE and its contractors should plan to work toward converting the new DOE technical standard to a non-Government standard. This approach conforms with Federal requirements related to technical standards development and use established in Public Law (PL) 104-113 (15 U.S.C. 272) and Federal policy described in Office of Management and Budget (OMB) Circular A-119.

It is important to note that technical standards do not become requirements within DOE simply because the standards exist. Technical standards become mandatory documents when (1) they are cited as a requirement in a DOE policy (P) or requirements (R) document; (2) they are identified as mandatory in DOE-approved contractor documents, such as safety analysis reports and sets of work-smart standards; or (3) they are identified as mandatory standards in contractual agreements between DOE and its contractors.

Information is the product of the Technical Standards Program. To be effective, that information must reflect the Department's needs and be communicated to those people who need it. The Technical Standards Program has been structured with this in mind. Figure 1 illustrates the program's working interfaces.

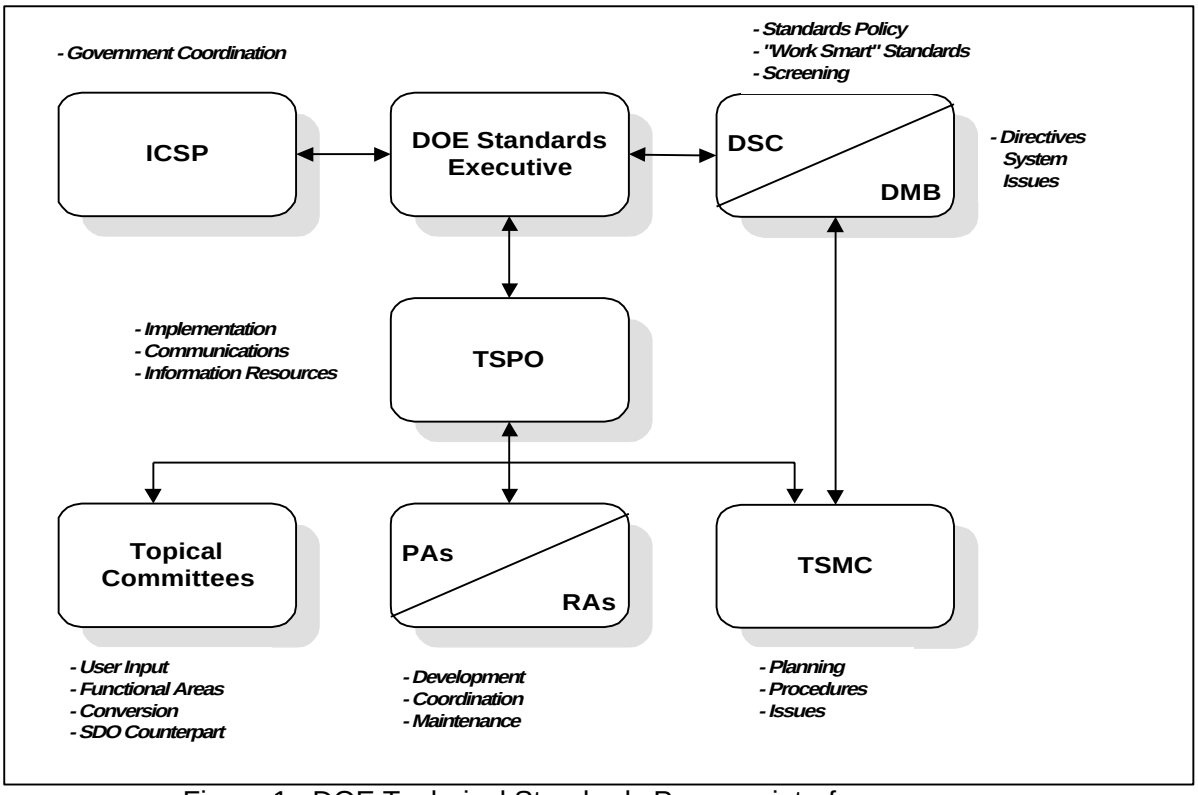


Figure 1. DOE Technical Standards Program interfaces.

Because technical standards are recognized as the foundation of the documents hierarchy in DOE, there are two Department policy bodies that directly influence the strategies and methods employed by the Technical Standards Program. The Department Standards Committee (DSC) provides overall direction and vision on strategic standardization issues within DOE; the Directives Management Board (DMB)[1] provides a similar function for the DOE Directives System. Both groups are composed of senior DOE officials. Serving as an advisor to the DSC, the Department Standards Executive, designated in accordance with OMB Circular A-119, directs implementation of the Department's policy on the development and use of technical standards. In this role, the Department Standards Executive also represents DOE's interests in Federal agency standardization activities coordinated by the Interagency Committee on Standards Policy (ICSP).

The DOE Technical Standards Program Manager provides leadership and management support for the Technical Standards Program Office (TSPO), established to implement the requirements of PL 104-113 and OMB Circular A-119 through the Technical Standards Program, and a network of Technical Standards Managers (organized as the Technical Standards Managers' Committee, TSMC) representing every DOE Headquarters program office, DOE operations and field office, and contractor organization. The Program Manager brings focus, continuity, and purpose to the program; concurrently, the TSPO and TSMC act as a clearinghouse for standards information, promote participation of individuals in non-Government standards work, identify and respond to standards needs, provide information on DOE technical standards initiatives and relevant non-Government standards work, and expand standards awareness through education and other outreach programs.

DOE Headquarters, field, and contractor organizations rely on the expertise and services of the TSPO and TSMC to meet their program responsibilities as either Preparing Activities (develop/maintain technical standards) or Review Activities (assess the adequacy of technical standards for meeting identified needs). Overall coordination of specific technical standards issues both within DOE and directly with the non-Government standards community can also be conducted through designated topical committees recognized under the Technical Standards Program. These groups are usually composed of subject matter experts (SMEs) from various DOE/contractor organizations and organized under a single chairperson. Topical committees generally function independently under the broad recognition of the Technical Standards Program; they can be called upon to support specific technical standards needs within the Department and use the Technical Standards Program forum to bring forward important technical standards issues for consideration. The Technical Standards Program is a Department-wide effort that crosscuts all organizations and disciplines. Information on the Technical Standards Program can be electronically accessed at the following Internet address (URL):

http://apollo.osti.gov/html/techstds/techstds.html

In addition, the American National Standards Institute has developed the National Standards Systems Network (NSSN), a global information system on international, regional, and domestic technical standards. The NSSN can be electronically accessed at the following Internet address (URL):

http://www.nssn.org/

[1] As of June 1, 1998, the DMB function is inactive. However, it is expected that this function will be reactivated in the near future.

Technical standards provide a practical solution to the Department's challenge to safely and reliably manage and operate its facilities at reasonable cost. Through them, the technologies of industries and governments worldwide are available to DOE. Technical standards are the repository for international experience and knowledge. The Technical Standards Program links the Department to this repository.