United States Environmental Protection Agency

Paper on Tribal Issues Related to Tribal Traditional Lifeways, Risk Assessment, and Health & Well Being:

Documenting What We've Heard

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Developed by:

The National EPA-Tribal Science Council

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Purpose of This Document

This document is meant to consolidate the many issues and ideas that have emerged from the various workshops that the National EPA-Tribal Science Council (TSC) has held on the topic of risk assessment, health and well-being, and tribal traditional lifeways. It is intended to serve as a starting point for discussion by EPA staff as to potential approaches for addressing some of these issues from an EPA perspective. Although it was not written by tribes, it is meant to capture tribal perspectives that emerged from these events.

Background

In September of 2002, the TSC tribal representatives formally identified tribal traditional lifeways and subsistence as their highest priority science issue, with a focus on both looking at ways to integrate tribal traditional lifeways and subsistence lifestyles into EPA's current risk assessment policies and procedures as well as discussing development of a potential new environmental decision-making paradigm, one focusing on human health and ecological well-being.

This issue impacts tribal communities throughout Indian Country. Tribes assert that EPA's current risk assessment policies and procedures are not protective of tribal resources and lifeways, and are not adequate to account for or include a holistic approach for assessing the social, cultural, and spiritual values, beliefs, and practices that link tribal people to their environment. Current risk scenarios and risk factors are geared toward urban settings in the United States. They were not developed with subsistence lifestyles in mind, and, therefore, tribes that practice tribal traditional lifeways that focus on subsistence practices or lifestyles outside the "mainstream" are less protected since they are subject to increased exposure. In addition, the risk management solutions identified from the current risk assessment methodologies often force tribal populations to alter activities that are essential to their existence, such as those constraints imposed by the creation and adoption of fishing and hunting advisories.

Tribes wish to play an integral role in developing improved risk assessment policies and procedures within the Agency. In addition, they ask that EPA allow for increased consultation and coordination with tribal governments when risk assessment and management activities are undertaken that potentially impact their lands, resources, and cultural practices. As sovereign nations, tribes assert that they posses a legal and moral right to be involved in decision making that affects their people, lands, and aboriginal and treaty rights due to the federal trust responsibility, which arises from Indian treaties, statutes, executive orders, and the historical relations between the United States and Indian tribes.

This trust responsibility is underscored by EPA's Indian Policy, which supports tribal "self-government" and "government-to-government" relations between federal and tribal governments. Under EPA's 1984 Indian Policy, EPA recognizes tribal governments as sovereign entities with primary authority and responsibility for the reservation populace. Accordingly, EPA will work directly with tribal governments as the independent authority for reservation affairs, and not as political subdivisions of states or other governmental units.

Formed in 2000, the National EPA-Tribal Science Council's mission is to provide a forum for tribes and EPA to work collaboratively to identify and address national environmental science issues of importance to both tribes and EPA. To ensure that the TSC has a national and cross-program perspective, it is composed of a single tribal representative from each EPA Region with federally recognized tribes, a tribal representative from Alaska, and an Agency representative from each EPA Program and Regional Office.

The TSC tribal representatives formally raised the issue of tribal traditional lifeways and subsistence lifestyles and their lack of representation in current risk assessment policies and procedures as a priority for the Council to address in September 2001; this issue was reiterated as a tribal science priority by the Council in November 2004. To address the issue, the TSC decided to focus on both the short-term goal of integrating tribal traditional lifeways and subsistence lifeways into EPA's risk assessment process and the more long-term goal of developing a new environmental decision-making paradigm for EPA consideration, one focusing on human health and ecological well-being. Specifically, the TSC has sponsored three workshops that have brought together tribal representatives and risk experts to help advance its thinking on these topics over the past two years. They have included the following:

TSC Workshop on Health & Well Being and Risk Assessment held in Albuquerque, NM on February 19-20, 2003. The purpose of this workshop was to convene specific tribal representatives working on addressing these topics and EPA staff experienced with the risk assessment process to gain a better understanding of the issue and better insights into the way EPA and tribes view the current risk assessment process.

TSC Workshop on Health & Well Being and Tribal Traditional Lifeways held in Reno, NV on May 13-15, 2003. The purpose of this workshop was to share the health and well-being concept with a broader audience and get feedback that would help build on information collected during the "National Subsistence Technical Planning Meeting for the Protection of Traditional & Tribal Lifeways" hosted by the Alaska Native Science Commission in Alaska in April 2003.

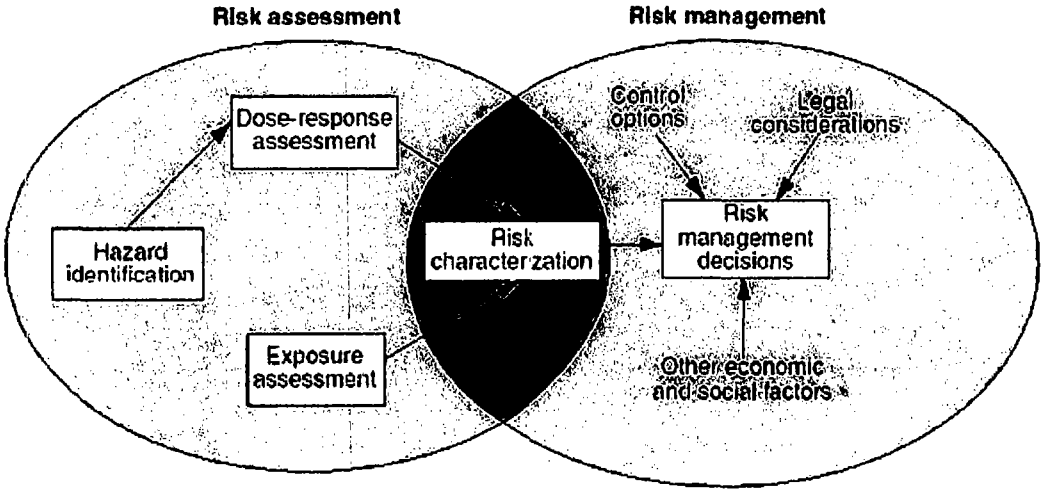
TSC Workshop on Addressing Tribal Traditional Lifeways in EPA's Risk Assessment Policies and Procedures held in Reno, NV on January 24-27, 2005. The purpose of this workshop was to convene a group of tribal representatives working in the area of risk assessment and a broader audience of observers to talk about both short-term things that EPA and tribes could do to address the current risk assessment process and identify approaches for more long-term changes that are more tribally appropriate.

Introduction

The three TSC workshops resulted in a great deal of discussion by tribal representatives both on the short-term goal of integrating tribal traditional lifeways and subsistence lifestyles into EPA's current risk assessment process and the more long-term goal of developing a new environmental decision-making paradigm for EPA consideration. The following sections highlight and categorize some of the issues, ideas, and comments presented by the tribal representatives as these workshops. Section I presents the information provided during discussions by tribal participants regarding improving EPA's current risk assessment process through the integration of tribal traditional lifeways and subsistence lifestyles into EPA's current risk assessment policies and procedures. Section II presents the information provided by tribal representatives regarding the potential development of a new environmental decision-making paradigm that would focus on human health and ecological well-being.

What is Risk and How does EPA use it?

Generally, risk refers to the possibility of injury, harm, or other adverse and unwanted effects. The analysis, management, and communication of risks to human health and safety and environmental quality is the foundation for the risk assessment paradigm. The National Academy of Sciences (NAS) published the environmental risk assessment paradigm (Figure 1) in 1983, National Research Council. The NAS concluded that the paradigm consists of two separate elements - risk assessment and risk management. NAS defines risk assessment as "a process in which information is analyzed to determine if an environmental hazard might cause harm to exposed persons and ecosystems."



Source: EPA Office of Research and Development.

Figure 1. Diagram of risk assessment paradigm

EPA uses the paradigm and definitions published by NAS as their basic approach in assessing and managing environmental risks. The overall process provides a way for EPA's environmental decision making including legal, regulatory, policy and criteria. Figure 1 shows the basic steps in the assessment of human health risk. While ecological risk assessment uses a different framework, both frameworks provide the scientific data and information from the assessment that feeds into risk management decisions that also considers other legal, economical, social, other factors.

Whether one is assessing human or ecological risk, EPA uses relevant data and information to the extent possible; limitations on data use can include lack of appropriate peer review, unacceptable quality, an inability to make the information available to the public or ethical considerations. Where relevant chemical- or exposure-specific data cannot be found or can't be used, EPA employs default assumptions and extrapolations to fill in the data gaps so that the risk assessment process can proceed. Use of defaults and assumptions is described in detail in *Risk Assessment Principles and Practices* (U.S. EPA, 2004). Occasionally, the results of hazard

identification and dose response are published separately and represent many people in the United States. For example, the EPA Integrated Risk Information System (IRIS) provides this type of information to assist risk assessors, who must perform their own exposure assessment and characterization of risk. Additional details for both the human and ecological risk assessment processes are described below.

Human Health Risk Assessment

EPA has developed Guidelines for assessing risk to humans that follow the four steps in Figure1: Hazard Identification, Dose-Response Assessment, Exposure Assessment, and Risk Characterization.

Hazard Identification

This step poses some fundamental questions. Does this environmental contaminant pose a hazard to humans? Does it cause cancer, kidney damage, developmental effects or some other health endpoint? EPA generally uses a weight of the evidence approach in these decisions. All data on studies in humans, animals or *in vitro* tests are evaluated for quality and as to whether they demonstrate an effect. Both positive data and those which do not show an effect are considered using frameworks established in these EPA publications: *Guidelines for Mutagenicity Risk Assessment* (U.S. EPA, 1986a); *Guidelines for Developmental Toxicity Risk Assessment* (U.S. EPA, 1991); *Guidelines for Reproductive Toxicity Risk Assessment* (U.S. EPA, 1996); *Guidelines for Carcinogen Risk Assessment* (U.S. EPA 1986b, revised U.S. EPA 2005). These guidelines provide a framework for evaluating data and choosing the mode of action whereby the contaminant produces its effect

Dose-Response Assessment

This is the step which determines the potency of the contaminant in producing health effects. The dose response assessment may estimate a level of exposure without appreciable risk or a level of risk at a particular exposure. Generally, the dose-response assessment consists of two parts: the evaluation of data in the observable range, and the extrapolation from the observable range to low doses. In the first part, the risk assessor may apply a biologically based model or fit a mathematically derived curve to the data for an effect, such as tumors observed in rats. The choice of extrapolation method below the point of departure depends on consideration of the mode of action. When the mode of action implies a threshold, EPA generally calculates a reference dose or reference concentration (RfD or RfC), by dividing the point of departure by a series of factors to account for variability and uncertainty. The methodology can be found in *A Review of the Reference Dose and Reference Concentration Processes* (U.S. EPA 2002). When the mode of action implies linearity of response at low dose, then procedure is to draw a line from the point of departure through the origin of the dose response curve. The estimate of potency is the slope of the line. For contaminants thought to be carcinogenic, low dose linearity is the default when the mode of action is not known.

Exposure Assessment

In this step the risk assessor determines how people are exposed or come in contact with the contaminant. Is it inhaled, eaten in foods, ingested in water or is there some other route of exposure? The risk assessor will estimate the amount of contaminant to which different

populations will be exposed. In the best circumstances this estimate will use data specific to the population in question; most often it will use models or rely on defaults for amount of air inhaled, amount of soil ingested and so on. If the data and methods are available, exposure assessment will include estimates of the amount of contaminant which reaches the target organs. *EPA has published Guidelines for Exposure Assessment* (U.S. EPA 1992) as well as an *Exposure Factors Handbook*, (U.S. EPA 1997) listing defaults for ingestion, body weights and so forth; the latter document is being updated.

Risk Characterization

This final steps combines all the information and judgments from hazard identification, dose response and exposure assessment. The risk characterization should include a description of the nature and magnitude of the risk, an interpretation of the adversity of the risk, a summary of the confidence or reliability of the information available to describe the risk, areas of where information is uncertain or lacking completely, and documentation of all of the evidence supporting the characterization of the risk.

The risk characterization can take many forms and be more or less lengthy. For example, in the Mercury Study Report to Congress, the risk characterization comprised an entire volume, which provides estimates of numbers of people at risk, who was particularly susceptible, extent of risk to wildlife, and a comparison of the magnitude of risks between wildlife and humans. In all cases, EPA's Risk Characterization Policy (U.S. EPA 2000) requires that the risk assessment be transparent, clear, reasonable and consistent with other assessments of similar scope. Whenever supported by data and methods, the risk characterization will include not only descriptions of uncertainty and variability, but also quantitative estimates of uncertainty or variability.

Ecological Risk Assessment

Ecological risk assessment "evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors" (U.S. EPA, 1992a). The process is process is used to systematically evaluate and organize data, information, assumptions, and uncertainties in order to help understand and predict the relationships between stressors and ecological effects. An assessment may involve chemical, physical or biological stressors, and one stressor or many stressors may be considered. Ecological risk assessment provides valuable information for environmental decision making by giving risk managers an approach for considering available scientific information along with the other factors needed to consider (e.g., social, legal, political, or economic) in selecting a course of action.

Ecological risk assessment includes three primary phases: problem formulation, analysis, and risk characterization. In problem formulation, risk assessors evaluate goals and select assessment endpoints, prepare the conceptual model, and develop an analysis plan. During the analysis phase, assessors evaluate exposure to stressors and the relationship between stressor levels and ecological effects. In the third phase, risk characterization, assessors estimate risk through integration of exposure and stressor-response profiles, describe risk by discussing lines of evidence and determining ecological adversity, and prepare a report. The interface among risk assessors, risk managers, and interested parties during planning at the beginning and

communication of risk at the end of the risk assessment is critical to ensure that the results of the assessment can be used to support a management decision.

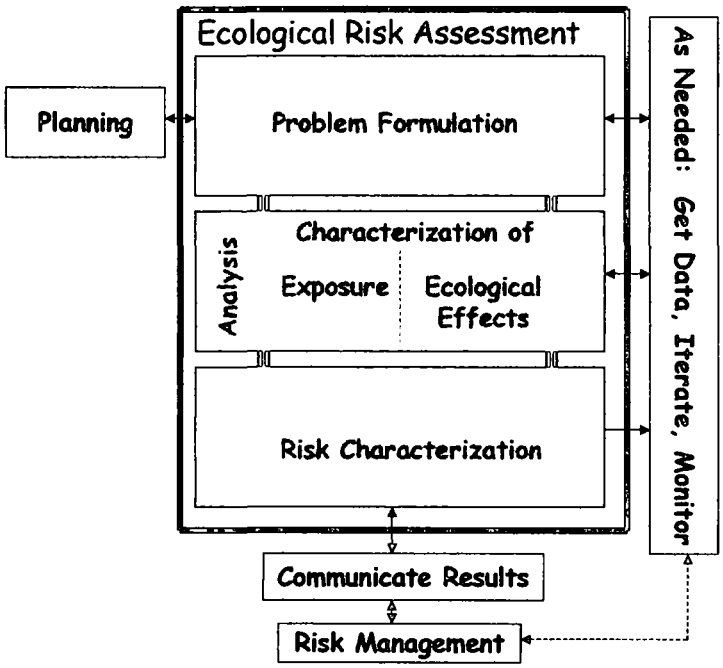


Figure 2. Diagram of Ecological Risk Assessment

Section I: Changing the Current Risk Assessment Policies and Procedures

Although tribes have expressed interest in having EPA develop a new, more tribally appropriate decision-making process that would serve as an alternative to the current risk assessment paradigm, a significant number of the discussions the TSC has had with tribes have focused on changes that could be made to improve the current risk assessment process. The sections that follow highlight the various issues that were raised by tribal representatives during the three workshops convened by the TSC regarding how to change the current risk assessment process to be more reflective of tribes' needs in the near term. The issues are presented in no particular order.

Increase Educational Opportunities for Tribes on EPA's Risk Assessment Process

In general, tribal representatives have expressed a need for increased educational opportunities about risk-related topics. As a workshop panel member at the 2005 Reno workshop, stated, a disconnect exists between data collection efforts and how this data is utilized to understand human, ecological, and community impacts. Additional education and training is important in enabling tribal members to better understand the risks associated with exposures and impacts. In the short-term, EPA should support and develop education and risk assessment tools to allow tribes to better utilize environmental and risk data to reduce their exposures and impacts. (2005 Reno pg 25-26) The specific educational topics identified by tribal representatives are described below.

Risk Assessment Paradigm

At the 2003 Albuquerque workshop, a tribal participant indicated that tribes frequently do not grasp their regulatory situation and the implications of ARARs and NEPA/CERCLA/NRDA processes involving risk assessment and associated data collection. (2003 Albuquerque, pg 16) Although EPA presented a half-day risk assessment training course at the 2005 Reno workshop that provided participants with an overview of basic risk assessment terminology and processes, tribal participants indicated that they would have preferred a course that was longer and more tribally focused. A participant suggested that a full- or 3/4-day training course on risk assessment would have better educated participants on the basics of risk assessment. There was general agreement from training participants that those providing risk assessment training to tribes should have experience working with tribal communities and possess an understanding of tribal structure, culture, and lifeways. Participants felt that any risk assessment training provided to tribes should provide real-life examples and case studies specific to Indian Country. *(Tribal Science Council Risk Assessment/Health & Well-being Workshop: Training Evaluation Summary, Comments Summary.)*

Risk Communication

At the 2005 Reno workshop, a tribal participant indicated that there is often a

misconception by tribes that they will be able to use risk assessment data to identify and prove the source of health impacts within their community. Tribes are often disappointed by the risk assessment process when clear health impacts cannot be demonstrated. (2005 Reno, pg. 18) Additional education and training are needed so that tribes understand how risk assessment data are used to understand human, ecological, and community impacts and how this information is then utilized in risk management decision making.

Risk Ethics and Informed Consent

When working with tribes on risk assessment studies and gathering potentially sensitive tribal data, it is important that tribes are educated on issues of informed consent and risk ethics, ensuring that tribes are provided adequate information on both the possible risks and the potential benefits of their involvement to allow them to make informed decisions as to whether and how they wish to be involved in risk assessment processes. During the 2005 Reno workshop, a participant representing a tribal organization identified the specific need for training on risk ethics and informed consent, highlighting the advantages and possible disadvantages of tribal participation in the risk assessment process. (2005 Reno, pg. 24)

Educate EPA on Tribal Values and Culture

At the 2003 Reno workshop, there was general consensus that tribal communities need to be involved in educating EPA on tribal values and in changing Agency culture to allow for tribal issues and concerns to be recognized and incorporated into policy decisions. (2003 Reno, pg. 12) During the 2003 Reno workshop, a tribal speaker reflected this sentiment more broadly, indicating that tribes need to educate the outside world as to the needs and values of native peoples. (2003 Reno, pg. 10)

Outreach and Involvement of Tribes

In a number of discussions, tribal representatives have emphasized the importance of early and continued involvement by tribes throughout the risk assessment and risk communication process. Workgroup members at the 2005 Reno workshop, made a number of suggestions for promoting early and continued communication with tribes, with the goal of improving risk assessment policies and procedures. These included:

Tribal Consultation

Efforts are needed to ensure that tribes are appropriately consulted on risk assessment activities, particularly in respect to gaining insights into potential historical observations regarding environmental impacts and change. (2005 Reno, pg. 10-11) During the 2003 Albuquerque workshop, a tribal representative observed that consultation with tribes during the risk assessment process is vital. She observed that the key to defining risk lies in defining risk from a tribal community's perspective and noted that EPA and tribes often possess differing views on risk. EPA is often addresses risk from a media-focused, media-driven perspective and tribes are often most concerned with the direct impacts of various risk factors on the community as a whole. As a result, government-to-government consultation between EPA and individual tribal governments is extremely

important to allow for adequate risk characterization and definition. (2003 Albuquerque, pg. 6) However, additional clarification is needed in defining how tribal consultation will occur in terms of both site-specific (e.g., Superfund site cleanup) and national-level processes (e.g., establishment of drinking water standards and re-registration of pesticides). Clarification is also needed regarding with whom the Agency will consult (e.g., tribal government, tribal elders, tribal organizations, etc.). A suggestion was made during the 2005 Reno workshop, that the tribal consultative process being developed by the EPA American Indian Environmental Office (AIEO) be incorporated into any tribal collaboration and communication efforts involving the development of new risk assessment policies and procedures. (2005 Reno, pg. 28)

Formal Agreements Regarding Decision Making

EPA and tribes should enter into a formal agreement prior to the planning and problem formulation phase to generate a two-way conversation regarding the issues involved and to provide an opportunity for the tribes involved to identify their unique questions and concerns. At the 2005 Reno workshop, participants indicated that EPA and tribes should hold upfront discussions to determine how information generated during the risk assessment will be used and that tribes should be allowed to enter into a co-decision making process if tribal lands may be impacted. (2005 Reno, pg. 10-11)

Resources for Tribal Involvement

In addition, when providing for appropriate involvement and coordination with tribes, consideration needs to be given to ensure that tribes possess sufficient resources to be able to participate. During the 2005 Reno workshop, there was general agreement from participants that a number of tribes lack sufficient technical and financial resources to assess and manage risks, while at the same time these tribes often have to contend with large tracts of land, cross-media contamination, and long- and short-term exposures. (2005 Reno, pg. 29) At the 2003Albuquerque workshop, participants reported that the funding made available for tribes for risk assessment is "woefully inadequate and inconsistent." (2003 Albuquerque, pg. 16) For tribes to be effectively involved, they need to possess sufficient resources, such as, travel, funding for participation, research, etc. (2005 Reno, pg. 11)

Valuation of Natural Resources

During the 2005 Reno workshop, a TSC member observed that one of the major reasons that risk assessment does not work well in Indian Country is that a disconnect exists in the way that tribal and non-tribal communities value the environment and their resources. (2005 Reno, pg. 19) While EPA factors economic considerations into its risk management decisions, thereby necessitating that an economic (dollar) value be placed on natural resources, many tribal communities do not accept monetary valuation of their resources. Some tribal representatives have indicated that valuation metrics that do not involve the concepts of "Western economies" are needed. (2005 Reno, pg 29) At the 2003 Albuquerque workshop, a suggestion was made by a tribal member that traditional economic variables that are used by the Agency be replaced with "economic" variables of consequence to tribal communities, such as relating things in

terms of valued tribal resources (e.g., number of moose hunted by a tribe). (2003 Albuquerque, pg. 11)

Data Collection and Use

During the three workshops, tribal representatives identified a number of issues related to data collection and use within the context of risk assessment processes. These issues, which included the need to incorporate both tribal traditional knowledge and qualitative data into the risk assessment process, the need to develop methods for ensuring appropriate collection of data from tribal sites, the need to ensure data ownership by tribes and to protect confidentiality of tribally sensitive data, and the need to improve quality assurance of tribal data. Each of these issues is further explained below.

Incorporate Tribal Traditional Knowledge

Many tribal representatives participating in the TSC workshops emphasized that tribes possess a great deal of observational and experiential knowledge about their environment. They indicated that this knowledge, often referred to as tribal traditional knowledge and tribal ecological knowledge, should be incorporated into existing risk models and scenarios. At the 2003 Albuquerque workshop, a tribal representative observed that the work that EPA is conducting on risk assessment is not new and that tribes have observational and experiential knowledge with the issue dating back for centuries. She observed that when developing tribal risk assessments, this direct observational and experiential knowledge needs to be incorporated. She explained that in tribal communities, this type of direct observation, experience, and habituation, which is handed down by the generations, is held to be much more truthful than secondhand knowledge, represented by the traditional Western science methodology of gathering and incorporating scientific data into reports. (2003 Albuquerque, pgs. 5-6)

During the 2005 Reno workshop, it was indicated that both "Western" science and tribal traditional knowledge need to be recognized as forms of science (2005 Reno, pg. 15), that tribal traditional knowledge should be included as an input into risk assessment on equal footing with scientific data (2005 Reno, pg. 27), and that guidance is needed on where and how to include tribal traditional knowledge into the risk assessment process (e.g., in identifying appropriate sampling sites and sampling periods.) (2005 Reno pg. 28)

In a related discussion at the 2005 Reno workshop, a tribal representative spoke of the need for generating valid ethnographic data to use in risk assessment processes, noting that anecdotal tribal information should not be dismissed, but that care should be taken to ensure that the data is valid (i.e., that the data collected are systematic and repeatable and are considered "good data"). (2005 Reno, pg. 24)

Incorporate Qualitative Data

At the 2005 Reno workshop, there was discussion on the need to incorporate qualitative, rather than strictly quantitative, data into EPA's risk assessment process, particularly as some tribal members indicated that they did not agree that spiritual and cultural aspects

of a tribe's lifestyle could be quantified. (2005 Reno, pg. 22) Methods are needed for incorporating this qualitative information into the risk assessment process so that it is provided to decision makers when making risk management decisions. At the January 2005 workshop in Reno, NV, there was recognition that both qualitative and quantitative approaches to risk assessment exist and that debate on these issues is healthy. (2005 Reno, pg. 28) A tribal representative indicated that qualitative data should be allowed to be brought into the risk assessment process and given equal weight with quantitative data. (2005 Reno, pg. 23) Several workshop panel members agreed that more discussion is needed as how best to incorporate qualitative data inputs into the risk assessment process in an equitable way, as risk assessments are constrained by current laws and mandates. (2005 Reno, pg. 25)

Appropriate Data Collection from Tribal Sites

Tribal members noted on various occasions that the samples and data collected for risk assessment purposes from tribal sites was often done without tribal involvement, and, therefore, was not representative of the impacted tribe's health and lifeways. At the 2005 Reno workshop, a TSC tribal representative indicated the need for tribes to be involved in the planning and development of risk assessments, particularly in regard to sampling protocols to determine where and when to sample and, in the case of fish sampling, what parts of the fish to sample. (2005 Reno, pg. 18) In addition, during the 2003 Albuquerque workshop, a tribal representative spoke of her experience involving baseline human health risk assessments conducted on lands on the Akwesasne Reservation in New York. She highlighted a number of instances in which the tribe felt that tribal concerns were not taken into account during data sampling and collection. These included the lack of data on consumption rates for women of child bearing age in the assessment, the collection of data on limited stretches of the river system that was impacted, and limited data on only two fish species that were not considered to be the most important species by the tribal community. (2003 Albuquerque, pg. 13)

Data Ownership and Confidentiality

The issue of data confidentiality and ownership is very important to tribal communities, who can be reluctant to provide sensitive tribal data to outside entities. Such a reluctance to share data can impact risk assessment processes. As noted by an EPA representative at the 2005 Reno workshop, a major obstacle to complete the Tribal LifeLine Project has been EPA's ability to access tribal data. (2005 Reno, pg. 20)

Data access and ownership is particularly problematic due to concerns by tribes that providing tribal data and information driving risk assessment studies will subject the data to become publicly available under Freedom of Information Act (FOIA) requirements. A tribal representative at the 2005 Reno workshop, indicated that, recognizing the need to work within the framework of the existing risk assessment framework and within the parameters of FOIA, tribes should be educated on the various options that exist for protecting tribal data while working within these structures. A tribal representative observed that tribal exposure models are each context-specific, and,

therefore, there are ways to include cultural impacts and risks in a general way that would allow tribes to use these models. (2005 Reno, pg. 23)

Quality Assurance of Tribal Data

Some frustration was voiced that, in the past, EPA has rejected tribally developed data from risk assessment studies. (2003 Albuquerque, pg. 13) During the *2005 Reno workshop*, a tribal representative emphasized that in developing tribal exposure assessments, it is necessary to gather peer reviewed data that meet the strict rules of evidence and are well documented. During the workshop, it was also suggested that collaboration between EPA and tribes is needed to ensure that the data developed by tribes is considered valid and is accepted under EPA's laboratory standards. (2005 Reno, pg. 29) and that additional focus on data quality assurance standards is needed to ensure that the data developed and provided is valid and will be accepted by EPA.

Unique Tribal Exposures

Tribal representatives have asserted that current risk assessment policies and procedures do not take into account or allow for unique characteristics of tribes and tribal communities that create unique tribal exposures, and, therefore, are not fully protective of tribal health and lifeways. Throughout each of the three workshops, tribal members discussed numerous aspects of tribal communities and tribal lifestyles that result in their unique exposure factors, including:

Tribes Represent Relatively Small Populations: At the 2005 Reno workshop, a tribal member indicated that tribal populations are unique because they possess relatively small population numbers in comparison to the general U.S. population. As a result, the individual indicated that tribes are unique in facing the possibility of cultural loss and even extinction in the face of environmental hazards. The tribal member suggested that EPA consider different standards and a different definition of "population" where tribal communities are involved. (2005 Reno, pg. 9) Small population size also makes it difficult for many tribes to demonstrate significant human health impacts during standard risk assessments so as to warrant action by regulators. As noted by a tribal representative at the 2005 Reno workshop, within existing risk assessment models, many tribes are not large enough to register a population impact or "cancer cluster;" therefore, many tribes are trying to identify other environmental indicators to demonstrate environmental impact. (2005 Reno, pg. 25)

Tribes are Tied to Fixed Land and Resource Bases: At the 2005 Reno workshop, a tribal member indicated that tribes are unique in that tribal communities are tied to their lands and are not able to simply move away from contamination sources when impacts occur. (2005 Reno, pg. 29) In addition, at the 2005 Reno workshop, a TSC representative observed that tribal resources and their value to the tribe are very much tied to their lands and their geographic proximity. He described an instance in which a biological opinion paper developed by the U.S. Fish and Wildlife Service (USFWS) for bald eagles nesting along the Penobscot River was developed. The risk assessment conducted by USFWS concluded that the population of eagles in the entire Northern States Recovery Region (comprising 24 states) would not be jeopardized if the eagles

along the river were removed and, therefore, allowed the "taking" to occur. However, the eagles were part of the Penobscot Indian Reservation, and the cultural impact to the tribe from the loss of the eagle community on their Reservation was never considered in either the risk assessment or risk management decision processes. At issue was the fact that it was the eagle population within the Reservation to which the tribe has close cultural connections and, therefore, impacted the tribe and not the eagles elsewhere in the country. (2005 Reno, pg. 18-19)

Tribes Possess Unique Dietary, Religious, and Cultural Practices: As discussed during the 2005 Reno workshop, each tribe possesses a unique variety of tribal practices, including tribal diets, religious practices, and cultural practices (e.g., basket making, use of medicinal plants, and sweat lodge ceremonies) that should be factored into tribal exposure scenarios. (2005 Reno, pg. 28) Recognition is needed that impacts affecting tribal culture and diet greatly impact tribal health. (2005 Reno, pg. 29) During the 2003 Reno workshop, a tribal participant indicated that exposure scenarios need to be reflective of tribal lifestyles and consumption patters. As an example, they observed that a number of tribes living "subsistence lifestyles" consume large quantities of a variety of fish species, which can complicate the development of accurate exposure scenarios, and that, for many tribes, fish advisories restricting or eliminating fish consumption are not a viable risk management solution, as, for many, tribes cannot give up their lifestyle practices in response to fish advisory warnings. (2003 Reno, pg. 24)

To help address these unique tribal exposures within the current risk assessment process, various suggestions were provided by the tribal representatives attending the workshops. These suggestions are outlined below.

Include More Sensitive Populations

At the 2005 Reno workshop, a tribal representative indicated that the current risk assessment processes needs to be improved to better include more sensitive populations, expanding current models, which focus mainly on exposures to the general U.S. population. (2005 Reno, pg. 17)

Demonstrate Care When Developing "Tribal Default Values"

EPA, in its *Exposure Factors Handbook,* summarizes data on human behaviors and characteristics affecting exposures and provides recommended exposure factor values. These recommended exposure factor values can serve as "default values" to be used by risk assessors when sufficient site-specific data for a specific geographic population is not available. These default values are generally based on the typical U.S. suburban population.

At the 2003 Albuquerque workshop, participants discussed the need to develop default exposure values that are more applicable for tribal communities than the current default values developed for the "general population." However, tribal representatives expressed concerns that the default values developed for a particular tribe under a particular set of conditions could be construed as being "the tribal default values example," which would

then be factored into all future tribal risk assessments. (2003 Albuquerque, pg. 19) During the workshop, a tribal representative had reported that the Shoshone-Bannock Tribes have experienced problems with this, involving a contractor that wished to utilize the default values developed by Barbara Harper for another tribe and extrapolate them for a risk assessment being developed for the Shoshone-Bannock Tribes. (2003 Albuquerque, pg. 16) Tribal representatives indicated that, where possible, default values should be replaced by the best available data for a given tribal community. (2003 Albuquerque, pg. 18)

When, during the *2005 Reno workshop*, a suggestion was made to develop a separate "tribal" exposure factors handbook, a tribal representative cautioned against development of a separate exposure factors handbook for tribes, observing that mainstream exposure factors should be the goal, focusing on the protection of all vulnerable populations. (2005 Reno, pg. 11-12)

Develop Tribal Exposure Scenarios

At the 2003 Reno workshop, tribal representatives indicated that there could be no "one size fits all" tribal exposure model. However, it was noted that while no one model will fit all tribes, tribes should focus on developing a general "tribal" model developed on common tribal values and concerns, which can then be adapted and applied to tribal communities. (2003 Reno, pg. 13)

In general, workshop participants were supportive of current efforts underway by EPA to incorporate tribal exposure scenarios into risk assessment models. The efforts discussed included OPPTS' Tribal LifeLine Project, which focuses on development of probabilistic modeling software that focuses on incorporating tribal exposure scenarios and lifestyles into a model measuring aggregate and cumulative pesticide exposures, allowing tribes to input the kinds of parameters that they feel are reasonable and reflective of their lifestyles (2005 Reno, pg. 20) and TASWER's Native American exposure and risk assessment model, which will serve as a training tool for tribes allowing them to incorporate more tribally relevant exposure pathways when examining exposures to chemicals from hazardous waste sites. (2005 Reno, pg. 21)

A tribal representative indicated that developing tribally specific models does not necessarily require the development of individual models for each tribe in Indian Country and suggested that the development of EcoRegion-based models, such as those currently being developed by Barbara Harper under an EPA ORD Science to Achieve Results (STAR) grant represent a potential improvement to current "tribal" risk models. Barbara Harper is involved in developing EcoRegion-based scenarios that reflect unique regional resource bases. While specific usage patterns and usage rates could differ among tribes in a region, the regional-based scenarios could be adjusted for site-specific issues and represent a better baseline than existing suburban population default models. (2005 Reno, pg. 17) The EcoRegion-based models are not tribal- or site-specific, but could provide a better starting point for predicting risk than is currently supplied by national-level, suburban-based risk models. (2005 Reno, pg. 22)

Another factor to be considered when developing tribal exposure scenarios, as noted by a tribal representative during the 2005 Reno workshop, is that a number of tribes are currently working to restore their natural resources and ensure more sustainable resource use. In doing so, many tribes intend to not only continue but to increase their use of natural resources and traditional food sources. Therefore, when developing tribal exposure scenarios, modelers need to recognize and account for increased resource usage. (2005 Reno, pg. 21) As discussed during the workshop, a need exists for exposure scenarios to account for historical consumption rates and patterns that would allow tribes to sustain tribal traditional health and cultural practices (2005 Reno, pg. 18), and efforts are underway to describe traditional use and traditional (cultural) lifeways patterns for use in risk assessment, with the aim of restoring and protecting tribal resources and lifestyles. Rather than developing fish consumption surveys to identify current suppressed resource use and consumption levels, some researchers are looking at current subsistence and treaty information (as well as anthropological, environmental archeological, and historical information) to identify traditional (cultural) consumption patterns to serve as a good measure for resource restoration goals and accommodate for the resurgence of interest by tribes in traditional foods. (2005 Reno, pg. 22)

In addition, as tribes are trying to return to a more traditional diet, they are looking for ways to compare the risks posed by consuming traditional versus non-traditional food items. (2005 Reno, pg. 25) Though this needs to be balanced with the potential impacts of implementing dietary advisories if health impacts are determined, sensitivities are needed in weighing the potential health risks posed by contaminants and the potential health and cultural impacts that could result from the implementation of dietary advisories on traditional foods.

Incorporate Qualitative versus Quantitative Tribal Impacts

During the workshops, participants discussed the need for both quantifiable and non-quantifiable impacts (e.g., loss of ceremony and culture of a tribe when contaminated river water—and/or the perception of this contamination—impacts a tribe's ability to participate in sweat lodges) be included in risk assessment processes. At the 2003 Albuquerque workshop, a tribal representative indicated that current risk assessment policies and procedures tend to ignore the impact of potential activities on tribal culture, such as the impacts of potential action on a tribe's origin or creation story, landscapes, historical stories, songs, dances, prayers, language, etc. She noted that while these impacts may not be easily quantifiable, they are vitally important to the continued health and well-being of tribal communities and the protection of treaty-reserved homelands. (2003 Albuquerque, pg. 6) At the 2005 Reno workshop, a tribal representative recommended that not only should quantifiable and non-quantifiable impacts be included, but they should be given equal weight in the risk assessment process. (2005 Reno, pg. 9) Additional discussion is needed to determine how best to incorporate qualitative impacts into the risk assessment process. As was noted by a tribal representative at the 2005 workshop in Reno, NV, the current scientific standards used by EPA require quantifiable threshold exposure levels to determine risk and questions

exist over whether and how tribal practices (e.g., access to ceremonial areas) can be monitored appropriately. (2005 Reno, pg. 9)

Section II: Developing a New Paradigm

Although the TSC recognizes the need to improve the current risk assessment process to better incorporate tribal perspectives, there has also been a significant amount of feedback collected from tribes about more long-term alternatives to the current risk assessment paradigm for environmental decision making. The sections that follow highlight the feedback that was received from tribal representatives during the three workshops convened by the TSC regarding what this new paradigm should entail. The issues are presented in no particular order.

Incorporate a Health-based Focus

During the 2005 Reno workshop, several participants asked for a more health-driven process, one that avoids looking at maximum risk and exposure levels. They observed that the current risk assessment paradigm focuses solely on hazard and risk assessment. A participant indicated that a safety/health-driven process is particularly crucial in relation to Reservation lands, as tribes and tribal lifeways are tied to tribal lands, and, therefore, precaution and protection are crucial elements. (2005 Reno, pg. 8)

Focus on Risk Prevention

During the *2005 Reno workshop*, several participants indicated that a new paradigm should focus on risk prevention rather than on cleanup after contamination has occurred. The paradigm should focus on protecting the next seven generations and beyond, geared toward protection of human health and the environment in perpetuity. (2005 Reno, pg. 8)

Incorporate Cumulative Impacts

At the 2003 Albuquerque workshop, a tribal representative recommended that a future paradigm incorporate cumulative impacts. He suggested that the focus of current risk assessment policies and procedures be broadened to include more than just a single contaminant, noting that health effects from background levels of multiple chemicals, which exist in the environment in quantities that are right at the contaminant limit, while lawful, may pose considerable health risk and need to be addressed. (2003 Albuquerque, pg. 14)

Create a Holistic Paradigm—One that Incorporates Impacts to Community Health, Culture, Lifeways, Well-being and the Environment

At the 2003 Albuquerque workshop, a tribal representative indicated that EPA and tribal communities are often at odds in terms of risk assessment science because of the language used by EPA in the discussion of risk assessment issues. He indicated that the EPA risk assessment paradigm discusses human health as the most important factor in the risk assessment process, and this contrasts with tribal traditions which view humans as the "younger brother" in a holistic worldview. He observed that this difference in view creates friction in Indian Country. (2003 Albuquerque, pg 4)

During the 2003 Albuquerque workshop, tribal representatives agreed that the current risk model being utilized by EPA is too narrow in scope and needs to be broadened to incorporate a more holistic view of tribal community health and well-being, one that incorporated impacts to

community health, culture, lifeways and well-being as well as the environment. During the workshop, one representative described the concept of risk, as perceived by the Shoshone-Bannock people. She indicated that, when compared to the traditional Western view of risk, which can be defined as the "chance of injury, damage or loss," the Shoshone-Bannock concept of risk is viewed in terms of healthiness and the interdependency of all living things. This concept is closely tied to the physical, mental, and spiritual well-being of all components of the universe and must, for example, include an evaluation of the role of risk in the social, linguistic, ecological, cultural, and traditional values of the tribes. (2003 Albuquerque, pg. 15)

During another presentation at the workshop, a tribal representative provided an explanation of the worldview of Alaska Native communities, observing that this worldview is wholly different from other communities because Native Alaskan communities have been raised to see the world (and, subsequently, the environmental and health issues that they face) "through a different set of eyes." She described the holistic nature of this worldview as encompassing physical, emotional, spiritual, and mental components and described the accompanying value system upon which the worldview was based. She stated that this worldview is a critical part of the native communities' health and well-being paradigm. (2003 Albuquerque, pg. 8)

During another presentation at the workshop, two other representatives indicated that in the tribal worldview, healthy people and a healthy ecosystem are inseparable. They indicated that if aspects of traditional lifeways and risks to the cultural ecosystem are included within the risk assessment framework, risk assessments will also have a public health appearance, where "health" is understood to be comprised of an individual's and community's well-being with their lives fully integrated into a healthy ecosystem. (2003 Albuquerque, pg. 15)

Include Health and Wellness Indicators

Throughout the various workshops, there was discussion over the development and use of health and wellness indicators and the need to incorporate these into decision-making processes. During the 2003 Reno workshop, it was noted that any model developed should be able to measure values common to all indigenous communities, taking into account for things such as self esteem, pride, cultural knowledge, and tribal heritage. It was noted that tribal communities understand the linkages between the environment and people and would be able to use a model developed on tribal understanding as a starting point to communicate ideas and evaluate cultural and social aspects of an issue and communicate these issues to outside groups. (2003 Reno, pg 13) During the 2005 Reno workshop, a tribal representative indicated that the fields of community- and public-health provided a good basis for examining the big picture of health impacts, both on the level of individual human health and community-wide health impacts, and observed that a number of cultural, social, health, and welfare indicators that are currently used in the public health arena and in social impact assessments can have direct applicability for tribal risk assessment. (2005 Reno, pgs. 22 & 25)

During the 2003 Albuquerque workshop, a tribal representative indicated that tribal communities are looking into ways to establish "life indicators" to measure the true health and well-being of their communities. He described a model being developed by the Assembly of First Nations called the Community Life Indicators Wheel, which can be used to identify

particular life indicators that are representative of an individual community. (A detailed description of the Community Life Indicators Wheel and The Assembly of First Nations Community Health Indicators project can be found in "Mohawk Council of Akwesasne, Community Health Indicators, Changes in These Indicators and the Analysis of Risk to Social Structures and Cultural Practices.") (2003 Albuquerque, pg. 11)

During the 2003 Reno workshop, tribal participants identified a number of potential cultural and community health indicators that could be used to help measure the health and well-being of tribal communities. These indicators included:

- ***Cultural Indicators***, including: (1) gathering activities (e.g., funerals, spiritual and seasonal gatherings, marriages, coming of age ceremonies, pow wows, dances, pilgrimages, hunting and gathering practices, and leadership activities; (2) ceremonies (e.g., sweat lodges, births, doctoring/healing, dances, clan ceremonies, blessings, and purifications; and (3) cultural activities (e.g., language, songs & art, basket making, growing traditional crops, gathering traditional medicines, attendance at classes teaching cultural traditions, level of understanding/use of natural resources by tribal people, and changes in cultural/subsistence practices).

- ***Health Indicators***, including: (1) negative indicators (e.g., suicide, substance abuse, mortality/birth rates, cancer rates, mental health statistics, addictive behaviors, human lead and mercury levels, and disease statistics) and (2) positive indicators (e.g., decreases in disease, family integrity, and nutrition).

- ***Community Indicators***, including: incarceration rates, visits to drug court and tribal courts, number of individuals involved in foster programs, vandalism, gangs/drug dealers/methamphetamine labs, domestic violence, family (the perception/definition of who family is by tribal peoples, how well the community is reflected in the extended family, where people live, are family members living close to each other and maintaining a sense of family, is the community family oriented), elder center, education rates, participation in youth club activities, day care, availability of emergency and disaster preparedness services, communication.

- ***Natural Resource Indicators,*** including: tracking of historical land uses; programs and projects being implemented by tribal communities to restore, rehabilitate, and enhance their local environments; measurement of appreciation/media coverage of such activities by outside entities was recommended as a potential indictor measurement; reintroduction of native species; presence of a fisheries department; the number and type of fish being caught by community members; quantification of wetland restoration activities; availability of natural resources to continue traditional practices (i.e., sweet grass, clays, paints, and berries) and whether these resources are being impacted by contamination; roadside spraying and its impact on the ability of tribal communities to continue traditional practices; measurement of the stability of the acreage where traditional activities are practiced; the number of people utilizing walking trails, tribal cultural sites, and other natural resources; whether tribal practices are being

impacted by outside groups competing for the same resources or through destruction of habitat through other purposes; and the availability of water – both in respect to water quality and quantity. (2003 Reno, pg 14-16)

Use a Cross-Media Approach

During the 2005 Reno workshop, several tribal participants indicated that the new paradigm should not be "Program-specific," i.e., should not be focused on a particular media, such as water, soil, or air, but rather should involve a cross-media approach. (2005 Reno, pg. 8) At the 2003 Albuquerque workshop, several tribal representatives indicated that the current EPA methodology for CERCLA and media Acts (CAA, SDWA, CWA) are geared toward single media, single contaminants, and single pathways, rather than being cumulative. They suggested that if CERCLA were more like NEPA and comparative risk, and if human health risk assessments were combined with ecological (or eco-cultural) risk assessments, then a cumulative method that reflects tribal perspectives and traditional lifeways could be achieved. They observed that the CERCLA statute does not prevent this; it simply has not been done before. (2003 Albuquerque, pg. 15)

Reflect the Precautionary Principle

During the 2005 Reno workshop, a number of individuals suggested that the precautionary principle be considered as a basis for possible alternative approaches to the current risk assessment paradigm for protecting human health and the environment. It was noted that a number of nations, states, and municipalities are already moving to adopt the precautionary principle. However, a tribal representative, who serves on the Tribal Pesticide Program Council, cautioned that an approach based on the precautionary principle might not be universally applicable. She noted that, in the case of pesticide registration, risks posed by pesticides are often not fully understood until the pesticide has been released into the environment, at which point environmental contamination has already occurred. (2005 Reno, pg. 8)

Recognize that for Some Tribes, a "Zero Contamination Policy" Exists

During the 2005 Reno workshop, a tribal participant noted that an inherent concern in discussing risk standards and setting exposure levels, remains that many tribal members are insistent that there is no allowable contamination level other than "zero" contamination; their philosophy and beliefs will not allow them to agree to any level of "acceptable" contamination. The participant noted that this creates problems, particularly given EPA's current risk assessment approach, and, as a result, can stall cleanup efforts. (2005 Reno, pg. 8)

Work with Tribes on a Government-to-Government Basis

Tribal participants indicated that it is imperative that EPA work with tribes on a government-to-government basis when considering changes to EPA's risk assessment policies and procedures. During the 2003 Albuquerque workshop, a TSC tribal representative expressed concerns that tribes had not been fully consulted during the development of EPA's cumulative risk assessment framework, noting that the Federal government has a mandate to consult with tribes on a government-to-government basis on issues that ultimately affect Tribes. (2003 Albuquerque, pg. 4) During the 2005 Reno workshop, a number of tribal participants asked that EPA enter into government-to-government consultation with their individual tribes to develop

recommendations for improving EPA's risk assessment policies and procedures. A recommendation was made that EPA send representatives out to all tribes in Indian Country to explain the issues...and answer questions raised by tribes. (2005 Reno, pg. 13)

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