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ALAMEDA POINT
SSIC. NO. 5090.3

# FINAL NAVAL AIR STATION ALAMEDA RESTORATION ADVISORY BOARD MEETING SUMMARY

Building 1, Suite 140, Community Conference Room
Alameda Point
Alameda, California

September 10, 2002

## ATTENDEES

See attached list.

## MEETING SUMMARY

### I. Approval of Minutes

Michael John Torrey, Community Co-Chair, called the meeting to order at 6:30 p.m.

Mr. Torrey asked for comments on the August 6, 2002, Restoration Advisory Board (RAB) Meeting Minutes. The minutes were approved with the following correction:

George Humphreys stated that the discussion regarding the status of early transfer should include a sentence about the increase in area of the footprint proposed for early transfer.

### II. Co-Chair Announcements

Mr. Torrey made the following announcements.

The East Bay Conversion and Reinvestment Commission will host the 2002 Northern California Opportunities in Contracting Conference on Tuesday, October 8, 2002, at the Hilton Hotel, Oakland Airport. Information regarding the conference will be included in the mid-monthly mailing.

Mr. Torrey requested that an agenda item be added to the October 2002 RAB meeting to discuss nominations for the 2003 Community Co-Chair and Vice Community Co-Chair positions.

Mike McClelland, Department of the Navy (Navy), made the following announcements.

Judy Huang, Regional Water Quality Control Board had a prior commitment that prevented her from attending the RAB meeting.

The Navy, the City, and the Alameda Point Community Partners (Partners) recently met to discuss the status of early transfer. The Navy conveyed the RAB members' desire to be more involved in the early transfer process and to be regularly updated on progress. The City and the Partners both agreed to attend the October 2002 RAB meeting to introduce members of the Partners, discuss the concerns of the RAB members, and review the projected timeline for early transfer. Kurt Peterson added that Elizabeth Johnson, City, had told him that she also would be participating in the presentation.

Various correspondence and documents were distributed to the RAB.

## III. Human Health Risk Assessment Panel Discussion

Michael Wade, Ph.D, Senior Toxicologist for the Department of Toxic Substances Control (DTSC); Sophia Serda, Ph.D, Toxicologist for the U.S. Environmental Protection Agency (EPA); and Christine Shirley, Toxicologist for Arc Ecology conducted a panel discussion regarding risk assessment. The goal of the presentation was to give RAB and community members an overview of the risk assessment process, apply the major concepts to a specific site at Alameda, and teach RAB members what to look for in reviewing risk assessments. Handouts were provided. Dr. Wade began the panel discussion. The objectives of his portion of the presentation were to provide an overview of what risk assessment is, describe how a baseline human health risk assessment (HHRA) is conducted, and to review the procedures for screening contaminated sites. Dr. Wade described the risk assessment process in terms of four major components: (1) data collection and evaluation, (2) toxicity assessment, (3) exposure assessment, and (4) risk characterization. The goal of data collection and evaluation, always the first step, is to determine what hazards or chemicals of potential concern (COPC) are present, and where they are located. Exposure and toxicity assessment can be conducted simultaneously. Exposure assessment involves estimating how much, and in what manner, COPCs might enter the human body. Toxicity assessment determines what the estimated toxic effects would be of each COPC for any given dose. Finally, risk characterization uses the information from the first three steps to determine the total cancer risk and the total noncancer hazard for the site.

The first step, data collection and evaluation, begins with the site investigation, followed by the sampling design (plan of where to look and what to look for), site characterization, (which involves the collection and analysis of soil, groundwater, sediment, surface water, soil gas, air, and possibly biota samples), and data analysis (which determines which chemicals were detected at the site, frequency of detection, and maximum detection). Ultimately, this phase of the risk assessment results in identification of what types of chemicals will be targeted (COPC) in the risk assessment. The major groups of chemical contaminants are metals; volatile organic compounds, such as chlorinated solvents and fuel components (such as benzene), polynuclear aromatic hydrocarbons (PAH); and polychlorinated biphenyls (PCB) and pesticides, which tend to be very stable.

The exposure assessment, which is often conducted concurrently with the toxicity assessment, involves determining the potential exposure pathways and exposure routes to calculate intake and estimate exposure. Exposure pathways are the ways in which people can come in contact with COPCs. They include incidental soil ingestion, inhalation of fugitive dust, dermal contact with soil or water, inhalation of vapors from soil or groundwater, and ingestion of groundwater or surface water. It is the goal of the exposure assessment phase to determine which of these pathways may be complete at a given site. Exposure routes are the ways that the COPCs could potentially enter the human body; inhalation, ingestion, or dermal contact. Dr. Wade used a schematic diagram to illustrate the many possible ways that people could be exposed to COPCs. Exposure can be defined in terms of three parameters: intake rate (how fast the COPC enters the body when exposed), frequency (how often the person is exposed) and duration (how long the period of exposure lasts). Total intake is calculated by multiplying the chemical concentration, intake rate, exposure frequency, and exposure duration and dividing that product by the product of body weight and an averaging time.

The toxicity assessment is based on two basic concepts of toxicology: toxic chemicals are either carcinogens or noncarcinogens. Carcinogens are believed to exhibit a "nonthreshold" mechanism of action, which means that there is a risk associated with any level of exposure. Mathematical models are used to estimate a dose that would cause one out of a million subjects to get cancer, based on conservative assumptions that maximize the estimate.

Noncarcinogens are believed to be toxic only above a certain "threshold" (often referred to as a reference dose [RFD]) below which it is unlikely to have any effect. There is an expected positive correlation between dose and health effects. In determining RFDs, toxicologists build in many safety factors to give highly conservative estimates. Studies to determine thresholds are usually conducted with animals using dose and control groups. On average, a study using 400 animals would cost between $400,000 and $600,000.

Risk characterization is the process of quantifying health effects from exposure to toxic chemicals. For non-carcinogens, the potential for health effects is expressed as a "hazard quotient (HQ)" and is equal to the intake divided by the RFD. The total non-cancer HQ for a site is the sum of the HQ for all chemicals in all media. For carcinogenic chemicals, the potential for health effects is expressed as "carcinogenic risk," and is calculated by multiplying the intake by a slope factor. U.S. Environmental Protection Agency (EPA) and DTSC use slightly different slope factors. The total cancer risk for a site is the sum of risk from all chemicals in all media.

Dr. Serda began the second portion of the panel discussion by asking RAB members to offer information about Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Sites 14 and 15. RAB members stated that the sites are located in the northern portion of Alameda Point along the Oakland Inner Harbor. Site 14 was formerly used as a fire training area. Removal actions have been conducted for dioxins in soil at Site 14 and for PCBs at Site 15. Dr. Serda stated that at Site 14, the ecological risks are higher than the risks to human health. Section 5 of the remedial investigation (RI) report for Sites 14 and 15 provides the results of the risk assessment, which incorporates data that are representative of current site conditions. Appendix D includes the entire HHRA.

Dr. Serda's presentation also described the risk assessment process, and included handouts. Risk assessment is a comprehensive study of the ways people might be in contact with chemicals and the likelihood that health effects may result from that contact. It is a tool used by regulatory agencies to protect human health and determine when remedial action is necessary. It is required by federal Superfund regulations before cleanup action can be taken. Risk assessment is not a study of existing medical conditions or their possible causal relationships with past chemical exposures, nor is it a re-creation of ways people might have previously been in contact with chemicals. Dr. Serda emphasized that a risk assessment is used to evaluate the potential that contaminants could cause health effects in the future and that "only the dose makes the poison."

Jo-Lynne Lee asked how risk drivers for a site are determined. The drivers are selected from all of the chemicals present at a site by applying risk calculations to data collected at the site. Several factors must be evaluated to determine what risks exist at a particular site; such as completed pathways, concentration of COPCs, and frequency and duration of contact with COPCs. EPA uses several methods for collecting toxicity data, including observation of wildlife, laboratory studies (*in vitro* and *in vivo)*, and human and epidemiological studies (pharmaceutical tragedies, accidental exposures, and studies comparing experimental groups versus control groups). Dr. Serda reiterated that EPA and DTSC have slightly different toxicity values on which risk calculations are based. This discrepancy is based on differences in the processes and studies each agency used to derive its toxicity criteria. EPA's toxicity value for benzo(a)pyrene, ([B(a)P]) for example, is 7.3 milligrams per kilograms per day (mg/kg-day), whereas DTSC's toxicity value for B(a)P is 9.6 mg/kg-day.

Mr. Peterson asked which set of values would be used to determine cleanup goals for Alameda Point. Dr. Serda stated that she preferred to leave that question until the question-and-answer period following the individual presentations by panel members;she also stated that she has not submitted her comments on the HHRA for Sites 14 and 15, and that she prefers to use only one set of values in a HHRA report. She cautioned RAB members not to confuse the term toxicity value with remedial action objective. The focus of her presentation to the RAB was to demonstrate how the elements of the risk assessment process, introduced by Dr. Wade, had been applied to Sites 14 and 15.

Dr. Serda pointed out that the RI includes evaluations of several exposure pathways for the COPCs at Sites 14 and 15. In addition, these pathways are evaluated for several scenarios (residential, recreational, occupational, and construction worker) that are based on specific sets of assumptions about the expected nature of exposure. For instance, soil ingestion, dermal contact with soil, ingestion of homegrown produce, inhalation of particulates from soil, and inhalation of volatiles from groundwater were the pathways assessed for the residential scenario, which assumes exposure to COPCs for 350 days per year for 30 years.

In addition to evaluating the pathways by which people may come in contact with chemicals, an HHRA must consider the concentrations of the COPCs at the points of exposure to humans, called the exposure point concentrations, which are determined by the site characterization data. It is important that all data used in the mathematical models to estimate risk are accurate. At some sites, it may be particularly important to get a nearly exact measurement of what type and level of risks are present. In these situations, mathematical models may not be accurate enough, and more direct measurements to determine how and what is going on may be warranted.

Dr. Serda also discussed several topics about risk that are sometimes confused or misunderstood. Risk assessment is the process by which excess risk is measured and quantified. Risk management, however, is the decision-making process to control excess risk. Finally, risk communication is the way in which risk is discussed between agencies and communities involved in the risk management process.

Ingrid Baur asked if risk assessments consider scenarios where the cumulative risk associated with a person's workplace and place of residence would be above action levels even if the two risks considered separately were below action levels. Christine Shirley, ARC Ecology, responded that generally the residential risk is evaluated over 24 hours, so theoretically, the risk associated with the workplace should be taken into account in the residential risk scenario. If, however, the risk associated with the workplace was significantly higher than that of the place of residence, this model would not accurately account for the cumulative risks. Ms. Shirley also stated that risk assessments are designed to reflect average risks to people living or working in a particular area; it does not represent a comprehensive picture of an individual's personal risks. Dr. Serda added that the risk assessment in the RI accounts only for risk associated with the present site conditions at Sites 14 and 15, not the risks associated with everything a person might be exposed to in their lifetime.

Mr. Peterson asked if it was safe to assume that if the risks associated with a residential use scenario are well below action levels, the risks also will fall below action levels for all other scenarios. Dr. Serda confirmed that this assumption is correct.

Ms. Shirley conducted the final portion of the panel discussion; handouts were provided. She began her presentation by reminding RAB members that a risk assessment is a model that is based on many assumptions, and it results in an estimate of risks associated with a particular site. Therefore, there is a certain level of error associated with the results of every risk assessment. She cautioned against focusing too much on the numbers generated by risk assessments, particularly when used on a small scale. She advised that risk assessments can be most useful when used to predict trends on very large scales, such as studies of air pollution or ozone depletion across the nation. She stated that risk assessments should be used to compare or rank hazards, to assist in risk management and funding decisions, and to organize data. Inherently, risk assessments involve some degree of bias, which increases as scale of the assessment decreases.

Ms. Shirley stated that RAB members should review risk assessments closely and pay attention to the parameters and assumptions defined in each one. Many factors can be varied based on individual site characteristics that may influence the risk estimate results. For instance, eliminating one or more of the following may affect the outcome of the risk assessment:

- Risk associated with background levels
- Data from beneath roads or buildings
- Volatiles in groundwater
- Incomplete exposure pathways
- Residential risk scenarios
- Portions of a data set with high detection limits
- Cumulative risk

Dr. Serda stated that none of these items had been excluded from the risk assessment for Sites 14 and 15. Ms. Shirley urged RAB members to begin the review process as early as possible, emphasizing the importance of reviewing work plans. If comments are made during preparation of the work plan, there is a much greater chance that disagreements can be resolved. If issues are not raised until the preparation of the risk assessment document, it is very difficult and expensive to change the methodology. Ms. Shirley also urged RAB members to compare RI reports with their individual work plans to confirm that the methods and decisions agreed to in the work plans were followed. Dr. Serda stated that her reviews of RI reports always include detection limits and comparisons of the methods described in the work plan with those presented in the RI report. Ms. Shirley stated that Alameda Point is fortunate to have regulators who have the time to conduct thorough reviews.

Ms. Shirley stated that the ideal risk assessment accounts for all site risks, and proceeds to the risk management process only after considering all possible risk scenarios. Some risks are present at sites prior to any release or industrial activity, and these risks often are set aside in the decision-making process. It is important to determine which chemicals are the risk drivers at each site. Sometimes institutional controls (ICs) are used to control risks and prevent completion of potentially complete exposure pathways, however, it may not always be possible to enforce such restrictions indefinitely. For example, deed restrictions on residential property might prohibit the installation of wells for accessing groundwater. While such restrictions might be successful if properly enforced, Ms. Shirley stated that she feels that the means to enforce ICs indefinitely does not exist, and that changes in ownership of property make proper enforcement even less likely. She cited several examples of instances where failure to properly enforce ICs resulted in residents being exposed to potentially harmful amounts of toxic substances.

Mr. Peterson asked if the Navy is responsible only for contamination attributable to Navy activities, or if they are responsible for all contamination present at Alameda Point. Ms. Shirley stated the Superfund guidance requires the owner of the property to take full responsibility for all contamination regardless of the source. However, if the property owner can provide sufficient evidence that another party is responsible for all or part of the contamination, there are means by which property owners can seek financial compensation for cleanup costs. Mr. Peterson asked if the Superfund guidance requiring the Navy to address all contamination would deter them from completing a comprehensive background site characterization in areas where Navy activities were not conducted. Dr. Serda stated that the Environmental Baseline Survey (EBS) was conducted to locate all areas impacted by elevated levels of toxic substances, regardless of historic Navy activities. It was during this process that the PAHs at Site 25 were identified. Andrew Dick added that the EBS provides background data across the base. Ms. Shirley reminded RAB members that all military and industrial sites have surprises, and that they should not be angered by these events, but feel confident that the findings will be thoroughly addressed in the appropriate manner.

Ms. Lee asked how community members who do not have a technical background in risk assessment could review the document. Ms. Shirley stated that a technical background is not necessary as long as the reviewer reads the document carefully and uses common sense to evaluate the assumptions. In addition, books like The Exposure Factors Handbook can be useful in conducting reviews.

Ms. Baur stated that in her review of the RI report, she noticed two apparently conflicting sentences in the Executive Summary (ES). Craig Hunter, Tetra Tech EM Inc., Project Manager for Operable Unit 1, will review the ES and a report will be provided to the RAB at the October 2002 meeting.

Mr. Humphreys recalled that for a risk level of $1 \times 10^{-6}$, PAH concentrations must be below 0.062 parts per million (ppm). However, he has seen action levels of 0.62 ppm, and wanted to know if EPA had a new standard for PAHs. Dr. Wade stated that the 0.62 ppm action level was the result of a risk management decision at Midway Village, another Bay Area site. Cleanup levels are sometimes adjusted based on site characteristics. The urban-industrial nature of the Bay Area has resulted in a higher ambient level of PAHs, and because DTSC and EPA do not require cleanup below background levels, agreements to slightly increase action levels have been made at many sites. Dr. Serda added that levels of PAHs below 1 ppm are often almost impossible to distinguish from other materials such as road (asphaltic) materials. However, PAHs concentrations that exceed 1 ppm are fairly reliable indicators that a major source exists, and that further action should be taken. Ms. Shirley stated that it is not realistic to think that all sites can be cleaned up to the lowest possible levels of every contaminant. Attempting to clean up to the lowest possible risk level for every chemical would involve removing nearly all the soil on the base, resulting in new problems: where to take the contaminated soil, and where to find clean fill material. Finding the right balance is the ultimate goal of the risk management decision-making process.

Mr. Humphreys asked if averaging values to determine risks is a trick to lower risk levels. Ms. Shirley stated that averaging is a necessary tool used in risk assessment to characterize large areas. Because cleaning up all sample points on an individual basis is not feasible, averaging techniques are used to determine approximate risks over larger areas and assist in risk management decisions. Dr. Wade cautioned that although it is not being used as a trick at Alameda Point, averaging techniques could be used to make risks appear lower than they are. For instance, if the majority of the risk is present at the surface, the exposure is on the surface, and samples are averaged from the surface to a depth of 10 feet below ground surface (bgs), the risk will appear significantly lower. In such cases, in residential areas, risk should be averaged over the top 2 feet, and again from 0 to 10 feet bgs. Dr. Serda added that the site conceptual model should always be evaluated when determining the appropriateness of using averaging techniques. If the contaminant is a pure product layer 3 feet below ground surface (bgs) with no soil impacts above or below the pure product, averaging should not be used.

Lee Dodge, Levine Fricke, asked why a 1 in 1 million risk of getting cancer should be a concern if the average American man generally stands a one in four chance of getting cancer. Ms. Shirley stated that the risk level of 1 in 1 million is a tool that is used in managing risks associated with chemicals and should not be interpreted as a personal risk level. Risks associated with chemicals in a risk assessment are only a small fraction of the risks each person is exposed to based on the characteristics of their lifestyle and hobbies. When combined with all the other risks each person is exposed to, the cumulative risk is far greater than 1 in 1 million. Dr. Wade added that there is also a legal component, and that agencies have to enforce restrictions that require risks to be less than 1 in 1 million. By itself, a 1 in 1 million risk does not warrant concern, but that is the goal of the risk management process. The cleanup goals are established to be protective of human health, and to lower risks to a level that is safe.

Doug DeLong asked if Ms. Shirley or anyone else from Arc Ecology will be reviewing the RI report for Sites 14 and 15. Ms. Shirley stated that Lea Loizos will be reviewing it and submitting formal comments, and that she will be available to help Ms. Loizos, if necessary. Ms. Shirley stated that the Technical Assistance for Public Participation (TAPP) grant is also a tool RAB members can use to assist in reviewing documents.

Jean Sweeney asked if the planned redevelopment of Sites 14 and 15 into a golf course will have any impact on the risk assessment. Dr. Serda stated that all of the data used in the risk assessment are representative of current site conditions, and the intended reuse as a golf course does not change the actual risk assessment. The intended reuse will be taken into account during the feasibility study (FS) and the decision for the final remedy.

Mr. Humphreys stated that it was not accurate to say that the EBS had sampled everywhere on Alameda Point because no samples had been collected from inside the landfill at Site 1; only surface samples had been collected. Dr. Serda stated that generally the risks associated with landfills are related to the gases volatilizing off of the landfill, or materials migrating into groundwater. Dr. Wade stated that if the site is going to remain a landfill, the material within the site is so heterogeneous that random sampling will not result in an accurate characterization. Capping is a presumptive remedy to isolate the waste and prevent volatilization or migration to groundwater.
Mr. Humphreys asked if there is any guarantee that no unexploded ordnance (UXO) lies beneath the surface in the landfill given that many shells had been found on the surface. Ms. Shirley stated that the UXO issue is separate from the risk assessment issue, but that if the community feels that it is a great enough cause for concern, they should pressure the Navy to have the landfill removed. Mr. Humphreys asked how deep the landfill is, and Mr. McClelland estimated that it could be 20 to 30 feet deep. Mr. Humphreys stated that he recalled having heard that dredge material from the Seaplane Lagoon would be used as a cap for the landfill, and that it would not meet the permeability requirements for landfill caps. In addition, Mr. Humphreys expressed concern that dredge materials from the Seaplane Lagoon used as fill material between the surface of the landfill and the cap would be subject to liquefaction in the event of an earthquake. In addition, Mr. Humphreys feels that it would not be possible to conduct seismic stability analysis on the landfill cap without knowing exactly what is beneath it. Mr. McClelland stated that it has been proposed that the dredge materials from the Seaplane Lagoon be used for fill material beneath the cap, not that it would be the cap itself.

## IV. Community and RAB Comment Period

Mr. McClelland opened the discussion for RAB and community members to continue to discuss questions regarding risk assessment, in addition to any other comment or question topics.

Ms. Loizos suggested that a focus group be formed for OU-3 and passed around a sign-up sheet for members interested in participating in that group. An updated list of the new focus groups will be included in the September 2002 mid-monthly mailing.

Mr. DeLong asked when groundwater becomes surface water, and how it is dealt with in the assumptions for risk assessments. Dr. Serda stated that when it reaches the surface, it is classified as surface water. Dr. Serda stated that the pathways evaluated for groundwater focus on the potential for volatiles in groundwater to migrate into buildings. In addition, Dr. Serda stated that the answer to Mr. Humphreys' question would vary greatly, depending on which chemicals are present. Ms. Shirley added that there is a finite amount of chemicals that can be dissolved in water, and that most of them, even when water levels fluctuate through layers of soil, will tend to stay dissolved in the water. The exception to that rule is floating product. If there is floating product on top of the water table, some amount of the floating product will smear onto the soil when the water table rises. .

Ms. Lee asked for a vote approving the OU-5 RI/FS focus group to seek TAPP grant money for assistance in the technical review of the RI/FS report. Mr. De Long asked how much money is available. Mr. McClelland stated that there is a maximum amount of $25,000 for the remainder of the year. Mr. Humphreys asked if any money would be used to assist in the review of the OU-3 RI/FS. Ms. Loizos stated that because there is only enough money to cover the cost of one review, and the fact that there are currently residents living at OU-5, the OU-5 focus group decided it would be most appropriate to allocate the funds to the review of the OU-5 documents. In addition, a professor at the University of California at Berkeley has offered to assist the RAB in the review of the OU-3 documents at no charge. The RAB unanimously voted to approve the request for TAPP grant money for a third party review of the OU-5 RI/FS reports.

Because the panel discussion and question and answer period ran longer than expected, the remaining agenda item, BRAC Cleanup Team activities were postponed until the October 2002 RAB meeting.

The meeting was adjourned at 8:51 pm.

## ATTACHMENT A

## NAVAL AIR STATION ALAMEDA
## RESTORATION ADVISORY BOARD MEETING AGENDA
## SEPTEMBER 10, 2002

**(One Page)**

# *RESTORATION ADVISORY BOARD*

## *NAVAL AIR STATION, ALAMEDA*

## *AGENDA*

**10 SEPTEMBER, 2002 6:30 PM**

**ALAMEDA POINT – BUILDING 1 – SUITE 140**

**COMMUNITY CONFERENCE ROOM**

(FROM PARKING LOT ON W MIDWAY AVE, ENTER THROUGH MIDDLE WING)

| TIME | SUBJECT | PRESENTER |
|---|---|---|
| 6:30 - 6:35 | Approval of Minutes<br>Meeting minutes available online at:<br>www.efdsw.navfac.navy.mil/Environmental/AlamedaPoint.htm | Michael-John Torrey |
| 6:35 - 6:45 | Co-Chair Announcements | Co-Chairs |
| 6:45 - 8:10 | Human Health Risk Assessment<br>A Panel Discussion | Michael Wade - DTSC<br>Sophia Serda - EPA<br>Christine Shirley - ARC |
| 8:10 - 8:20 | BCT Activities | Marcia Liao |
| 8:20 - 8:30 | Community & RAB Comment Period | Community & RAB |
| | RAB Meeting Adjournment | |
| 8:30 - 9:00 | Informal Discussions with the BCT | |

## ATTACHMENT B

## NAVAL AIR STATION ALAMEDA
## RESTORATION ADVISORY BOARD MEETING SIGN-IN SHEETS

**(Four Pages)**

## ALAMEDA POINT
## RESTORATION ADVISORY BOARD
### Monthly Attendance Roster for 2002

**Date: September 10, 2002**

*Please initial by your name*

| COMMUNITY MEMBERS | JAN | FEB | MARCH | APRIL | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingrid Baur | X | X | | X | | X | | X | IB | | | |
| Clem Burnap | | | | | | | | | | | | |
| Ardella Dailey | | * | | | X | X | | | | | | |
| Nick DeBenedittis | | | | | | | | | | | | |
| Douglas deHaan | | X | X | | X | X | | | dg | | | |
| Tony Dover | X | | X | | | | X | | | | | |
| George Humphreys | X | X | X | X | X | X | X | X | GH | | | |
| James D. Leach | X | X | * | * | X | X | X | | | | | |
| Jo-Lynne Lee | X | ** | X | | ** | | | * | | | | |
| Lea Loizos | X | X | X | X | | X | X | * | LL | | | |
| Bert Morgan | X | X | X | X | X | X | | X | | | | |
| Ken O' Donoghue | | | | | | | | | | | | |
| Kurt Peterson | | | | X | X | X | X | X | KP. | | | |
| Kevin Reilly | X | X | | | X | X | X | X | KR | | | |
| Bill Smith *(attending for Mary Sutter)* | X | X | X | X | | | | | | | | |
| Dale Smith *(attending for Mary Sutter)* | | | | X | X | X | | | ds | | | |
| Lyn Stirewalt | X | X | * | | * | X | | * | | | | |
| Mary Sutter | | | | | | | | | | | | |
| Jean Sweeney | | | | | | ** | | X | X | | | |
| Jim Sweeney | | | | | | ** | X | X | X | | | |
| Luann Tetirick | | X | X | | X | X | X | X | X | | | |
| Michael John Torrey | X | X | X | X | X | X | X | X | X | | | |

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Alameda/Meetings/Rab/SIGNINSHEET.xls

* Denotes excused absense

| COMMUNITY MEMBERS | JAN | FEB | MARCH | APRIL | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dana Kokubaun | | | | | | | | | | | | |
| Golden Gate Audubon Society | | | | | | | | | | | | |
| Betsy P. Elgar | | | | | | | | | | | | |
| Debbie Collins | X | X | | | | | X | | | | | |
| David Rheinheimer | | | | | | | | x | x | | | |
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| REGULATORY AND OTHER AGENCIES | JAN | FEB | MARCH | APRIL | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Anna-Marie Cook (EPA) | X | * | X | X | X | | X | * | AMC | | | |
| David Cooper (EPA) | X | X | X | | | | | X | | | | |
| Judy Huang (RWQCB) | | | | | | | | X | | | | |
| Elizabeth Johnson (City of Alameda) | X | X | | X | X | ** | ** | * | | | | |
| Marcia Liao (DTSC) | | | * | X | X | X | X | X | X | | | |
| Laurent Meillier (RWQCB) | | | | | | | | | | | | |
| Patricia Ryan (DTSC)' | X | X | X | X | X | X | | | [signature] | | | |
| Sophia Serda (EPA) | | | | | ** | | | | | | | |
| Michael Shields (USCG) | | | | | | | | X | X | | | |
| MERRY GOODENOUGH USCG | | | | | | | | | X | | | |
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* Denotes excused absense

| U.S. NAVY | JAN | FEB | MARCH | APRIL | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Glenna Clark | | | | | | | | | | | | |
| Andrew Dick | ** | | | X | X | | | X | | | | |
| Steve Edde | X | X | X | X | | | X | [illegible] | | | | |
| Greg Lorton | | | | | | | X | | | | | |
| Mike McClelland | X | X | X | X | | ** | X | X | [illegible] | | | |
| Tom Pinard | X | X | | X | X | X | X | X | [illegible] | | | |
| Rick Weissenborn | X | | | X | X | X | X | | | | | |
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| TETRA TECH EMI | JAN | FEB | MARCH | APRIL | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Courtney Colvin | X | X | X | | X | X | X | X | CDC | | | |
| Tracy Craig | X | X | X | | | X | | X | [illegible] | | | |
| Chris Fennessy | | | | | | X | | | | | | |
| Jim Helge | | | | | | X | | | | | | |
| Marie Rainwater | | | | | | | | | | | | |
| Leah Waller | X | X | X | | | | | | | | | |
| Corinne Crawley | | | | X | | | | | | | | |
| | | | | | | | | | | | | |

| GPI | JAN | FEB | MARCH | APRIL | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Michael Stone | ** | ** | ** | ** | ** | ** | ** | ** | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

Revised 04/02/01
Alameda/Meetings/Rab/SIGNINSHEET.xls

* Denotes excused absense

| OTHER | JAN | FEB | MARCH | APRIL | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Charlene Washington-EBCRC | | | | | | | | | | | | |
| Janet Argyres-Bechtel | | | | | X | | | | | | | |
| Bart Draper-Bechtel | | | | | | | | | | | | |
| Stephen Quayle-Bechtel | | | | | | | | | [signature] | | | |
| Bruce Marvin - IT, Aquifer Solutions | X | | | | | | | | | | | |
| Rezsin Jaulus-Alameda Point Coll. | | | | X | | X | | X | [signature] | | | |
| Eric Johansen - Bechtel | | | | | X | | | | | | | |
| Ron Rinehart, Pacific States | | | X | X | X | X | X | X | [signature] | | | |
| Aidan Barry - APCP | | | | | X | X | X | | | | | |
| Bill Howell - 3-D Environmental | | | | | X | X | | | [signature] | | | |
| Lee Dodge - LFR | | | | | | | X | | [signature] | | | |
| ~~David Rheinheimer~~ Comm member | | | | | | | | X | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

* Excused absence

** Attended but did not sign roster

[signature]

Revised 04/02/01

Alameda/Meetings/Rab/SIGNINSHEET.xls

* Denotes excused absense

## ATTACHMENT C

## NAVAL AIR STATION ALAMEDA
## RESTORATION ADVISORY BOARD MEETING HANDOUT MATERIALS

East Bay Conversion and Reinvestment Commission, 2002. Flyer regarding the 2002 Northern California Opportunities in Contracting Conference to be held Tuesday, October 8, 2002. August 6.

Risk Assessment at Naval Air Station Alameda, Department of Toxic Substances Control (DTSC). Presented by Dr. Michael Wade, DTSC. September 10.

Risk Assessment Presentation, Alameda Point Restoration Advisory Board, Focus on Sites 14 and 15. Presented by Dr. Sophia Serda, U.S. Environmental Protection Agency (EPA). September 10.

Draft Sites 14 and 15 Remedial Investigation Report, selected tables, 2002. Presented by Dr. Sophia Serda, EPA. September 10.

An Alternative View of Human Health Risk Assessment, 2002. Presented by Chris Shirley, Arc Ecology. September 9.

Role of Background in the CERCLA Cleanup Program, Memorandum by EPA, 2002. Presented by Chris Shirley, Arc Ecology. May 1.

Superfund Today, Focus on Risk Assessment: Involving the Community, 2002. EPA.

**East Bay Conversion and Reinvestment Commission, 2002. Flyer regarding the 2002 Northern California Opportunities in Contracting Conference to be held Tuesday, October 8, 2002.**

**(Two Pages)**

# *The East Bay Conversion and Reinvestment Commission*

**950 West Mall Square, Room 171, Alameda, CA 94501**
**Ph: (510) 749-5951 Fax: (510) 749-5984 email: ebcrc@dnai.com**

August 6, 2002

Congresswoman Barbara Lee, the U.S. Small Business Administration and the East Bay Conversion and Reinvestment Commission would like to invite you to the ***2002 Northern California Opportunities in Contracting Conference.*** This conference is supported by the U.S. Department of Commerce, Economic Development Administration.

This one day conference will be held on:

**Tuesday, October 8, 2002**

**7:00AM Registration**

**Hilton Hotel**
**Oakland Airport**
**150 Hegenberger Road**
**Oakland, California**

As in the past, this conference will feature more than a billion dollars in contract opportunities, resulting in real contracts for a number of small businesses. Come meet with key decision makers and contract specialists. This is an outstanding opportunity for you to promote your company.

We are requesting that you attend this valuable conference. The conference will provide businesses with vital technical information on how to contract with public agencies and large private contractors. It will also provide information on specific contracting and procurement opportunities from these agencies and the private sector.

Pre-registration is $60. On-site is $75. Checks are payable to EBCRC. This fee includes a continental breakfast and networking luncheon. If you are interested in becoming a Sponsor, please refer to the enclosed registration form.

Please mail or fax this form no later than Friday, September 20th to:

EBCRC
950 West Mall Square , Room 171
Alameda, CA 94501

Fax: (510) 749-5984

The conference date is rapidly approaching so please do not delay in responding to this request. We expect this event to be sold out as space is limited.

Your participation in the *2002 Northern California Opportunities in Contracting Conference* will ensure its success, and we look forward to your participation and support.

If you need additional information, please contact Charlene Washington, our Economic Development Coordinator at (510) 749-5963.

Sincerely,
The EBCRC

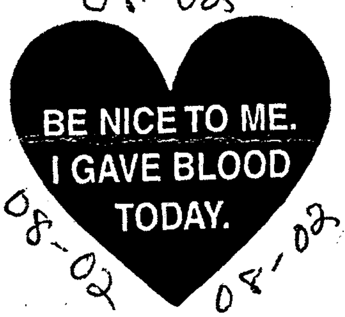
______**Gold Sponsor** ($5000) - Exhibit booth, two tables of ten each for the networking luncheon and recognition on our Conference brochure.

______**Silver Sponsor** ($2500) - Exhibit booth, one table of ten for the networking luncheon and recognition on our Conference brochure.

______Yes, my organization wants to participate on a panel.

**For Individuals:** Conference fees include a continental breakfast and networking luncheon.

08-02




08-02 08-02

Please make check payable to EBCRC, 950 West Mall Square, Room 171, Alameda, California 94501. EBCRC is a 501(c)(3) nonprofit corporation. Consult with your tax advisor regarding the terms of deducting your contribution. For Registration Form or

**If you have any questions please call Charlene Washington at (510) 749-5963.**

stributor!

Michael John Torrey
Housing Commissioner
Alameda Housing Authority/ Restoration Advisory Board
174 Maple Way

**Risk Assessment at Naval Air Station Alameda, Department of Toxic Substances Control**

**(24 Pages)**

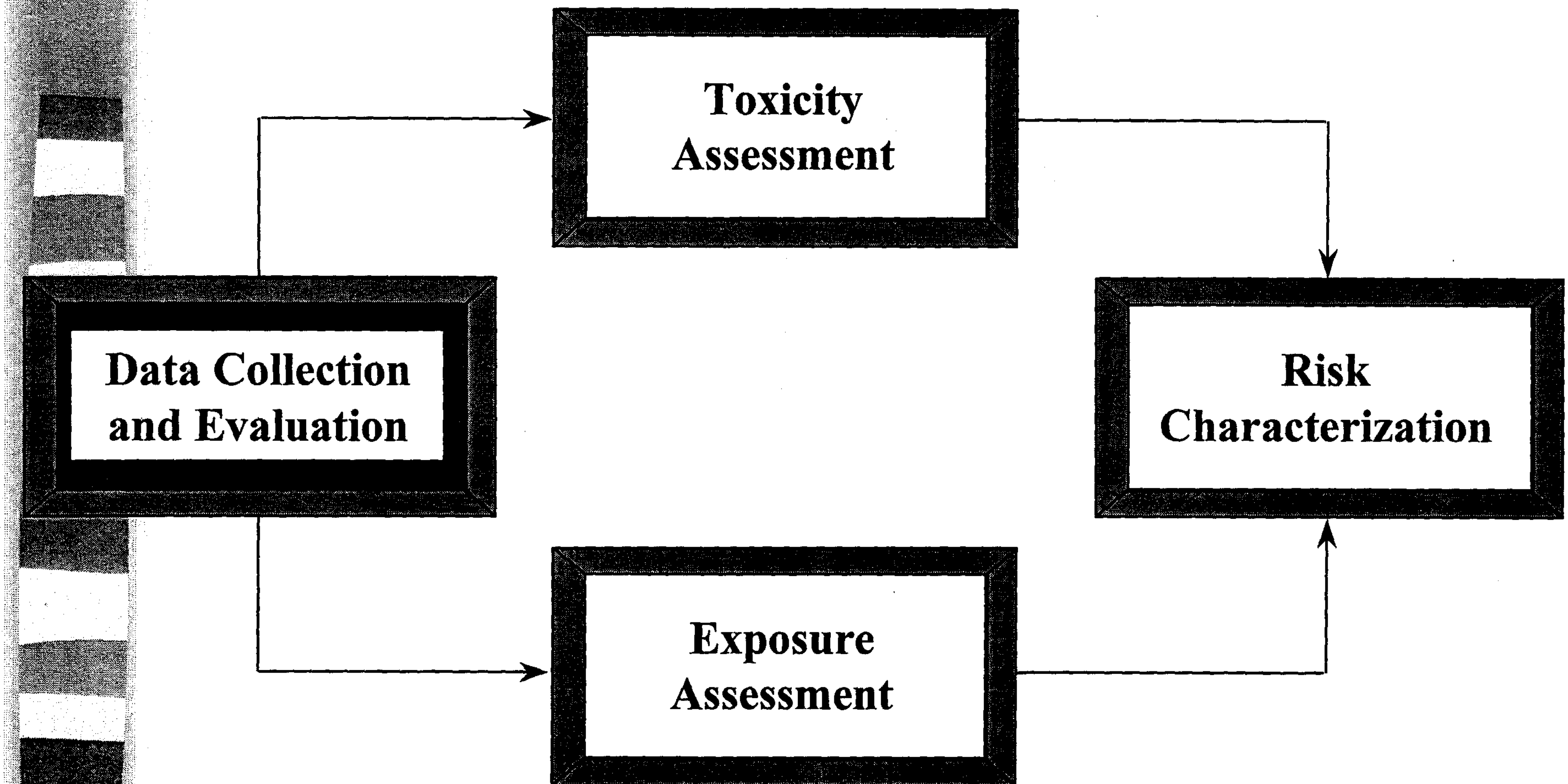
# NAVAL AIR STATION ALAMEDA

- MICHAEL J. WADE, Ph.D., DABT
  SENIOR TOXICOLOGIST
- DEPARTMENT OF TOXIC SUBSTANCES CONTROL
  SACRAMENTO

# OBJECTIVES

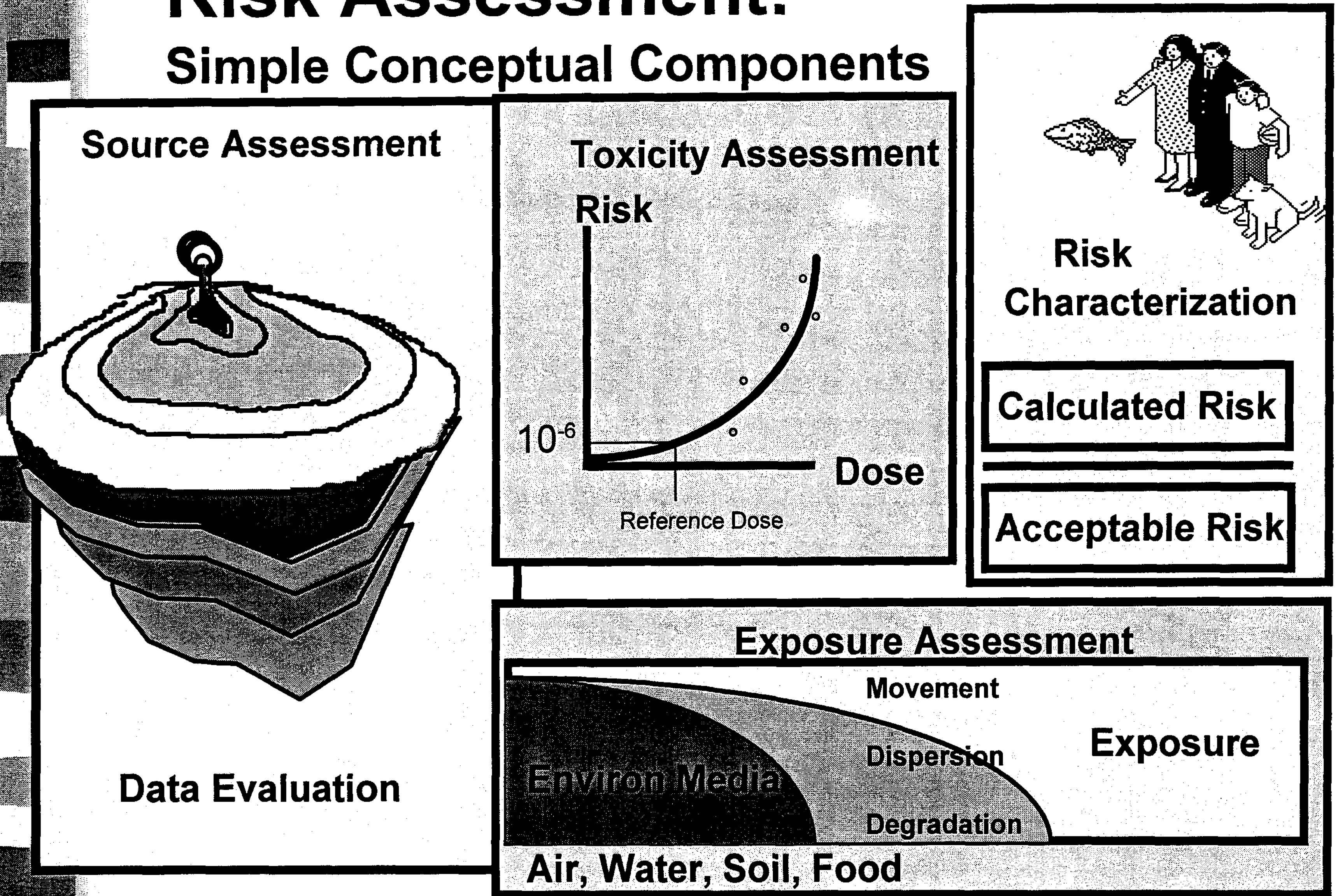
- OVERVIEW OF RISK ASSESSMENT
- BASELINE RISK ASSESSMENT
  - HUMAN HEALTH
- SCREENING CONTAMINATED SITES
- ANSWER YOUR QUESTIONS

# Four Steps of Risk Assessment:

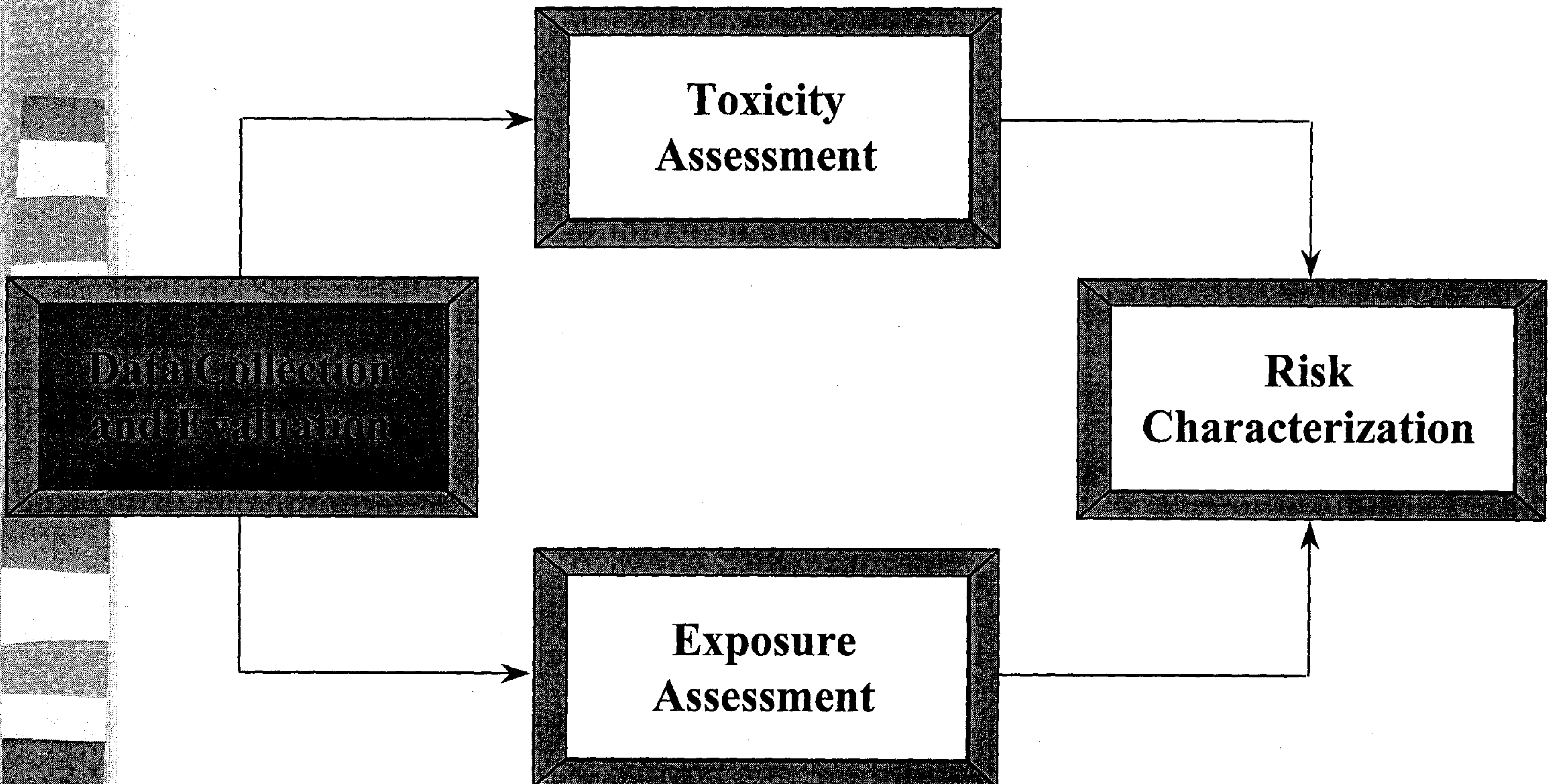


# Risk Assessment:

## Simple Conceptual Components



# Four Steps of Risk Assessment: Data Collection and Evaluation



# Step 1: Data Collection and Evaluation

1. SITE INVESTIGATION
2. SAMPLING DESIGN
3. SITE CHARACTERIZATION
4. DATA ANALYSIS
5. SELECTION OF COPCS

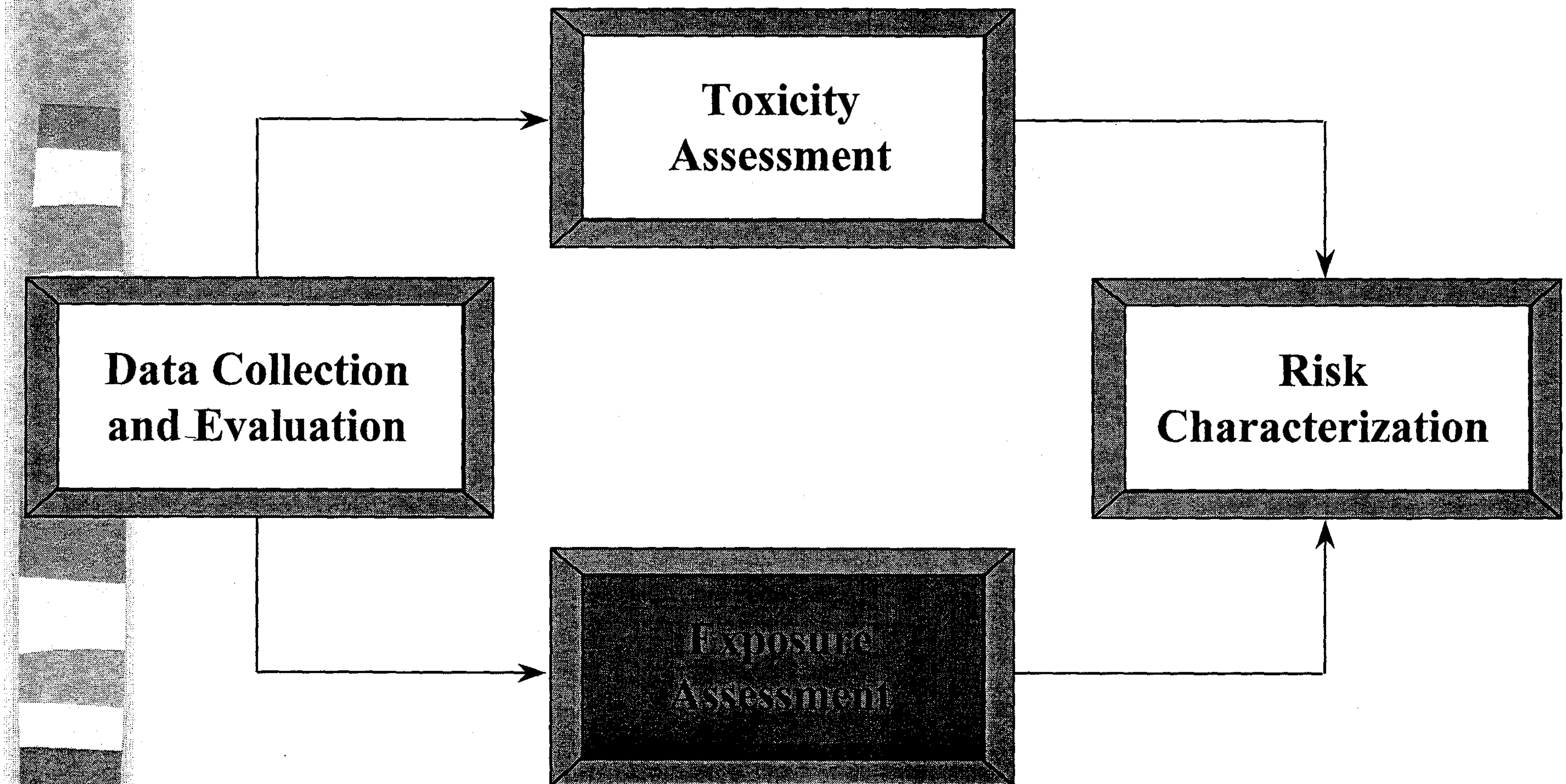
# SITE CHARACTERIZATION

- Sampling: soil, groundwater, sediment, surface water, soil gas, air, biota -

# CHEMICAL CONTAMINANTS

- **METALS**
- **VOLATILE ORGANIC CHEMICALS (chlorinated solvents, fuel components)**
- **POLYNUCLEAR AROMATIC HYDROCARBONS**
- **PCBs**
- **PESTICIDES**

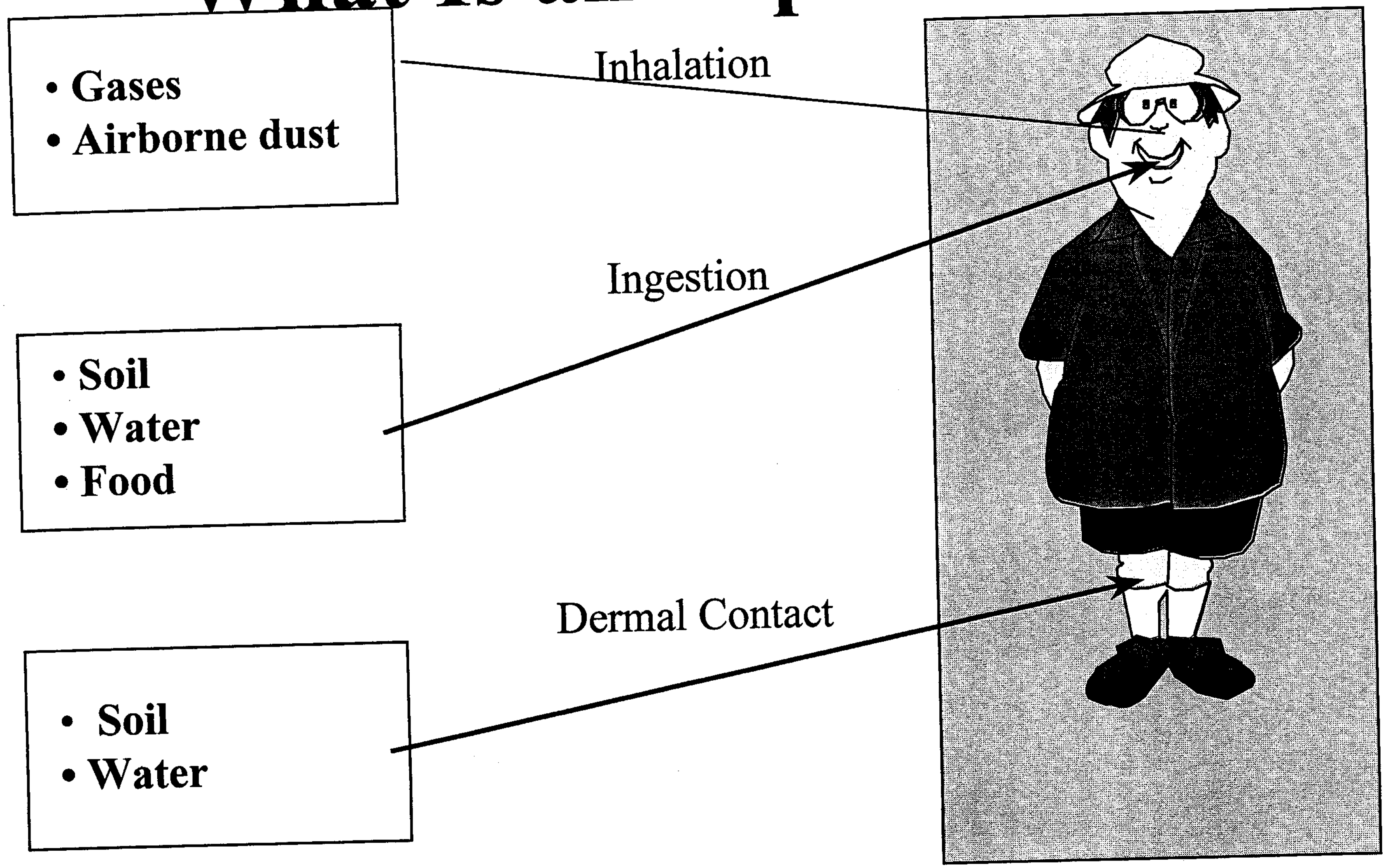
# Four Steps of Risk Assessment: Exposure Assessment



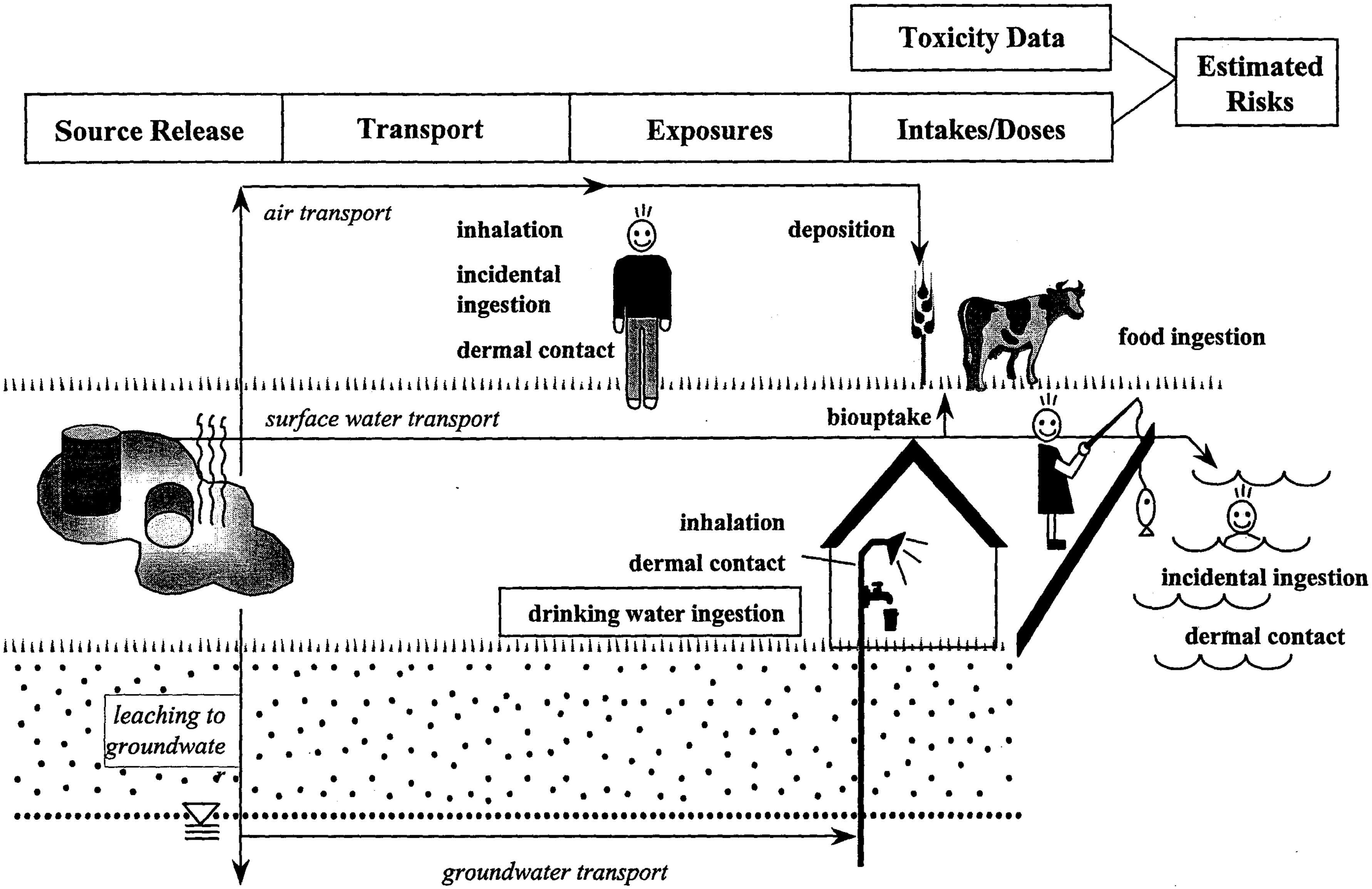
# EXPOSURE PATHWAYS

- **Incidental soil ingestion**
- **Inhalation of fugitive dust**
- **Dermal contact with soil and/or water**
- **Inhalation of vapors from soil or groundwater**
- **Ingestion of groundwater or surface water**

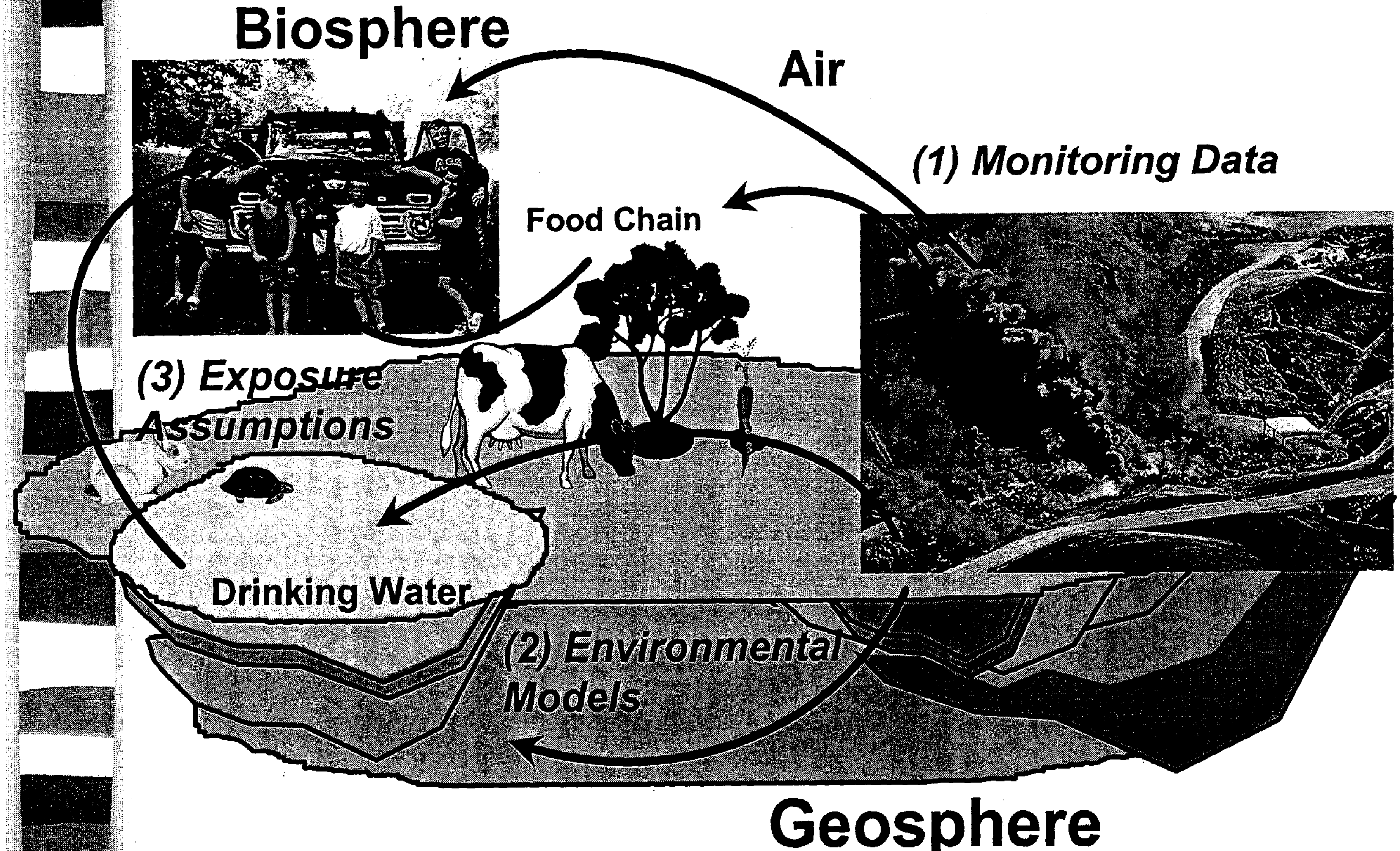
# What Is an Exposure Route?



# Many Exposures Can Contribute to Estimated Risks



# O' what a tangled web we weave..



# How Do We Calculate Chemical Intake?

**Concentration in soil, water, or air** X **Exposure Parameters: Specific to the receptor and exposure scenario**

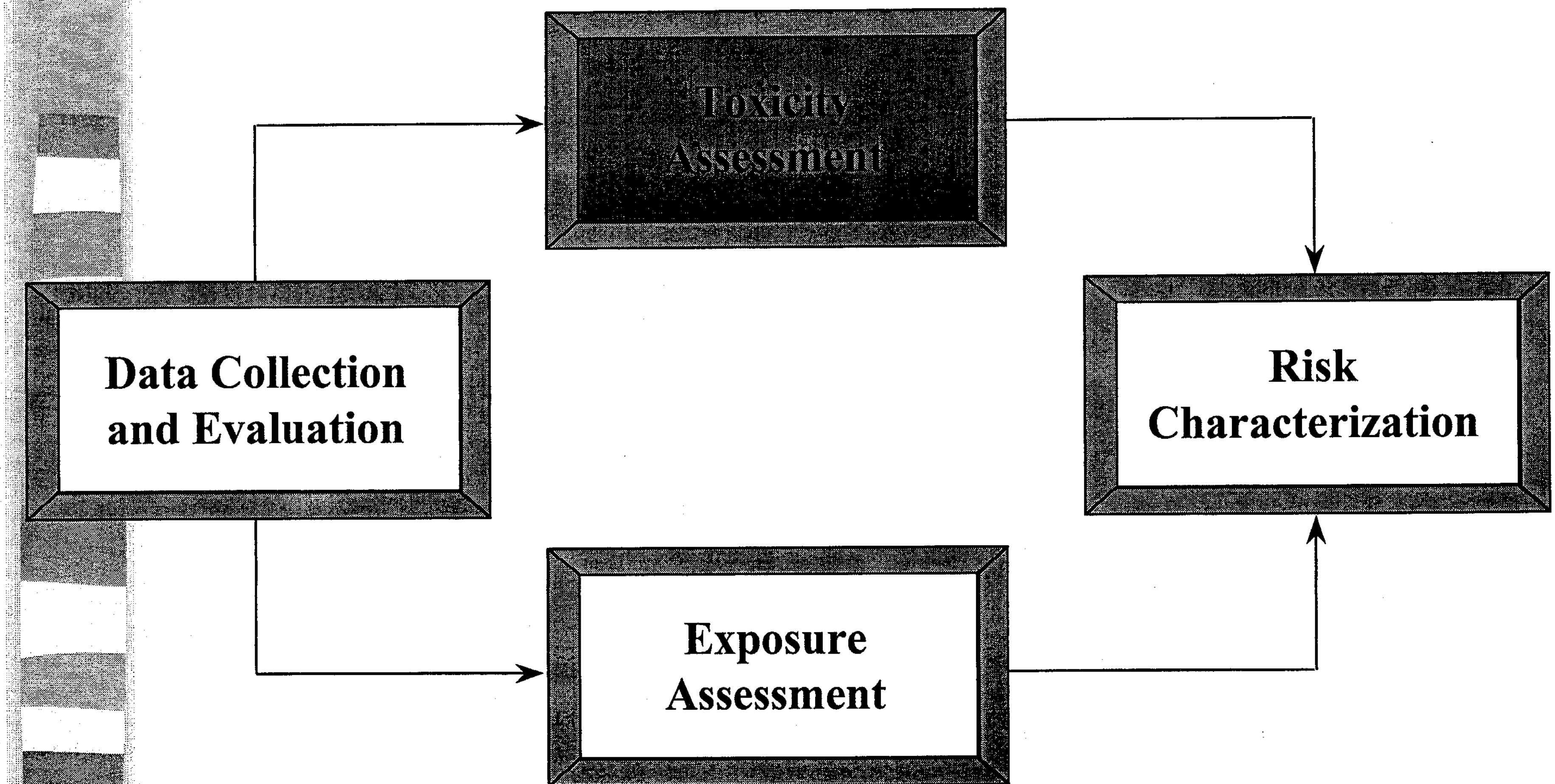
$$\textit{Intake} = \frac{\textit{Chemical Concentration} \times \textit{Intake Rate} \times \textit{Exposure Frequency} \times \textit{Exposure Duration}}{\textit{Body Weight} \times \textit{Averaging Time}}$$

# ESTIMATING EXPOSURE

- Exposure parameters
- $E_{z(dw)} = C_{z(dw)}$ x 2 Liters/day

- Sum exposure for all media and pathways
- $\square_z$soil, $\square_z$water, $\square_z$air,

# Four Steps of Risk Assessment: Toxicity Assessment



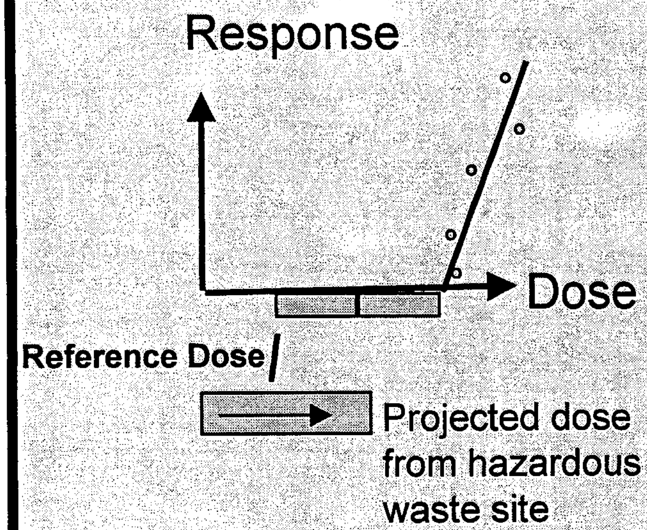
# Some Basic Toxicological Concepts

– Two categories of toxic chemicals:

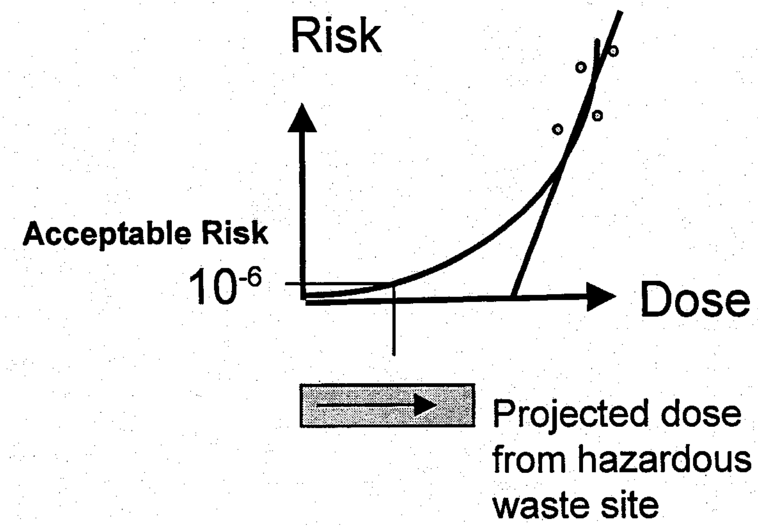
– Carcinogenic Chemicals

- Believed to act via a “nonthreshold” mechanism of action. There is a risk is associated with any exposure level.
- Noncarcinogenic Chemicals
- Believed to act via a “threshold” mechanism of action. This means that there is a level of exposure (i.e., a threshold) below which it is unlikely to have an effect.

# Toxicity Assessment-How Harmful?

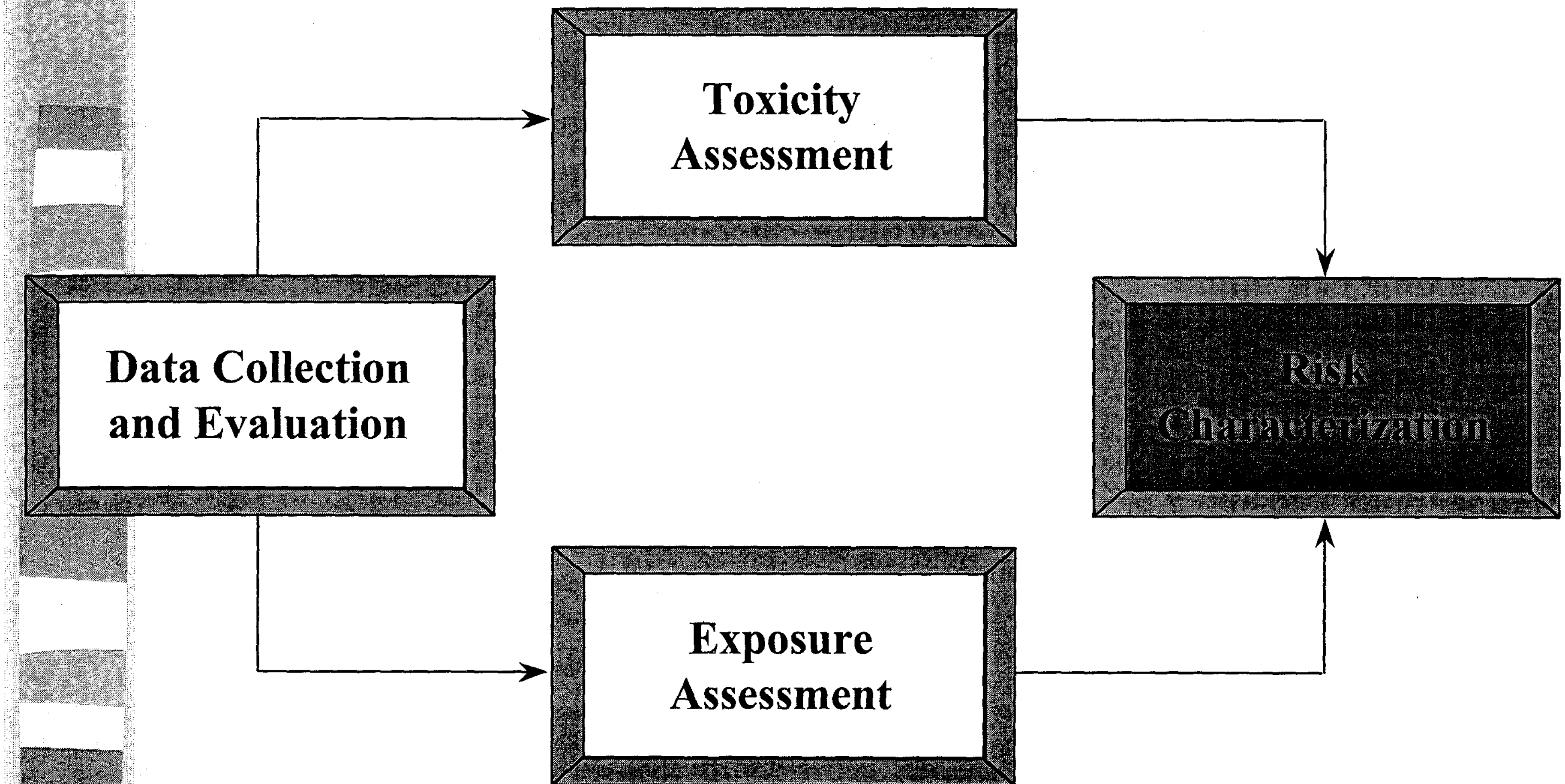



**Threshold Toxicity:**
safety factors for safe dose
RfD = presumed safe dose




**Non-Threshold Toxicity:**
Carcinogens
Risk extrapolated for all doses
Acceptable dose for acceptable risk

# Four Steps of Risk Assessment: Risk Characterization



# How Do We Quantify Health Effects from Exposure to Noncarcinogenic Chemicals?

For noncarcinogens, the potential for health effects is expressed as a "hazard quotient."

For a single chemical:

$$\text{Hazard Quotient} = \frac{\text{Intake}_i}{\text{Reference Dose}_i}$$

# How Do We Quantify Risks from Carcinogenic Chemicals?

For carcinogenic chemicals, the potential for health effects is expressed as "carcinogenic risk."

For a single chemical (i),

$$Risk_i = Intake_i \times Slope\ Factor_i$$

# RISK CHARACTERIZATION

- TOTAL CANCER RISK FOR SITE:-sum risk over all chemicals and all media
- TOTAL NON-CANCER HAZARD FOR SITE:- sum hazard over all chemicals and all media

# SCREENING RISK ASSESSMENT

- SIMPLIFIED- HEALTH PROTECTIVE
- IDENTIFY IMMEDIATE THREATS
- SCREEN OUT INSIGNIFICANT AREAS
- PRGs

# PRELIMINARY REMEDIATION GOALS (PRGS)

- GENERIC VALUES CAN BE USED FOR SCREENING
- BASED ON RISK ASSESSMENT METHODS
- U.S. EPA REGION IX CRITERIA

**Risk Assessment Presentation, Alameda Point Restoration Advisory Board, Focus on Sites 14 and 15.**

**(Two Pages)**

## Risk Assessment Presentation

# Alameda Point RAB

**Focus on Sites 14 & 15**

Sophia Serda, Ph.D.
Toxicologist
(415) 972-3057
serda.sophia@epa.gov

EPA
REGION 9

## TOXICOLOGY & RISK ASSESSMENT

### The Most Important Concept in Toxicology:

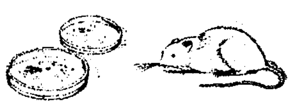
***"Only the dose makes the poison"***

**Paracelsus, 16th Century**

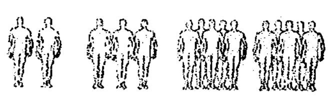
## Where We Get Our Data

Observation of Wildlife

Laboratory Studies



Human Studies/ Epidemiology



## Pathways

- Air
- Groundwater
- Soil
- Foodchain
- Cultural

## Factors

- Is there a Completed pathway?
- What is the Concentration?
- What is the Frequency of contact?
- What is the Duration of contact?

## Risk Topics

- ***Risk Assessment*** is how we measure and quantify excess risk
- ***Risk Management*** is the decision-making process to control excess risk
- ***Risk Communication*** is how we talk and include other agencies and communities in the risk management process

**Draft Sites 14 and 15 Remedial Investigation Report, selected tables, 2002.**

**(Four Pages)**

exposure. An evaluation of all possible human exposures is necessary to identify receptors that are in current contact with or could come in contact with Site 14 or 15 constituents.

According to reuse plans for Alameda Point, recreational and occupational exposures are the most likely future exposures at Sites 14 and 15. Each of these exposure scenarios were evaluated, along with residential, which is considered more conservative, and construction worker exposures. The exposure scenarios for Sites 14 and 15 were evaluated for the following pathways:

- **Residential** - soil ingestion, dermal contact with soil, inhalation of particulates from soil, inhalation of VOCs in ambient air, inhalation of VOCs in indoor air, and ingestion of homegrown produce
- **Occupational** - soil ingestion, dermal contact with soil, inhalation of particulates from soil, inhalation of VOCs in ambient air, and inhalation of VOCs in indoor air
- **Recreational** - soil ingestion, dermal contact with soil, inhalation of particulates from soil, and inhalation of VOCs in ambient air
- **Construction Worker** - soil ingestion, dermal contact with soil, inhalation of particulates from soil, and inhalation of VOCs in ambient air

Because these pathways are based on future exposures, they are considered potentially complete and are evaluated to provide a conservative estimate of risk. Although construction workers may have transient dermal contact with groundwater, this exposure was considered insignificant due to the very short duration and limited extent expected. It is not assessed in this HHRA. Conceptual site models and tables that indicate which exposure pathways are complete for each exposure scenario are provided in Appendix D.

Exposure is based on "intake," which is defined as the mass of a substance taken into the body per unit body weight per unit time. Intake from a contaminated medium is determined by the amount of the chemical in the medium, the frequency and duration of exposure, body weight, the contact rate, and the averaging time.

EPA (EPA 1992) requires that exposure parameters used to determine contaminant intakes for a given pathway should be selected so that the estimated intake represents the average and

## TABLE 5-7: SITES 14 AND 15 HUMAN HEALTH RISK ASSESSMENT SUMMARY

Draft Remedial Investigation Report for CERCLA Sites 14 and 15, Alameda Point, Alameda, California

| EXPOSURE SCENARIOS | | SITE 14[1] | | SITE 15[1] | |
|---|---|---|---|---|---|
| | | Cancer | Non-cancer | Cancer | Non-cancer |
| **Residential** | | | | | |
| EPA | RME | 6.2E-05 | 0.99 | 4.4E-05 | 0.61 |
| | CTE | 1.9E-05 | 1.0 | 1.3E-05 | 1.0 |
| DTSC | RME | 7.50E-05 | 0.70 | 6.4E-05 | 0.47 |
| | CTE | 2.10E-05 | 0.73 | 1.9E-05 | 0.53 |
| **Occupational** | | | | | |
| EPA | RME | 6.3E-06 | 0.14 | 7.4E-06 | 0.097 |
| | CTE | 1.0E-06 | 0.13 | 1.2E-06 | 0.085 |
| DTSC | RME | 7.1E-06 | 0.083 | 1.1E-05 | 0.065 |
| | CTE | 1.2E-06 | 0.071 | 1.7E-06 | 0.056 |
| **Recreational** | | | | | |
| EPA | RME | 4.6E-06 | 0.068 | 6.2E-06 | 0.041 |
| | CTE | 2.3E-07 | 0.013 | 3.0E-07 | 0.0082 |
| DTSC | RME | 5.3E-06 | 0.04 | 9.8E-06 | 0.027 |
| | CTE | 2.7E-07 | 0.0069 | 4.8E-07 | 0.0051 |
| **Construction Worker** | | | | | |
| EPA | RME | 5.5E-07 | 0.19 | 3.8E-07 | 0.15 |
| | CTE | 1.6E-07 | 0.052 | 1.1E-07 | 0.041 |
| DTSC | RME | 6.0E-07 | 0.16 | 5.1E-07 | 0.13 |
| | CTE | 1.8E-07 | 0.045 | 1.5E-07 | 0.038 |

Notes:

| | |
|---|---|
| 1 | Includes risk from background |
| CTE | Central tendency exposure |
| DTSC | Based on California Office of Environmental Health Hazard Assessment toxicity values used by California Department of Toxic Substances Control |
| EPA | Based on U.S. Environmental Protection Agency toxicity values |
| RME | Reasonable maximum exposure |

## TABLE 5-8: SITE 14 HHRA RISK DRIVERS

Draft Remedial Investigation Report for CERCLA Sites 14 and 15, Alameda Point, Alameda, California

Residential Scenario (0 to 10 feet bgs)
Receptor: Adult/Child

| MEDIUM | CONSTITUENT | CARCINOGENIC RISK[1] | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **Ingestion of Soil** | **Dermal** | **Inhalation of Dust** | **Inhalation Ambient Air** | **Inhalation Indoor Air** | **Ingestion of Produce** | **Total Constituent Risk** |
| Surface and Subsurface Soil | Arsenic | **2.0E-05** | **2.0E-06** | **9.7E-07** | NA | NA | **1.4E-05** | **3.7E-05** |
| | Benzene | NA | NA | NA | NA | **1.30E-08** | NA | 1.3E-08 |
| | Beryllium | NA | NA | **1.5E-07** | NA | NA | NA | 1.5E-07 |
| | Cadmium | NA | NA | **5.6E-08** | NA | NA | NA | 5.6E-08 |
| | Benzo(a)pyrene | **3.0E-06** | **1.3E-06** | 6.1E-09 | NA | NA | **2.9E-06** | **7.1E-06** |
| | Dibenzo(a,h)anthracene | **3.0E-06** | **1.3E-06** | 1.2E-09 | NA | NA | NA | **6.3E-06** |
| | Dioxin TEQ | 2.9E-06 | 2.90E-07 | 1.40E-08 | NA | NA | **2.4E-06** | 5.6E-06 |
| | Tetrachloroethene | 2.2E-09 | 7.3E-10 | 4.0E-13 | **2.5E-09** | **4.8E-10** | NA | 5.4E-09 |
| | Trichloroethene | 2.4E-10 | 8.2E-11 | 6.4E-13 | **4.9E-09** | **2.8E-09** | NA | 5.2E-09 |
| Exposure Route Totals[2] | | 3.1E-05 | 5.8E-06 | 1.2E-06 | 7.4E-09 | 1.6E-08 | 2.4E-05 | |
| | | | | | | Total Site Risk | 6.2E-05 | |

## TABLE 5-8: SITE 14 HHRA RISK DRIVERS

Draft Remedial Investigation Report for CERCLA Sites 14 and 15, Alameda Point, Alameda, California

| MEDIUM | CHEMICAL | NON-CANCER RISK[1] | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Ingestion of Soil | Dermal | Inhalation of Dust | Inhalation Ambient Air | Inhalation Indoor Air | Ingestion of Produce | Total Constituent Risk |
| Surface and Subsurface Soil | Aluminum | **0.04** | 0.00 | **0.14** | NA | NA | NA | **0.18** |
| | Antimony | **0.04** | **0.01** | NA | NA | NA | NA | 0.044 |
| | Arsenic | **0.10** | NA | NA | NA | NA | **0.073** | **0.18** |
| | Barium | 0.005 | 0.01 | **.012** | NA | NA | NA | 0.028 |
| | Cadmium | 0.088 | **0.000031** | NA | NA | NA | **0.079** | 0.088 |
| | cis-1,2-Dichloroethene | NA | NA | NA | NA | **0.000022** | NA | 0.000022 |
| | 1,2-Dichlorethene (total) | 0.00001 | NA | 0.000000027 | **0.00029** | NA | NA | 0.0003 |
| | Dieldrin | 0.003 | **0.0000019** | NA | NA | NA | .003 | 0.0033 |
| | Ethylbenzene | NA | NA | NA | NA | **0.0000068** | NA | 0.0000068 |
| | Manganese | 0.008 | NA | **0.39** | NA | NA | NA | **0.39** |
| | Nickel | 0.001 | 0.0 | NA | NA | NA | **0.011** | 0.021 |
| | Tetrachlorethene | 0.000010 | 0.0 | 0.0000000043 | **0.000027** | NA | NA | 0.000037 |
| | Toluene | NA | NA | NA | NA | **0.00017** | NA | 0.00017 |
| | Trichloroethene | 0.0000086 | 0.00000008 | 0.00000004 | **0.00032** | NA | NA | 0.00033 |
| Exposure Route Totals[2] | | 0.25 | 0.011 | 0.55 | 0.00071 | 0.00021 | 0.18 | |
| | | | | | | Total Site Risk | 0.99 | |

Notes:

1 Reasonable maximum exposure (RME) risk based on Environmental Protection Agency assumptions
2 Includes total risk from all constituents evaluated in the risk assessment
bgs Below ground surface
NA Not applicable

**An Alternative View of Human Health Risk Assessment, 2002.**

**(Four Pages)**

An alternative view of human health risk assessment
By Chris Shirley, Arc Ecology (415-495-1786)
09/09/02

I have an alternative view of human health risk assessment. I hope in the next 15 minutes to give you something to think about when you are reviewing the risk assessments at Alameda.

I think that human health risk assessment is misused in EPA's Superfund program. Why?

Because the scale of the method mismatches the scale of the problem. Risk assessment is too crude of a tool to be used as a basis for cleanup decisions at small sites. Recall the topic of significant digits in math...the result of a calculation should not exceed the precision of the original measured value. Risk assessment is based on some very crude estimates of toxicity and exposure. The estimates really only begin to mean something when applied to very large areas and populations – say air pollution in a major city or the effects of second-hand smoke on the US population as a whole, or arsenic in drinking water nationwide. The cleanup decisions at military bases happen on a much smaller neighborhood scale. Yet, the assumptions that underlie the risk assessment methodology are not appropriate for this smaller scale.

That being said, I do believe that risk assessment can be a useful tool for evaluating small sites. The methodology can be used to rank potential hazards and zero in on the ones that have the highest likelihood of causing harm. The method stops making sense, though, when the risk numbers are used like they mean something in the outside world.

*Risk assessment cannot prove that an area is safe...it can only give us an inkling that one area is safer than another.*

Remember: **the modeled result is not reality.**

Risk assessment is a model ... the outcomes are not real any more than a painting of a tree (even a really good one) IS a tree.

Like painting, modeling relies on making simplifying assumptions in order to illustrate a point.

Risk assessment is NOT an exact science

- All the input data are crude estimates
- Many unknowns
- Many opportunities for discretionary judgements
- Ignores complexities (such as synergistic interactions)
- Errors multiply

Therefore, in my view, the risk assessment model is only useful for:

- Normalizing chemical concentrations
- Finding and ranking potential hazards
- Finding remedial actions that give the biggest bang for the buck
- Interjecting some discipline into cleanup decision-making process

How might my view of risk assessment work within EPA's the risk assessment schema?

- Baseline
  - Rank the chemicals of concern
  - Rank contaminated areas from worst to best

- Risk management
  - Determine cost/benefits for potential actions
  - Figure out where you can get the biggest bang for your buck

- After-action
  - Identify and track remaining issues

As you know, EPA does not use risk assessment in the way I've described -- that is to rank, prioritize, and track actions. Instead, explicit numbers are reported that purport to represent a statistical risk due to estimated exposure.

<u>The Consequence of Believing Too Much in the Numbers</u>
One of the consequences of believing too much in the numeric outcome of risk assessment is the temptation to manipulate your run of the model to achieve a desired outcome. This is exactly what we've seen happen at military bases. One of the most common methods of manipulation is to intermingle risk assessment with risk management.

For example:

- Screening "background" concentrations from the baseline risk assessment
- Excluding soil under paved areas and buildings from sampling, or risk analysis because there is no current exposure pathway
- Excluding groundwater data from the risk assessment because drilling wells is not permitted in the local jurisdiction
- Assessing risk only for industrial reuses, because the site has always been industrial.

The fair way to play this game is to assess all baseline risk THEN to look at ways to manage site conditions in a health- and environmentally-protective way.

Broken Pathways: institutional controls and risk assessment

Another common trick is to claim that baseline risks can be mitigated by restricting access or use of a site. The claim is that an institutional control (a law or restriction) will break a pathway of exposure and therefore reduce risk.

Unfortunately, the risk that the institutional control might fail is NOT addressed in the typical risk assessment. Instead it is assumed that the institutional controls will work and keep working as long as the contamination exists. In other words, the estimated risks presented to support this type of remedial action do not address the robustness, effectiveness, or permanence of the institutional control.

I could talk for a long time about institutional controls. I won't tonight but I will leave you with this: there is very little evidence to suggest that institutional controls work, even over the short-term.

The Mare Island Example: a medical school located at Mare Island wanted to rent some apartments at the base in which to house students. Lennar had control of the property. DTSC granted Lennar permission to rent the buildings to the university to use as apartments on the condition that nobody under the age of 18 would occupy them (due to lead hazards). The university was to report this condition to the individual students. Not more than a year later a student reported at a RAB meeting that families (with young children) were living in the apartments. Somehow the restriction had been forgotten.

Acceptable risk management range" Acceptable? To whom?

EPA uses the general $10^{-4}$ to $10^{-6}$ risk range as a "target range" within which the Agency strives to manage risks as part of a Superfund cleanup. EPA generally will not require cleanup when risks are less than $1 \times 10^{-6}$.

Somehow "target range" has changed to "acceptable risk range" in Navy documents.

*The Navy cannot make the claim that their estimated risks are acceptable to anyone but themselves. What is acceptable to the Navy (or EPA) may not be acceptable to you. Don't be lulled into complacency when you see this term... instead treat it like a red flag.*

As a reviewer of a risk assessment you need to figure out how well the assumptions used in the assessment match your community – your habits, demographics, dreams, etc.

Also, don't be lulled into complacency by the claim that a site risks are (or will be cleaned to) the magic $10^{-6}$ risk level. Dig into how that level was achieved.

Equal risks are not Equal

Remember that estimated risks cannot be compared to each other unless ALL of the input assumptions are the same...

- a $10^{-6}$ level cleanup at Hunters Point will not necessarily be the same as a $10^{-6}$ cleanup level at Alameda.
- $10^{-6}$ residential is not the same as $10^{-6}$ industrial

Rather than compare risks…compare the concentrations of each chemical that equate to the "equal" risk. If the chemical concentrations differ then so do the assumptions were used to compute the risk.

<u>Other Common Tricks</u>
Here are some other common ways in which risk is underestimated:

- Not reporting cumulative risk (required but often ignored in baseline risk assessments)
- Ignore important pathways of exposure (current or future)
- Average chemical concentrations over too large an area, thereby hiding hot-spots
- Not calculating risks when there are no toxicity values in the EPA database (pretend no information = no risk)
- Set high "background concentrations," and then screen samples out of the risk assessment process
- Ignore "non-detects" even if the detection limits are really high.
- Assume that pavement, fences, or other barriers will not allow contact with contamination (variation of ignoring pathways of exposure)
- Assume that industrial sites will always be used for industrial purposes.

Look at the depth of the cleanup too…we've seen "surface" defined anywhere from 6 inches to 10 feet.

<u>Start the review process early – at the work plan stage</u>
In my opinion the most important part of the risk assessment to review is the <u>workplan.</u>

This is true of all parts of the RI/FS process. The workplan determines how the study will be carried out, and how the data will be collected and evaluated, and what assumptions will be used.

Be sure to check all draft reports against the work plan. Did the Navy do what they said they would do? You'd be surprised at how many times I've found major discrepancies.

**Role of Background in the CERCLA Cleanup Program, Memorandum by EPA, 2002.**

**(15 Pages)**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

*Signed May 1, 2002*

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

**MEMORANDUM**

**SUBJECT:** Transmittal of Policy Statement: "Role of Background in the CERCLA Cleanup Program" OSWER 9285.6-07P

**FROM:** Michael B. Cook, Director ***s/ Michael B. Cook***
Office of Emergency and Remedial Response

**TO:** Superfund National Policy Managers
Regions 1 - 10

This memorandum transmits the attached document, Role of Background in the CERCLA Cleanup Program" for regional implementation. Draft versions of this policy were distributed for internal review and comment in January 2001 and August 2001. The policy was also discussed and comments were received at the Superfund Technical Focus Forum (July 2001), the 2001 Annual Risk Assessors Meeting, and at the 2002 EPA Superfund National Radiation Meeting in a joint session with the Federal Facilities Leadership Council.

This document clarifies the U.S. Environmental Protection Agency (EPA) preferred approach for the consideration of background constituent concentrations of hazardous substances, pollutants, and contaminants in certain steps of the remedy selection process, such as risk assessment and risk management, at Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or "Superfund") sites. EPA has developed this policy to respond to stakeholder questions about the general application of background concentration during the CERCLA remedial investigation process. This policy encourages national consistency and responds to the Agency's goals for risk characterization and communication of risk to the public as expressed in other EPA policy and guidance documents.

If you have questions regarding this policy, please contact Jayne Michaud of my staff at (703) 603-8847 or michaud.jayne@epa.gov.

# Role of Background in the CERCLA Cleanup Program

U.S. Environmental Protection Agency
Office of Solid Waste and Emergency Response
Office of Emergency and Remedial Response
April 26, 2002
OSWER 9285.6-07P

**Table of Contents**

**Purpose**

This document clarifies the U.S. Environmental Protection Agency (EPA) preferred approach for the consideration of background constituent concentrations of hazardous substances, pollutants, and contaminants in certain steps of the remedy selection process, such as risk assessment and risk management, at Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or "Superfund") sites. To the extent practicable, this document may also be applicable to sites addressed under removal actions and time-critical actions. In general, the presence of high background concentrations of hazardous substances, pollutants, and contaminants found at a site is a factor that should be considered in risk assessment and risk management.

The primary goal of the CERCLA program is to protect human health and the environment from current and potential threats posed by uncontrolled releases of hazardous substances, pollutants, and contaminants. Contamination at a CERCLA site may originate from releases attributable to the CERCLA site in question, as well as contamination that originated from other sources, including natural and/or anthropogenic sources not attributable to the specific site releases under investigation (EPA, 1995a). In some cases, the same hazardous substance, pollutant, and contaminant associated with a release is also a background constituent. These constituents should be included in the risk assessment, particularly when their concentrations exceed risk-based concentrations. In cases where background levels are high or present health risks, this information may be important to the public. Background information is important to risk managers because the CERCLA program, generally, does not clean up to concentrations below natural or anthropogenic background levels.

A comprehensive investigation of all background substances found in the environment usually will not be necessary at a CERCLA site. For example, radon background samples normally would not be collected at a chemically contaminated site unless radon, or its precursor (radium, Ra-226) was part of the CERCLA release. Also, EPA normally would not analyze background samples for Ra-226 at a cesium (Cs-137) site, or dioxin at a lead site where dioxin was not the subject of a CERCLA release into the environment.

This document provides guidance to EPA Regions concerning how the Agency intends to exercise its discretion in implementing one aspect of the CERCLA remedy selection process. The guidance is designed to implement national policy on these issues.

Some of the statutory provisions described in this document contain legally binding requirements. However, this document does not substitute for those provisions or regulations, nor is it a regulation itself. Thus, it cannot impose legally-binding requirements on EPA, States, or the regulated community, and may not apply to a particular situation based upon the circumstances. Any decisions regarding a particular remedy selection decision will be made based on the statute and regulations, and EPA decision makers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate. EPA may change this guidance in the future.

**History**

Background issues are discussed in a number of EPA documents[1]. A need for CERCLA-specific guidance was identified during risk assessment reform discussions with stakeholders in 1997. An issue that is often raised at CERCLA sites is whether a reliable representation of background is established (EPA, 1989). To assist Regions with this issue, EPA developed a peer-reviewed practical guide to sampling and statistical analysis of background concentrations in soil at CERCLA sites (EPA, 2001b).

EPA has developed this policy to respond to questions about the general application of background concentration during the CERCLA remedial investigation process.[2] This policy encourages national consistency and responds to the Agency's goals for risk characterization and communication of risks to the public as expressed in other EPA policy and guidance, including:

- *Policy for Risk Characterization* which provides principles for fully, openly, and clearly characterizing risks (EPA, 1995b); and,

- *Cumulative Risk Assessment Guidance* which encourages programs to better advise

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[1] *Risk Assessment Guidance for Superfund Volume I, Human Health Evaluation Manual* [RAGS] (EPA, 1989).
Preamble to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 1990a).
*Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions* (EPA, 1991).
*Determination of Background Concentrations of Inorganics in Soils and Sediments at Hazardous Waste Sites* (EPA, 1995a).
*Soil Screening Guidance: User's Guide* (EPA, 1996).
*Ecological Risk Assessment Guidance for Superfund* (EPA, 1997a).
*Rules of Thumb for Superfund Remedy Selection* (EPA, 1997b).
*Soil Screening Guidance for Radionuclides: User's Guide* (EPA, 2000).
*ECO Update. The Role of Screening-Level Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessments* (EPA, 2001a).

[2] The process of determining when risks warrant remedial actions and the degree of cleanup for specific hazardous substances, pollutants, and contaminants involves many factors that are not addressed in this document. Additional guidance is provided in the EPA (1991) *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions.*

citizens about the environmental and public health risks they face (EPA, 1997c).

**Definitions of Terms**

For the purposes of this policy, the following definitions are used.

*Background* refers to constituents or locations that are not influenced by the releases from a site, and is usually described as naturally occurring or anthropogenic (EPA, 1989; EPA, 1995a):

1) *Anthropogenic* – natural and human-made substances present in the environment as a result of human activities (not specifically related to the CERCLA release in question); and,

2) *Naturally occurring* – substances present in the environment in forms that have not been influenced by human activity.

*Chemicals (or constituents) of concern (COCs)* are the hazardous substances, pollutants, and contaminants that, at the end of the risk assessment, are found to be the *risk drivers* or those that may actually pose unacceptable human or ecological risks.[3] The COCs typically drive the need for a remedial action (EPA, 1999a).

*Chemicals (or constituents) of potential concern (COPCs)* generally comprise the hazardous substances, pollutants, and contaminants that are investigated during the baseline risk assessment. The list of COPCs may include all of the constituents whose data are of sufficient quality for use in the quantitative risk assessment, or a subset thereof (EPA, 1989).

*Screening* is a common approach used by risk assessors to refine the list of COPCs to those hazardous substances, pollutants, and contaminants that may pose substantial risks to health and the environment. Screening involves a comparison of site media concentrations with site-specific risk-

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[3]Guidance for determining if site risks are unacceptable is discussed in the EPA (1991) ***Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions.*** As stated in the EPA (1991) memorandum, "EPA uses the general $10^{-4}$ to $10^{-6}$ risk range as a "target range" within which the Agency strives to manage risks as part of a Superfund cleanup." The risk used in this decision generally is the "cumulative site risk" to an individual using reasonable maximum exposure (RME) assumptions for either current or future land use and includes all exposure pathways which the same person may consistently face. See also EPA (1989) RAGS, Section 8.3.

based values.[4]

## Consideration of Background in Risk Assessment

A baseline risk assessment generally is conducted to characterize the current and potential threats to human health and the environment that may be posed by hazardous substances, pollutants, and contaminants at a site. EPA's 1989 *Risk Assessment Guidance for Superfund* (RAGS) provides general guidance for selecting COPCs, and considering background concentrations. In RAGS, EPA cautioned that eliminating COPCs based on background (either because concentrations are below background levels or attributable to background sources) could result in the loss of important risk information for those potentially exposed, even though cleanup may or may not eliminate a source of risks caused by background levels. In light of more recent guidance for risk-based screening (EPA, 1996; EPA, 2000) and risk characterization (EPA, 1995c), this policy recommends a baseline risk assessment approach that retains constituents that exceed risk-based screening concentrations. This approach involves addressing site-specific background issues at the end of the risk assessment, in the risk characterization. Specifically, the COPCs with high background concentrations should be discussed in the risk characterization, and if data are available, the contribution of background to site concentrations should be distinguished.[5] COPCs that have both release-related and background-related sources should be included in the risk assessment. When concentrations of naturally occurring elements at a site exceed risk-based screening levels, that information should be discussed qualitatively in the risk characterization. To summarize:

- The COPCs retained in the quantitative risk assessment should include those hazardous substances, pollutants, and contaminants with concentrations that exceed risk-based screening levels.

- The Risk Characterization should include a discussion of elevated background concentrations of COPCs and their contribution to site risks.

- Naturally occurring elements that are not CERCLA hazardous substances,

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[4]Risk-based values or concentrations are generally based on a cancer risk of one-in-a-million ($1 \times 10^{-6}$) or a hazard quotient of 1.0 for noncarcinogens (EPA, 1996) or screening-level ecological risk values (EPA, 1997a; EPA, 2001a). COPCs with concentrations below the screening levels might be excluded from the risk assessment unless there are other pathways or conditions that are not addressed by the screening values (EPA, 1996).

[5]Technical guidance should be consulted for sampling and analysis of background concentration data (EPA, 2001b).

pollutants, and contaminants, but exceed risk-based screening levels should be discussed in the risk characterization.

This general approach is preferred in order to:

- Encourage national consistency in this area;
- Present a more thorough picture of risks associated with hazardous substances, pollutants, and contaminants at a site; and,
- Prevent the inadvertent omission of potentially release-related hazardous substances, pollutants, and contaminants from the risk assessment.

This approach is consistent with the *Policy for Risk Characterization* which provides principles for fully, openly, and clearly characterizing risks (EPA, 1995b). Risks identified during the baseline risk assessment should be clearly presented and communicated for risk managers and for the public. Risk characterization is one of many factors in determining appropriate CERCLA risk management actions (EPA, 1991; EPA, 1995b).

**Consideration of Background in Risk Management**

Where background concentrations are high relative to the concentrations of released hazardous substances, pollutants, and contaminants, a comparison of site and background concentrations may help risk managers make decisions concerning appropriate remedial actions. The contribution of background concentrations to risks associated with CERCLA releases may be important for refining specific cleanup levels for COCs that warrant remedial action[6].

Generally, under CERCLA, cleanup levels are not set at concentrations below natural background levels. Similarly, for anthropogenic contaminant concentrations, the CERCLA program normally does not set cleanup levels below anthropogenic background concentrations (EPA, 1996; EPA, 1997b; EPA, 2000). The reasons for this approach include cost-effectiveness, technical practicability, and the potential for recontamination of remediated areas by surrounding areas with elevated background concentrations. In cases where area-wide contamination may pose risks, but is beyond the authority provided under CERCLA, EPA may be able to help identify other programs or regulatory authorities that are able to address the sources of area-wide contamination, particularly anthropogenic (EPA, 1996; EPA, 1997b; EPA, 2000). In some cases, as part of a response to

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[6]For example, in cases where a risk-based cleanup goal for a COC is below background concentrations, the cleanup level may be established based on background.

address CERCLA releases of hazardous substances, pollutants, and contaminants, EPA may also address some of the background contamination that is present on a site due to area-wide contamination.

The determination of appropriate CERCLA response actions and chemical-specific cleanup levels includes the consideration of nine criteria as provided in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 1990b). In cases where applicable or relevant and appropriate requirements (ARARs) regarding cleanup to background levels apply to a CERCLA action, the response action generally should be carried out in the manner prescribed by the ARAR. In the case where a law or regulation is determined to be an ARAR and it requires cleanup to background levels, the ARAR will normally apply and be incorporated into the Record of Decision, unless the ARAR is waived.

**Consideration of Background in Risk Communication**

EPA strives for transparency in decision-making (EPA, 1995c) and encourages programs to better advise citizens about the environmental and public health risks they face (EPA, 1997c). The presence of high background concentrations of COPCs may pose challenges for risk communication. For example, the discussion of background may raise the expectation that EPA will address those risks under CERCLA. The knowledge that background substances may pose health or environmental risks could compound public concerns in some situations.

On the other hand, knowledge of background risks could help some community members place CERCLA risks in perspective. Also, the information about site and background risks can be helpful for both risk managers who make an appropriate CERCLA decision, and for members of the public who should know about environmental risk factors that come to light during the remedial investigation process.

As a general policy matter, EPA strives for early and frequent outreach to communities in order to share information and encourage involvement (EPA, 2001c). EPA has made a clear commitment to fully, openly, and clearly characterize and communicate risks (EPA, 1995b; EPA, 1995c). There is no one-size-fits-all technique that can help explain risks associated with CERCLA releases or with background levels, or the basis of risk management decisions. Approaches will depend on the site, the issues, and the level of community interest. Early on in the process, Regions should clarify their understanding of stakeholder expectations and clearly explain the relevant constraints and limitations of the CERCLA remedial process (EPA, 1999b; EPA, 2001c).

In some cases where area-wide contamination may pose a risk, but is beyond the authority of the CERCLA program, communication of potential risks to the public may be most effective when coordinated with public health agencies. Examples of situations where Regions might coordinate risk communication with local, state or federal health officials are sites where widespread lead contamination or high levels of naturally occurring radiation have been found, but are not the subject of a CERCLA release into the environment. Public health agency officials may combine education and outreach efforts to inform residents about ways to reduce exposures and risks.

**Hypothetical Case Examples**

Three general hypothetical case examples are given to show how background may be considered in risk assessment and risk management at CERCLA sites:

Case 1 presents an example of a chemical site with widespread background contamination.

Case 2 presents an example of a radiation site with both natural- and release-related sources.

Case 3 presents an example of a site with hazardous substances, pollutants, and contaminants from both natural- and release-related sources.

In these examples, it is presumed that adequate samples are collected from appropriate background reference locations and evaluated using appropriate statistical methods. It is presumed that background is not used to screen out substances from the risk assessment. For simplicity, only one pathway[7] is used for hypothetical human health risk assessments.[8]

Based on the presumptions above, the basic concepts these examples are designed to highlight are:

- Background issues should be discussed in the risk characterization portion of the baseline risk assessment in order to inform risk management decisions;

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[7] At most CERCLA sites, risks for the reasonably maximum exposed individual typically are combined across several exposure pathways to estimate the total risks at a CERCLA site. This is done only for the pathways which the same individual would be likely to face consistently (EPA, 1989). Depending on the particular CERCLA site, risks could be calculated for the entire area of the site or for separate units (see Section 4.5 of RAGS (EPA, 1989)). More technical guidance for characterizing background concentrations and comparing data sets is provided in EPA (2001b) and other technical references cited previously in this document.

[8] Guidance on the consideration of background concentrations during screening level ecological risk assessments is provided in EPA (2001a).

- Information about unacceptable risks should be communicated to public; and,
- Other factors, such as the nine criteria provided in the NCP, should be considered by the risk manager in making final decisions.

**Hypothetical Case 1**

The ABC Industrial Site risk assessment included all COPCs that exceed site-specific risk-based concentrations for soil pathways. The results of the risk assessment identified the following COPCs with risks above or at the high end of the $10^{-4}$ to $10^{-6}$ risk range: arsenic, dieldrin, and 4,4-DDT. The hazard quotients were below 1.0.

Arsenic is a potential background substance – it is a common naturally occurring element – but is also a hazardous substance that was released at this site. The available site characterization data indicate that soil arsenic concentrations may be naturally occurring or consistent with background concentrations. Dieldrin and DDT are present at high concentrations that contribute to an unacceptable site risk. However, only dieldrin is known to be associated with the CERCLA site activities and releases. Since there are no known historical uses of DDT at this CERCLA site, the RPM suspects that the DDT in soil originated from area-wide agricultural pesticide applications in this part of the state. Based on this information, the RPM requests additional sampling of background locations for arsenic and DDT analysis. A statistical comparison of sampling data for arsenic and 4,4-DDT in on-site samples and background samples indicates that site concentrations for DDT are consistent with background concentrations. Local and regional data support the conclusion that DDT is an area-wide contaminant. The additional data indicate that arsenic concentrations on the site are above background concentrations. Therefore, the arsenic risks cannot be attributed solely to background.

In this example, arsenic and dieldrin are the soil COCs for which cleanup goals should be derived. The risk characterization should present information about DDT as an area-wide background contaminant that is unrelated to releases at this site, and the Agency should explain whether or not it will be addressed. The RPM should consider whether other regulatory programs or authorities are able to address the area-wide DDT contamination in a coordinated response effort. If available, the location(s) of additional information on pesticide use in this part of the state should be provided for concerned citizens.

**Hypothetical Case 2**

At ABC Radium Production Site, site characterization data indicate that radium (Ra-226) and inorganics are present in soil. Arsenic concentrations exceed screening levels but are assumed to be within naturally occurring levels. To confirm this assumption, the RPM evaluates site-specific background samples for comparison to site concentrations. The site-specific background analysis confirms that arsenic concentrations collected on the site are consistent with background concentrations in soils. There are no known regional anthropogenic sources of arsenic (such as smelters or pesticide manufacturers). Arsenic, in this case, is considered to be a naturally occurring substance and is excluded from further consideration in the quantification of site risks. However, the finding of natural background arsenic at concentrations that may pose health risks should be discussed in the text of the risk characterization.

The risk assessment indicates that Ra-226 exceeds the high end of the acceptable risk range of $10^{-4}$ to $10^{-6}$. It is commonly known that Ra-226 occurs naturally in the environment. Samples collected in an appropriate background location near this site indicate that Ra-226 levels from natural sources are lower than the site levels, but are associated with a risk at the upper end of the risk range ($10^{-4}$).

In this example, only Ra-226 should be a COC for which a cleanup goal should be derived. The risk characterization, however, should include a discussion of natural background levels of both arsenic and Ra-226.

**Hypothetical Case 3**

XYZ Site contains buried chemical wastes, but some anecdotal accounts indicate that radium may have been used. Preliminary site characterization data show that arsenic, manganese, and Ra-226 concentrations exceed the site-specific, risk-based concentrations. A comparison of arsenic and manganese concentrations in groundwater samples collected from upgradient background locations indicates that only manganese site concentrations are consistent with background levels and considered to be naturally occurring. Naturally occurring manganese is not considered further in the quantification of risks, but is included in a qualitative discussion of risks in the risk characterization.

The RPM decides to analyze for Ra-226 both at the site and in background locations because it is commonly known that Ra-226 occurs naturally in the environment. Samples are collected in an appropriate background location near this site. The samples indicate that Ra-226 levels at this site are not different from naturally occurring levels. Therefore, Ra-226 is not a COPC for further consideration in the quantification of risks. Subsequent site investigation data confirms the use of chemicals, but not radionuclides.

In this example, only arsenic risks are quantified in the risk assessment. The baseline risk for groundwater indicates that arsenic poses an unacceptable risk. The risk characterization should include a discussion of the natural Ra-226 and manganese concentrations because the levels exceeded risk-based concentrations. Site characterization data indicate that site disposal activities caused naturally occurring arsenic in soil to be mobilized and leach to groundwater. Arsenic, therefore, is the subject of a CERCLA release into the environment and a cleanup goal for it should be derived.

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**Superfund Today, Focus on Risk Assessment: Involving the Community, 2002. EPA**

**(Five Pages)**

United States
Environmental
Protection Agency

Office of Solid Waste and
Emergency Response
(5204G)

EPA 540-K-98-004
OSWER 9200.2-26J
PB98-963254
April 1999

EPA

# Superfund Today

FOCUS ON RISK ASSESSMENT: INVOLVING THE COMMUNITY

## What is Human Health Risk Assessment?

How dangerous is that Superfund site near you? Past activities at the site, such as wood treating, metal plating, dry cleaning, or waste disposal may have left hazardous substances in the buildings or soil. In many cases, these substances have moved into the ground water, surface water, or air. Every time you come into contact with these substances you face some risk.

Risk assessment is the process of estimating how dangerous a particular situation is. Superfund's risk assessors seek to determine whether the hazardous substances at a site present a danger to you and your family. They also do separate studies to evaluate threats to the environment. Therefore it is important that they have as much information about the site as possible. You and other people who live and work near the site may have important knowledge and insights to share that can help the risk assessors. Your involvement is useful throughout the risk assessment, but it is most helpful early in the process. The notepad to the right shows some of the information you may have.

Each Superfund site is unique, so risk assessments are done on a site-by-site basis. The risk assessment estimates the current and possible future risks to your health from the site. The goal is to understand what levels of cleanup will be necessary to make sure you and your family are protected. The site manager uses the information provided by the risk assessors to choose a good cleanup strategy.

Living near a Superfund site doesn't mean your health is threatened. The danger to you will depend on the substances present and the ways you may be exposed to them. You have a right to be informed about the possible threats and what EPA plans to do to protect you. The information in this issue will help you understand how EPA measures human health risks at Superfund sites and how you can be involved in the process. ❑

You or your neighbors may be able to provide information about:

1. *What has gone on at or around the site*
2. *Possible ways people can be exposed to hazards at the site*
3. *Who is likely to be exposed to material from the site*
4. *Community concerns, cultures, and values*

### This Issue...

- ✓ Explains Superfund's human health risk assessment process
- ✓ Discusses your participation in the risk assessment process
- ✓ Gives you some tips for getting involved
- ✓ Provides sources you can go to for more information and help

# How Does Superfund Evaluate Risk?

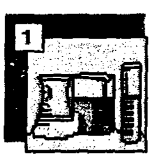
A human health risk assessment estimates the "baseline risk." This is the likelihood of health problems occurring as a result of the hazardous substances at the site. Risk assessors make this determination through the following four-steps:

*Step 1: Data Collection & Evaluation*
*Step 2: Exposure Assessment*
*Step 3: Toxicity Assessment*
*Step 4: Risk Characterization*

Before beginning, the risk assessors prepare a work plan. The work plan identifies: 1) what data are needed; 2) what assumptions are being made; and 3) what technical models will be used (models are tools used to predict site specific outcomes such as how ground water moves away from a site or how substances in soil become airborne). Your input during the development of the work plan can help the risk assessors to better understand the circumstances at the site and to avoid missing important information.

Key questions risk assessors should ask you during work plan development:

- What do you know about how the site has been used?
- Who might be exposed to materials from the site?
- How might people be exposed? *for example: fishing, gardening, playing*
- What are your concerns about dangers posed by the site?

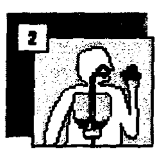



## Data Collection & Evaluation

The collection of adequate and appropriate data is critical for evaluating the potential risks posed by the site. Some data may already be available from the first investigation of the site. These data are supplemented by more samples of soil, air, water, sediment, plants, fish and/or animals as described in the work plan. The samples are analyzed in laboratories to reveal the types and levels of hazardous substances present. The samples collected are directly related to what the risk assessors understand to be the problems. This is why your input is so important. When the samples are analyzed, hundreds of substances may be detected. Some of these chemicals are naturally occurring or are present at levels that will not cause harm. Risk assessors identify those substances which could pose a danger to your well-being. These are called "chemicals of potential concern."

Key questions risk assessors should ask you about data collection and evaluation:

- What are the current and future uses of the site?
- Are you concerned about specific hazardous substances?
- On which parts of the site are hazardous substances most likely to be found?
- Do you have suggestions about the best times to conduct sampling?
- Do you have questions about how samples are collected and analyzed?




## Exposure Assessment

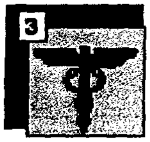
After the risk assessors have the results of the data analysis, they look at the ways you might be exposed to any chemicals of potential concern. You may come into contact with them in a variety of ways: breathing, touching, or consuming contaminated air, water, soil, or food. For each of these "exposure pathways," the risk assessors estimate quantities that could reach a person's lungs, digestive system, or skin.

Using this information, risk assessors calculate the "Reasonable Maximum Exposure (RME)." The RME is the highest level of human exposure to the substances that is likely to occur. Exposures are calculated for different groups of people, such as children, site workers, residents, and the elderly. The calculations take into account how long, how often, and in how many ways people could be exposed to the hazardous substances. The RME also factors in the number of years exposure could occur if the site were not cleaned up. Both current and likely future uses for the site are considered. The exposure assessment gives the risk assessors information about who is vulnerable to the substances that are present.

During this step you can contribute information about behaviors and activities that could lead to increased risk of exposure.

Key questions risk assessors should ask you about exposure assessment:

- Who may come in contact with the site? *for example: children, the elderly, pregnant and nursing women, people with chronic illnesses*
- How do people use the site? *for example: fishing, gardening, hunting*
- Where are children likely to play or trespass?
- How often are people exposed?
- What types of animals are hunted?
- Do people fish here?
- Do people garden or gather food from the site?



## Toxicity Assessment

While the exposure assessment is underway, the risk assessors are also looking at the toxicity, or harmfulness, of each chemical of potential concern. They want to determine what kind of health effects may result from various levels of exposure to the hazardous substances at the site. Risk assessors usually do not do their own toxicity testing, but rely on previous scientific studies of the effects of the substances on animals and, when available, on humans. They evaluate both the cancer and non-cancer effects for each substance, if enough scientific data exist.

The likelihood of some cancer resulting from a Superfund site is expressed as a probability; for example, a "1 in 10,000 chance" (sometimes expressed as $1x10^{-4}$ or 1e-04). This means that for every 10,000 people exposed to the RME, one extra cancer may occur, beyond what would be expected from all other sources.

Non-cancer health effects can range from rashes, eye irritation, and breathing difficulties to organ damage, birth defects, and death. Risk assessors calculate the level of exposure above which non-cancer health effects begin to occur (this is called the "hazard quotient").

Community input during the toxicity assessment is limited because it is a very technical, science-based process. You should tell the risk assessors about any concerns you have about potential health effects. This will help them give you clear explanations of the conclusions they are reaching about possible health hazards.

Key questions risk assessors should ask you about the toxicity assessment:

- [illegible]
- [illegible]

## Risk Characterization

Finally, the risk assessors combine the results of the first three steps and come up with their estimate of the risks posed by the site. This is known as "risk characterization." In reaching their conclusions they take into account the types and amounts of hazardous substances present, the ways in which people are exposed, and the effects of the substances on human health. The risk assessors are very careful to make sure their work will not lead to results that understate the level of threat posed by the site. Their results will be used by the site manager, who decides what cleanup actions must be taken to protect you and your family. During this last part of the risk assessment, the risk assessors should provide you with a clear explanation of what their conclusions mean for your health.

Key questions risk assessors should ask you during risk characterization:

- Have your concerns been adequately answered?
- Do you believe any substances, kinds of exposure, or any vulnerable persons have been missed?
- Do you understand the results of the risk assessment?

### Risk Assessment

1 Data Collection & Evaluation

↓

2 Exposure Assessment

↓

3 Toxicity Assessment

↓

4 Risk Characterization

↓

### Cleanup Decision

## ATSDR's Role in Risk Assessment

The Agency for Toxic Substances and Disease Registry (ATSDR) is part of the U.S. Public Health Service. ATSDR may conduct a Superfund **public health assessment**, which is an independent evaluation of whether exposure to a site poses a danger to the people who live and work near it. This helps to ensure that EPA does not overlook or underestimate any threats. Both a human health risk assessment and a public health assessment study overall hazardous substance threats to people. Neither is a substitute for a personal medical exam to determine your own health status. To find out more about public health assessments, [illegible]

# How The Risk Assessment Results Are Used

The risk assessors explain their conclusion to the managers responsible for cleaning up the site. The risk assessment is just one of the things the managers look at when deciding what actions must be taken to protect your health and welfare. Other things that play a role in the decision are state and federal regulations, technology alternatives, costs, and community acceptance. If the level of risk is low, the site managers may decide that some or all of the substances may remain safely at the site. Sometimes cleanup workers can simply put a cap over the site or build underground walls to keep hazardous substances from reaching you or others. The site manager's goal always is to keep the community safe. Until all site actions are completed, workers continue to check the conditions to make sure that you are not in any danger. ❑

## REMEMBER...

- ✓ Your input to the risk assessment is important. You need to realize, however, that risk assessors must follow certain regulations and technical procedures. While all your concerns will be considered, the risk assessors may not always be able to do all of the things you want. But they should be responsive and give you clear explanations for what they are or are not doing.
- ✓ Risk assessment is not an exact science. Risk assessors use the best available data on what is occurring, or could occur, at the site. They apply their scientific judgment to calculate the likelihood of exposure to hazardous substances and the health consequences of such exposure. While the results are probabilities, not certainties, the risk assessors are careful not to underestimate any threats. The risk assessment is one of many inputs to the decision of how to protect your health and welfare. ❑

# Tips for Getting Involved

**How Do I Get Started?**

Seek out and talk to the risk assessors about becoming involved in the process.

Review the key questions in this document and begin to think how you will answer them.

**What Should I Keep In Mind?**

***Be Prepared...***
To be involved in a meaningful way you must make some commitment of time and energy. You can prepare by:

1) Learning about the risk assessment process and the site history;
2) Participating in meetings and talking with risk assessors; and
3) Following up on key issues.

***Take Initiative...***
Look for ways to get involved. Raise concerns in a constructive manner and contribute fully and responsibly during the risk assessment.

***Ask Questions...***
Don't be afraid to say you don't understand something. Be sure to ask for clarification of technical concepts.

***Recognize Constraints...***
The Superfund law and accompanying policies and regulations establish a framework within which the risk assessment and all other activities must be conducted. There are also professional and technical guidelines and funding restrictions that affect what risk assessors can do. ❑

# The Rest of the Story: Superfund Cleanups

EPA uses the results of a risk assessment to help decide whether any long-term cleanup is needed at a Superfund site. If the answer is "yes," the risk assessment also guides decisions on the type of remedy and cleanup levels that would protect your health and the environment. After the risk assessment, EPA continues to seek your opinions on proposed cleanup approaches, which are thoroughly investigated before any decision is made.

There are two basic types of cleanup technologies in use at Superfund sites: treatment and containment. **Treatment** technologies use engineering approaches to reduce the amount of hazardous substances present, their ability to move off the site, or the hazard they present. Treatment technologies include destroying substances by burning them at high temperatures while controlling the fumes; allowing substances to evaporate into an air stream that is then treated and released; and injecting soils with micro-organisms that digest substances and result in less harmful materials. **Containment** approaches build barriers that isolate hazardous substances and keep them from coming into contact with people and the environment. Containment technologies include constructing a protective barrier, or cap, over the contaminated area; excavating the substances and disposing of them in a securely designed landfill; and building an underground barrier that blocks, diverts, or captures polluted ground water.

In many cases, a combination of treatment and containment is the best solution. Engineers design the long-term cleanup approach. As cleanup work progresses, the levels of the hazardous substances are constantly measured to make sure the cleanup goals are being achieved and that there is no immediate danger to you. If chemical materials are left at a site, EPA re-examines the site every five years after cleanup to make sure it is still safe. ❑

**For More Information...** on EPA's risk assessment process, or about a Superfund site in your neighborhood, please contact the toll-free Superfund/RCRA Hotline at 1-800-424-9346 or the Community Involvement Coordinator in the EPA regional office for your state; their numbers are listed below. Your local EPA office can tell you where you can go to review files on every Superfund site in your area. This information may include the results of a risk assessment. Often, EPA conducts community meetings to keep people who live near a site informed about site activities. You may also find useful information on the Superfund home page (www.epa.gov/superfund) under the Community Tools and Technical Resources subheadings. ❑

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290 Broadway St.,
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(212) 637-3671 or (800) 346-5009

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VERSION: NA (e.g., Draft, Draft Final, Final) REVISION #: NA

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