RISK, COMPETITIVENESS & CONSERVATION DATA SUMMARY

OVERVIEW: The Risk, Competitiveness & Conservation Data Summary module organizes data from the risk, competitiveness, and conservation components of a CTSA together with data from the Process Safety Assessment, Market Information, and International Information modules. Data organized in this module are transferred to the Social Benefits/Costs Assessment module for analysis of: (1) the benefits and costs to the individual of alternative choices (referred to as private benefits and costs); and (2) the benefits and costs to others who are affected by the choices (referred to as external benefits and costs). Data are also transferred to the Decision Information Summary module where they are combined with the results of the Social Benefits/Costs Assessment to identify the overall advantages and disadvantages of the baseline and the substitutes.

GOALS:

- Compile data on the baseline to serve as a basis of comparison when evaluating the trade-offs among risk, competitiveness, and conservation.
- Compile data on each of the substitutes to identify the trade-offs among risk, competitiveness, and conservation issues associated with a substitute.
- Compile information on the uncertainties in the data that should be considered in the decision-making process.
- Develop simplified, interpretive summaries of the data that note clear distinctions in trade-off issues of the substitutes as compared to the baseline.
- Transfer data to the Social Benefits/Costs Assessment and Decision Information Summary modules.

PEOPLE SKILLS: The Risk, Competitiveness & Conservation Data Summary module requires the people skills outlined in the previous module descriptions for the analytical components of a CTSA, as well as the people skills required for the Social Benefits/Costs Assessment module. Completing this module should be a joint effort by all members of a DfE project team. Knowledgeable personnel and technical experts who completed the analytical modules are needed to evaluate results and identify uncertainties in the information.

DEFINITION OF TERMS: None cited.

APPROACH/METHODOLOGY: The following presents a summary of a general approach for organizing the data compiled in a CTSA. Methodology details for Steps 10 and 12 follow this section.

Risk

Step 1: Obtain data on environmental releases and transfers of pollutants from the Survey of Workplace Practices & Source Release Assessment module. Note any assumptions, scientific judgements, and uncertainties in the data. The Exposure Assessment module analyzes modeled or measured environmental concentrations of pollutants to determine exposure levels, but other effects of emissions (e.g., a smokestack that deposits soot on someone's laundry) may be considered in the Social Benefits/Costs Assessment.

Step 2: Review the Exposure Assessment module to determine the potential for chemical exposure via the evaluated pathways (e.g., dermal, inhalation, ingestion). In past CTSAs, exposure potential has been used as an indicator of risk potential when toxicity data were not available. Note any assumptions, scientific judgements, and uncertainties included in the assessment.

Step 3: Obtain data on the human health and environmental risks of alternatives from the Risk Characterization module. Note any assumptions, scientific judgements, and uncertainties included in the assessment.

Step 4: Review the Process Safety Assessment module to determine if the baseline or alternatives pose particular process safety hazards. List special precautions or actions that may be required to mitigate safety hazards.

Competitiveness

Step 5: Review the Regulatory Status module to determine which alternatives are regulated by environmental statutes, including any bans or restrictions that may affect availability. Alternatives being banned or phased-out should have been eliminated from consideration when the Regulatory Status module was completed. However, other alternatives may be under consideration for a ban or phase-out.

Step 6: Obtain data on the relative performance of the substitutes as compared to existing performance standards or as compared to the baseline from the Performance Assessment module. Note any assumptions, judgements, or uncertainties that should be reported with the performance data.

Step 7: Obtain the costs of alternatives from the Cost Analysis module. Note the assumptions and types of costs (e.g., operating, capital, indirect, etc.) that are included in the cost figures.

Step 8: Review the Market Information and International Information modules to identify any current or anticipated problems with the supply of or demand for the

substitutes. This can include supply shortfalls or international trade issues (e.g., taxes, tariffs, or prohibitions) that might limit the availability of a substitute.

Conservation

Step 9: Review the Energy Impacts and Resource Conservation modules for conservation data. Note alternatives that consume scarce resources or that are derived from nonrenewable resources.

Data Summaries and Data Transfer

Step 10: Construct data summary tables of the data obtained in Steps 1 through 9.

Step 11: Review the data for each alternative to determine the trade-off issues associated with any one substitute. Note changes in trends from the baseline to the substitutes (e.g., the baseline performs well, is cost-effective, but consumes large amounts of water and has a high potential for worker exposure; an alternative performs well, is expected to be cost-effective if supply/demand relationships stabilize; has reduced water consumption and potential for exposure as compared to the baseline).

Step 12: Using data from the baseline, trends among trade-offs identified in Step 11, and existing published guidance or data from modules describing the levels of concern for different parameters (e.g., risk assessment guidance on concerns for risk), develop simplified, interpretive summaries of the data that note clear distinctions in trade-off issues of a substitute as compared to the baseline.

Step 13: Transfer the risk, competitiveness, and conservation data summary information and any assumptions, judgements, or uncertainties that should be reported with the data to the Social Benefits/Costs Assessment and Decision Information Summary modules.

METHODOLOGY DETAILS: This section provides methodology details for completing Steps 10 and 12. In some cases, information on interpreting the significance of results can be found in the published guidance listed previously in other module descriptions.

Details: Steps 10 and 12, Constructing Data Summary Tables and Interpretive Summaries

In Step 10, relevant information from the CTSA can be structured in table, or matrix, format for ease of understanding. Data summaries that compare the substitutes to the baseline should be presented using some consistent unit of measure for each category. Table 10-1 is an example of a matrix that can be used to compare the impacts of alternatives on health and the environment. Data for the baseline and the alternatives should be included in the matrix. A DfE project team may show quantitative data in the matrices, or use symbols (e.g., "+" or "-") or text to illustrate

the impacts of the alternatives as compared to the baseline. Note that impacts which are stronger than others can also be recognized (e.g., high, medium, or low positives or negatives).

TABLE 10-1: EXAMPLE MATRIX OF ENVIRONMENTAL RELEASE AND RISK-RELATED DATA

Alternative	On-site Releases[a]			Off-site Transfers[a]			Risk[b,d]			
	Air	Water	Land	POTW[c]	Hazardous Waste Disposal	Recycling	Worker		General	
							Exposed Population	Risk Characterization	Exposed Population	Risk Characterization
Baseline										
Alternative 1										

a) Data on environmental releases and transfers are obtained from the Survey of Workplace Practices & Source Release Assessment and the Exposure Assessment modules (environmental releases and transfers that must be modeled).
b) Risk data are obtained from the Risk Characterization module. Quantitative data included here could include individual or population cancer and non-cancer risk to workers and other exposed human populations, and risk to aquatic organisms. Qualitative data might include an assessment of the potential for exposure to the health and environmental hazards identified in the Human Health Hazards and Environmental Hazards Summary modules.
c) Publicly Owned Treatment Works.
d) Data on population sizes are obtained or can be developed from the Survey of Workplace Practices & Source Release Assessment and Exposure Assessment modules.

Table 10-2 is an example matrix for compiling conservation information. The cost of energy and other resources should have already been incorporated in the Cost Analysis module. However, it is important to note the rate of resource consumption, or choices that consume scarce resources or that are derived from nonrenewable resources.

TABLE 10-2: EXAMPLE MATRIX OF CONSERVATION INFORMATION[a]

Alternative	Energy Consumption[b]		Other Resources Consumption[c]		
	Natural gas (BTU/hr)	Electricity (kWh/day)	Water (gallons/day)	Chemical Product (gallons/yr)	Machine Oil (gallons/mo)
Baseline					
Alternative 1					
Alternative 2					

a) Resource data are usually collected in units of mass or volume per unit time (m/t or L^3/t). To convert to mass or volume per unit production, multiply by the reciprocal of the production rate (e.g., 10 Btu/hr x 1 hr/50 widgets = 0.2 Btu/widget).
b) Energy data are obtained from the Energy Impacts module.
c) Other resource data are obtained from the Resource Conservation module.

To the extent possible, data should be normalized to some consistent basis, preferably per unit production ($/widget, Btu/widget, No. of product rejects/widgets produced, etc.). Normalization allows the baseline and substitutes to be compared directly. The following discusses the data summaries in more detail.

Exposure Potential and Health or Ecological Risk. The exposure potential and risk associated with using the baseline or a substitute can be presented together, particularly since risk is a function of exposure potential. For each system, qualitative descriptors could be used to list the potential for dermal (skin), inhalation, and ingestion exposure as high (+++), moderate (++), or low (+). Below each exposure scenario would be listed the corresponding risk level. Concerns for risk could be categorized as "clear," "possible," negligible," or "not quantified."

"Clear" concern indicates an inadequate margin-of-safety according to generally accepted risk assessment standards for exposure to the chemicals in question (see the list of published guidance in the Risk Characterization module). "Possible" concerns indicate that the margin-of-safety is slightly less than desirable and may not afford adequate protection in some circumstances. "Negligible" concerns indicate that an adequate margin-of-safety exists for exposure to the chemicals in question under the expected conditions of use.

For some chemicals evaluated in a CTSA, there may be insufficient data to quantify the risk, and although the exposure potential may be well-characterized, the precise risk cannot be quantified; these risks should be listed as "not quantified." Categorizing of risk into concern levels should only be undertaken by someone with expertise in accepted risk assessment standards.

Regulatory Status. Highlight alternatives that have a clearly different regulatory status as compared to the baseline or other alternatives. These might include alternatives being banned or phased-out, alternatives with no VOC content, or alternatives that do not use or contain regulated toxic chemicals.

Process Safety. Briefly summarize the safety hazards associated with the baseline in general. Use qualitative descriptors to indicate if an alternative improves working conditions by reducing safety hazards or may negatively influence working conditions by introducing a new safety hazard (e.g., "+" for improved safety; "-" for reduced safety). Special precautions or actions required to mitigate additional safety hazards of alternatives should be listed.

Performance. If performance data were collected on more than one measure of performance, the data can be combined into one overall assessment of the relative performance of a substitute or listed separately. If a substitute performs well, but fails to meet some traditional performance measure (e.g., the brightness requirement of virgin paper), it may be necessary to assess the performance measure to determine if industry standards are changing in response to environmental or other concerns.

Cost. Cost data should be provided in terms of dollars per unit production or some other consistent unit. The categories of costs (e.g., capital, operating, maintenance, indirect, etc.) and any assumptions that are included in the cost data should be clearly documented.

Energy and Resource Consumption. The types of energy or other resources evaluated and any assumptions should be clearly documented. If the project team focusses on a particular category of resources (e.g., water usage), information should be provided on the reasons for concern about the resource (e.g., continuing usage of large amounts of water could limit the industry's potential for growth; reliance on a scarce resource creates societal burdens and limits growth potential; mandated restrictions on use are anticipated, etc.).

Market and International Information. Businesses need to be aware of any expected supply shortfalls or international conditions that could limit the availability of a substitute. This information should also be briefly summarized.

FLOW OF INFORMATION: This module summarizes the data on risk, competitiveness, and conservation compiled throughout a CTSA. The data summaries should report the technical data compiled in a CTSA in an understandable manner that will assist individual decision-makers in the decision-making process. The Risk, Competitiveness & Conservation Data Summary module receives data from the Workplace Practices & Source Release Assessment, Exposure Assessment, Risk Characterization, Process Safety Assessment, Regulatory Status, Performance Assessment, Cost Analysis, Market Information, International Information, Energy Impacts, and Resource Conservation modules. It transfers data to the Social Benefits/Costs Assessment and Decision Information Summary modules. Example information flows are shown in Figure 10-1.

ANALYTICAL MODELS: None cited.

PUBLISHED GUIDANCE: None cited.

DATA SOURCES: None cited.

FIGURE 10-1: RISK, COMPETITIVENESS & CONSERVATION DATA SUMMARY MODULE: EXAMPLE INFORMATION FLOWS