11.1 Generating and Viewing Reports

The program allows you to generate and view several reports:

- The Stream Report (SR)
- The Economic Evaluation Report (EER)
- The Itemized Cost Report (ICR)
- The Cash Flow Analysis Report (CFR)
- The Throughput Analysis Report (THR)
- The Environmental Impact Assessment Report (EIR)
- Emissions Report (EMS)
- The Input Data Report (IDR)
- The Equipment Report (EQR)

You can create, view, and save the reports in the following Format:

⇨ Excel (Fully Formatted)

⇨ Excel (Unformatted Data)

⇨ HTML

⇨ PDF

⇨ RTF

⇨ Text

⇨ XML

⇨ Preview (this format is for quick viewing and printing only, it can not be edited)

Before you create the reports you should visit the **Reports/Options/Default** dialog so as to set the general as well as the individual reports options, including the format of each report file. Before creating a report file, the program will check to verify that all simulation results and cost items are up-to-date (in case any modifications have been made to the current design case after the last simulation and/or economic calculations were performed). If the variables are found not to be up-to-date, then the program will notify you and request your permission to redo the simulation and economic calculations before creating the report file.

11.1.1 Generating and Saving Multiple Reports

You can create and save one or more reports by selecting **Reports/Create and Save As** from the main menu. This brings up the following interface:

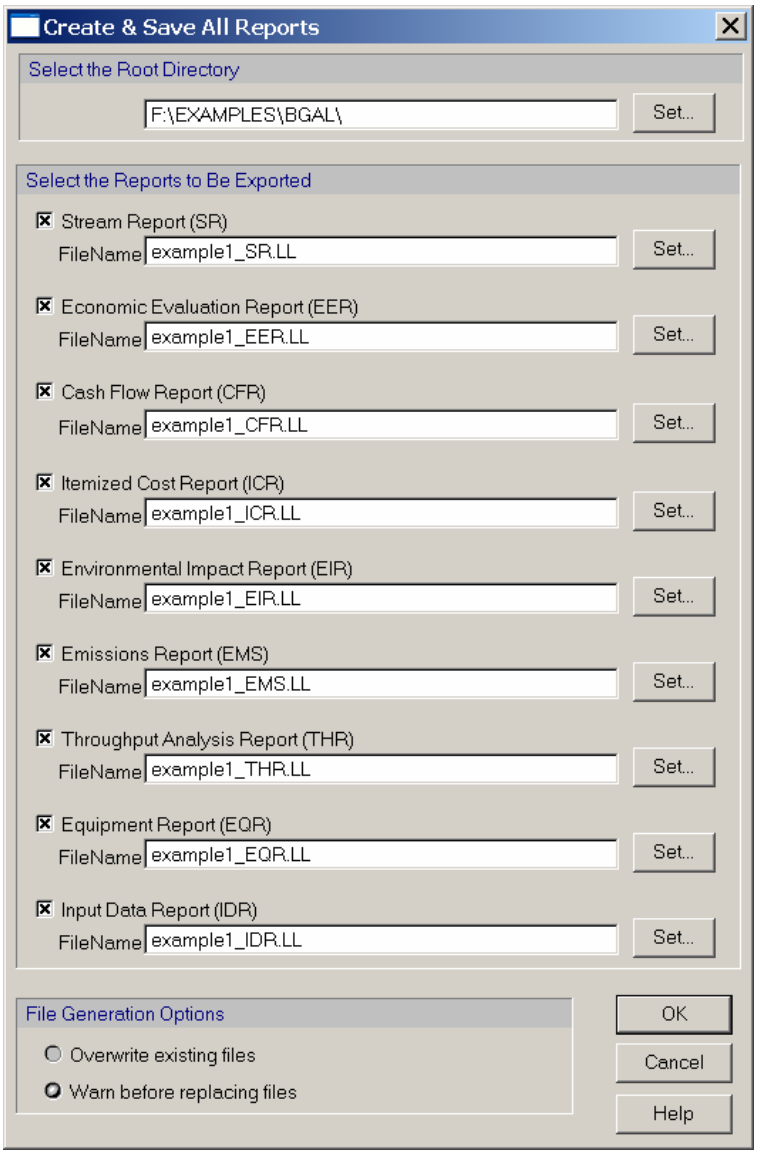

Figure 11.1: **Create and Save As** interface for creating multiple reports

This interface allows you to specify which reports you want to create, their names, and their locations.

Root Directory: Set the directory to which the report files will be saved. Press on the **"Set…"** button to browse through your directories.

Reports to be created / saved: Select whether a report is to be created/saved by clicking the respective check box. A default name is given for all the reports. To change the default name and/or the directory that the report is to be saved at click on the **"Set…"** button.

File Generation Options: Select whether existing report files are to be overwritten, or whether you should be warned first.

11.1.2 Generating, Saving, and Viewing Individual Reports

You can request to generate, save, and view any of the reports of the design case if you select any of the following commands from the Reports menu:

- Stream & Mat. Balance(SR)
- Economic Evaluation (EER)
- Cash Flow Analysis (CFR)
- Itemized Cost (ICR)
- Throughput Analysis (THR)
- Environmental Impact (EIR)
- Emissions (EMS)
- Equipment (EQR)
- Input Data (IDR)

11.1.3 Viewing Any Existing Report

You can request to view any report by selecting the **Reports/ View Any** from the main window menu. This command will bring up the Windows File browse dialog, in order for you to browse and choose the report file you want to view. You can choose to view any report, whether it is associated with the current Design Case or not. Once you have opened a report for viewing, feel free to modify and annotate it in any way that suits you. The program will never need to read in the report again, so you should not hesitate to modify it.

From this dialog you can set the default options that affect all the reports. These options will apply to the reports if in the respective report interface you chose "Use Default" for the general options.

Formats supported by SuperPro for the reports:

- ⇨ Excel (Fully Formatted)
- ⇨ Excel (Unformatted Data)
- ⇨ HTML
- ⇨ PDF
- ⇨ RTF
- ⇨ Text
- ⇨ XML
- ⇨ Preview (this format is for quick viewing and printing only, it can not be edited)

11.2 General (Default) Reports Options

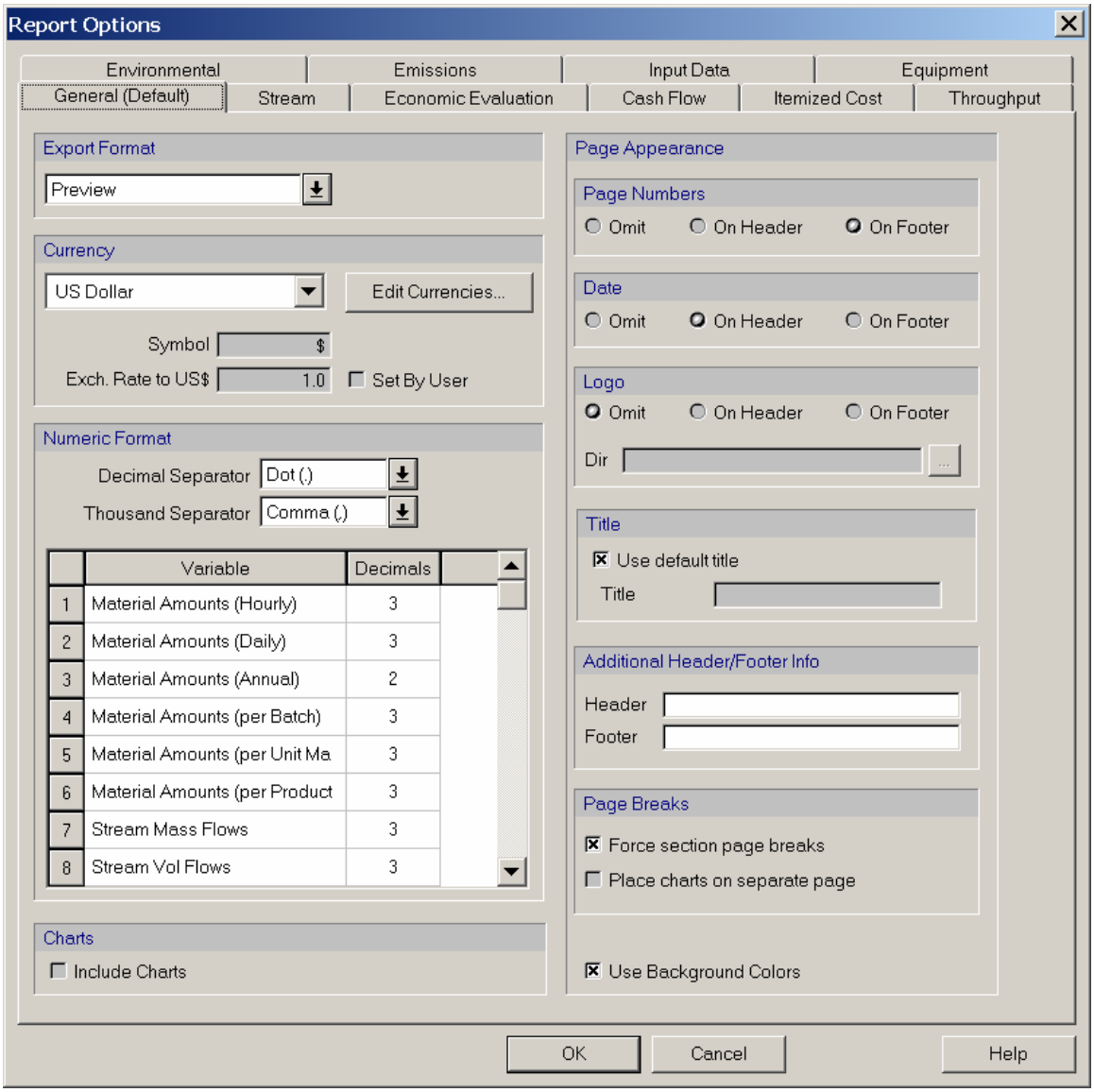

Figure 11.3: The General (Default) options dialog for the reports

Currencies: You can select the currency to be used in the reports, among the currencies registered in the currencies databank. You can edit this databank by clicking on **"Edit Currencies"** which brings up the **Currencies Databank Interface**. If you want to change the properties of user-registered currency for the reporting purposes of

this Design Case only then click on the **"Set By User"** check box. This will enable the conversion and symbol windows for all currencies except the US Dollar. The changes in those windows will not apply to the databank.

Numerical Format: You can select the symbol for the decimal and the thousand separator. You can also specify the number of decimal points for the different variable categories that are listed.

Charts: Click on the "Include Charts" check box to have system generated charts included to the reports.

Page Appearance:

- ⇨ You can select whether to omit, display on header, or display on footer, the page numbers, the date, and the logo.
- ⇨ You can either use the default title (clicking on the "Use Default title" check box) or set your own.
- ⇨ You can insert additional Header / Footer text.
- ⇨ You can force a page break after each report section by clicking the "Force Section Page Breaks" check box.
- ⇨ You can place each chart on a separate page by clicking the "Place Charts on Separate Page" check box.
- ⇨ You can make use of background color by clicking on the "Use Background Colors" check box.

11.3 Stream and Material Balance Report

The Materials and Stream report can be seen as been comprised of four sections:

- ⇨ Overall Process Data
- ⇨ Raw Material Requirements Section
- ⇨ Streams and Their Properties Section
- ⇨ Overall Material Balance Section
- ⇨ Equipment Contents Section

The top part of the stream report provides information on the overall process. The second part of the report provides information on starting and raw material requirements. The raw material requirements are printed in various units for each flowsheet section. A number of breakdowns are provided, highlighting the distribution of raw material consumption.

The third part of the stream report contains important information about the streams in the current design case. For each stream, the following information is included:

a. Name,

b. Source Unit Procedure (or INPUT if it is an input stream),

c. Destination Unit Procedure (or OUTPUT if it is an output stream),

c. Activity (U/ml),

d. Temperature (°C),

e. Pressure (bar),

f. Density (g/l),

f. Composition (component wt %).

g. Component Flowrates

h. Total Mass or Molar Flowrate (kg/h or kg/batch), and

i. Total Volumetric Flowrate (m^3/h or m^3/batch).

Next, in the stream report, there is an overall mass balance section. In that section, for each component, the program sums up the total flow coming into the process (through any of the input streams) and all of each component's flow that leaves the process (through any of the output streams) and reports the difference.

Finally, the last section of the stream report, presents information about equipment contents (for batch recipes only). This section of the report shows for each piece of equipment that holds a volume of material (e.g. a vessel) its initial contents before the batch started, and its volume contents as each unit procedure hosted by that equipment progresses.

Several user-adjustable settings determine the final form of the stream report, as well as the units that key-variables are reported. These settings can be adjusted from the dialog (Figure 11.4) that appears when the option **Reports/Options/Stream (tab)** is selected from the main menu.

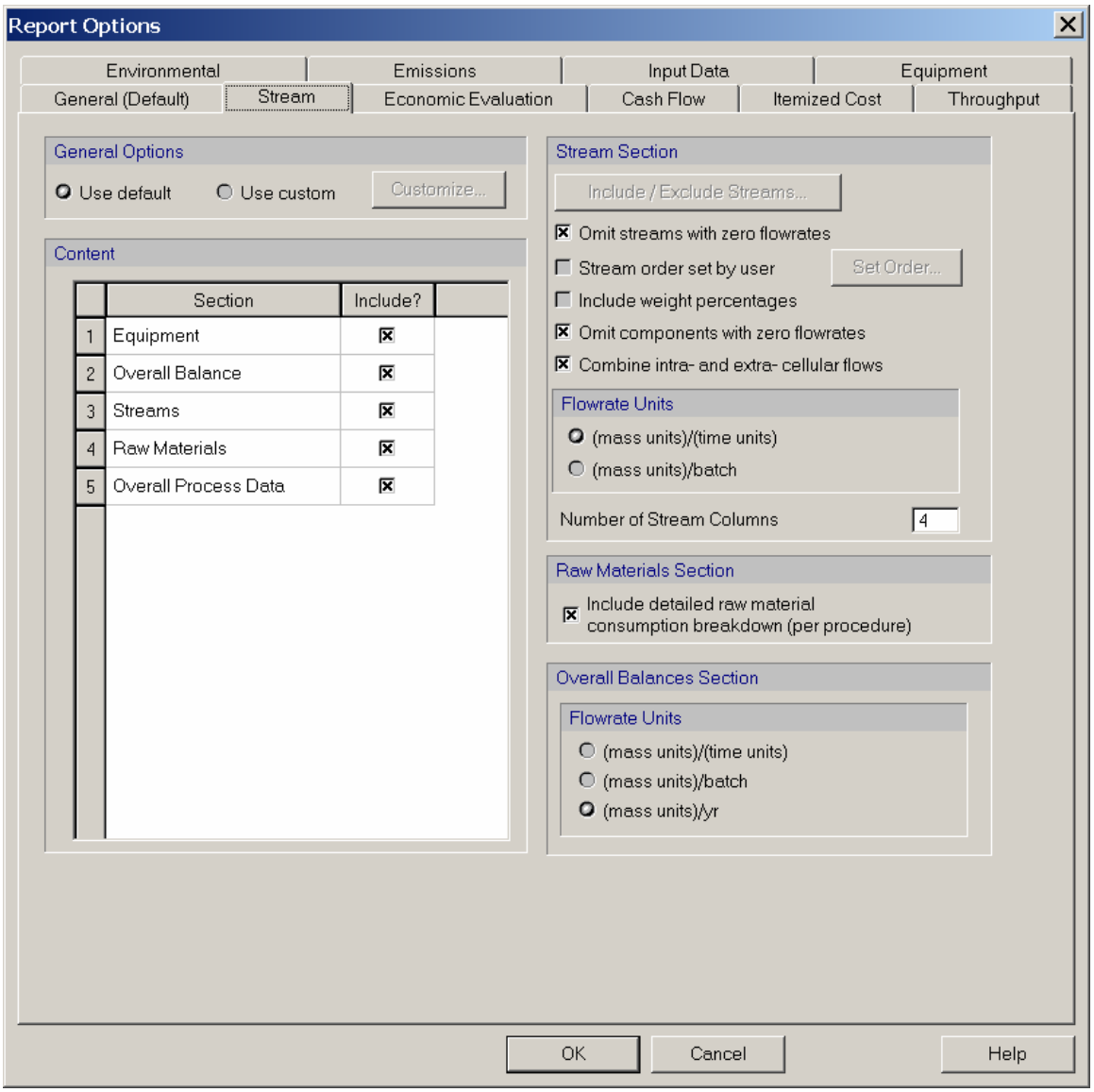

Figure 11.4: The stream and material balances report options dialog.

General Options: You can either use the Default options or Custom options. To customize the general options click on the **" Customize…"** button to bring up the General(Default) interface. The changes done in general options through this interface will be applied only on the Materials & Streams report.

Content: Select whether the stream report should include sections on Equipment, Overall Balance, Streams, Raw Materials, and Overall Process Data, by clicking on the respective "Include" button.

Stream Section Options:

- All streams by default are included in the stream report. If you wish to exclude (or re-introduce) some streams to the report, click on the **"Include/Exclude Streams…"** button and the **Include / Exclude Streams in SR Dialo**g appears. An alternative way exists to simply include or exclude a single stream to the stream report: Simply check (or uncheck) the **'Incl. In Stream Report'** option from the stream's command menu.
- By default, the system includes in the report all streams (even those with zero flowrates). However, you can decide to omit these you can set the **'Omit streams with zero flowrates'**.
- By default, ProDesigner orders the stream included in the report, by the time that they are utilized (in a batch recipe) or by the time that they are used in the solution algorithm (in a continuous flowsheet). For the majority of applications you will find that this order makes the most sense. However, users have the option to re-arrange the order of streams. Simply click on the **"Stream Order Set By User"** option on this section of the options, which enables **Set Order** dialog which allowing you to rearrange the order of streams. Note that this order will remain as set by the user until a new stream is added or a stream is deleted from the flowsheet. When that happens, the order is 'forgotten' and the default order is used once more. That is why it is recommended to set the order only just before printing the stream report (after all structural adjustments to the flowsheet have been made).
- Select the **"Include Weight Percent option"** to display the weight percent of each component in the stream report.
- By default, all components will be reporting their flowrates and compositions in all streams (even those components that even though have been introduced in the registration table, they don't appear anywhere in the process). If you wish to eliminate such components from showing in the report, you can set the **'Omit components with zero flowrates'**. Sometimes this can reduce long stream reports, mostly full of zeros. Note however, that this will only eliminate components that do not appear anywhere in the process (not on specific streams).
- Select the **"Combine Intra and Extra Cellular flows"** option to display the sum of intracellular and extracellular flowrate for each component. If this option is not selected then both flowrates are printed for each component present in a stream.
- The flowrate in continuous mode is expressed in **"mass units / time units"**, and in batch mode it can be either in **"mass units / batch"** or **"mass units / time units"**. The specific mass / time units can be selected from the **Physical Units Preferences** interface which you can access from the **Flowsheet Context Menu**.
- When putting together the stream report, streams are included in a table that has a fixed number of streams (by default 4) per run, however you can change this number (the range is 1-4).

Raw Material Requirement Breakdown:

Normally, raw material requirements (consumption) as presented in the first part of the stream report, shows the consumption of each raw material on a per-section basis. This will be very useful for rather large flowsheets, where an intelligent decomposition of the overall processing schemes to sections will greatly facilitate the understanding of material allocation. However, for smaller flowsheets, users would prefer to have **"Include Detailed raw material consumption breakdown"** option checked and force Pro-Designer to report material consumption on a per-unit-procedure basis.

Overall Balances Section:

Select the flowrate units for the overall balances. In continuous mode the flowrates can be expressed either in **"mass units / time units"** or **"mass units / yr"** and in batch mode the flowrates can be expressed either in mass "units / batch" or **"mass units / yr"**. The specific mass / time units can be selected from the **Physical Units Preferences** interface which you can access from the **Flowsheet Context Menu**.

NOTE:

a. For input streams the source unit operation is designated as INPUT and for output streams the destination unit operation is designated as OUTPUT.

b. At the end of the overall mass balance section, the sum of all flows coming in and going out of the plant is reported, as well as their difference. Since no mass is lost in any of the unit operations supported by the program (no mass to energy conversion anywhere) the difference between the total amount of raw materials and the output of the plant (products and wastes) *must always be zero*. In design cases with recycle loops, it is possible to encounter situations where that difference between total input and output is non-zero (usually a small number). This is usually attributed to round-off errors during the convergence of the simulation calculations. If you demand more accuracy, then it is recommended to tighten up the convergence criterion for recycle loops (reduce the allowed tolerance) and/or switch from total flow based convergence to component-flow-based convergence. To adjust these settings use the dialog that comes up at the selection of the **Edit/Flowsheet Options/Recycle Loop Options...** option from the main menu (see Adjust Convergence Parameters in Chapter 2).

11.4 Costing and Economic Evaluation Reports

There are three reports created and presented by the program, which contain costing and project economic evaluation information:

a. Economic Evaluation Report (EER)

b. Itemized Cost Report (ICR)

c. Cash Flow Analysis Report (CFR)

Further, the program displays the key results of costing and economic evaluation calculations on the “Executive Summary” dialog (**View/Executive Summary**).

11.4.1 Economic Evaluation Report

This report contains the following sections:

Executive Summary
Contains the key results of costing and economic evaluation.

Equipment Specification and FOB Cost
Contains a one-by-one itemization of each unit operation's equipment requirements and the related cost.

Fixed Capital Estimate Summary
Contains a multiplier-based estimation of the Direct Fixed Capital (DFC) for the current design case. If the DFC of at least one section is specified by the user, then, this table simply displays the DFC of each section as well as the DFC of the entire flowsheet.

Labor Requirement Estimate Summary
Displays labor requirements and labor cost for each section and the entire flowsheet.

Raw Materials
Diplays the amount, unit cost, annual cost, and percent contribution of each raw material as well as the total amount and cost for the entire flowsheet.

Various Consumables
Contains operating costs related with replacement of membranes (for membrane filters, if present in the design), filter cartridges (for dead-end filters), resins (for chromatography columns), activated carbon (for activated carbon adsorption units), and molders (for plastics molding units).

Waste Treatment/Disposal
Contains a tabulated summary for each stream designated as waste (solid, liquid and emissions) that includes its unit cost for waste treatment/disposal, its total amount generated by the plant (per year) and the cost associated with treating it. A sum over all waste treatment and disposal costs is also presented.

Utility Requirements
Contains one paragraph for itemized power consumption (and total power consumption by the whole plant). Furthermore, it contains one paragraph for each heat transfer agent employed by the plant. Each paragraph presents an itemized listing with the amount consumed by each unit utilizing the heat transfer agent, as well as the cost associated with it. Subtotals for each agent and a grand total for all utility consumption is also included.

Annual Operating Cost - Summary
Contains all entries leading to the total annual operating cost: Raw Materials, Labor-Dependent, Equipment-Dependent, Laboratory/QC/QA, Consumables, Waste Treatment/Disposal, Utilities, Transportation, Miscellaneous, Advertising and Selling, Running Royalties, and Failed Product Disposal.

Profitability Analysis
Contains a condensed listing of all important figures leading to the estimation of gross profit, net profit, gross margin, return on investment and payback time.

Several user-adjustable settings determine the final form of the stream report, as well as the units that key-variables are reported. These settings can be adjusted from the dialog that appears when the option **Reports/Options/Economic Evaluation (tab)** is selected from the main menu.

For the general data you can either use the **Default** options or **Custom** options. To customize the general options click on the **"Customize…"** button to bring up the **General(Default)** interface. The changes done in general options through this interface will be applied only on the EER. You can also select which of the above sections are to be included in the report by clicking on the respective "Include" checkbox.

11.4.2 Itemized Cost Report

This report contains the various costs associated with each section: raw materials, labor-depentent, equipment-dependent, consumables, waste treatment/disposal, utilities. The report can display the following sections:

Flowsheet Parameters	Contains the key production parameters related to this Design Case.
Section Breakdown	Contains a cost breakdown (in terms of raw materials, labor, equipment, consumables, waste treatment/disposal, utilities) per flowsheet section.
Distribution Summary	Contains a summary breakdown per cost item and section.
Cost Item Breakdown	Contains subsections for the breakdown of cost items (in terms of raw materials, labor, equipment, consumables, waste treatment/disposal, utilities). This breakdown can be done in different levels as described in see Itemized Cost Report (Interface).

Tip

You may elect to include or exclude some of the elements that contribute to the total operating cost of the process. You can also dictate the units for reporting operating cost breakdown summaries (included at the end of the itemized cost report). All these options can be accessed through the dialog that appears in response to the **Edit / Flowsheet Options / Preferences / Operating Cost Options…** from the main menu (or the **Preferences / Operating Cost Options…** from the flowsheet's context menu.

Several user-adjustable settings determine the final form of the stream report, as well as the units that key-variables are reported. These settings can be adjusted from the dialog that appears when the option **Reports/Options/Itemized Cost (tab)** is selected from the main menu.

For the general data you can either use the **Default** options or **Custom** options. To customize the general options click on the **"Customize…"** button to bring up the **General(Default)** interface. The changes done in general options through this interface will be applied only on the ICR.

Content: A list of topics that can be included in this report is given. Select whether they are to be included, and also the level of breakdown for each. The selected topics can be broken down by:

- Section: the cost of raw materials, labor, utilities, waste, consumables, is listed per section.
- Type: the cost of each category of raw materials, labor, utilities, waste, consumables, is listed per section.
- Type (detailed) each procedure use/instance of each category of raw materials, labor, utilities, waste, consumables, is listed per section.

Finally you can choose between the following cost bases for ICR's Breakdown Summary:

- Per year
- Per batch (available for batch design cases)
- Per Kg of Main Product (available for bulk products)
- Per entity of Main Product (available for discrete products)

11.4.3 Cash Flow Analysis Report

This report contains the following sections:

Cash Flow Analysis
Contains a table that presents a cash flow breakdown for each year that the plant is expected to be in operation. The calculated net present value (NPV) and internal rate of return (IRR) before and after taxes are also included.

Loan Information
Contains information about the amount of money borrowed to finance the DFC, Working Capital, Up Front R&D and Up Front Royalties of the project. The pieces of information presented include: amount, interest rate, loan time, percent debt and percent equity.

Breakdown of Capital Outlay
Contains a detailed analysis of how capital is used to finance different aspects of the plant's operation.

Breakdown of Loan Payment
Contains a detailed breakdown of payments made each year of the plant's operation against loans made to finance DFC, Working Capital, Up Front R&D and Up Front Royalties.

The report settings can be adjusted from the dialog that appears when the option **Reports/Options/Economic Evaluation (tab)** is selected from the main menu. For the general data you can either use the **Default** options or **Custom** options. To customize the general options click on the **"Customize…"** button to bring up the

General(Default) interface. The changes done in general options through this interface will be applied only on the CFR.

11.4.4 Executive Summary

This is a dialog that comes up when you select the **View/Executive Summary** option from the main menu. It contains the following tabs:

Summary
Contains the key project economic evaluation figures: Capital Investment, Revenues, Operating Cost, Production Rate, Unit Production Cost, Gross Margin, Return on Investment (ROI), Payback Time, Internal Rate of Return (IRR) and Net Present Value (NPV).

Capital Investment
Contains more detailed information on capital investment estimation.

Operating Cost
Contains a breakdown of operating cost.

Revenues
Presents the main revenue source, its annual rate and its unit price (for manufacturing plants, this is the selling price of the main product; for waste treatment/disposal plants, this is the processing fee). It also contains a table with all other sources of revenue. Finally, the total annual revenue is displayed.

11.5 Throughput Analysis Report

SuperPro is equipped with powerful throughput analysis and debottlenecking capabilities. The objective of these features is to allow the user to quickly and easily analyze the capacity and time utilization of each piece of equipment, and to identify opportunities for increasing throughput with the minimum possible capital investment. An in-depth coverage of the Throughput Report (THR) contents as well as of throughput analysis and debottlenecking and how it can be done effectively with Pro-Designer can be found in Chapter 9.

The report settings can be adjusted from the dialog that appears when the option **Reports/Options/Throughput (tab)** is selected from the main menu. For the general data you can either use the **Default** options or **Custom** options. To customize the general options click on the **"Customize…"** button to bring up the **General(Default)** interface. The changes done in general options through this interface will be applied only on the THR. A list of sections that can be included in this report is given. Select whether they are to be included by clicking on the respective **"Include"** checkbox.

11.6 Environmental Impact Assessment Report

This report presents information that describes the effects of the process output streams on the environment. Furthermore, it contains a detailed bookkeeping of all chemicals

that are either regulated by the EPA or tagged as hazardous by the user. The report itself is composed of the sections:

- Waste by Type Section
- Waste by “Section” Section
- Stream Section
- Overall Balance Section
- Component Fate Section
- SARA 313 Chemicals Section
- 33/50 Chemicals Section
- Solid Waste Section
- Aqueous Waste Section
- Organic Waste Section
- Emissions Section
- Hazardous Streams Section
- Pollution Indices Section

The contents of each section are described in the following paragraphs.

11.6.1 EIR: Waste By Type Section

This section lists the amount of each component /mixture classified as waste under the different waste categories (aqueous, organic, solid, emissions). The amounts are expressed in terms of kg/kg of Main Product, kg/yr, kg/batch, and as % of the category waste.

11.6.2 EIR: Waste By “Section” Section

This section lists the amount of each component /mixture classified as waste under the different waste categories (aqueous, organic, solid, emissions) for each process section.

11.6.3 EIR: Stream Section

This section is somewhat similar to the first section of the stream report. Each stream is described by its name, source and destination unit procedure (or INPUT/OUTPUT). Then the list of its environmental properties is included (TOC, COD, ThOD, etc.) as concentrations (in mg/l) and daily demands (kg/day.) The number of columns used in the presentation of streams is the same as in the stream report (and therefore can be modified from the **Edit/Preferences/Stream Format...** dialog, Figure 11.4).

11.6.4 EIR: Overall Balance Section

This section presents the total environmental load increase or decrease as reflected by the values of TOC, COD, etc. of all streams entering and leaving the process. It contains two tables: one presents the values either on-a-per-hour-basis (only choice for continuous processes) or on-a-per-batch basis (choice available for batch processes); the second table has the same numbers on a yearly basis. Notice that the second table (yearly values) also reports the percentage reduction (or increase if the value is negative) of each environmental index.

11.6.5 EIR: Component Fate Section

It is becoming ever more imperative for managers responsible for the operation of manufacturing and wastewater treatment facilities to be aware of the ultimate destination of each chemical as they leave the plant's battery limits as either solid or liquid waste or gaseous releases to the atmosphere (emissions). This section presents the allocation of each chemical that either enters or is produced by the plant facility to all waste gateways. The first column presents the cumulative amounts of each chemical entering on any of the input streams of the plant, and the next three columns present the amounts leaving the plant on all waste streams (solid, liquid streams and gaseous).

11.6.6 EIR: SARA 313 Chemicals Section

Two groups of chemicals demand special attention for regulatory purposes: one group includes all the chemicals that must be included in the SARA 313 report as required by government regulations; the other is the group of chemicals required to be present in the 33/50 reduction plan, as dictated by government regulations. This section deals with the first group (and the next section with the other). It presents an accurate account of all SARA 313 chemicals entering and leaving the plant as well as their difference. It should be mentioned that in order for a component to be included in this section, its 'Is SARA 313' flag must be set to TRUE (see Chapter 3.)

11.6.7 EIR: 33/50 Chemicals Section

Similar to the previous section, only dealing with 33/50 chemicals. In order for a component to be included in this section, its 'Is 33/50' flag must be set to TRUE.

11.6.8 EIR: Solid Waste Section

As described in detail in Chapter 4, you can classify the output streams of a design case as Solid Waste, Aqueous Waste, Organic Waste or Emission. This section deals with the description of all streams classified as Solid Wastes. It consists of two parts. The first part enumerates all streams that are characterized as solid waste by listing their composition (weight %), flowrate (in kg/h) and annual flowrate (kg/year). The second part presents a detailed accounting from the component point of view; it shows how the total amount of each component leaving as solid waste is distributed in each stream. It

should be mentioned that you can specify some components not to be listed in this section of the EIR report by setting the component property 'Is Tracked in Solid Waste' to FALSE (all components have this flag set to TRUE by default.)

11.6.9 EIR: Aqueous Waste Section

Similar to the Solid Waste Section, only deals with streams classified as Aqueous Waste.

11.6.10 EIR: Organic Waste Section

Similar to the Solid Waste Section, only deals with streams classified as Organic Waste.

11.6.11 EIR: Emissions

Similar to the Solid Waste Sections, only deals with streams classified as emissions.

11.6.12 EIR: Hazardous Streams

As described in Chapter 3, some components can be tagged by the user as hazardous when present in a stream at a concentration higher than a specified threshold. The presence of such components in output streams automatically tags the streams as hazardous. Furthermore, you may explicitly tag a stream as hazardous, if so desired (see Section 4.1.3.) In this section, the hazardous streams are presented. The format of this section is similar to those of waste streams.

11.6.13 Pollution Indices

The last section of the EIR report presents certain ratios that are indicative of the environmental kindness (or lack thereof) of a design case. The first index presented applies to processes that have a main revenue stream (e.g. manufacturing facilities with a main product stream). It reports the ratio of total amount of waste (solid, liquid and emissions) produced per kg of main revenue stream processed. The next three indices are similar but report each of the three separate categories of wastes instead.

The next four indices apply to processing plants that employ raw materials. It reports the ratio of total, solid, liquid and gaseous waste produced per kg of raw material utilized.

⇨ The report settings can be adjusted from the dialog that appears when the option **Reports/Options/Environmental (tab)** is selected from the main menu. For the general data you can either use the **Default** options or **Custom** options. To customize the general options click on the **"Customize…"** button to bring up the **General(Default)** interface. The changes done in general options through this interface will be applied only on the EIR. You can select which of the above report sections are to be included by clicking on the respective **"Include"** check box. Also you can select to **"Omit environmental properties from intermediate streams"** by clicking on the respective check box.

11.7 Emissions Report

This report presents information on air pollutant flow from the various procedures of a process. The flowrates (in kg/h) represent average flows during the cycle of a procedure. For each procedure, the Actual and Permit Allowable flowrates of the following pollutant categories are included:

a. Total Particulate (and its various subcategories),

b. Total VOC (and its various subcategories),

c. Acid Gases (and its two subcategories),

c. Extremely Toxic Gases (ETG) and its two subcategories,

d. Carbon Monoxide (CO),

e. NOx,

f. SO2 and

g. BASES.

Due to the importance of estimating emissions and presenting a detailed emissions report, a special chapter is dedicated to explain how Pro-Designer estimates emissions and what are the contents of the Emissions Report (EMS) (Chapter 10).

The report settings can be adjusted from the dialog that appears when the option **Reports/Options/Emissions (tab)** is selected from the main menu. For the general data you can either use the **Default** options or **Custom** options. To customize the general options click on the **"Customize…"** button to bring up the **General(Default)** interface. The changes done in general options through this interface will be applied only on the Emissions Report. You can select which of the above report sections are to be included by clicking on the respective **"Include"** check box.

11.8 Input Data Report

This report contains all the input information to a design case used for simulation and economic evaluation. It can be very useful for documenting a design case, or for attempting to identify sources of error in a design case with unexpected results. Since the design case file is saved in a proprietary format (not readable by anything else other than the program itself), engineers and scientists could use the IDR report as an alternative way to communicate the exact specifications of a process created by the program.

The input data report contains the following sections:

- *Thermodynamic and other Properties of Chemical Components*
  Contains all the components and their property values as set in the current design case; it also contains the components designated as biomass, water and activity assessment. It also reports which component properties have been used during the last run of the simulation.

- *Preferences*

  Contains information on the stream report format.

- *Input Stream Data*

  Contains the description of each stream that is an input to the whole process; for each stream the following attributes are listed: name, temperature, pressure and component composition (flow, extracellular fraction).

- *Procedure & Operation Data*
  Lists the operations in all procedures. For each operation in a unit procedure it contains (a) all parameter values used as inputs by the operation's model and (b) the labor factors used to estimate labor demands.

- *Process Scheduling Data*
  Contains for the scheduling data set for the whole plant (annual operating time and either number of batches or batch efficiency) and the scheduling data for each operation (process time, turnaround time, number of cycles, start time).

- *Equipment and Labor Parameters*

  Contains an equipment related table with several equipment related parameters such as: the number of standby units, the material of construction, the material factor, the installation factor, the maintenance factor for labor and the maintenance factor for materials. Also contains a labor related table with one entry for each operation for each operation (with the batch labor factor, the continuous labor factor, the maintenance factor for labor and the maintenance factor for materials.

- *Economic Data*

  - *Cost Multipliers*
    Contains all cost multipliers used to estimate the total investment (piping, instrumentation, insulation, electrical work, etc.), the total operating cost (fringe benefits, supervision, laboratory etc.) and the labor requirements (warehouse, packaging, etc.).

  - *Main Revenue Stream and Byproducts*
    Contains the stream designated as the main revenue stream (if any) and the any other streams designated as secondary sources of revenue (byproducts). For each such stream, its rate and the revenue per unit produced (or processed) is also reported.

  - *Raw Materials*
    Contains a listing of all streams designated as raw materials along with their purchase prices.

  - *Waste Treatment*
    Contains a listing of all streams designated as waste (solid, liquid or emissions), along with their required waste treatment costs per unit of waste.

The report settings can be adjusted from the dialog that appears when the option **Reports/Options/Input Data (tab)** is selected from the main menu. For the general data you can either use the **Default** options or **Custom** options. To customize the general options click on the **"Customize…"** button to bring up the **General(Default)**

interface. The changes done in general options through this interface will be applied only on the IDR. You can select which of the above report sections are to be included by clicking on the respective **"Include"** check box.

11.9 Equipment Report

This report contains the following sections:

Equipment Summary: contains a list of all equipment used in the *Design Case* and displays the # of units, capacity, material of construction, and cost for each equipment.

Itemized List: contains a tables with several equipment related parameters such as: the number of standby units, the material of construction, the material factor, the installation factor, the maintenance factor for labor and the maintenance factor for materials.

CIP Skid List: lists all CIP skids, the equipment that use each skid, and their scheduling summary

SIP Panel List: lists all SIP panel, the equipment that use each panel, and their scheduling summary

Consumables: lists the consumables used by the equipment, and their usage information.

The report settings can be adjusted from the dialog that appears when the option **Reports/Options/Equipment (tab)** is selected from the main menu. For the general data you can either use the **Default** options or **Custom** options. To customize the general options click on the **"Customize…"** button to bring up the **General(Default)** interface. The changes done in general options through this interface will be applied only on the Equipment Report (EQR). You can select which of the above report sections are to be included by clicking on the respective **"Include"** check box.

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