

## List of Design and Operating Data Requirements

The following are operating and design data parameters utilized by the *Membrane Alarm System and Automated Reporter*, MASAR<sup>®</sup> software versions:

### I. **Required Parameters**

1. Train or Skid Name, Number or ID.
2. Stage Number (1,2 or 3).
3. Date of each data set collected.
4. Operating Hour (total cumulative operating time excluding membrane system shutdowns).
5. Feed Temperature (*first stage* input only).
6. Feed Salinity or Electrical Conductivity (*first stage/pass\*\** input only) – **RO/NF**.
7. Feed Pressure (input to *each stage*).
8. Membrane Pressure Drop (RO/NF)/TMP (UF/MF) - feed pressure minus brine pressure directly across the average pressure vessel (per stage)\*.
9. Permeate Pressure (output from *each stage*)\* - *final value is adequate*.
10. Final Reject or Brine Flow (*final discharge*).
11. Permeate Flow (output from *each stage*).
12. Permeate Salinity or Electric Conductivity (*per stage*)\* – **RO/NF**.
13. Total No. of Pressure Vessels On-line (*per stage*)\*.
14. Number of Membrane Cartridges per Pressure Vessel On-line (*per stage*)\*.

### II. **Optional Parameters**

1. Turbidity "NTU" (*Membrane system feed*).
2. Silt Density Index "SDI" (*Membrane system feed*).
3. Micron Filter Pressure Drop (*Membrane system feed line*).
4. RO Feed pH (*Membrane system or common acidified feed line*).
5. Redox Potential or ORP reading (*Membrane system or common feed line*).
6. Chlorine Residual (*Membrane system or common feed line*).
7. Other (*as may be specifically requested by the user*).

\* IF STAGE DATA IS NOT AVAILABLE, OVERALL SYSTEM DATA (i.e., as one stage or pass) CAN BE USED BUT IT WILL BE LESS ACCURATE AND RESULTS CANNOT INDICATE STAGE-SPECIFIC PROBLEMS.

\*\*For double-pass systems (i.e., UF/RO or RO/RO), same data parameters are required for each pass (except the primary feed temperature).

### Data Requirements:

Each record data set must contain at least the parameters listed under Required Data, in order for MASAR<sup>®</sup> database and operating system to produce the design output and system features.

**Design projection or conditions\*\*** all parameters listed under I. plus the projected product flow and salinity of the train per stage, if available (*usually provided by the membrane manufacturer*). These will be the basis for normalization of data and they should represent the

*average actual conditions* as much as possible, according to **ASTM D 4516** (*Standard Practice for Standardizing Reverse Osmosis Performance Data*).

**Operating data\*** file for each train, available in any electronic data file format (*Excel*<sup>®</sup>, *Lotus*<sup>®</sup> or any other spreadsheet, *MSAccess*<sup>®</sup>, *Paradox*<sup>®</sup> or any other database, or data files from any membrane manufacturer's normalization program (i.e., Dupont's **NormPac**<sup>®</sup>: all .dbf files for the selected Train; *Hydranautics*' **RODATA**<sup>®</sup>: **Rodata.mdb**; *Koch Fluid Systems*' **NormPro**<sup>®</sup>: **Tempdata.dbf**).