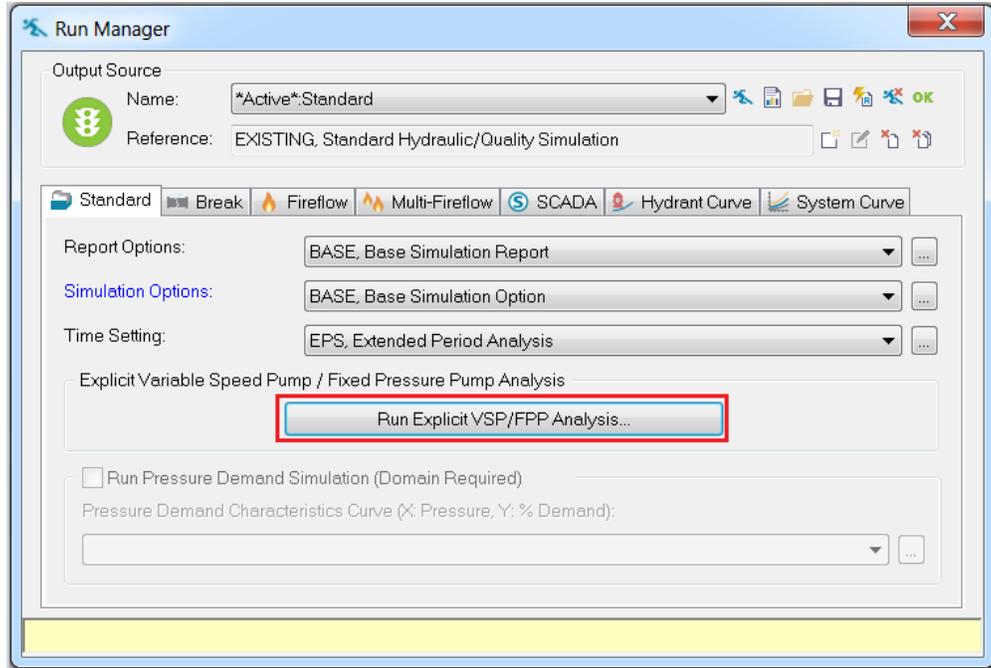


# Explicit VSP

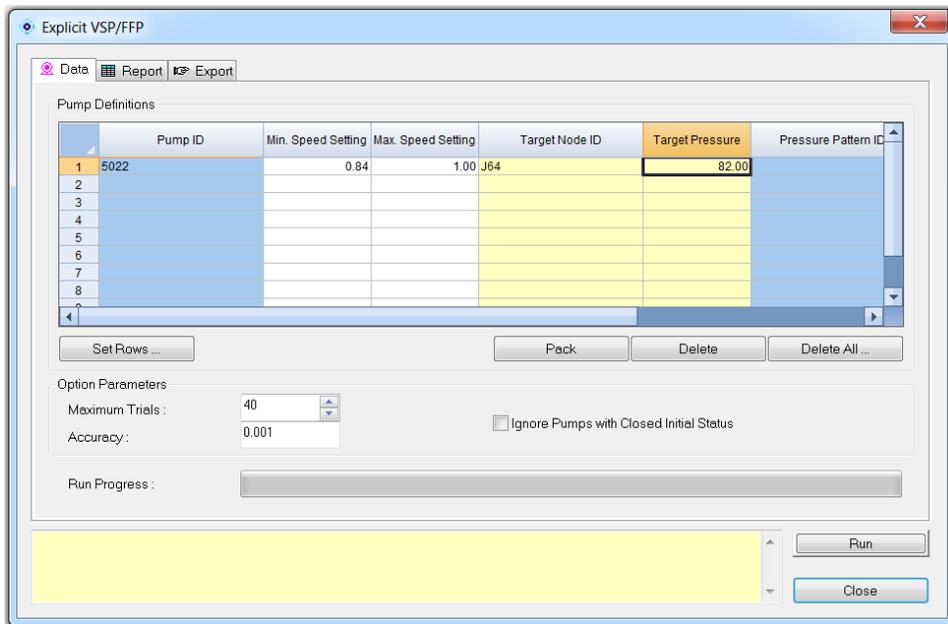
During a VSP/FPP Analysis, InfoWater Pro allows you to specify a target pressure to be maintained at a target junction node along with the minimum and maximum allowable speeds for each variable speed pump in the system. The lower and upper pump speed limits should represent a wide variety of operating conditions and should include the range where the pump is expected to operate. During the analysis, the program automatically computes the pump speed required to meet the targeted pressure at the target junction node. If no solution can be found within the specified pump speed range, then InfoWater Pro will set the pump speed to the corresponding upper or lower speed limit. A warning message will also be issued indicating that no solution is available within the operating range specified. This closely describes actual variable speed pumping operation.



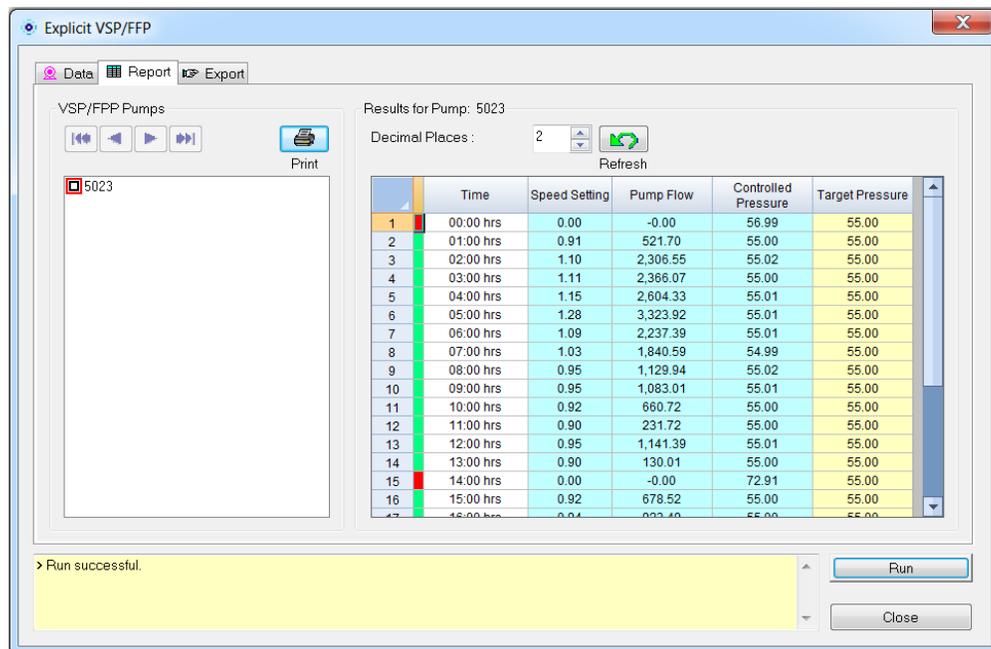
## Methodology

To run a Variable Speed Pump analysis do the following:

- To conduct a variable speed pump analysis, from the **InfoWater Pro** button ->**Analysis** menu, select **Run Manager** to display the **Run Manager** dialog box. From the **Standard** tab, select the **VSP/FPP Analysis** button to launch the **Variable Speed Pump** dialog box.



- The Data Tab allows you to input VSP Model parameters. Enter the Pump ID for which the VSP Analysis is to be conducted. More than one pump can be analyzed during a VSP simulation.
- Specify the minimum pump speed to be utilized during the VSP Analysis. This is the minimum value that will be employed by InfoWater Pro.
- The maximum pump speed to be utilized during the VSP Analysis. This is the maximum value that will be employed by InfoWater Pro.
- Specify the Target Node ID. This is an optional field. Specify the target junction node here where the desired target pressure is to be maintained. The speed of the pump for which a VSP analysis is being carried out will be varied to maintain the specified target pressure at this junction. This target junction may be located anywhere in your system and has to be unique for each VSP pump when multiple VSP analysis is run. If the **Target Node ID** entry is left blank (no entry), then InfoWater Pro will assume that the pump discharge node is that the target node and the desired pressure will be maintained at that location.
- Specify the target pressure to be maintained at the target node ID during the VSP Analysis. InfoWater Pro will calculate the pump speed between the min. and max. values to maintain the specified pressure at the target junction node.
- For an EPS, the target pressure can be specified to vary during the simulation period as a time pattern. In that case, the time pattern ID should be specified in the Pressure Pattern ID field.
- Once the above data are specified, click **Run** to initialize the VSP Analysis. The results are then displayed as shown in the **Report** dialog box. The red color indicates that the pump is off while the green represents normal pump operation and the corresponding results (speed setting, discharge flow and discharge pressure) are shown in the associated columns.



## VSP/FPP Pumps

**VSP Pumps** - The Pumps that were used for the Variable Speed Analysis are displayed here. Click on any of the pumps to see their report. The red check indicates the pump that is currently displayed.

### Results for Pumps

**Print** - Click on **Print** to print the Report.

**Decimal places** - Choose the number of decimal places that you want to display in your VSP report here.

**Refresh** - Use this to update the report with the latest run results.

**Time** - Simulation time step.

**Speed Setting** - The calculated speed setting at the simulation time step.

**Pump Flow** - The flow value calculated at the simulation time step and speed setting.

**Controlled Pressure** - The pressure calculated at the Target Junction Node at the specified simulation time step.

**Target Pressure** - The specified pressure to be maintained at the target junction node during the VSP Analysis. InfoWater Pro will vary the pump speed between the min. and max. values to maintain this pressure.

### Message Board

The message board displays messages during the VSP run.

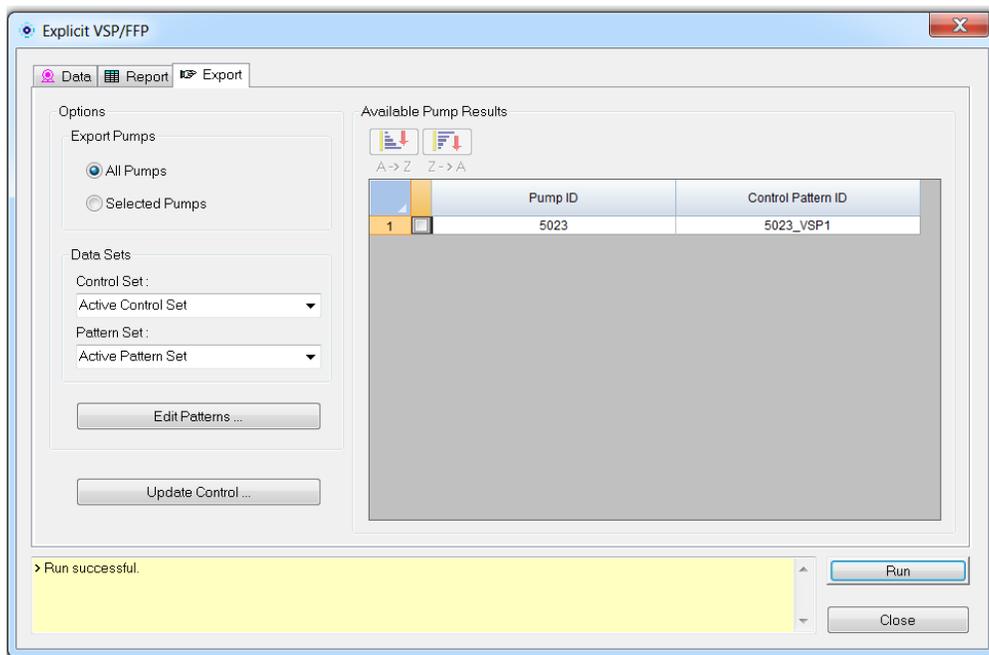
### Run

Choose the **Run** button to run your VSP analysis.

### Close

Use this button to close out of the VSP analysis dialog box.

- Review the results from the run and for an EPS use the **Export** tab to export the VSP Analysis results.



## Options

**Export Pumps** - Specify whether all pumps or the selected pumps speed patterns are to be exported and associated for the listed pumps. To select a pump, click on the small square next

to the Pump ID field to place a red check.

#### **Data Sets**

**Control Set** - Specify the location to export the calculated simple control set to identify the pump behavior. By selecting the Active Control Set, the currently active control set for that

pump will be overwritten. To store the data in another control set, select the desired control set from the drop-down box.

**Operation Set** - Specify the location to export the calculated pattern ID. By selecting the Active Operation Set, the currently active operation set for that pump will be assigned with the

new pattern created by the VSP Analysis. To store the data in another operation set, select the desired operation set from the drop-down box.

#### **Available Pump Results**

**Sort** - Sort pump IDs in ascending order. Sort pump IDs in descending order.

**Pump ID** - The Pump ID for which the VSP Analysis is to be conducted. More than one pump can be analyzed during a VSP simulation.

**Control Pattern ID** - The name to be assigned to the new pump speed pattern that will be affiliated with the selected pump. This pattern is required prior to running a Standard hydraulic simulation via the Run Manager.

#### **Update Control**

Once the Control and Operation Sets have been assigned, click on this button to create the new data sets.

#### **Message Board**

The message board displays messages during the VSP run.

#### **Run**

Choose the **Run** button to run your VSP analysis.

#### **Close**

Use this button to close out of the VSP analysis dialog box.

- For an Extended Period Simulation (EPS), InfoWater Pro automatically computes the pump speed pattern to maintain the desired targeted pressure (which can be defined as a time varying pattern) at the target junction node. This pattern can also be exported for use with the standard variable speed pump (manual) operation.
- Once the speed pattern has been created and exported to the selected pump, a Standard hydraulic simulation via the Run Manager will then need to follow the VSP Analysis in order to adequately determine pump behavior and pump operating costs.