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Chapter 2 Understanding Plunger Lift Operations

Over time, a well's gas production declines but a plunger lift system can increase a well's productivity and life span. The natural pressure that lifts the gas from the well to the surface declines. Liquids collect in the wellbore or tubing and reduce the gas flow. If the liquids remain in the well, they eventually stop the gas flow. A plunger system lifts the liquids out of the well. Deliquification optimizes gas production and increases the life span of the well.

This chapter describes basic components of a plunger lift system, plunger lift functions, and your role in the operations. For more information about configuring a well program, see "Configuring a Single-Well" or "Configuring Production of Multiple Wells" in the Guides section of the Help Documents.

2.1 Components

The well system components of plunger lift operations are:

Plunger Components

- Plunger that acts as a well-bore swab
- Lubricator that catches the plunger when it surfaces and provides access for maintenance
- Arrival sensor that indicates when the plunger has surfaced
- Bottom hole bumper spring that cushions the plunger's fall

Plunger Cycle Control

- Motor valve, a pneumatic valve, that controls gas flow
- A-Valve , a solenoid valve, that controls the motor valve
- Controller that uses a Well Program to control the A-Valve
- User interface such as the WellVision™ application, the WellTrekker™ application, or the Walk Up Display to direct the controller
- Analog and digital devices that provide data inputs the controller monitors
    - Sales line pressure sensor
    - Tubing pressure sensor
    - Casing pressure sensor
    - Other devices
- [Optional] B-Valve a solenoid valve for a vent that can relieve backpressure on the Sales Line and assist the plunger cycle

Production on Site (provided by the site owner)

- Sales line
- Separator that separates gas, oil, and water

- Tank that stores the liquids removed by the plunger

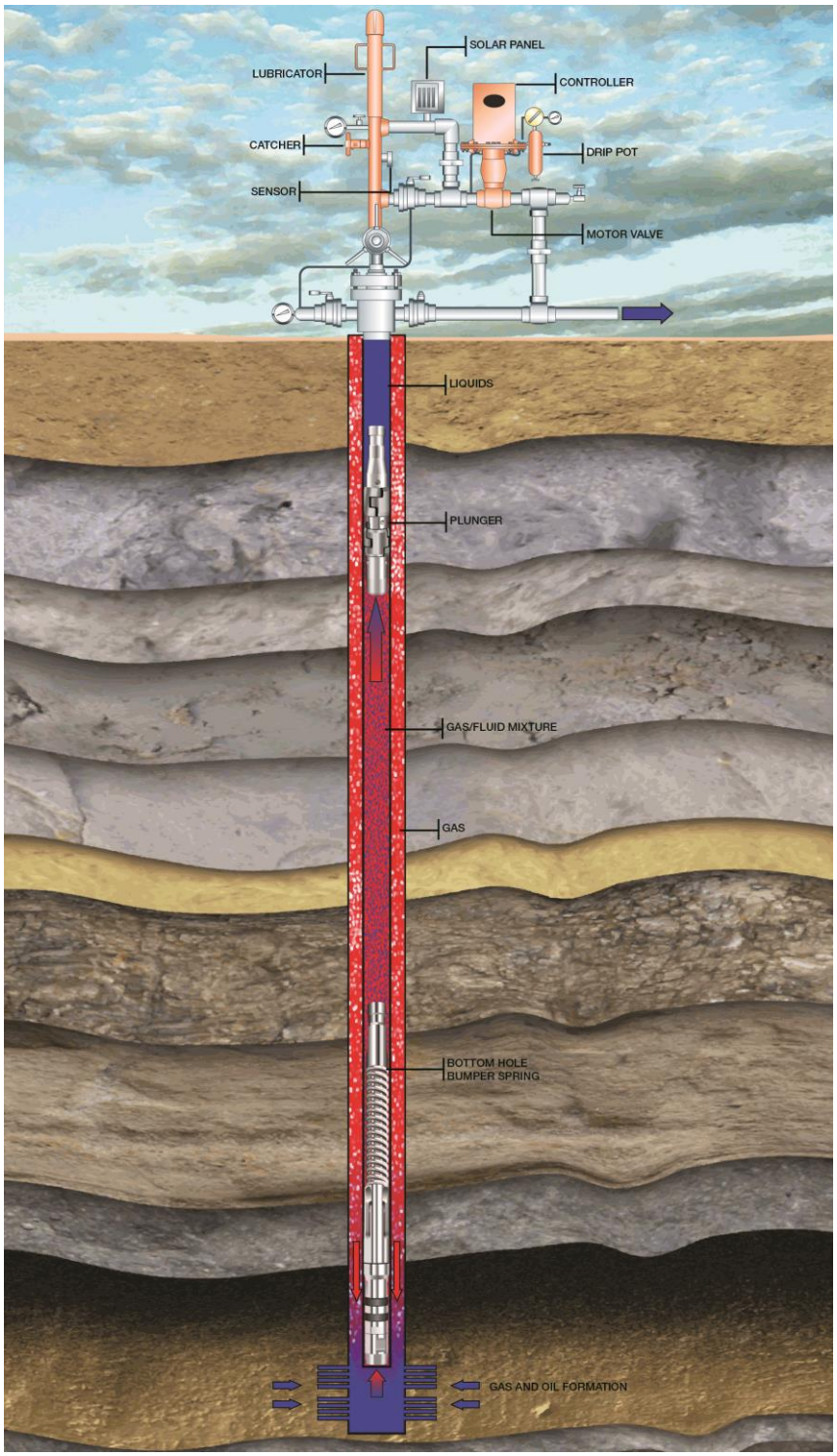

Figure 2-1: The basic components of the Plunger Lift System in place

2.2 Plunger Lift Cycle

The plunger system lifts the liquids using pressure from the gas flow. The plunger moves between the bottom hole bumper spring and the lubricator at the top of the well. The Motor Valve controls physical flow of the gas. The A-valve controls when the Motor Valve is open and closed. When the A-valve is closed, the gas flow is off. The plunger falls down the well, through the liquid, and to the bottom hole bumper spring. When the A-Valve is open, the gas flow is on. The natural pressure from the gas flow lifts the plunger. The liquids move ahead of the plunger, out of the well, and into a separator or directly into the tanks. The separator directs gas into the Sales line, oil to an oil tank, and water to a water tank.

The controller uses a Well Program to direct the components through the plunger cycle. The plunger cycle has modes. The Well Program specifies the modes used during the cycle. Using the Well Program, the controller optimizes production in response to the well conditions. The Well Program has production methods to simplify configuration of optimization. The user chooses a production method and enters set points to create a Well Program.

The following paragraphs describe the modes and production methods that the Well Program uses to optimize production.

2.2.1 *Basic Modes of the Plunger Cycle*

The plunger cycle has basic modes: FALL, CLOSE, A OPEN, and SALES. During FALL mode, the plunger returns to the bottom of the well (⇓). During CLOSE mode, the pressures build in the well. The well is not producing gas. During A OPEN mode, the plunger rises to the top with the liquids. After the plunger arrives (⇑), the Well Program uses SALES mode to produce gas.

The modes that the Well Program uses depend on the arrival of the plunger, on the production method, and set points. An arrival sensor detects the surfacing of the plunger. The controller monitors this sensor and other input devices. The controller compares the data inputs with the set points specified by the user in the Well Program. In the basic scenario for the Time method, after the plunger arrives, the controller directs the Well Program into SALES mode.

Each mode has primary set points and a group of secondary set points. The basic set points are periods of time or pressure values. Additional set points are values used in a calculation. The production method determines which set points the Well Program uses to exit and enter modes. For a basic example, the primary set points for the Time Method are Fall Time, Close Time, A Open Time, and Sales Time.

2.2.2 *Conditional Modes of the Plunger Cycle*

The controller and Well Program can respond automatically to well conditions. The well conditions affect the arrival of the plunger. A Well Program has a group of secondary set points that specify conditional modes: Line Delay, Mandatory Shut-In,

B Open, and B Delay. These set points allow the plunger lift system to respond to the conditions of the well. The production method specifies which set points the controller uses to respond to well conditions.

To optimize production in response to well conditions, the Well Program has modes for using delay, shut-in, and the B-Valve. Not all well systems have a B-Valve, but a Well Program can use it to optimize production.

For an example of a delay, the basic mode, A OPEN, is a fixed time, A Open Time. However, well conditions can slow the arrival of the plunger. If the Well Program specifies the set point, Delay Close, the controller can allow production beyond the time set for A OPEN mode. The plunger does not arrive but gas continues to flow and the plunger continues to rise.

To close production in response to conditions, the system has a MANDATORY SHUT-IN mode. The primary set point for this mode is a time setting. However, the controller can use a pressure setting on the Casing to enter this mode. For example, if the plunger does not arrive during the time specified for the set point, A Open, the controller counts down the time interval specified by the set point and detects that the pressure on the casing is lower. After that time, the Well Program enters Mandatory Shut-in mode and production stops so that pressure can build to raise the plunger on the next plunger cycle.

2.3 Optimization Programs, Production Methods, and Set Points

The user can specify a Well Program in the WellVision application. Using the information unique to the well, the user chooses a production method and specifies the set points. The controller uses this Well Program to evaluate the data inputs and direct operations.

The Well Program can include the following factors to adjust production. These factors apply to every production method.

Constant factors

- Tubing depth
- Tubing diameter
- Plunger type or style

Variable factors

- Sales line pressure
- Production ratio of gas-to-liquid

Some set points are common to all of the methods. These set points close the well to protect the gas lines from damage or can respond to possible damage.

For example, to monitor backpressure and protect the sales line, each method includes the following set points for that line:

- High Line Shut-in Pressure: The maximum pressure that the program allows on the line before automatically closing. To prevent shut-in due to spikes in pressure, the user can specify a delay time.
- High Line Pressure Shut-in Delay time: A period of time the controller samples the pressure. The controller uses the samples to decide if a high reading is temporary or steady. If temporary, production can continue. If steady, the program closes the well.
- Low Line Shut-in Pressure: The minimum pressure the program allows on the line before automatically closing the well.

Best Practice Always enter values for these set points to protect the Sales Line. These settings can prevent ruptures or close the well in the case of a rupture. Also, set the Notifications tool to send a text or an email in response to alarms. For more information about the Notifications tool, see "Monitoring Well Performance."

The user can choose from several production methods. Each method employs specific primary set points and a group of associated set points. These set points allow the user to customize movement between the modes in response to well conditions.

The user can disable any set point by entering zero or a value too high to occur. (Zero time is 00:00:00; zero pressure is 0; high time is 99:59:59; and high pressure depends on the gauge.).

The WellVision and WellTrekker applications offer the following production methods to optimize a well with the Plunger Lift System:

- Time method
- Time method with AutoCycle
- Casing pressure minus Tubing pressure
- Casing pressure minus Line pressure
- Tubing pressure minus Line pressure
- (Multi-well only) Casing pressure minus Line pressure or Tubing pressure minus Line pressure

The following paragraphs describe the methods and their set points.

2.4 Time Method

Using the Time method, the controller manages the well using set points of time. The times for FALL, A OPEN, CLOSE, and SALES modes repeat for every plunger cycle. The Well Program offers additional set points to respond to well conditions. The

following sections describe how the controller and the Well Program work together through the basic and conditional modes of the plunger cycle. For more information, see "Well Program Set Points" in the Reference section of the Help Documents.

2.4.1 Time Set Points and the Basic Plunger Cycle

A basic Well Program, that uses the time method, moves through the following modes using plunger arrival (⇑) and time countdowns (Δt).

FALL ⇓ Δt –> CLOSE Δt –> A OPEN ⇑ Δt –> SALES Δt –> FALL

Figure 2-2: The basic plunger cycle

The controller closes the A-Valve and the Well Program enters the FALL mode. During FALL mode, the plunger drops (⇓). The controller counts down the time specified for Fall Time. The Well Program enters CLOSE mode. The controller counts down the time specified for Close Time. During the CLOSE mode, pressure builds in the well. The Controller monitors the data coming from the pressure sensors. However, the Well Program using a Time method does not use pressure readings to change modes. The controller continues to monitor pressures and the Well Program can use pressure settings to override the time settings.

After the Close Time expires, the Well Program enters A OPEN mode and opens the A-valve. The controller counts down the time set in A Open Time. This setting should match the time the plunger usually takes to come up the wellbore and remove the liquids. The arrival sensor detects the surfacing of the plunger. The controller directs the Well Program to enter SALES mode. The controller counts down the time set in Sales Time. After the Sales Time expires, the controller directs the Well Program to enter FALL mode and closes the A-valve. The process repeats. If the Sales Time is zero (00.00.00), the Well Program enters FALL mode. The user can turn off any set point for time with a value of zero (00.00.00).

2.4.2 Pressure Set Points and the Time Method

If the user specifies the set points for high and low line pressure, the Well Program responds to the pressure settings by entering DELAY CLOSE mode. The sequence of the modes depends on when the controller detected the High Line Shut-In pressure and the results of the sampling during the time set in High Line Pressure Shut-in Delay.

If the pressure sampling reveals the pressure spiked and then fell, the Well Program returns to the previous mode. The controller continues to count down the time set for that mode during the delay. The delay does not change the duration of A OPEN mode or SALES mode.

FALL –> CLOSE –> A OPEN **Δp –> DELAY CLOSE Δt –>** A OPEN

FALL –> CLOSE –> A OPEN –> SALES **Δp –> DELAY CLOSE Δt –>** SALES

Figure 2-3: The High Line Pressure Shut-in Delay set point can adjust for pressure spikes.

If the sampling reveals a possible problem, the Well Program closes the well and enters FALL mode.

FALL –> CLOSE –> A OPEN **Δp –> DELAY CLOSE Δt –>** FALL

FALL –> CLOSE –> A OPEN –> SALES **Δp –> DELAY CLOSE Δt –>** FALL

Figure 2-4: The High Line Pressure Shut-in Delay set point can trigger FALL mode.

Well conditions change and the changes affect the plunger arrival. To respond to variations in the plunger's arrival, the user can specify additional set points in the Well Program.

2.4.3 Other Conditional Modes and Set Points

The plunger might not surface as expected during A OPEN mode. The flow might be too low to raise the plunger or excessive backpressure might be the issue. To raise the plunger, the program must close the A-Valve for a time to build pressure or the system must relieve excessive backpressure through a B-Valve.

Respond to no plunger by closing A-Valve

To close the A-Valve, the Well Program offers a set point, Mandatory Shut-in Time. After the A Open time expires, the controller checks for data from the arrival sensor. If the controller cannot verify arrival and the program provides a Mandatory Shut-In time, the controller directs the program into MANDATORY mode and counts down the time. After the time expires, the Well Program enters FALL mode.

FALL –> CLOSE –> A OPEN ⊗ **Δt –> MANDATORY SHUT-IN** ⊗ **Δt –>** FALL

Figure 2-5: No plunger can trigger the MANDATORY SHUT-IN mode.

Respond to no plunger by opening B-Valve

If the system has a B-Valve, the controller can direct the valve to open and vent the backpressure. With the backpressure relieved, the flow might raise the plunger and the sensor can detect the arrival (⇑).

FALL –> CLOSE –> A OPEN **–> B OPEN ⇑ Δt –> B DELAY Δt –>** SALES Δt –> FALL

Figure 2-6: The modes for B-Valve can increase production.

To add this response to the program, the user specifies a B Open Time. After the plunger arrives and the time expires, the Well Program enters B DELAY mode. The program uses the B Delay Time before entering SALES mode. The controller counts down the Sales Time. The program enters FALL mode. The cycle repeats.

If the flow cannot raise the plunger (⊗) with the backpressure released, then the program enters MANDATORY SHUT-IN mode. The controller counts down the Mandatory Shut-In time. When the controller detects the required pressure, the program enters OPEN mode. The cycle repeats.

FALL –> CLOSE –> A OPEN **–> B OPEN Δt ⊗ –> MANDATORY SHUT-IN Δt –>**FALL

Figure 2-7: No plunger affects the Well Program.

For more information about using the Time Method, see "Configuring a Single Well" or "Configuring Production of Multiple Wells" in the Guides section of the Help Documents. For more information about set points, see "Well Program Set Points" in the Reference section of the Help Documents.

2.5 Pressure Methods

A well analysis might indicate that pressures instead of time would optimize production more effectively. The user can choose a production method that uses pressure differentials. The WellVision and WellTrekker applications offer the following calculations as methods.

- Casing pressure minus Tubing pressure
- Casing pressure minus Line pressure
- Tubing pressure minus Line pressure
- (Multi-well only) Dual Pressure Differential: Casing pressure minus Line/Tubing minus Line pressure

For each of these methods, the user specifies a differential in pressure based on the well's conditions. The primary set point is Differential Open Pressure. The set point answers the question: "At what pressure difference, does the user want the Well Program to enter A OPEN mode?" Time still plays a role as the controller counts down Fall Time before evaluating the pressure differential. After the Fall Time expires, the controller evaluates the pressures. If the difference meets pressure criteria specified by the set points shown as a delta p (**Δp)**, then the Well Program enters A OPEN mode.

FALL –> CLOSE **Δp** –>A OPEN –> SALES –> FALL

Figure 2-8: A change in pressure differential can trigger a change in mode.

Basis for differential	**Well opens if:**	**Well example**
Casing pressure – Line pressure	Difference in pressure is greater than (>) the setting	Most well configurations
Tubing pressure – Line pressure	Difference in pressure is greater than (>) the setting	Well with a packer and no annular pressure
Casing Pressure –	Difference in pressure is less	Well with slow building casing

Basis for differential	Well opens if:	Well example
Tubing pressure	than (<) the setting	pressures
Casing pressure – Line pressure or Tubing pressure – Line pressure (Multi-well only)	If both conditions are met or either one of them are met.	Wells that users want to respond to two differentials

Table 2-1: Production Methods and Pressure Differential

For more information about the pressure methods, see Configuring a Single Well or Configuring Production for Multiple Wells in the Guides section of the Help Documents.

2.6 Automatic Adjustment for Plunger Arrival

The Time Method with the AutoCycle program provides automatic adjustments using the plunger arrival and number of arrivals. Using the AutoCycle program, a Well Program uses initial settings, monitors the arrival of the plunger, and adjusts time or pressure settings. These adjustments fine-tune the production cycle for optimum plunger speed, liquid removal, and well performance.

For this method, the controller monitors and records data about the arrival of the plunger. The Well Program uses the AutoCycle program to respond with adjustments immediately.

2.6.1 *Time Method with the AutoCycle Program*

The AutoCycle program uses the plunger speed to optimize production. The user provides values for a set of arrival times. These values depend on the specific well. The arrival times indicate to the AutoCycle program the speed of the plunger. Given the depth of the well and the arrival time, the AutoCycle program calculates the speed by dividing the depth by the arrival time. $(Depth/Feet\ per\ Minute)$

Maintaining an appropriate speed is critical to the production and safety of the well. Plungers that arrive too fast can damage wellhead components at the surface. This damage might lead to failure. Plungers that arrive too slowly might indicate that pressures are falling. The pressure might be too low to raise the plunger. To optimize production, the AutoCycle program uses a set of arrival windows. Each window type has a set of counters and a set of adjustments.

The following figure shows the basic plunger cycle and where the AutoCycle program windows affect production.

FALL –> CLOSE –> **A OPEN ⇑ □t ct adj** –> SALES or CLOSE –> <*next cycle*>

Plunger arrival (⇑) Window evaluated (□t) **Count evaluated (ct) Adjustments applied (adj)**

Figure 2-9: The windows of the AutoCycle program apply after the plunger arrives.

The following paragraphs provide more detail about the windows and their associated parameters.

2.6.2 *Plunger Arrival Windows*

The AutoCycle program makes the same adjustments to the Afterflow Time and Off Time that an on-site operator would make while tending the well. The AutoCycle program compares the actual time of arrival with the values of the set points for the windows.

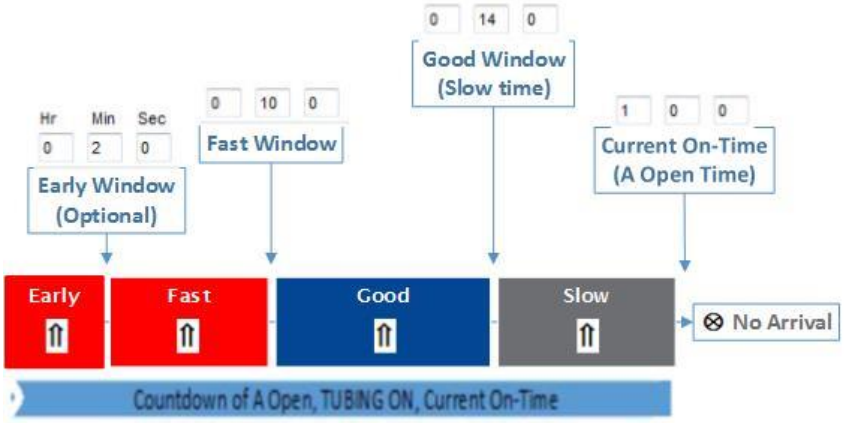

Figure 2-10: Arrival Windows of the AutoCycle program

This comparison identifies the speed of the plunger and the category of arrival. Using this comparison, the AutoCycle program makes adjustments as described in the table below:

Plunger arrival	Adjustments applied
Good	None, within this window of time, the AutoCycle program does not make adjustments. However, the program does identify minimum and maximum and maximum times. This arrival indicates best production of the well with an ideal arrival time. The depth of well divided by 800 equals the low limit of Good window. The depth of well divided by 600 equals the upper limit of Good window.
Fast	Decrease down hole pressure; within this window of time, the plunger arrives too quickly. The AutoCycle program deducts from the Fall Time/Close Time (Off Time) and/or adds to the Sales Time (Afterflow time).

Plunger arrival	Adjustments applied
Slow	Increase down hole pressure; within this window of time, the plunger has arrived too slowly. This indicates that the down hole pressure was too low. The AutoCycle program deducts from the Sales Time (Afterflow time) and/or adds to the Fall Time/Close Time (Off Time). The user can set options for No Afterflow on Slow Arrivals. The depth of well divided by 270 equals the upper limit of slow window.
No	Increase down hole pressure if the plunger fails to arrive at the surface. The AutoCycle program deducts from the Sales Time (Afterflow time) and adds to the Fall Time/Close Time (Off Time). No arrival might indicate well problems. If the plunger fails to arrive multiple times, The AutoCycle program informs the controller; the Well Program enters FALL mode and the well is shut-in. The controller raises a Plunger Error. The user needs to clear the error before production can resume.

The user provides set points for times typical to the well. These set points define the windows of time so that the AutoCycle program can adjust the settings correctly. The arrival windows are dependent on the amount of time it takes for the plunger to reach the surface after the A-Valve (Tubing Valve) is open:

The figure below shows the area of the AutoCycle tab that specifies the values for evaluating plunger speed.

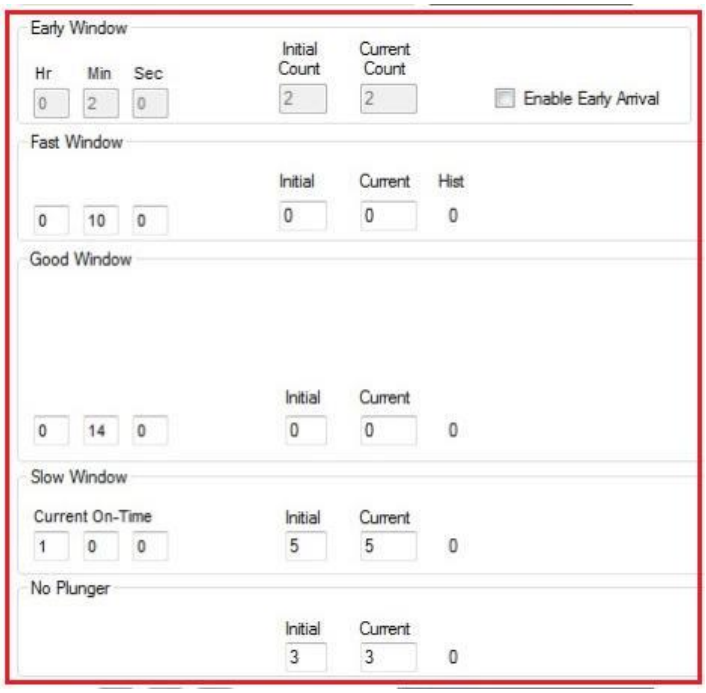

Figure 2-11: The set points in the Arrival Windows area on the AutoCycle program tab

The user provides the values for the plunger arrival times. The arrival time indicates the rate of speed. If the user knows the depth of the well, the user can specify the well information for the AutoCycle program. Given the depth of the well and the arrival time, the AutoCycle program calculates the speed by dividing the depth by the arrival time. (Distance/Time = Speed) Maintaining an appropriate speed is critical to the production and safety of the well. Plungers that arrive too fast can damage wellhead components at the surface. This damage might lead to failure. Plungers that arrive too slowly plungers might indicate that well pressures are falling. The pressure might be too low to raise the plunger. Maintaining a good plunger speed ensures safe and efficient production from the well.

The figure below shows the AutoCycle tab. The user can accept default values that are based on a depth of 8000 feet. The program can meet any level of control the user might want to apply. The user can supply an initial set of times specific to the well and allow the AutoCycle program to adjust automatically. Or the user can enter adjustments.

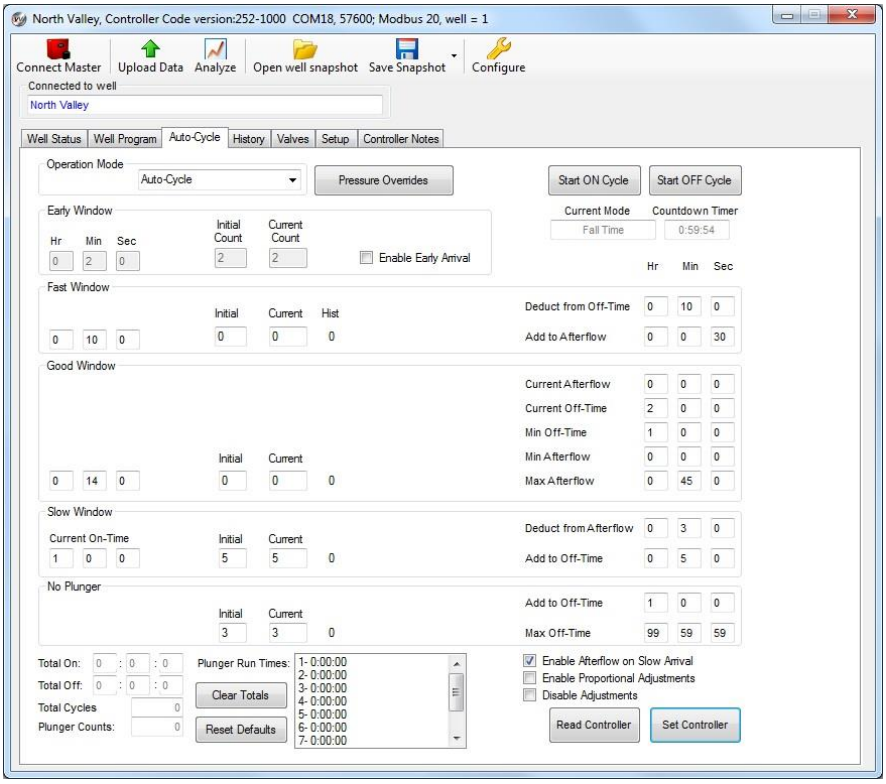

Figure 2-12: The AutoCycle Tab

To tailor the program to the well, the program has counters the user can change to match the characteristics of the well. The following section describes the counters and the section after that describes the adjustments.

2.6.3 *Plunger Arrival Counts*

The user can adjust the AutoCycle program by providing arrival counts that are associated with each window. Each window has an initial and a current counter.

- The **Initial** specifies the number of arrivals to match before the program responds. This count remains at the default value until the user changes it. The program does not adjust this number.
- The **Current** counter displays the number of remaining arrivals required to trigger a mode change. This counter reduces the value by one for each arrival in the window. When this counter equals zero (0), the program changes to the mode appropriate for the type of arrival.

  The counts that close the well require the arrivals to be consecutive such as Early, Slow, or No Plunger. Requiring consecutive arrivals keeps the well open despite occasional plunger errors but triggers a shut-in for a pattern of errors. The counts that move the well program from A OPEN to SALES (AFTERFLOW) are nonconsecutive such as Fast and Good. The nonconsecutive counts allow the well to produce for Fast or Good arrivals without interruption. The counters for Slow and No Plunger reset to the initial

value immediately upon a Fast or Good arrival. The Early counter resets upon a Slow or No Plunger arrival. The counters for Fast and Good arrivals reset upon a Slow or No Plunger arrival.

The user needs to know the characteristics and pressures of the well to set the counts appropriately. No single set of values works for all scenarios. The default values are a basic set to begin operations.

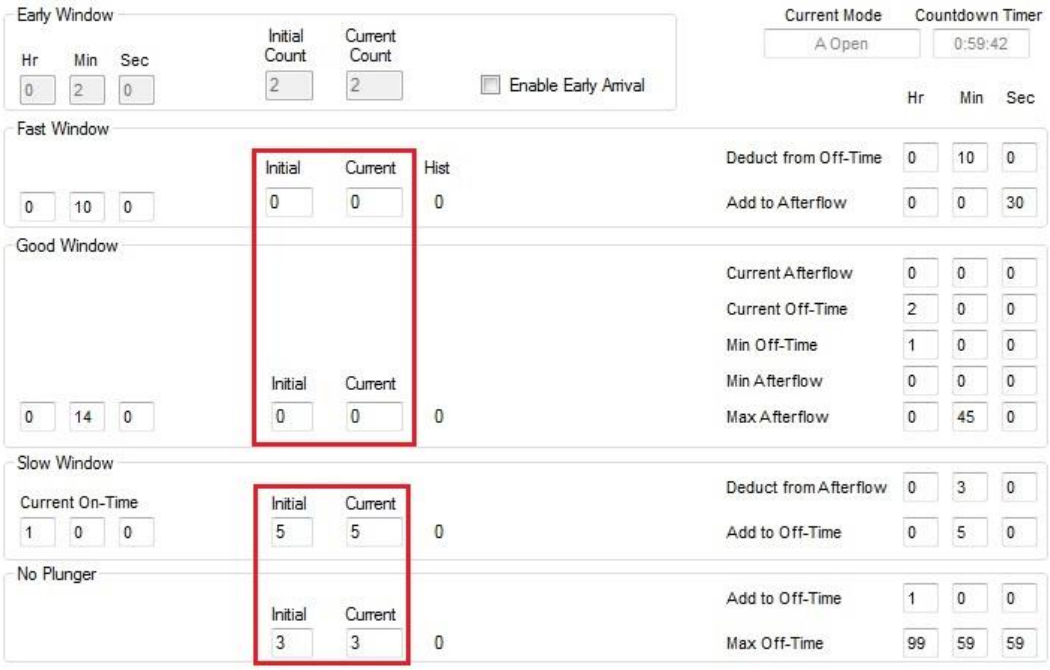

Figure 2-13: The Default Values for Counts

Notice that the counts for the Fast Window are both zero (0). With these values, a Slow or No Plunger resets the Current to the Initial. Zero (0) triggers the SALES (AFTERFLOW) mode with the time adjustments for the Fast window. Therefore, a Fast Plunger always moves the program into SALES (AFTERFLOW) mode.

FALL –> CLOSE –> A OPEN ⇑ □**t 0ct adj** –> SALES –> <*next cycle*>

FALL –> CLOSE –> A OPEN ⇑ □**t 0ct adj** –> SALES –> <*next cycle*>

FALL –> CLOSE –> A OPEN ⇑ □**t<if good>0ct** –> SALES –> <*next cycle*>

Plunger arrival (⇑) Window evaluated (□**t) Count evaluated (ct) Adjustments applied (adj)**

Figure 2-14: The windows of the AutoCycle program apply after the plunger arrives.

The same is true for the Good window default values. Notice that good arrivals have associated set points and not adjustments

- Current Afterflow (Sales Time)
- Current Off-Time (Close Time)
- Min Off-Time (Fall Time)

- Max and Min limits on Afterflow

Notice that the counts for the Slow window are equal at five (5). After five (5) consecutive Slow arrivals, the Current count is zero (0) and the program enters CLOSE mode. The program applies the time adjustments to influence the next cycle toward a Good arrival.

FALL –> CLOSE –> A OPEN ⇑ □t **4ct** –> SALES –> <*next cycle*>
FALL –> CLOSE –> A OPEN ⇑ □t **3ct** –> SALES –> <*next cycle*>
FALL –> CLOSE –> A OPEN ⇑ □t **2ct** –> SALES –> <*next cycle*>
FALL –> CLOSE –> A OPEN ⇑ □t **1ct** –> SALES –> <*next cycle*>
FALL –> CLOSE –> A OPEN ⇑ □t **0ct adj** –> CLOSE–> <*next cycle*>
Plunger arrival (⇑) Window evaluated (□t) **Count evaluated (ct) Adjustments applied (adj)**

Figure 2-15: The slow count decreases by one and adjustments occur when the count is zero.

As long as the arrivals are in the Slow window, the program adds to the Off-Time (Close Time) and deducts from the Afterflow time (Sales Time) of the next cycle. The program continues to adjust the times until the plunger arrives in either a Good or Fast window. This change resets the Slow Count from zero (0) to the Initial count of five (5). The program continues to evaluate the arrivals and apply adjustments based on the arrival type and the counts.

The following table summarizes the description of the counts.

For the window…	**Current shows # that are…**	**Current Resets to Initial on…**	**Mode triggered when Current = 0**
Early	Consecutive	Any other arrival type	CLOSE
Fast	Nonconsecutive	Any Slow or No arrival	SALES
Good	Nonconsecutive	Any Slow or No arrival	SALES
Slow	Consecutive	Nonconsecutive and Fast or Good arrival	CLOSE*
No Plunger	Consecutive	Any Fast or Good arrival	CLOSE

* Unless the Enable Afterflow on Slow is selected on the AutoCycle tab

Table 2-2: Plunger Counts and Arrival Windows

The following section describes the adjustments for the arrival windows and the set points of the Good Window.

2.6.4 *Automatic Time Adjustments*

The AutoCycle program compares the actual time of arrival with the values of the window set points. This comparison identifies the speed of the plunger and the

category of arrival. The program applies the adjustments to the Afterflow (Sales) time or the Off-Time (Close) if the plunger arrival is outside the **Good Arrival** window and the count for the window is zero (0). The adjustments can increase or decrease pressure to control the plunger speed. The Fast, Slow, and No Plunger windows have adjustment set points the user can specify.

- **Afterflow (Sales)**: Afterflow (Sales) relieves pressure after the plunger arrives. Shorter Afterflow (Sales) relieves less pressure for the next Tubing On (Open) mode while longer Afterflow cycles relieve more pressure. Less pressure slows speed and increases time it takes for the plunger to arrive.
- **Current Off-Time Adjustments:** Tubing Off cycles allow pressure to build in order to lift the plunger and liquids to the surface. Longer Tubing Off (Close) modes result in more pressure buildup; shorter Tubing Off (Close) modes result in less pressure buildup. More pressure increase speed of the plunger and decreases the time it takes for the plunger to arrive.

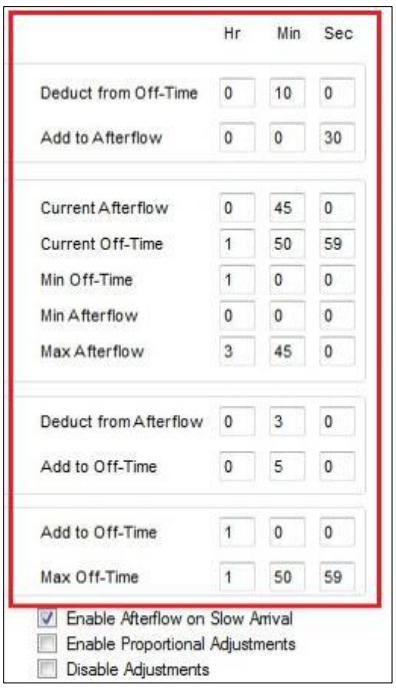

Figure 2-16: Section of the AutoCycle tab for reading or specifying adjustments

Smaller Time Adjustments

The user can set the AutoCycle program to make proportional adjustments. Proportional adjustments are partial adjustments based on how far the plunger arrival is from the Good Arrival time.

Best Practice If the arrival time is very close to the Good Arrival window use the option for proportional adjustment.

2.6.5 *AutoCycle Pressure Set Points*

The user can set the program to respond to pressure readings by using the Pressure Overrides feature. The user can specify pressure set points or differentials that move the program from A OPEN mode to AFTERFLOW (SALES) mode or to CLOSE mode.

The adjustments for the Casing Pressure, Tubing Pressure, and Differential Pressure Overrides on Fast, Slow, and No Arrivals are available.

The user can specify pressure set points that change the mode of the AutoCycle program under certain conditions. The following lists summarize the pressure conditions that trigger the A Value (Tubing Valve) to open or close.

Open A-Valve (Tubing Valve) Overrides:

- If Casing pressure is greater than or equal to the set point
  - Casing Pressure >=
- If Tubing pressure is greater than or equal to the set point
  - Tubing Pressure >=
  - If the differential of Tubing pressure and Line pressure is greater than or equal to the set point
  - Tubing Pressure – Line Pressure >=

Close A-Valve (Tubing Valve) Overrides:

- If Casing pressure is less than or equal to the set point
  - Casing Pressure <=
- If Tubing pressure is less than or equal to the set point
  - Tubing Pressure <=
- If Differential pressure is less than or equal to the set point
  - Differential Pressure <=
  - This requires a delay of 3 minutes where the pressure must stay below this set point
- If Line pressure is greater than or equal to the set point
  - Line Pressure >=
  - A delay time is optional
  - Shuts in the well until the condition is no longer met

The figure below shows the AutoCycle Pressure Overrides dialog box.

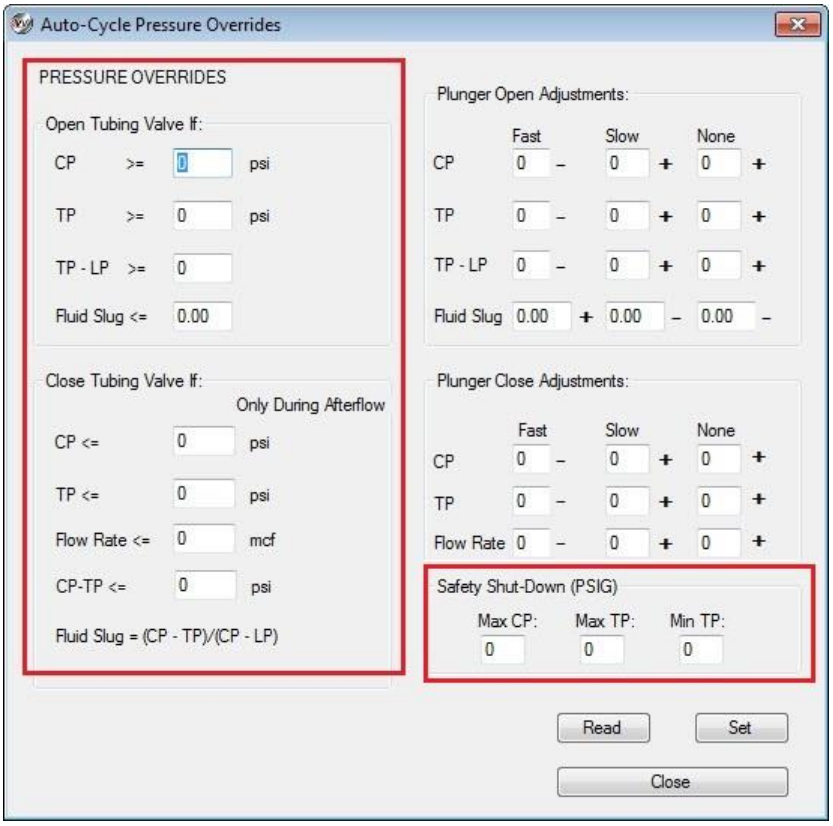

Figure 2-17: The dialog box for pressure set points

By using the pressure overrides, the user sets the program to respond to the current pressure readings in addition to the passing of time.

2.6.6 *Automatic Adjustment of Pressure Set Points*

The user can set the program to adjust the pressure set points for the next cycle based on the plunger arrival.

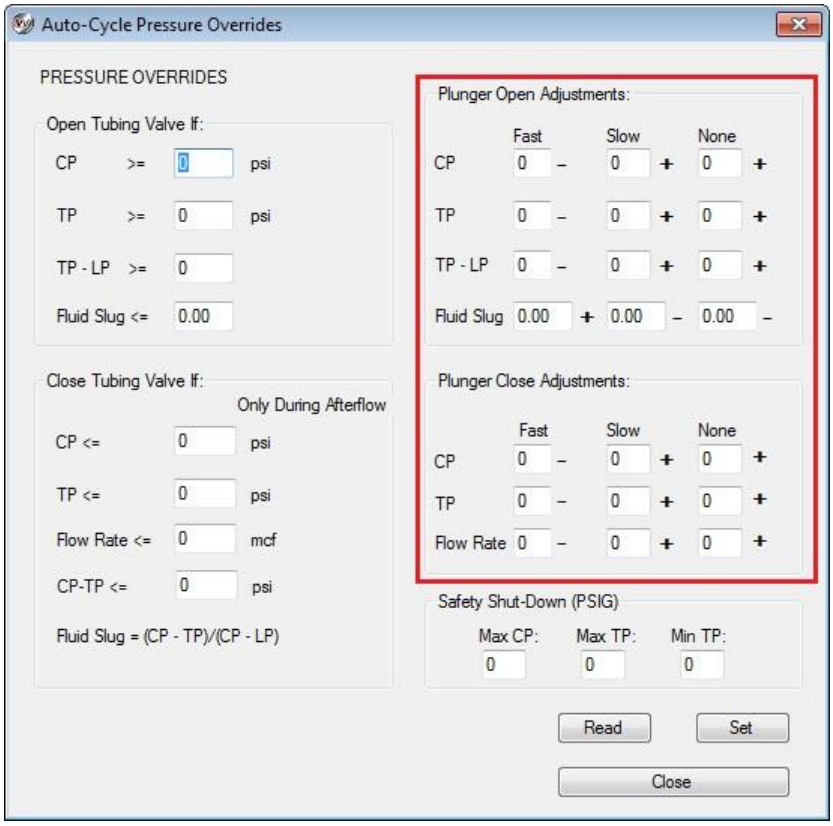

Figure 2-18: Adjustments to Pressures for the Arrival Windows

After the user has enabled the program, the user can analyze the results of the optimization program.

For more information, see "Well Program Set Points for AutoCycle" in the Reference section of the Help Documents.

Go to the 8000 Series Documentation Map.

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