

Tango™ RoundsLogging:

Tango™ RoundsLogging is a function that allows industrial plant technicians to use Smart Phones and Tablets for collecting equipment health information through tasks such as:

1. Basic Operator Care Rounds
2. Lubrication Routes
3. Mechanical or Electrical inspections
4. Environmental or Safety inspections
5. IR Thermography Condition Assessments
6. Ultrasonic condition assessments

The first four activities use RoundsLogging's Process Parameter function for defining appropriate trend and observation points for each asset component, then collecting measurements in the plant via a Smart Phone or Tablet.

The fifth and sixth activities are examples where RoundsLogging works with Tango's Condition Task Assessment process to provide a routing system on a Smart Phone or Tablet for predictive maintenance systems that do not have that capability.

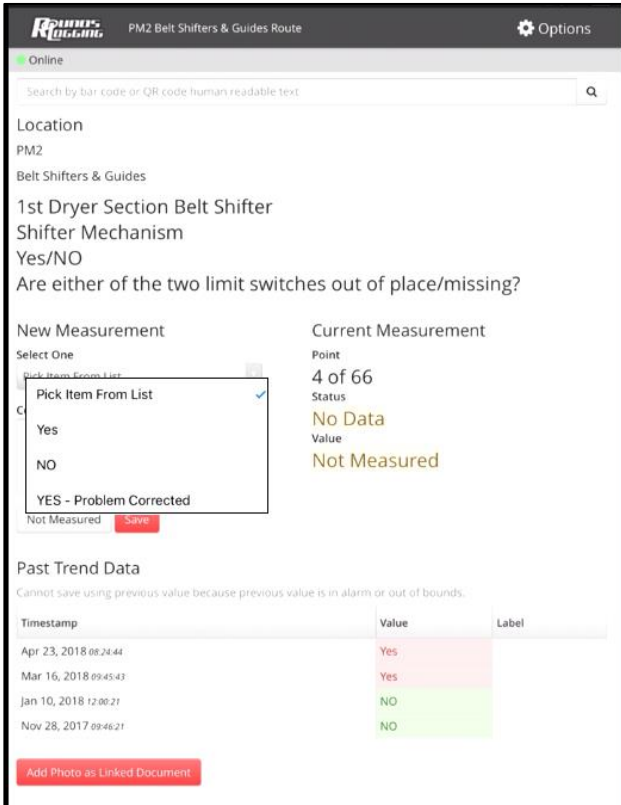
In either RoundsLogging application the information gathered on the Smart Phone or Tablet becomes part of the historical asset health record in Tango, and problem conditions found during the inspections or routes can be escalated to a Condition Entry. All Condition Entries for an asset component, including those from other condition monitoring activities such as vibration analysis, oil analysis, and electrical testing, are posted to Tango's Integrated Condition Status dashboard.

Android™, IOS™, or Surface™ devices may be used for RoundsLogging – the choice is typically driven by brand or cost preference rather than functionality differences. Some begin with a phone for convenience, but there is a preference for the larger screens on tablets.

RoundsLogging – Process Parameters Routes:

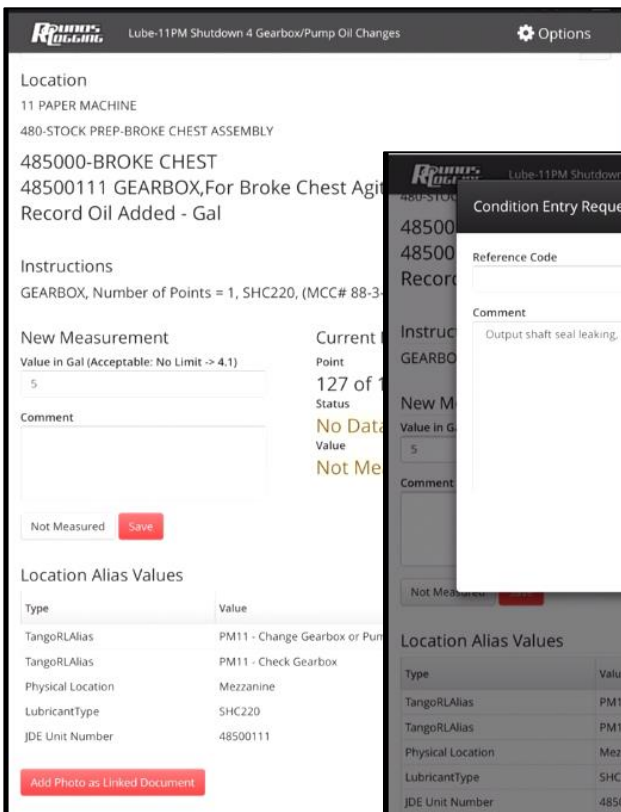
There are two types of process parameter measurement points that can be set for asset components in Tango:

- *Observations* are text-based measurements where the technician selects the appropriate value from a predefined list, such as 'Check Oil Level' with options to select 'Overfull, Full, or Low'.
- *Trends* are numeric based measurements such as temperature in deg C, flow rates in GPM, grease added in Oz, or crane cable thickness in CM.



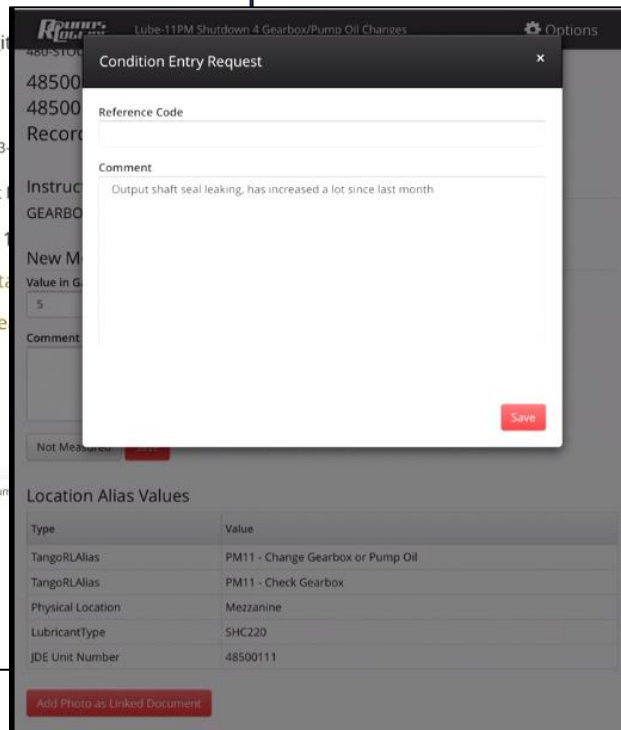
Example #1: Basic Operator Care Observation Point –

The user selects the appropriate item from the pick list; each item indicates either ‘No Problem’ or ‘Problem Found’ for the observation point. Note that up to 5 Past Data values can be shown for reference – those in Red are ‘Out of Bounds’ measurements & triggered a ‘Request for Condition Entry’ in Tango. This allows problems found in the field to be escalated to Tango’s Integrated Condition Status dashboard for communication to other users.



Example #2: Lube Route Trend Point –

The user enters a numeric value. In this case ‘5’ exceeds the high alarm value set at ‘4.1’, so the user is prompted for additional information about the alarm. This additional information is carried forward when escalated to a Condition Entry, which can be pushed into the eventual work order. Note that a low alarm value can also be specified for trend points.



Photographs of the asset and the problem may be linked to the measurement point.

Rounds Logging Lube-11PM Shutdown 4 Gearbox/Pump Oil Changes Options

11 PAPER MACHINE
488-PROCESS SERVICES-DILUTION
486700-C.PIT & PULPER DILUT. PUMP
48670003 PUMP,Dilution, For Couch Pit and Broke Pulper
Check Oil Condition

Instructions
PUMP BEARINGS, Number of Points = 1, DTEXHVY, (MCC# 88-4-C4)

New Measurement Current Measurement
Select One Point
Pick Item From List 9 of 132

Comment ata
Pick Item From List
Good Measured
Foamy (Air Present)
Milky (Water Present)
Dark / Discolored
Add Comment

Location Alias
Type Value
TangoRLAlias PM11 - Change Gearbox or Pump Oil
TangoRLAlias PM11 - Check Pump Bearings or Reservoir
TangoRLAlias PM11 - Lube Seals
Physical Location Basement
LubricantType DTEXHVY
LubricantType SHCPM460
JDE Unit Number 48670003

Add Photo as Linked Document

Example #3: Lube Route Observation Point –

If desired, instructions can be added for any individual measurement point – in this case specifying the number of lube points, the type of lubricant, and the MCC energizing this asset in case lock-out is needed.

Example #4: Environmental Inspection Observation point –

Definitions for the observation name and items in the pick list are controlled during customers' initial setup – they can be very simple or extremely detailed as needed.

Rounds Logging ENV-ROUTE 3 EAST MILL Options

Location
EAST MILL STORAGE
470 - CONTAINER STORAGE
SATELLITE AREA
BASEMENT SOUTH - CELL 1
Are Containers Contained?

New Measurement Current Measurement
Select One Point
Pick Item From List 7 of 30

Comment ured
Pick Item From List
Yes
No
Installed Containment
Containment in Progress

Past Trend Data
Save Using Previous Value

Timestamp	Value	Label
Oct 26, 2012 16:21:11	Yes	
Oct 05, 2012 17:34:02	Yes	

Location Alias Values
Type Value
JDE Unit Number ENV-INSP

Add Photo as Linked Document

Rounds Logging MW WEEKLY 10PM OPERATING FLOOR Options

Location
10 PAPER MACHINE
460-STOCK PREP-BOTTOM STOCK LCR REFINERS
465620-#1 BOTTOM STOCK REFINER
46562305 MOTOR,For 3000HP Refiner Plate Adjusting
Inspect Base / Bolts Condition

Instructions
1. Visual inspection of base for cracks at welds, erosion of base and supporting grouting
2. Visually check motor hold down bolts for looseness by check anti-vibration point

New Measurement Current Measurement
Select One Point
Pick Item From List 11 of 287

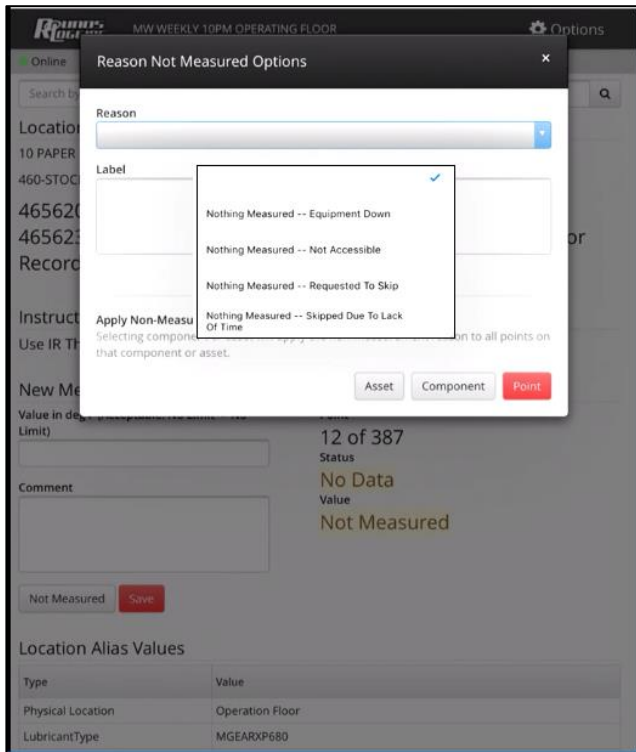
Comment red
Pick Item From List
Good
Problem Found - Corrected
Problem Found - Monitor
Problem Found - Write WO

Location Alias Values
Type Value
LubricantType MGEARXP680
JDE Unit Number 46562305
Route Order 40
Physical Location Operating Floor
RouteName MW WEEKLY 10PM OPERATING FLOOR
TangoRLAlias MW CHECK MOTOR 3

Add Photo as Linked Document

Example #5: Mechanic Inspection Observation Point –

Instructions are also customer defined and may be simple or detailed.

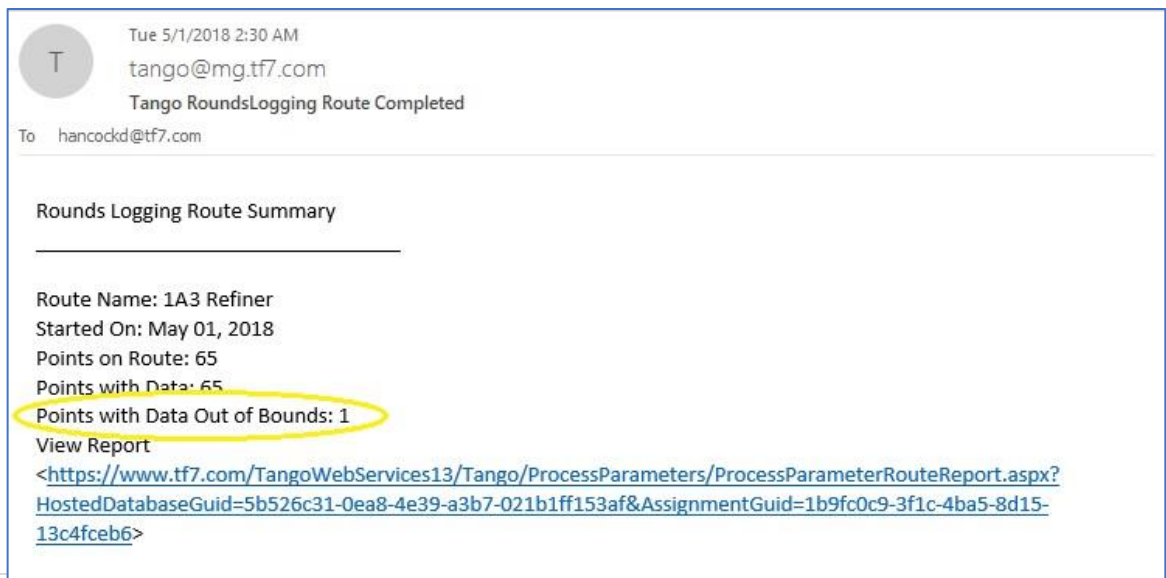


Example #6: Point Not Measured Reason

When the user cannot complete the measurement of a point, the reason may be tracked.

Once a RoundsLogging Process Parameter Route has been completed, Tango presents a process for making decisions on escalating reported problems to condition entries and inclusion on the Integrated Condition Status dashboard.



First, specified Tango user names are notified by e-mail when a route is completed, with a count of points measured, a count of points indicating a problem, and a link to the interactive summary report in Tango for completion of each Condition Entry Request:



The e-mailed link will take the user directly to the Process Parameter Collected Data Summary Report for that specific route completion; measurement points indicating a problem are shown at the top of the report, along with the Condition Entry Request that includes comments entered by the inspection tech:

Name: Lube-Kamyr-Daily
 User: mcoy
 Downloaded: May 02, 2018, 16:46:12
 Uploaded: May 02, 2018, 16:51:39

Order	State	Value	Trend	Location	Condition Entry Request	Trend Value Comment	Linked Documents	Collected By
120	Out of Bounds	Yes	General Comments	KAMYR #1 090-CHIP SUPPLY AND STEAMING-MAKE UP LIQUOR 091800-COLD BLOW PUMP 09180003 PUMP COLD BLOW	Add Entry Comment: Continue to check for free water daily.			mcoy @ May 02, 2018 16:50:18 EST
990	Out of Bounds	Yes	General Comments	KAMYR #2 030-CHIP SUPPLY AND STEAMING-MAKE UP LIQUOR 031600-#1 MAKE UP LIQUOR PUMP 03160003 PUMP #1 MAKE UP LIQUOR	Add Entry Comment: Continue to add oil to pump daily.			mcoy @ May 02, 2018 16:51:00 EST
10	OK	0	Record Oil Added - Gal	KAMYR #1 090-CHIP SUPPLY AND STEAMING-HIGH PRESSURE FEEDER 091400-CHIP CHUTE CIRCULATION PUMP 09140003 PUMP CHIP CHUTE CIRCULATION		From Previous Value		mcoy @ May 02, 2018 16:49:16 EST
30	OK	Good	General Comments	KAMYR #1 090-CHIP SUPPLY AND STEAMING-HIGH PRESSURE FEEDER 091400-CHIP CHUTE CIRCULATION PUMP 09140003 PUMP CHIP CHUTE CIRCULATION		From Previous Value		mcoy @ May 02, 2018 16:49:16 EST
40	OK	0	Record Oil Added - Gal	KAMYR #1 090-CHIP SUPPLY AND STEAMING-MAKE UP LIQUOR 091600-#1 MAKE UP LIQUOR PUMP 09160003 PUMP #1 MAKE UP LIQUOR		From Previous Value		mcoy @ May 02, 2018 16:49:17 EST
60	OK	Good	General Comments	KAMYR #1 090-CHIP SUPPLY AND STEAMING-MAKE UP LIQUOR 091600-#1 MAKE UP LIQUOR PUMP 09160003 PUMP #1 MAKE UP LIQUOR		From Previous Value		mcoy @ May 02, 2018 16:49:17 EST

For decision support   a user may click the icons at the left side of each row to open the measurement point's location in the tree or to bring up the trend /observation history:

When the decision is

Integrated Condition Status Report

User: TF7, Date: May 08, 2018, Time: 11:29:59

Severity	Unit
1	10 PA MACH
2	KAMYR #1
3	10 PA MACH
4	10 PA MACH
5	10 PAPER MACHINE

Trend Data

KAMYR #1 » 090-CHIP SUPPLY AND STEAMING-MAKE UP LIQUOR » 091800-COLD BLOW PUMP » 09180003 PUMP COLD BLOW

Record Oil Added - Gal

made that a reported problem should be escalated to a condition entry, the user clicks the 'Add Entry' button to open the screen for completing the condition entry information and posting the problem to the Integrated Condition Status dashboard:

Other paths for viewing the problems reported & escalating appropriate items to the ICSR are through Tango's 'Process Parameter Currently Out Of Bounds' and 'Process Parameters Out Of Bounds History' reports:

Process Parameters Currently Out of Bounds									
Task	Unit	Function	Asset	Comp	Parameter	Value	Timestamp	Condition Entry	Condition Entry Request Comment
Lube-12PM Shutdown 3 Gearbox/Pump Oil Changes	12 PAPER MACHINE	490-STOCK PREP-MACHINE CHESTS	495100-MACHINE CHEST	49510111 GEARBOX,For Machine Chest Agitator	Check Oil Condition	9 Dark / Discolored	Jun 18, 2013	Add	Dark
ENV-ROUTE 3 EAST MILL	EAST MILL STORAGE	470 - CONTAINER STORAGE	SATELLITE AREA	ENV-INSP 10PM OP.FLOOR WESTSIDE	Are Containers Contained?	54 No	Oct 26, 2012	Add	
ENV-ROUTE 3 EAST MILL	EAST MILL STORAGE	470 - CONTAINER STORAGE	RESERVOIR/CONTAINMENT	46024001 TANK, Hydraulics, For Press	Inspect Reservoir Condition/Leak(s)	60 Issue or leak	Oct 26, 2012	Add	

Process Parameter Out of Bounds History Report									
Location Filter: All Locations									
Report Date Range: Jan 01, 2013 to May 08, 2018									
									Filter: 10PM-Daily
Task	Unit	Function	Asset	Comp	Parameter	Value	Timestamp	Condition Entry	Condition Entry Request Comment
Lube-10PM-Daily	10 PAPER MACHINE	460-STOCK PREP-BOTTOM STOCK CLEANER SYSTEM	464600-DECULATOR & PRIMARY CLEANER	46300005 MOTOR,For Bottom Stock Primary Cleaner Pump	Check Oil Condition	Add Comment	Oct 08, 2013	Add	Outboard side low added .1
Lube-10PM-	10 PAPER MACHINE	460-STOCK PREP-BOTTOM	464600-DECULATOR &	46300005 MOTOR,For	General Comments	Yes	Feb 04, 2013	Add	West pkg needs take up

The interactive RoundsLogging Process Parameter Route Adherence report helps manage compliance to inspection schedules and successful data collection on measurement points:

Roundslogging Adherence																																																																																																													
Filters																																																																																																													
Date Range		Jan, 01 2014 through Dec, 31 2014																																																																																																											
Task		Lube-9 Evap-Daily																																																																																																											
<table border="1"> <thead> <tr> <th colspan="2"></th> <th colspan="4">Route Completion Adherence</th> <th colspan="4">Route Point Adherence</th> </tr> <tr> <td colspan="2"></td> <td colspan="4">81.18%</td> <td colspan="4">80.78%</td> </tr> </thead> <tbody> <tr> <td colspan="2">☐ Non Grouped Routes</td> <td colspan="4">81.18%</td> <td colspan="4">80.78%</td> </tr> <tr> <td colspan="2">☐ Lube-9 Evap-Daily</td> <td colspan="4">81.18%</td> <td colspan="4">80.78%</td> </tr> <tr> <td></td> <td>Scheduled Start Date</td> <td>Scheduled End Date</td> <td># of Route Completions</td> <td># of Points On Route</td> <td># Points Measured OK</td> <td># Points Measured Not OK</td> <td># of Points marked as Not Measured</td> <td># of Points with No Data Entered</td> <td></td> </tr> <tr> <td colspan="3">Totals</td> <td>207</td> <td>3060</td> <td>2472</td> <td>0</td> <td>0</td> <td>588</td> <td></td> </tr> <tr> <td></td> <td>Jan 01, 2014</td> <td>Jan 01, 2014</td> <td>0</td> <td>12</td> <td>0</td> <td>0</td> <td>0</td> <td>12</td> <td></td> </tr> <tr> <td></td> <td>Jan 02, 2014</td> <td>Jan 02, 2014</td> <td>1</td> <td>12</td> <td>12</td> <td>0</td> <td>0</td> <td>0</td> <td></td> </tr> <tr> <td></td> <td>Jan 03, 2014</td> <td>Jan 03, 2014</td> <td>1</td> <td>12</td> <td>12</td> <td>0</td> <td>0</td> <td>0</td> <td></td> </tr> <tr> <td></td> <td>Jan 06, 2014</td> <td>Jan 06, 2014</td> <td>1</td> <td>12</td> <td>12</td> <td>0</td> <td>0</td> <td>0</td> <td></td> </tr> </tbody> </table>												Route Completion Adherence				Route Point Adherence						81.18%				80.78%				☐ Non Grouped Routes		81.18%				80.78%				☐ Lube-9 Evap-Daily		81.18%				80.78%					Scheduled Start Date	Scheduled End Date	# of Route Completions	# of Points On Route	# Points Measured OK	# Points Measured Not OK	# of Points marked as Not Measured	# of Points with No Data Entered		Totals			207	3060	2472	0	0	588			Jan 01, 2014	Jan 01, 2014	0	12	0	0	0	12			Jan 02, 2014	Jan 02, 2014	1	12	12	0	0	0			Jan 03, 2014	Jan 03, 2014	1	12	12	0	0	0			Jan 06, 2014	Jan 06, 2014	1	12	12	0	0	0	
		Route Completion Adherence				Route Point Adherence																																																																																																							
		81.18%				80.78%																																																																																																							
☐ Non Grouped Routes		81.18%				80.78%																																																																																																							
☐ Lube-9 Evap-Daily		81.18%				80.78%																																																																																																							
	Scheduled Start Date	Scheduled End Date	# of Route Completions	# of Points On Route	# Points Measured OK	# Points Measured Not OK	# of Points marked as Not Measured	# of Points with No Data Entered																																																																																																					
Totals			207	3060	2472	0	0	588																																																																																																					
	Jan 01, 2014	Jan 01, 2014	0	12	0	0	0	12																																																																																																					
	Jan 02, 2014	Jan 02, 2014	1	12	12	0	0	0																																																																																																					
	Jan 03, 2014	Jan 03, 2014	1	12	12	0	0	0																																																																																																					
	Jan 06, 2014	Jan 06, 2014	1	12	12	0	0	0																																																																																																					

RoundsLogging – Condition Assessment Tasks:

Tango Condition Assessments allow PDM technicians to efficiently document and integrate their conclusions after collecting and analyzing data from specialized technology systems such as vibration or oil analysis. RoundsLogging allows PDM technicians to assess condition tasks on mobile devices as they collect data in the field, especially useful for some IR thermography, ultrasonics, and motor testing systems that lack a routing tool.

In the RoundsLogging application the user steps through each asset component in the task as he or she performs the condition monitoring, and then selects the appropriate condition state from a pulldown list. The typical state list includes:

- Measured, No Problem, Nothing to Report
- Measured, No Problem, Add Condition Comment
- Measured, Mildly Abnormal
- Measured, Condition Entry
- Nothing Measured – Equipment Down
- Nothing Measured – Not Accessible
- Nothing Measured – Requested to Skip
- Nothing Measured – Skipped for Lack of Time
- Nothing Measured – No Site Support

‘Measured – Condition Entry’ is the state for a reportable condition problem, and will lead to a Condition Entry in the Integrated Condition Status dashboard.

The screenshot shows the RoundsLogging mobile application interface. At the top, the title bar reads "RoundsLogging USound-10PM Monthly" with an "Options" gear icon on the right. Below the title bar, there is a search bar with the text "Search by bar code or QR code human readable text" and a magnifying glass icon. The main content area displays the following information:

- Location:** 10 PAPER MACHINE, 469-FACILITIES AND UTILITIES-SEWER, 747101-10PM TO MAIN SEWER PUMP #1
- Asset Name:** 74710108 VALVES, For 10PM to Main Sewer Pump #1
- New Measurement:** A dropdown menu is open, showing a list of condition states. The first option, "No Condition Assessment", is selected and has a blue checkmark.
- Current Measurement:** Point: 9 of 10, Status: No Data, Value: No Condition Assessment
- Value:** 74710108

The dropdown menu for "New Measurement" contains the following options:

- No Condition Assessment (checked)
- Measured, No Problem, Nothing To Report
- Measured, No Problem, Add Condition Comment
- Measured, Mildly Abnormal
- Measured, Condition Entry
- Nothing Measured -- Equipment Down
- Nothing Measured -- Not Accessible
- Nothing Measured -- Requested To Skip
- Nothing Measured -- Skipped Due To Lack Of Time
- Nothing Measured -- No Site Support