

# Pre-Turnaround Planning: Capture real-time data to optimize your turnaround and reduce cost over-runs

Tru-Scan® and Tru-Grid™ Scans assist in defining and developing a turnaround critical path project scope at an early stage ensuring that your turnaround meets your goals. The most common use of gamma scans is to give process engineers and operations an online tool that results in understanding how a column is performing. This data can be used in advance of a turnaround to identify gross tray or packing damage and other process problems without having to shut down the column for internal inspections. These results will fully prepare turnaround planners with the knowledge they need for critical path decisions that must be made prior to shutdown. At other times the results from Tru-Scans® can either justify an unscheduled shutdown or identify options that will enable a plant to continue operating until the next scheduled shutdown.

When damage is found, a turnaround coordinator can accurately define what trays and/or packing are needed, estimate the cost, and procure the needed hardware weeks in advance of a scheduled turnaround. Scans performed five to six weeks prior to a scheduled shutdown usually provides enough time to order new equipment without expediting charges and to schedule the required manpower. Should an upset occur after that point additional scanning could be performed to identify if any new problems have developed that would require a revision to a critical path item.

## Depropanizer scan data determines damaged trays was not the problem

A US refiner requested that Tracerco scan all of the towers within six processing units prior to an upcoming turnaround. A good illustration of how gamma scans aided in their critical path decisions is from the results found in a Depropanizer column. The Depropanizer had to be run with a high base liquid level in order for the column's reboiler to operate properly. The base liquid level routinely covered the reboiler return nozzle.

The  $\Delta P$  of the Depropanizer was higher than normal. Operations suspected flooding, probably as a result of some tray damage to the lower trays due to the high base liquid level. The scan results did show the high base liquid level covering the reboiler return nozzle. As a result of the reboiler return vapor mixing with the base liquid there was a lot of liquid entrainment below the bottom tray (Tray 1 in Figure 1).

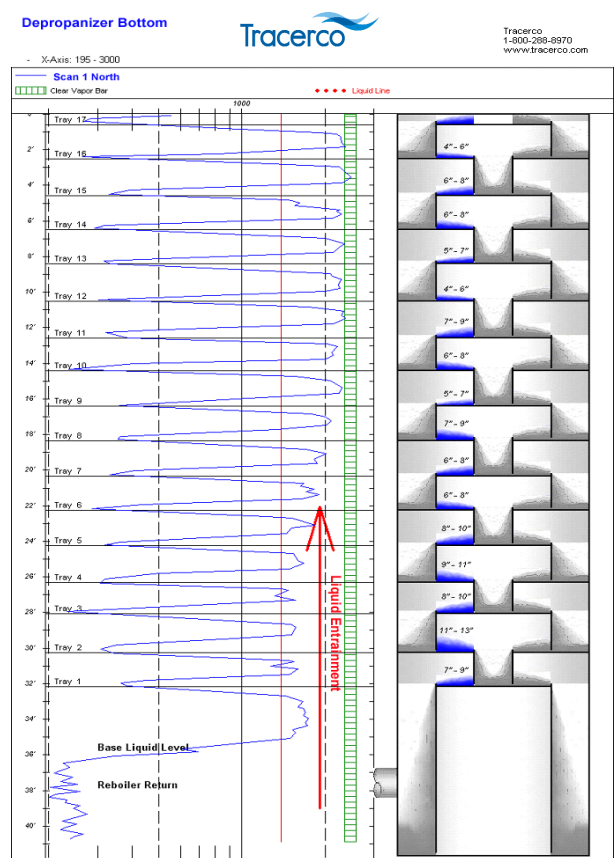


Figure 1 - Tru-Scan® results decided the course of action for the refinery during their turnaround. Modifications to the tower were made instead of preparing to replace damaged trays which scan results found were not necessary.

The bottom trays were flooding but had no apparent damage. These scan results decided the course of action for the refinery during the turnaround. Plans were made to modify piping so the reboiler would operate correctly with the proper base liquid level instead of purchasing trays when scan results indicated the existing trays were not damaged.

The refinery turnaround planners utilized scan data results from all the columns prior to their scheduled turnaround to order replacement equipment and help schedule the manpower required for the turnaround. The data indicated mechanical problems in three towers, process problems in six towers and no problems were indicated in the eleven remaining towers. Entry into these eleven columns could be avoided if there was no history of corrosion or other inspection needed.

This information essentially set the turnaround plan and avoided potential surprises on items that could have disrupted the original critical path. A chart of the results is shown in Figure 2.

### Conclusion

Strategic use of Tracerco's Pre-Turnaround Tru-Scan® and Tru-Grid™ Scan technology will enable you to identify equipment that does not need to be included in your turnaround project, evaluate the status of historically problematic process equipment, and establish the equipment dictating the critical path. A unit manager can avoid shutting down a column based upon the mere suspicion of tray damage, when the real problem may be related to process conditions. A turnaround coordinator can accurately define, estimate, and procure trays, packing, and other hardware weeks in advance of the turnaround schedule. The largest payoff from using Pre-Turnaround scans is when a unit manager can avoid shutting down a column altogether. For additional information on Tracerco's turnaround applications please contact a technical advisor in your area.

Summary of Problems	
<b>Crude Unit</b>	<b>Amine Absorber</b> No problems indicated
<b>Atmospheric Tower</b> All trays in place	<b>Debutanizer</b> No problems indicated
<b>Vacuum Tower</b> LVGO distributor plugged or damaged HVGO draw tray leaking or wash oil distributor damaged	<b>Depropanizer</b> No Tray Damage. High base liquid level covering the reboiler return inlet.
<b>Crude Unit</b>	<b>Naptha Splitter</b> No problems indicated
<b>Main Fractionator</b> Trays 21 and 22 damaged, all other internals in place	<b>Sat Gas Plant Stripper</b> No problems indicated
<b>Alky Unit</b>	<b>Amine Absorber</b> No problems indicated
<b>Isostripper</b> High reflux rate or subcooled reflux causing flooding on top four trays, lower accumulator tray leaking	<b>Debutanizer</b> Severe flooding throughout the tower
<b>Depropanizer</b> Severe liquid entrainment throughout the tower, no indications of mechanical damage	<b>Depropanizer Dryer</b> High reflux rate or subcooled reflux flooding top three trays, Tray 10 heavily loaded - possible downcomer restriction
<b>Acid stripper</b> No problems indicated	<b>Sponge Oil Absorber</b> No problems indicated
<b>Acid regenerator</b> No problems indicated	<b>Main Absorber</b> All trays in place
<b>Unsat Gas Plant</b>	<b>Delayed Coking Unit</b>
<b>Isobutane Absorber</b> Flooding present on top 32 trays	<b>Coker Fractionator</b> No problems indicated

Figure 2- Turnaround planners utilized scan data results from all the columns scanned prior to the scheduled turnaround to order replacement equipment and schedule the manpower required.

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