CCHMP Comments on ConocoPhillips' Incident Report For 10/22/10 Flaring Event

The following comments relate to reviewing ConocoPhillip's RCA report received on 12/21/10.

1. **The report identified that operators and maintenance technicians were unable to synchronize GTG23A to the power grid. Provide clarification that the incident investigation drilled into this situation to understand what happened and determined what is necessary to minimize reoccurrence. Also provide clarification whether this situation was likely unique to GTG23A or could happen to GTG23B or GTG23C as well, and if so, how that is being addressed.**

   ConocoPhillips Response:

   Yes, the incident investigation team evaluated the inability to synchronize as a factor in the overall incident sequence. This situation is unique to the A Turbine since it is the only turbine using relay control logic. The B and C turbines both use PLC based systems.

   The synchronizing process on the A Turbine is initiated after two turbine speed parameters are satisfied. The first speed parameter is satisfied at about 2849 rpm when speed switch relay PS2X activates. The second speed parameter is satisfied at 4961 rpm. Once both parameters are satisfied, the warm-up/cool-down timer (WCT) is enabled. After a fixed time, the ready to load relays are activated to start the synchronizing process.

   During this event, the turbine would not progress to the synchronizing step. Visually, the first speed relay PS2X was closed (condition satisfied), but it had a considerable voltage drop across the contact indicating high resistance. This was preventing the synchronizing. A jumper was installed under a temporary MOC to satisfy the speed condition and allow the synchronizing to proceed. The PS2X relay will be replaced during the A Turbine major turnaround currently underway.

   In the long run, the A Turbine relay controls are scheduled for replacement as part of the Refinery wide Controls Modernization Project. This project is a multi-year phased project. The SPP Unit is currently scheduled for modernization in 2014.

2. **The report identified that troubleshooting efforts by electricians, also noted as electrical circuit problems, tripped GTG23A while trying to sync the generator to the grid. Provide clarification that the incident investigation drilled into this situation to understand what happened and determined what is necessary to minimize reoccurrence. CCHMP also wants to know if this is hardware and/or human systems related and whether it is unique to GTG23A.**

   ConocoPhillips Response:

   The incident investigation team evaluated the A turbine trip as a factor in the overall incident sequence. This situation is a hardware issue and unique to the A Turbine since it is the only turbine using relay control logic. The B and C turbines both use PLC based systems.

   A member of the electrical group attempted to burnish the contacts on the PS2X relay in an effort to eliminate the voltage drop and high resistance across the relay (see discussion in #1 above). During this process, one of the other contacts on the PS2X relay was impacted causing the A Turbine to trip. The contact affected was most likely the one that opens the bleed valve when the gas turbine speed is below 2849 rpm.

3. **It was not clear why there was condensate in the steam injection system for Turbine C. Why wasn't the condensate trap examined or possibly replaced? On Turbine B there was a line leak, so no condensate was found.**

   ConocoPhillips Response:

   Following the initial A Turbine trip, the steam system pressure went through a cycle of low steam pressure back up to higher steam pressure as steam shedding actions were completed. This sequence caused the steam injection to the C Turbine to drop out and the air purge of the injection line to start and then stop. The steam injection does not restart automatically. Although shut, we believe the steam injection dropout valve on C Turbine did not hold tightly and a small amount of steam leaked by and condensed in the steam injection line. When the steam pressure dropped a second time, the air purge restarted pushing the condensate into the turbine. This caused the C Turbine to trip.

   The same potential condition existed on the B Turbine, and although we cannot be certain why the B Turbine was not similarly impacted, we believe that potentially enough steam leaked by the dropout valve that it kept the line hot and free of condensate.

   There is a condensate trap in the steam injection line immediately before it enters the turbine. It is likely that at the low steam leakage rate, sufficient pressure was not available in the line for the trap to function properly. We modified the procedure to ensure the steam injection is blocked using a gate valve to prevent the possibility of blowing condensate into the turbine.

4. **The report implies that the Unit 120 shutdown was a root cause rather than simply an initiating event. The unit shutdown should not be classified as a root cause. It was noted that on 10/6, the rates were roughly the same from Unit 120 when it shut down without causing problems with the Cogen. Turbines; so what is difference this time?**

   ConocoPhillips Response:
   Given roughly equivalent process circumstances, the difference between the October 6 and October 22 Unit 120 shutdown situations is best explained as random responses/dampening of the fuel gas system surges at Turbine A resulting from the U-120 trips. In the report, corrective action 2.D provides improvements to increase the likelihood of not tripping the A Turbine when U120 trips suddenly.

5. **Since the refinery air system is critical, are the controls and instruments in a PM program with the frequency that would be required for SIS? If not, why?**

   ConocoPhillips Response:
   The primary instrument air system for the Steam Power Plant (SPP) is unique. The SPP turbines are designed to be self sufficient by supplying their own instrument air. The intent is to protect the SPP in the event of a Refinery instrument air upset or failure. The three turbine air systems are serviced under preventative maintenance orders, with tasks ranging from weekly to annually.

   There is an independent backup supply of instrument air from the Refinery air system in the event that the SPP instrument air header pressure drops below a target value. The regulator that provides back up air supply from the Refinery is tested routinely by operators during their daily rounds. This testing did not indicate any problems with the air regulator. To provide the ability to conduct a more robust on-line test of the regulator, the Refinery has initiated a project to install a bypass connection. A repetitive preventative maintenance work order will be initiated to ensure periodic servicing of the regulator. This bypass connection should be installed by October 1, 2011.

6. **Section 450-8.016(c)(1) of the county's Industrial Safety Ordinance identifies that the final incident investigation report for major chemical accidents or releases must include a schedule for completion of resulting recommendations. Provide completion schedules for the following recommendations:**
   - #2.A.C – identifying action is "best done during 2011 mid-year turnaround" is not a commitment or definitive schedule;
   - #2.A.D – identifying action is "best done during the three SPP turbine outages in early 2011" is not a commitment or definitive schedule;
   - #2.A.E. – CCHMP understands that actions E.1 and E.2 may not be necessary but expects a date when that determination will be made and a more definitive schedule for E.1;
   - #2.B – provide a date when issuance of REOP for Unit 120 shutdown must be issued;

- #3.B – commit to consideration and include a schedule for implementation;
- #4.A – commit to consideration and include a schedule for implementation.

ConocoPhillips Response:

Action Item	Description	Completion Schedule
2.A.C	Enhance PV6400 pressure control capability.	The 2011 Turnaround will provide an opportunity to make tie-ins to the fuel gas system. This work should be completed by July 1, 2011.
2.A.D	Improve fuel gas control at SPP by tuning fuel gas skids, lowering pressure on Ranerex, placing controls on automatic.	Tuning of fuel gas skids and other minor setpoint adjustments will be completed by April 1, 2011. An engineering evaluation is underway to determine the feasibility and effectiveness to modify the fuel gas control system at the SPP unit and should be completed by July 1, 2011. If a decision is made to implement those changes, modifications should be complete by October 1, 2011.
2.A.E.1	Install a suction pressure control valve on the F-17 overhead line, G-17 Fuel gas Compressor suction line, to control the Unit 233 Fuel Gas pressure at 65 – 70 psig.	CoP Rodeo is confident that the above changes will adequately address the pressure surge issue. After the above changes have been implemented, the Refinery will be able to evaluate whether additional modifications are necessary. That decision will be made by December 31, 2011.
2.A.E.2	Upgrade the A-Turbine Woodward Governor controls to the equivalent of the Digital Triconex controls (on B, C Turbines)	The A Turbine controls are scheduled for upgrading in 2014 as part of the Refinery-wide Controls Modernization Project.
2.B	Expedite the issuance of REOP for Unit 120 shutdown	The REOP will be issued by May 1, 2011.
3.B	Consider changing the Air Purge drop out to include a manual reset before it can be activated after a drop-out event.	The Refinery is currently evaluating the merits of this recommendation. A determination to pursue this change will be competed by July 1, 2011 and changes made at the next Unit Turnaround (by April 1, 2012).

4.A	Consider revising the SPP Turbine Emergency Shutdown Procedure to block in the Instrument Air to both of the shutdown turbines to prevent loss of Instrument Air. When a turbine is ready to start open the SPP Instrument Air block valve and continue with the startup.	This recommendation will be evaluated and a determination made by July 1, 2011. Based on our study of the units during the recent Turnaround, we do not believe that air leakage played a role in the events.