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| **THREAT ID:** | | | | | | | | | | | | | | | |
| 1. WHAT IS THE PROBLEM? | | | | | | | | | | | | | | | |
| Title: SOKU Gas Plant Trip | | | | | | | | | | | | | | | |
| Date Occurred: 01/03/2021 | | | | | | Time: 1156hrs | | | | | Location: Soku Gas Plant | | | | |
| Date Reported: 01/03/2021 | | | | | | Time: 1800hrs | | | | | Reported by: EKEMINI Udo | | | | |
| **Event Type** | | Potential Threat (not yet occurred)  Reliability/integrity – Trip  Reliability/integrity – Equipment failure  Reliability/integrity – Others | | | | | | | |  | | | | | |
| Equipment Tag Number: SOKU GAS PLANT | | | | | | | | | | | | | | | |
| Background: Soku Gas plant was running smoothly, exporting Gas and condensate to NLNG and bonny terminal respectively. Power was supplied by G-8111 one of the three solar power turbines. While G-8101 and G-8121 were on standby. LP NAG and AG2 were running at 250mmscf/day and 60mmscf/day respectively.  Suddenly, a plantwide power outage was observed. This led to entire facility trip (AG2, LP NAG) while the process trains, EGGS2 and K2S were supported by availability of UPS.  Maintenance team joined Operations team to investigate the issue at the control room.  PACO team led the investigation using available resources (Historian-event logs, alarm downloads and C&E matrix).  Threat description: Soku Gas Plant Trip.  **Sequence of Events:**  - 11:45 hrs, 01/03/2021: K2S trip due to HH Alarm on the 11LIZA-901.  - 11:52 hrs, 11LIZA-901 HH Alarm cleared; unit reset, and unit start up.  - 11:56 hrs, Fuel gas XHP Trip due to HH alarm from the 69LIZA-008HH.  -1300 hrs, Troubleshooting was done by PACO team and issues with Train -1 fuel gas scrubber level control system was resolved.  -1335 hrs Solar turbine 1 started and power restored  -1400 hr-PACO team Continued troubleshooting on AG 2 issues.  20:15 hrs, Started AG2  20:25 hrs, AG2 tripped again on vibration HH alarm 21XT021A  23:50: LP NAG started and loaded  08:24 hrs 2nd March,2021 –AG2 re-started and plant normalized. | | | | | | | | | | | | | | | |
| Consequences: | | |  | Risk Assessment: (People, Asset, Environment, Reputation) | | | | | | | | | | | |
| No deferment / outage  Oil:  Gas:  Flare:  Other: Equipment failure  Downtime: | | |  | A | | B | C | D | | | E | Actual: D-3  Potential: P-0, A-2C, C-0, E-0.  Consequence Scenario   * Increased flare figure due to the period of outage (Additional 7.2mmscf) * Total Outage time is 15hrs 16minutes. * Total deferment calculated=US$235K | | |
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| Immediate Corrective Actions Taken: | | | | | | | | | | | | | | | |
| # | Immediate action | | | | | | | | Date | | | | | By | Notification / WO # |
| 1 | Confirm exact cause of shutdown | | | | | | | | 01-03-2021 | | | | | PACO Team |  |
| 2 | Troubleshoot and rectify cause of plant trip | | | | | | | | 01-03-2021 | | | | | PACO Team | 11840686 |
| 3 | Restart all rotating equipment | | | | | | | | 01/02-03-2021 | | | | | Ops & Mtce Team |  |
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| 2. WHAT DO WE THINK CAUSED THE PROBLEM? | | | | | | |
| **Investigation Team**(YES) | | | **Team Composition:**  Phillips Oluseye, Adesina Lukmon, Ifeanyi Anuku, Obinna Amaizu, Oguzie Austin and Ewomazino A | | | |
| **Problem Statement (Primary Effect)** | | | SOKU Gas Plant Trip   1. Expected: Plant to run uninterrupted. 2. Actual: Plant tripped on fuel gas unit trip.   Impact: Power outage, equipment trips , associated deferment and flare. | | | |
|  | | **Why? / Immediate cause** | | **Answer/Root Cause** | 3. EVIDENCE? | |
| Why 1 | | Why did Soku Gas Plant trip | | 1. Power outage to all end-users (YES) | 1. HMI indication 2. DCS chronological log | |
| Why 2 | | Why Power outage to all end-users | | 1. Fuel Gas supply cut off to end users (YES) | 1. HMI indication 2. DCS chronological log | |
| Why 3 | | Why was fuel gas supply cut off to all end-users | | Fuel Gas Train 1 HH level trip initiator(69LIZA-008) performed its SIF function (YES) | 1. DCS trend (Displayed in the inserted ppt) 2. Cause and Effects document | |
| Why 4 | | Why HH Alarm on 69LIZA-008? | | 1. Level control system (69LICA007 and 69UZV011) loop fail to function on demand. (YES) | 1. HMI indication 2. DCS chronological log and Trend | |
| Why 5 | | Why did level control system (69LICA-007 & 69UZV011) fail to function on demand? | | 1.Defective level controller(69LICA-007). (NO)  2.Final Control element(69UZV011) responded sluggishly (YES) | HMI display and trend | |
| Why 6 | | Why was final control element response sluggish | | Defective actuator  Wet Instrument air supply (YES) | Wet instrument air  Water drained from air filter regulator | |
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| **4. WHAT SOLUTIONS DO WE HAVE IN MIND?** | | | | | | |
| **#** | **Proposed Action** | | | | **Action Party** | **Target Date** |
| 1 | Service Shutdown valve | | | | Adesina Lukmon |  |
| 2 | Order spare kit for future purpose | | | | Oluseye Phillips |  |
| 3 | Changeout desiccant on air compressor package | | | | Okiomah Andrew |  |
| 4 | Ensure Mobile compressor is connected upstream new SNC2 instrument compressor dryer | | | | Casmir Ojobor |  |
| 5 | Confirm functionality of auto-drain system on instrument air compressor system | | | | Chioma Ukaegbu |  |
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| **5. HOW WILL THE PROPOSED SOLUTIONS ELIMINATE THE CAUSES OF THE PROBLEM?** | | | | | | |
| Prevention of actuator degradation | | | | | | |
| **LESSONS LEARNT**  Consider Long term replacement of fuel gas system level shutdown valves  Ensure mobile compressors are connected upstream air compressor package dryers. | | | | | | |
| **Incident Owner: Casmir Ojobor** | | | | | | |

