Exhibit I

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Human Performance Team Analysis

Event Direct Cause: On June 02,2020, a Plant Specialist A (PSA) assigned to the turbine system operated a six-way valve (6-way) on the turbine oil system. When the PSA rotated the valve 180°, oil to the turbine was isolated. This resulted in low turbine oil, a subsequent turbine trip, and damage to turbine due to heat generated by friction on the turbine bearings. The valve design, per interviews, should not have allowed the valve to isolate oil flow but internal stops were broken/ defective that allowed the valve to reposition to isolate oil flow.

	Individual Human Performance Review	Assessment
Worker Practices	Was a two minute drill or Pre-Job performed to ensure error traps were mitigated?	These tools are not used consistently at Comanche Unit 3 and were not utilized prior to manipulating the 6-way valve. However, workers did acknowledge steps such as consulting with a Control Specialist (CS) prior to going to work in the field.
Verification and Validation	Did the performers understand the correct end-state for the activity?	Plant Specialist A (PSA)—specifically PSA1—had the concept in mind of what he wanted to achieve. The 6-way valve was aligned to both coolers, which based on his experience was not the 'normal' position of the valve. He changed the position because oil piping was cool when it was expected to be hot. He had a desired configuration in mind, which was the 'normal' single cooler configuration. PSA1 did not understand the correct/ desired valve lineup since there was no conversation between the CS and himself prior to him taking action.
Worker Practices	Was the required procedure/ work plan used during the evolution?	No procedural guidance was used by PSA1 to operate the 6-way valve. No procedure was used to verify the line-up prior to valve manipulation. Available procedures are further discussed in the document. Based on interviews, few activities were conducted using specific procedural guidance to ensure proper configuration of components prior to execution. Procedures exist to verify systems are in service but do not provide specific direction

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		for the configuration of the Turbine Lube Oil (TLO). Both TLO coolers were discovered to be in service well into startup with one cooler without cooling water flow – just prior to synchronizing to the grid (both TLO coolers were likely in service without cooling water to one cooler on the previous day in the same position as discovered on the day of the event). A procedure was used to prepare the unit for start-up. Specific issues with the quality of the procedure are discussed in more detail in other sections of this form. No detailed procedure or work package was located for the TLO flush work that occurred during the outage (unclear what valves were positioned / repositioned during the work).
Worker Practices; Verification and Validation	Was the procedure the current revision?	Procedure revision control was determined to not be a significant factor in this event.
Worker Practices	Was place keeping or an equivalent tool used to ensure step completion/ sequencing?	As tasks of the Comanche 3 startup procedure checklist are completed, the information is relayed to the Operations Manager, who signs off on those items electronically, to ensure those systems are back in service. No evidence was noted that steps were missed but the exact configuration of TLO coolers is not explicitly captured in the information. This omission in the checklist may have contributed to having systems out of their “normal” lineups. Other areas of the procedure are discussed in subsequent sections of the form.
Worker Practices	Did the performer engage in active procedure use to ensure steps were logical? (thinking compliance)	PSA1 did not use a procedure when changing the valve position. Step-by-step procedure instruction is not typically used to change valve configuration.
Worker Practices	Was the activity impacted by the worker’s mental model for the task? (i.e.	PSA1 stated he felt rushed based on circumstances (i.e., the need to synchronize to the grid in a timely manner) during the unit startup. This may have been self-imposed time pressure based on other interviews. He stated that the manipulation of the valve

	complacency, perception of risk, time pressure, etc.)	could not isolate oil to the turbine based on valve design. PSA1 changed the position of the valve 180° based on his mental model for the 6-way valve operation. In addition, his mental model noted that both coolers in service was not the desired configuration. PSA1 wanted to warm up the oil based on 1) when he physically felt the oil piping and 2) the local temperature indications (108°F versus an expected temperature of 140°F). PSA1 also had previous experience/ knowledge that oil being too cool had impacted the unit operation in the past. PSA1 also stated a belief that good operators did not want other people touching their equipment for which they were responsible "for this reason," i.e. component positions out of normal lineup.
Worker Practices; Verification and Validation	Did the performer continue to perform the evolution if they were unsure of the outcome? (Stop when unsure)	PSA1 believed the 6-way valve was in the wrong position, which was causing the issue with oil temperatures. Following discussions with PSA2, he believed the TLO system was not in the correct (normal) configuration and went to investigate. A "Stop when Unsure" trigger was not recognized and PSA1 continued with the mindset that the 6-way valve was out of the normal position. Other individuals who inspected the position of the 6-way valve/ configuration of the TLO coolers noted the configuration was not as they expected but did not further pursue resolution.
Worker Practices	Were human Engineering devices (tags, gauges, controls) available and used appropriately by the performer?	Valve labelling consists of several small, non-descriptive symbols – small blue arrow, some directional arrows. These markings do not clearly indicate the line-up of the coolers nor do they indicate the direction of flow (east, west, or both). Positioning of the valves is dependent on implied knowledge by performers (also there is infrequent manipulation per the proficiency discussions below). Temperature gauges are available locally at the TLO piping.

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		There are no oil pressure gauges to measure oil pressure between cooler and bearings to ensure proper discharge pressure. Temperature and sound can be used as diverse/ alternate indications when making a configuration change.
Worker Practices; Verification and Validation	Were communications used appropriately to ensure accurate performance?	Communications did not occur between PSA1 and either CS prior to PSA1 going to inspect/ troubleshoot the lineup of the TLO coolers and 6-way valve. Communications between the two PSAs (PSA1 and PSA2) did not clearly articulate a plan for what PSA1 was going to do. PSA1, upon hearing the actions taken by PSA2, went to investigate the issue further as PSA1 was not satisfied with the information provided. No specific discussions occurred regarding changing system configuration during this discussion. (Note: PSA3 may have been in the room at the time of the discussion but not directly involved in the conversation but there is conflicting information on the presence of PSA3.) PSA1 did not communicate his findings or the action plan prior to changing the valve position despite having a radio to communicate with the CS. Face to face communications were challenged between work groups (i.e. CSs and PSAs) due to preventative COVID-19 measures to reduce the likelihood of spread between workers. The Sr. Operations Manager, the Operations Manager, and two PSAs (PSA2, PSA3) responded after the initial high oil temperature trip (initiated by the CS) by troubleshooting the cooling water system. They noted high oil temps on the west oil cooler (via physical touch). The Sr. Operations Manager directed the PSA3 to open the valve for the west cooler and oil temperatures began to drop. The change in system configuration was communicated back to the control room prior to the CS re-latching the turbine and proceeding with the startup.

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Worker Practices; Verification and Validation	Did the performer use the required level of verification such as STAR, IV, CV, or a Peer Check to perform the task?	PSA1 believed he was taking the correct action to realign oil flow based on the markings on the valve. He also believed oil flow to the turbine bearings could not be isolated regardless of valve configuration. After operating the 6-way valve, he waited, listened, and subsequently heard what sounded like oil flowing in the desired manner. However, due in part to the valve deficiency, his action isolated flow versus realigning oil flow to the normal configuration (i.e., oil flow through one TLO cooler).

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	Process Performance Review	Assessment
Procedures/ Work Instructions	Was there a procedure or work instruction to perform the activity correctly?	No procedure was used to manipulate the 6-way valve. Procedures (checklists) are used to align required systems but the 6-way valve was out of the normal line up. Several people questioned the TLO lineup but no actions were taken. Procedure quality is discussed later in the document.
Procedures/ Work Instructions	Was the level of use for the procedure appropriate for the task?	Cooling water valve line-up was not evaluated thoroughly prior to start-up.
Procedures/ Work Instructions	Was the procedure information accurate (i.e. component IDs, directions, etc.?) and contain sufficient detail to perform the task?	The procedure/start-up checklist did not include specifics for cooler valve line-up prior to startup. Major work was performed on the coolers but desired lineups were not verified prior to commencing unit startup. Desired configuration was established between PSAs and CSs as changes were occurring in the field during start-up activities as opposed to ensuring the desired TLO cooler valve lineups were achieved pre-startup. Interviews indicated a potential mindset among the workforce that the only method to change components' position would be included in a tagout positions and configuration would be bounded by the tagout process and restored via the tagout process. Other methods may be more effective to verify component positions if errors are made during the restoration. Informal methods for changing system / component configuration were noted in the interviews. Some stated they would change a component's position, then notify the CS, whereas others would request CS permission prior to taking action and use 3-way communication. This indicates an unclear standard for configuration control.

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		Manufacturer documentation for the installed 6-way valve is incorrect. The manufacturer information discusses an arm-type actuator whereas the installed actuator is a hand wheel / worm gear configuration. This may be a factor when considering the assumption that the valve cannot isolate flow as well as the damage to valve stops allowing flow isolation.
Procedures/ Work Instructions	Was the procedure/ work instruction up to date with most recent information?	After the January outage, the startup procedure was being updated but the changes were primarily related to chemistry considerations. The original startup procedure was written by an outside contractor with snippets from technical manuals but not human factored for the in-house PSAs/CSs at the plant. Much of the system's operation / component alignment is reliant on an individual's personal knowledge gained through operation – see subsequent sections in the form for further discussion on proficiency and training.
Procedures/ Work Instructions	Was the instruction confusing, vague, or overly reliant on an individual's knowledge?	Procedure COOP-3-TSLO-005, Unit 3 Turbine Lube Oil, did not provide a clear desired alignment for TLO cooling. Gaps in the procedure to ensure the system was in the appropriate configuration were reliant on individual knowledge.
Procedures/ Work Instructions	Was the procedure properly designed (order of steps, within capability to perform as written?)	Procedures contained information for startup but lacked details for valve lineups and were reliant on individuals' knowledge to execute successfully.
Procedures/ Work Instructions	Is the level of verification appropriate for the task and the potential consequences if performed incorrectly? (STAR, PEER, CV, IV, Hold Point)	Formal, process-driven Concurrent Verification (CV) or Independent Verification (IV) tools were not used. Peer checks are used in "unsure" situations where one individual does not have full confidence in an action.

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Supervisory Oversight	Were known deficiencies allowed to exist within the procedure?	Procedure for lube oil start up does not contain adequate direction to ensure valve lineup or the desired configuration for startup – no direction in procedure for desired valve lineup prior to start-up of turbine. Comanche 3 Startup procedure, COOP-3-CSUC-001, states to use procedure COOP-3-TSLO-005, Comanche 3 Turbine Lube Oil, to put the lube oil system in service. COOP-3-TSLO-005 does not provide clear guidance on the desired valve lineup for oil and cooling water for startup. The Sr. Operations Manager remarked that the procedure was not adequate in interviews but was surprised by the deficiencies.
Risk Assessment, Job Planning and Preparation	Were performers provided the needed tools and resources to successfully complete the task?	Detailed and accurate procedures were not available. Performers had available tools (specifically radios) to facilitate communications. More significant breakdowns were noted to contribute to this event.
Risk Assessment, Job Planning and Preparation	Was the task appropriately scheduled (duration, timing, cross-train implications)?	The task of changing configuration for turbine lube oil cooling is not a scheduled activity. This is part of a troubleshooting effort. Two individuals were assigned to a similar role as PSAs. While PSA1 and PSA2 interfaced prior to the oil valve manipulation, PSA1 did not validate with the CSs prior to investigating and changing the 6-way valve's position. The system configuration that was agreed to by the Sr. Operations Manager, Operations Manager PSA2, PSA3 and the CS, after the initial unit trip was not known to PSA1 at the time of the event.
Risk Assessment, Job Planning and Preparation	Was coordination between organizations sufficient to ensure successful performance?	Command and Control between two competing tasks—Sr. Operations Manager, Operations Manager, and PSA3—were performing one operation to address oil cooling, while PSA2 was working on placing oil absorbents and investigating high turbine lube oil differential pressure. PSA1 was bubbling ammonia. Sr. Operations Manager and PSA3 relayed the correction made to lube oil cooling to the CS. PSA2 discussed turbine oil configuration with PSA1 but PSA1 did not interface with CSs prior to investigating the cooler condition nor when deciding to change valve position based on his mindset of how the valve line-up should be configured.

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Risk Assessment, Job Planning and Preparation	Are barriers in place to protect against a single action becoming an event?	Potential that the operation of the 6-way valve is a single point vulnerability (SPV) with the capability to isolate oil flow.
Risk Assessment, Job Planning and Preparation	Were labels, controls, or indicators sufficient for the task?	Valve labelling on the 6-way valve was unclear with regard to both the flow path and required interpretation. Both top and bottom sets of labels were incomplete. PSAs studied the valves carefully to understand the desired action to take. No instructions used/ available for the correct position to align configuration. PSA1 relied on listening to determine flow but was not conclusive that the desired configuration had been obtained. (Temperature gauges are on the equipment but there are no pressure gauges or flow meters in the area where the valve was manipulated.)
Risk Assessment, Job Planning and Preparation ; Supervisory Oversight	Were the risks associated with the task known to the performers?	PSA1 believed that he knew the action that needed to be taken. He assumed that changing the valve's position could not interrupt flow to the system based on system documentation. Other Operations' personnel seemed to believe that making a change with the turbine/generator spinning posed a risk and also believed that a change was unnecessary notwithstanding the incorrect valve lineup identified.
Risk Assessment, Job Planning and Preparation	Were the risks associated with the task eliminated or mitigated to an appropriate level?	Risk of isolating turbine oil was not deemed credible because manufacturer information states the 6-way valve cannot isolate oil flow. (Note: a different type of valve operator was installed in the component (handle versus valve wheel/ worm gear) than what was listed in the manufacturer manual). There is the potential that the worm drive had more mechanical advantage and caused the mechanical stop (pin) to break. Risk of causing a configuration control event was not recognized.

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	Organizational and Management Performance	**Assessment**
Risk Assessment, Job Planning and Preparation	Was performance hindered by the physical environment (layout, access, or other field conditions)?	Valve operator installed was not the type listed in the valve manufacturer document; valve stops broken allowing over travel of the valve and unplanned isolation of oil. Markings on the 6-way valve to redirect flow are not clear. PSAs had to study the markings to make sense of the valve lineup and required actions to reposition the 6-way valve.
Qualified and Proficient Workers	Was the scope of the task beyond the performer's physical capabilities (such as due to fatigue, strength, dexterity, color blindness, etc)?	No evidence supporting physical capabilities impacted the event.
Qualified and Proficient Workers	Have performers ever been able to meet the desired performance level?	The unit has been started up successfully before with the same/ similar complement of workers. However, as discussed in other areas of this document, there are additional challenges with standards, procedures, and equipment that impacted this event (e.g., COVID-19 communication changes and attendant limitations discussed below).
Qualified and Proficient Workers	Are there personal problems beyond the performer's control that hinder desired performance?	COVID-19 working conditions have made communications more challenging. Restricted access to the control room to reduce face to face interactions with the CS were implemented to reduce the potential spread of COVID-19, but have challenged the ease and clarity of communications. Other communications means have been put in place (radios). For example, PSA1's normal communication method involved face to face discussions in the control room and interfacing with CSs regarding unit / system configuration to ensure adequate coordination/ status of unit.

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		Hearing loss by PSA1 and loud plant conditions may have impaired the ability to effectively use the radios in the plant. These factors were a potential barrier to effective communications.
Qualified and Proficient Workers	Have other performers successfully performed this task under similar conditions? If yes, why was this time different?	The 6-way valve is infrequently operated. *Cooling Turbine Lube Oil/ Warming Up Turbine Lube Oil* Comanche Unit 3 Turbine Lube Oil Procedure COOP-3-TSLO-005 gives high and low temperature limit guidelines for startups and normal operation (TS speed of 900 RPM--rated speed: TSLO Bearing Oil High Limit 127°F at Exit of Oil Cooler; TSLO Bearing Oil Temperature Lower Limit 69.8°F). There are also guidelines during shutdowns to maintain the temperature of the oil leaving the coolers between 95°F and 100°F. Interviews did not identify personnel that had dealt with two coolers in service, cooling water off to one cooler, and high lube oil drain temperatures. Also, interviews did not identify personnel that had dealt with two coolers in service, over-cooling the oil, and requiring the oil to be heated up. *Changing TLO cooler configuration* Yes, the TLO cooler configuration has been changed in the past. However, two coolers are not typically in service. One team (Sr. Operations Manager, Operations Manager and PSA3) were engaged in troubleshooting the oil temperature issue, while PSA2 was swapping the oil filters and the “duty” PSA1 was involved in bubbling ammonia. Informal turnover between PSA1 and PSA2 did not fully cover the expected system configuration and PSA1 did not interface with CSs prior to investigating or changing component position. *Verify System configuration* Yes. However, the system was not in the normal configuration with one lube oil cooler in service.

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		Unit Start Up Yes. Other startups have been successful but they have had their share of trips during startups (per interviews). The notable difference with this startup was the issues with oil temperatures and the use of two lube oil coolers in service versus one. Lube oil cooler flushing was conducted during the outage. This activity may have required changing valve positions during the work without adequate restoration. A combination of failed barriers eventually led to the event as discussed in this evaluation.
Qualified and Proficient Workers	Does the performer(s) have ample opportunity to stay proficient?	No. This valve is not manipulated frequently – estimated to have occurred 5 times in an 8-10-year period. Based on discussions, it likely would not need to be manipulated frequently. System training is required for proficiency but not operation of the 6-way valve specifically (Note: Manufacturer documentation does not match the valve operator installed in the unit.) There is a monthly refresher training on specific systems. Startups – PSA1 had the least experience with Comanche Unit 3 startups compared to the other PSAs. PSA1 had typically been an extra PSA during other startups, but PSA1 had experienced only 2 startups on Comanche 3 and the unit had only been online for about 6 months while PSA1 was assigned to the unit. Other barriers appear to be more effective in this event versus Just-in-Time Training (JITT) or other similar corrective actions.
Qualified and Proficient Workers	Is the performer(s) capable of demonstrating the correct behaviors for the task? (If no, work with management to determine next steps.)	No indications that workers are unable to demonstrate the correct behaviors.

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Supervisory Oversight	Is unacceptable performance viewed as rewarding for the performer(s)?	PSA1 indicated that he did not want to bother CS. His actions, when no event occurs, may be seen among the workforce as more efficient, e.g., better ownership of job/system, as compared to checking with CS prior to taking any and all actions.
Supervisory Oversight	Is acceptable performance viewed as punishing?	There appears to have been a perception by PSA1 of inconveniencing the CS by bothering the CS with a configuration question.
Supervisory Oversight	Are consequences for unacceptable performance known to the performer(s)?	There are unclear or inconsistent standards of operational conduct. Some configuration changes are deemed to not require prior approval/discussion while others do require approval/discussion. Consequences not discussed/discovered during interviews.
Supervisory Oversight	Have standards declined? Are there other examples of non-compliance without event?	There have been multiple trips on prior startups but without this level of adverse conditions.
Supervisory Oversight	Were there opportunities to correct this issue through previous identification?	The fact that both coolers were in service was identified by several individuals, but these individuals did not elevate issues. Two coolers in service was not the normal configuration, but this configuration did not have a demonstrated negative impact on operations. There were also unclear standards on communications requirements.
Supervisory Oversight	Are job expectations (V&V and Work Practices) routinely communicated?	PSAs responded in a similar manner for contacting the CS prior to system configuration changes. This may be an informal standard held-to or utilized by the workforce.
Supervisory Oversight	Is performance feedback provided on a consistent basis?	Yes. Supervisors/Managers provide feedback to workers on a regular basis.
Supervisory Oversight	Were previous corrective actions taken for the same or similar issue ineffective?	Not applicable to event. This is used typically to review Nuclear Corrective Action information.

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Target (Desired Outcome)	Hazard to Target		Assessment
Successful Unit Startup from Outage with Turbine Lube Oil System in service	Inadequate application of Human Performance Tools	Worker Practices	6-way valve was manipulated inappropriately by a PSA. Communications did not occur between CSs and PSA prior to position changes; plan of action was not validated with other PSA prior to taking the action. Mental model of the worker did not align with the potential consequences of operating a valve for oil flow to the turbine with the turbine running at 3600 RPM. Consequences were impacted by a faulted component (mechanical stop), which allowed the valve to isolate turbine lube oil flow. Furthermore, human factoring was not conducive to ensure proper valve lineup (no markings, no immediate feedback that desired end-state was achieved.)
	Inadequate verification	Verification and Validation Practices	There is no programmatic requirement to verify component manipulation prior to changing the state of a component. Some individuals perform actions such as checking with the CS but the standard is not formal or consistent.
	Inadequate task guidance	Procedures/ Work Instructions	The startup checklist and Turbine Lube Oil procedure do not contain specific instructions. The desired configuration is reliant on worker knowledge versus clear acceptance criteria (i.e., one or two coolers in service). Poor procedure quality combined with informal configuration control practice has the potential to result in additional challenges to configuration control.
	Inadequate mitigation of task risk/ inadequate task preparation	Risk Assessment and Job Planning and Preparation Activities	Troubleshooting processes may contain weaknesses, especially when working with a unit while it is in operation. The risks of starting up with two unit coolers versus one and validating the system configuration prior to startup was not effective to ensure the unit would startup and run without issue. Starting the unit with two turbine lube oil coolers in service may have challenged operations at a later time.

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	Workers not properly qualified or proficient for task	Qualified and Proficient Workers	Some knowledge appears to be informally transferred/on the job training versus being captured via formal training. Training overall seems to be higher level with experience picked up on the job (based on interviews).
	Inadequate oversight of activity/ process	Supervisory Oversight	Low procedural standards are allowed to exist. Standards for configuration control are not clearly established with multiple levels of the organization leading to vulnerabilities when changing system configuration.

Recommendations:

1) **Establish a formal communications standard for component manipulations. Rollout via formal training and leaders conduct field observations for a specified timeframe to ensure standard is engrained across the workforce. This could be considered on a fleet-wide basis and not just specific to Comanche 3.**
2) **Revise startup procedures to establish clear system lineups and prerequisites. This is being addressed by the Configuration Management Improvement team. This could be considered on a fleet-wide basis and not just specific to Comanche 3.**
3) **Develop a tiered decision making tool to assist when unexpected conditions are encountered in the field to require a decision making meeting with key stakeholders (i.e., engineering, maintenance, operations) to align on a path forward. This could be considered on a fleet-wide basis and not just specific to Comanche 3. Please see attached tool from Nuclear.**
4) **Perform an extent of condition analysis of Single Point Vulnerabilities in the plant that could cause similar level of consequence events (significant equipment damage or extended outages). This could be considered on a fleet-wide basis and not just specific to Comanche 3.**
5) **Review other valves that, if not operated or operating appropriately, could have severe consequences. Perform an extent of condition analysis targeting other components important to operations/ high consequence if not operated or operating appropriately. Implement human factored labelling as appropriate.**
6) **Conduct training on the operation of the 6-way valve. Label the 6-way valve with appropriate flow directions. Labeling is being addressed by the Technical Improvement team.**
7) **Add pressure gauges between lube oil coolers and turbine bearings that can be monitored while manipulating the 6-way valve. Gauges are being addressed by the Technical Improvement team.**

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8) **Correct mechanical stops on 6-way valve to prevent overtravel and interruption of turbine lube oil to the turbine. The new configuration should provide visual and tactile feedback to positively identify the limits of valve travel. Stops are being addressed by the Technical Improvement team.**
9) **Review recommendations for Comanche 3 and apply to Comanche 1 and 2 as appropriate.**
10) **Use this event as a case-study for a human performance refresher to other units.**