TVA **COO Standard Programs and Processes**	**Human Performance Program**	**COO-SPP-03.1.14** **Rev. 0000** **Page 1 of 52**
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1.0 PURPOSE

The purpose and intent of the Operating Group Human Performance (HU) program is to promote behaviors throughout the Operating Group that support safe and reliable execution of work, which contribute to achieving an incident-free safety culture. This COO Standard Program states the elements that define the standardization, alignment, and accountability for Human Performance across the Operating Group SBUs. The intent is that everyone "Keeps their head in the game." while at work within the Operating Group.

2.0 SCOPE

A. The Human Performance Program applies to Operating Group Strategic Business Units (SBUs) and serves as the highest tier Chief Operating Officer (COO) document applicable to Human Performance for all COO SBUs.

B. COO SBUs are required to implement this program in its entirety. SBUs may add additional requirements in an SBU- or BU-specific procedure but may not delete or revise content from this standardized program that lessens the intent of this program when they implement this program in their organizations.

C. A COO SBU/BU may exempt managed task contractors such as those supporting green/brown field projects from implementing these program requirements provided TVA evaluates the contractor's event/error prevention process or program and determines the contractor process or program meets the intent of this SPP.

D. This program is not applicable to select service providers with no operating plant or facility interface such as vending machine or similar service personnel.

E. **Review Cadence:** This program is reviewed triennially, documented in the Revision Log.

3.0 PROCESS

3.1 Roles and Responsibilities

3.1.1 Executive Owner

A. The COO is the appointed designee of the TVA Chief Executive Officer for Functional Area 03, Regulatory Compliance, for the Operating Group. The COO may designate a COO direct report as the Executive Sponsor of the Human Performance Program, who executes this responsibility for the COO.

B. The Executive Sponsor is responsible for the content this procedure and is the sponsor for any peer team providing governance and oversight of the Human Performance Program.

3.1.2 COO Strategic Business Units (COO SBUs)

A. Each COO SBU implements program elements as described in this SPP.

B. COO SBU Executive and Senior Vice Presidents are the executive sponsors for their SBU HU Program.

3.1.2 COO Strategic Business Units (COO SBUs) (continued)

C. The SBU executive sponsor designates personnel in their SBU to coordinate their SBU HU Program.

3.1.3 Managers and Supervisors

Managers and supervisors have the following responsibilities:

A. Reinforcing the proper use of the HU tools through observation and coaching,

B. Participating in HU training, serving as a role model for employees,

C. Implementing the HU program within their organization, and

D. Monitoring HU performance indicators and providing corrective action.

3.1.4 Employees

Employees "Keep their head in the game." by rigorously and mindfully using HU tools while working within the Operating Group.

3.2 Program Elements

3.2.1 Required HU Program Elements

The Operating Group Human Performance Program and any SBU- or BU-specific implementing procedure contain the following program elements:

A. The procedure complies with requirements of TVA Administration of Standard Programs and Processes (SPPs).

B. Designation of HU program sponsor by COO SBU and HU program coordinator duties by the SBU and/or BU.

C. Description of Human Performance Fundamentals explaining the bases of a sound HU program.

D. Establishment of initial and continuing training requirements assigned through the Automated Training Information System (ATIS).

E. States the requirements for performance indicators used to measure HU program effectiveness and adherence to program expectations.

F. Implementation of an observation program to monitor and reinforce HU tool use.

G. States the requirements for periodic self-assessment of HU program elements. The HU Program elements for each SBU are assessed every three years.

H. States the HU tools expected to be used to prevent errors, including when and how to use a tool.

3.2.2 HU Fundamentals

The Operating Group vision for human performance involves avoiding the consequences of human error that can cause harm to person, system, or property. Effective task execution must result in zero significant human performance events.

A. Introduction

Two methods prevent human error from disturbing the power system or harming other important assets:

1. Either keep people from making errors (error prevention), or

2. prevent human errors from harming the system (managing defenses).

The design of many power systems, structures, and components aids performance of the latter through engineered controls such as physical barriers, interlocks, keyed parts, shaped/color-coded controls, automation, and alarms. However, the prevention of errors, in general, depends more on people and their behaviors. For example, self-checking, utilizing procedures, and adhering to procedure guidelines will provide individuals with the means of avoiding mistakes; including peer-checking and three-way communication will engage another person as a separate barrier of protection against error.

B. Competence Versus Control -- Why We Use Tools

Any person, in any position, and in any organization can err. Therefore, controls (defenses and human error prevention techniques) are adopted to prevent or catch error. The purpose of these controls is to make the job or task go smoothly, properly, and according to high standards.

Positive control means: "what is intended to happen is what happens, and that is all that happens."

When people are directed to check or review another person's performance, the competence of the performer is not being called into question. Controls are necessary not because of incompetence, but because of human fallibility. The fact that a person has been assigned a task means he or she is already considered competent or qualified to perform the activity.

Human nature is the problem, and these necessary controls reduce the chance for human error. The consistent and rigorous use of HU tools depends on the performer possessing an attitude that respects human fallibility.

Our *Safety Culture* is reflected by the care each of us applies when using these tools.

C. Need for Identification of *Critical Steps*

A *critical step* is a procedure step, series of steps, or action that, if performed improperly, will cause irreversible harm to plant equipment, people, or significantly impact power system operation in a negative way. A typical work activity may contain one or two *critical steps*. Many activities do not have a *critical step*.

3.2.2 HU Fundamentals (continued)

Some actions are more important from a risk perspective. Some human actions are identified as "risk important" and specifically identified in safety analyses.

Some steps are irreversible -- that is, once an action has been taken, no reverse action can be made to recover or undo the changes; an example is when a device trip switch has been actuated inadvertently. Some steps might be considered critical when they meet the following criteria:

1. When human contact with a risk-important component is frequent, meaning there are more chances for error,
2. During transient or steady-state conditions only, or
3. When an action is not proceduralized, considered a "skill-of-the-craft."

3.2.3 HU Training

A. Initial and continuing training requirements are assigned through the Automated Training Information System (ATIS).

B. Training programs provide employees with knowledge of HU tools, an understanding of their bases and importance, and opportunities to master them.

C. Operating Group employees maintain proficiency through subsequent continuing training and through first-line supervisor coaching.

3.2.4 HU Metrics

A. Develop and implement performance indicators to measure HU program effectiveness and adherence to program expectations.

B. The criteria listed in Appendix B, COO Human Performance Event Criteria, are trended by each COO SBU for fleet comparison and performance monitoring.

C. HU Events are analyzed and processed in accordance with the SPP requirements found in Incident Prompt Investigation and Corrective Action Program.

3.2.5 HU Observation Program

A. SBUs implement an observation program that includes:

1. Conducting observations
2. Coaching the participants on the observed behaviors
3. Documenting the observation in a standard process, trending of results of the observations
4. Taking actions based on the results of those trends.

3.2.5 HU Observation Program (continued)

5. If events observed meet the threshold defined in CAP procedures, the required CAP program documentation will be originated.

Automatic responses, or skills, are learned through practice and experience. Persistent use of at-risk behaviors unconsciously builds overconfidence and trust in personal skills and ability. This is dangerous, because people presume they will not err. Without correction, at-risk behaviors can become automatic (skill-based), such as rolling through stop signs at residential intersections. Over the long term, people will begin to underestimate the risk of hazards and the possibility of error at the job site and will consider danger (or error) more remote. People will become so used to the practice that, under the right circumstances, an event occurs. This concept has also been termed "Normalization of Deviance."

Managers and supervisors must provide specific feedback to employees when at-risk practices are observed. People are more likely to avoid an at-risk practice if they know it is unacceptable. Otherwise, without coaching and correction, uneasiness toward equipment manipulations and intolerance of error traps tend to wane.

3.2.6 Periodic Self-Assessment

The HU Program elements for each SBU are assessed every three years.

3.2.7 HU Tools

A. Introduction

The word *tool* applies broadly to those devices that are used to facilitate the performance of work. More specifically, it usually denotes a device used to carry out one's occupation or profession. HU tools are a set of behaviors to aid personnel in performing their activities without consequential error. They provide performers with "off-the-shelf" methods to help them anticipate, prevent, or catch errors before they cause harm to person, equipment, or property. Most HU tools were derived from the observed practices of high-performing workers across the industry – people who are known to regularly perform their work safely, event-free, and with a high degree of quality.

Most COO workers perform physical work on power system equipment: they touch equipment and are capable of altering its condition. Although many of these tools are also applicable to engineers, analysts, supervisors, and managers, HU tools described in this SPP are those behaviors that focus primarily on error reduction -- anticipating, preventing, and catching active errors by field workers.

The table below lists these tools:

3.2.7 HU Tools (continued)

COO Common Human Performance Tools	
Fundamental HU Tools	Conditional HU Tools
Two-Minute Rule STOP When Unsure Self-Checking (STAR, Touch STAR) Procedure Use & Adherence Three-Way Communication Phonetic Alphabet	Pre-Job Briefing Peer Checking Concurrent Verification (CV) Independent Verification (IV) Flagging/Operational Barriers Place Keeping Post-Job Review First Check

B. A detailed description of each tool will make up the remainder of this section, with a brief summary in Appendix A. Each tool will be described using the following criteria:

Why - practical information as to the tool's purpose and potential limitations

When - cues as to when the tools could or should be used

How - behavior standards used to apply the tool properly

Avoid - at-risk behaviors, beliefs, assumptions, or situations that tend to diminish the effectiveness of the tool

3.2.8 Two-Minute Rule

The Two-Minute Rule acquaints workers with the work area, improves job site situational awareness, establishes a healthy sense of uneasiness, and leads workers to act in order to address the hazards identified.

A. The purposes of the Two-Minute Rule are:

1. Identify personnel safety concerns due to the physical surroundings of the area.
2. Identify personnel safety equipment needed in the event of an emergency such as an eyewash station or telephone.
3. Identify equipment sensitive to plant operation.
4. Ensure critical aspects of the job site are expected or reflect those discussed during the pre-job brief.
5. Identify and understand other work taking place in the area.
6. Refocus workers and supervisors prior to beginning work or returning from break.

3.2.8 Two-Minute Rule (continued)

B. The Two-Minute Rule at the job site supplements, but does not supersede, pre-job briefs or other human performance tools applicable to the task.

C. Perform a Two-Minute Rule at the Job Site immediately prior to beginning the task and re-commencing the task after a break.

D. Evaluate the jobsite with respect to expected conditions, necessary tools, and understand other work in the area and how that work may affect your job.

E. Evaluation includes a review of applicable questions, such as:

1. What hazards are in the area?
2. How could I get hurt?
3. Do we have proper Personnel Protective Equipment (PPE)?
4. Do we have the necessary Foreign Material Exclusion (FME) tools?
5. Are we on the correct Unit/Train/Component?
6. Are the appropriate safety barriers in place?
7. What else could go wrong? (Is the PJB/ Job Safety Analysis (JSA) correct?)
8. Have we changed, or do we need to change, our plan? (If yes, start at the beginning with the pre-job brief.)

F. If the review questions indicate that conditions are unsafe, not what was expected, or a change of plans is warranted, take immediate actions to place the plant in a safe condition. CONTACT your supervisor and resolve the situation; address the hazard *prior* to proceeding with the task.

3.2.9 STOP When Unsure

STOP is a tool to be used when you are uncertain, confused, or in doubt about any aspect of your job assignment. It allows you to obtain accurate information about the issue and get other individuals involved with resolution of the issue before proceeding with the assignment.

A. Whenever a question arises and you are uncertain about what to do next, stop and get help.

B. Given that the chances for error are particularly high in a knowledge-based situation, the best course of action when unsure is to take a time-out and refocus, or get another person's "mind" involved in the situation.

C. Use the "STOP" tool in error likely situations, such as:

1. When you experience unexpected results,

3.2.9 STOP When Unsure (continued)

2. If you find yourself in unfamiliar situations,
3. When you are confused or when your questions cannot easily be answered,
4. When you are uncertain whether your work is in compliance with expectations, procedures, or regulations,
5. When you are uncertain what qualifies a successful completion, or uncertain of what the expected outcome should be, and
6. When you observe work practices that differ from expected work practices.

D. Expected behavior standards include:

1. Stop the activity when confused or in doubt,
2. Place the system, equipment, or component and job site in a safe condition,
3. If available, ask an experienced team member (qualified on the activity) to help,
4. Inform immediate supervisor of the problem,
5. Perform another pre-job briefing, if work conditions are different from those discussed during initial pre-job brief, and
6. Do not proceed in the face of uncertainty.

E. At-risk behaviors to avoid include:

1. Assuming
2. Rationalizing an anomaly so that it can be ignored
3. Not asking for help
4. Thinking a task is 'routine' or 'simple'
5. Believing nothing bad can happen
6. Ignoring subtle differences
7. Being unaware of any critical parameter

3.2.10 Self-Checking (Also called S-T-A-R or Touch Star)

Self-Checking is used to focus attention on the appropriate component, think about the intended action, understand the expected outcome before acting, and verify the intended results after the action.

A. Self-Check is a human performance tool that includes distinct thoughts and actions designed to enhance an individual's attention to detail.

3.2.10 Self-Checking (Also called S-T-A-R or Touch Star) (continued)

B. Self-Check is an expected standard of performance for personnel at all times during their daily work activities. An individual must be 100-percent sure that the action they are about to take is correct, *before* taking action such as the manipulation of any equipment.

C. Self-Check is the number one tool we use daily during nearly every activity, manipulation, documentation, etc. The following actions are observable when manipulating plant controls, breakers, valves or similar equipment:

1. STOP: eliminate distraction and focus on the task,
2. POINT at or TOUCH the equipment or appropriate Identification Tag,
3. READ the identification tag,
4. Mentally DETERMINE what response is expected from the component after manipulation,
5. HESITATE for a second or two, before you finally
6. MANIPULATE the equipment, and
7. MONITOR it for expected response.

D. The **STAR** technique summarizes these steps and is defined by the following actions:

1. **S**TOP – The individual:
   a. Pauses before performing a task to enhance the attention to detail. This is the most important step of any self-check technique. The simple act of stopping increases the likelihood of performing the task correctly.
   b. Attempts to eliminate any current or potential distractions before proceeding.
2. **T**HINK – The individual:
   a. Understands specifically what is to be done before manipulating any equipment, doing a review, performing a step, or completing a task.
   b. Identifies the correct unit, train, component, etc. before taking any action. Use all the sensory cues that apply, such as visual, audible, or touch.
   c. Questions the situation by trying to identify all information pertinent to the job.
   d. Determines if the task is appropriate for the given conditions. Consider the expected responses and indications associated with the intended action, such as pressure, temperature, flow, noise levels, meters, recorders, vibration, and any other situational factors that apply.

3.2.10 Self-Checking (Also called S-T-A-R or Touch Star) (continued)

e. Decides what contingency actions (immediate or delayed) to take should an unexpected response take place.

f. Obtains the answers to any remaining questions or concerns.

3. **A**CT – The individual:

a. First, without losing eye contact, physically TOUCHes the component (unless touching will cause the intended action to occur; otherwise POINT at it).

b. If you are interrupted while in the process of manipulating equipment and remove your hand from that equipment, then you must perform the STAR technique again.

c. Confirms the correct component, train, unit, etc while touching or pointing at it.

d. Compares the component or device label to the in-hand checklist, procedure, or drawing. Depending on the situation, there is some benefit to saying the component's name aloud to enhance one's attention to detail.

e. Performs the intended action without losing the hand contact (or pointing, as applicable) that was established earlier.

4. **R**EVIEW – The individual:

a. Verifies that the actual response is the expected response.

b. If an unexpected response is obtained, then TAKE CONTINGENCY ACTIONS as previously determined, or place the component in a safe state.

E. Remember that Self-Check provides a method to properly identify the component to be manipulated, rigorously review the activity to be performed and its potential and expected consequences. STAR requires you to 'Stop' and 'Think'.

Make sure what you are about to do is indeed what you want to do. 'Touch' or Point to the device to be addressed. This action is maintained while you deliberately take the steps necessary to verify you are on the correct component.

Then, without breaking physical contact (or eye contact as applicable) 'Act'. After you 'Act', 'Review' the outcome to your expected response. Does it match? If the answer is yes, then continue. However, if the answer is no, Stop and involve your Supervisor/Foreman or Control Room Operator immediately.

The proper use of Touch STAR by personnel is recognizable by any observer at a distance.

3.2.11 Procedure Use & Adherence

Adherence to procedural direction is required. Procedure Use is directly linked to the procedure category and specifies the extent to which workers are required to rely on the procedure versus their own memory. Procedure use and compliance is required of personnel in accordance with the classification of each procedure.

Procedures are categorized into four types of use depending on the complexity of the task(s) being performed and the severity of any consequences if the task(s) is not performed properly.

A. Continuous Use Procedures

Continuous Use Procedures contain steps that, if performed improperly or out of sequence, could result in serve impact on personnel, plant equipment, or operation of the plant. The event would likely occur rapidly with little or time to take actions to prevent damage.

All Continuous Use Procedures require the following from the user:

1. Physically possessing the correct procedure,
2. Reading each step of a procedure before performing that step,
3. Performing each step according to the sequence specified in the procedure,
4. During completion of each step, all applicable procedure steps will be "signed-off" (or Place Keeping will be utilized) before proceeding to the next step,
5. If the task does not go as expected, performance of the task will stop until it is determined why expected actions are not being accomplished, and
6. Before proceeding to the next step of the activity, complete each "Sign-Off," if provided, by entering the user's initials on the appropriate line.

B. Reference Use Procedures

Reference Use Procedures contain steps that, if performed improperly or out of sequence, could adversely affect plant equipment or overall operation of the plant. These events would likely occur slow enough to allow time for recovery actions to prevent damage.

All Reference Use Procedures require the following:

1. The procedure must be read prior to starting the task and a copy should be in the immediate work area,
2. Periodic referencing of the procedure, during performance of the procedure, to verify that all steps are being correctly performed,
3. All applicable procedure steps will be "signed-off" (or Place Keeping will be utilized) to certify completion,

3.2.11 Procedure Use & Adherence (continued)

4. Stop performing the task if it does not go as expected, until it is determined why expected actions are not being accomplished, and

5. Because workers are responsible for performing every step in the procedure *as written,* frequent review of Reference Use Procedures is strongly recommended.

C. Information Use Procedures

Information Use Procedures contain steps that, if performed improperly or out of sequence, would result in no adverse impact on plant equipment or overall operation of the plant.

Information Use Procedures require the following:

1. Review of the procedure on an as needed basis, such as:

   a. When the individual cannot recall from memory an aspect of the procedure that needs to be performed,

   b. When the procedure is revised,

   c. Just prior to performance of the procedure, or

   d. As required by training, etcetera.

2. Those personnel who will be performing procedure activities from memory are responsible for correct performance, and will be held accountable for the results of their actions.

D. Multiple Use Procedures

A procedure or work document is designated a Multiple Use Procedure when more than one of these levels of use exist within it; this status will be indicated on the procedure's coversheet. The level of use for each section of the procedure or work document will be indicated within the procedure (a table of contents may be used for this purpose).

Within a Multiple Use Procedure or work document, it is permissible to abbreviate the three usage levels as CU, RU, and IU for Continuous, Reference, and Information Use, respectively.

3.2.12 Three-Way Communication

Three-Way Communication is a human performance tool that must be used by personnel to ensure all parties in a conversation understand the information being communicated.

An example of Three-Way Communication is included at the end of this section.

3.2.12 Three-Way Communication (continued)

A. Three-Way Communication requires identification of sender and receiver, and transmission of clear messages and responses that confirm or correct the original message. At first, these communication steps may seem unwarranted and even awkward in everyday activities, but practicing and enforcing these behaviors is one of the most effective tools available for preventing events.

B. Three-Way Communication responsibilities encompass the following:

1. Ensure all communications are clear, concise, and free of ambiguity.

2. For non-face-to-face verbal communication, the persons involved shall identify themselves by stating their name or title.

3. Use the Phonetic Alphabet, as required, to ensure proper component identification.

C. Sender Responsibilities (Direction) include:

1. ADDRESS intended receiver by name or title.

2. SPEAK clearly and OBTAIN the attention of the intended receiver.

3. SEND the intended message, using just enough necessary words, to minimize any chance of receiver misunderstanding.

4. Use component identification numbers, as well as the Noun Name of the component, when practical.

5. REQUIRE confirmation from the intended receiver of the information.

D. Receiver Responsibilities (Repeat Back) include:

1. REPEAT direction/request back to sender (paraphrasing is allowed).

2. MAINTAIN a questioning attitude.

3. If you question or do not understand a person's direction, then RECONFIRM with sender that instructions were correct as given.

4. TAKE no action until message is clearly understood and confirmed.

E. Sender Responsibilities (Confirmation) include:

1. VERIFY receiver's Repeat Back is satisfactory.

2. ANNOUNCE "Correct" if satisfactory.

3. ANNOUNCE "Wrong" if unsatisfactory, and REPEAT original communication.

F. When using a telephone, two-way radio, or PA systems, always initiate the communication by stating your name

3.2.12 Three-Way Communication (continued)

G. Operational directives given over the public address system require acknowledgment and repeat backs. This does not include announcements.

H. Listen carefully to repeat backs to ensure the receiver understands the message. Avoid the use of slang terms and words that sound alike.

I. Be specific, use equipment names and identification numbers.

Example: Three-Way Communication
Sender (Direction) Control Room: "*Name or title*, verify open the 2 Alpha Boiler Feed Pump Manual Suction Valve, 2-HCV-3-147 Alpha".
Receiver (Repeat Back) Field: "I understand verify open the 2 Alpha Boiler Feed Pump Manual Suction Valve, 2-HCV-3-147 Alpha".
Sender (Confirmation) Control Room: "That is correct."

3.2.13 Phonetic Alphabet

Use the phonetic alphabet to eliminate confusion or misunderstanding when referring to a letter of the alphabet.

The phonetic alphabet is as follows:

"A" - Alpha	"H" - Hotel	"O" - Oscar	"V" - Victor
"B" - Bravo	"I" - India	"P" - Papa	"W" - Whiskey
"C" - Charlie	"J" - Juliet	"Q" - Quebec	"X" - X-ray
"D" - Delta	"K" - Kilo	"R" - Romeo	"Y" - Yankee
"E" - Echo	"L" - Lima	"S" - Sierra	"Z" - Zulu
"F" - Foxtrot	"M" - Mike	"T" - Tango	
"G" - Golf	"N" - November	"U" - Uniform	

3.2.14 Pre-Job Briefing (PJB)

The Pre-Job Brief is a human performance tool that allows workers to think through a job and use their knowledge to make the job as safe and efficient as possible. It is used to mentally engage workers prior to a task so they clearly understand what to accomplish and what to avoid.

Workers actually involved with performing the work should prepare and lead pre-job briefs.

Those persons who prepare and lead pre-job briefs should be workers involved with performance of the work in question.

A. Low Hazard Jobs - A worker performing the job should conduct a verbal pre-job briefing prior to performing a low hazard job. The supervisor or foreman should be present during the brief to ensure briefing standards are met.

B. High Hazard Jobs - Workers conduct pre-job briefings for high hazard jobs that address the items on the applicable SBU checklist (similar to existing NPG, FPG, or RO TVA Pre-Job Briefing Form). The briefing results are documented for high hazard jobs by completing all information on the pre-job briefing checklist. The completed checklist is maintained in accordance with Safety and SBU retention requirements. A supervisor or manager shall be present during pre-job briefs for high hazard jobs. The supervisor or manager shall ensure high standards are maintained for pre-job briefs.

C. Workers prepare for the pre-job briefing. Preparation includes reviewing job procedures, work packages, the JSA (high hazard jobs), etc.

D. The pre-job briefing includes all workers involved with the activity and, if possible, occurs at the work site. The pre-job briefing includes joint participation between TVA and contractor personnel when the work to be performed involves both. Any worker who joins the work crew after the pre-job briefing has been conducted is provided the same pre-job briefing prior to beginning work.

E. Pre-job briefings emphasize the expectation for procedure usage (procedures, step text, job text, spec sheets, etc.)

F. Supervisors, foremen, and workers jointly decide if work can be performed safely. If anyone believes the work cannot be safely performed based on the pre-job briefing the supervisor will take appropriate corrective action to resolve the concern. If the concern cannot be resolved, it will be elevated to the next level of supervision until the concern is resolved.

G. An individual working alone is defined as a single worker who begins work at a remote location with no supervisor on site. While it is not practical to conduct a briefing for an individual working alone, supervisors and foremen instruct these employees to consider the job steps, hazards associated with each step, and the precautions to take to avoid the hazards. If the job is classified as a high hazard job, the worker also reviews the JSA. If a worker has concerns relative to the safety of the job, supervision will be contacted immediately for direction.

H. Activities that carry over multiple shifts will have a thorough turnover and new pre-job briefing with the on-coming shift.

3.2.14 Pre-Job Briefing (PJB) (continued)

I. If the work activity to be performed during the workday or shift is repetitive or similar, at least one pre-job briefing must be conducted before the start of the first job of each day or shift.

J. Additional briefings are held if significant changes occur during the conduct of a job that may affect the safety of workers. When performing a low hazard job, if changes occur in the work being performed that change the job classification to high hazard then an additional briefing is required that meets applicable requirements of this process.

K. Special precautions are given to work activities that involve troubleshooting or discovery of equipment problems. The scope of the activity, how far the troubleshooting activity can go without additional instructions, expected equipment responses, and energy sources are discussed. It is emphasized to workers that troubleshooting, by nature, places workers in an error-likely situation, where workers are functioning most often in the knowledge-based performance mode. If the scope of work activities changes during task performance addressed in the initial pre-job briefing, a new briefing is conducted.

L. The SAFER Acronym Provides a guide for a Pre-Job Brief

1. **S**ummarize the Critical Steps.
2. **A**nticipate Errors.
3. **F**oresee Potential Consequences.
4. **E**valuate Defenses and Controls to prevent, catch, and recover from errors, or prevent their consequences.
5. **R**eview Operating Experience and Lessons Learned relevant to the specific task and the critical steps performed.

3.2.15 Peer Checking

Peer Checking is "A series of actions by two individuals working together at the same time and place, before and during a specific action, to prevent an error by the performer."

A. Peer Checking is the opportunity to involve a co-worker at the same time you are about to perform the work in order to verify that the work to be performed is correct. Each individual shall actively monitor and challenge the other's actions and decisions. Seeking a second opinion from a co-worker, or "peer," is a very effective verification technique and may prevent an error-likely situation from actually resulting in an event. Use your co-workers to Peer Check your actions and prevent errors.

B. You should use Peer Checking for those sensitive plant evolutions that, if performed incorrectly, could result in personnel injury, plant transient, or equipment damage.

C. Peer Checking technique involves the following steps:

3.2.15 Peer Checking (continued)

1. The individual performing the task locates the component and verbally identifies each unique identifier on the component label to the peer.

2. The person may point to or touch the equipment to be manipulated during the explanation.

3. The person performing the task references the controlling document and verbalizes the position in which they intend to place (or check) the component.

4. The peer verbalizes the correct component identification, the intended action is correct, and people or systems are ready for the action.

5. Both individuals shall be aware of and understand the status of plant equipment that could be affected by the action.

6. The person performing the task places (or checks) the component in the intended position.

7. The peer witnesses the positioning (or check) of the component and physically verifies proper component position or condition, when applicable.

D. Peer Checking can be used for activities not directly associated with plant equipment. Engineers can benefit from a Peer Check when completing a calculation before it is used or formally approved. Peer checks can help anyone who wants to verify that his/her actions will accomplish the desired outcome. The important thing to remember about Peer Checking is that both individuals must understand the intended action and be aware of the status of plant equipment and personnel affected by the action.

E. Obtaining a Peer Check is a beneficial practice for any task but is exceptionally important when error likely situations exist. Error likely situations include:

1. Departure from routine

2. Time pressure

3. Something is not right – doubt

4. Apparent conflict between indications

5. Unfamiliarity/first time

6. Tired/fatigued

F. Operations and Maintenance employees should evaluate the use of Peer Checking for their critical activity steps. The use of Peer Checking should be discussed during pre-job briefings, and infrequently performed plant activities.

3.2.16 Concurrent Verification

Concurrent Verification is used to PREVENT an error by the worker when changing the condition or status of a component.

A. Concurrent Verification may be performed for critical or complex equipment, as directed by controlling documents or as directed by the Supervisor. Critical or complex equipment includes:

1. Components that, once operated, cannot be independently verified to be in the desired position.

2. Components that are confusing or difficult to operate and could have immediate safety, environmental or operational impact if operated incorrectly.

B. Both individuals are qualified to operate the component.

C. Both individuals involved determine, prior to the verification, who will fulfill the role of the individual performing the component manipulations and who will be the verifier. The individuals must rigorously adhere to these roles during concurrent verification. Both individuals must be qualified to perform the task.

D. The performer and the verifier, using controlling documents, independently identify the component and review the intended action. Prior to component identification and the intended action, the verifier will take no physical or verbal cues from the performer.

E. The performer shall independently:

1. LOCATE the component and IDENTIFY each unique identifier on the component label.

2. REVIEW the intended action.

F. The verifier shall independently:

1. LOCATE the component and identify each unique identifier on the component label.

2. REVIEW the intended action.

G. If the conditions are such that direct observation of the verification and action are impractical (such as tight quarters), then the desired component should be physically marked with tape or other suitable device by the verifier.

H. Component Manipulation

1. Each individual physically TOUCHes or POINTs at what they have separately decided is the correct component.

2. Both individuals DISCUSS the requested action to be performed and AGREE on the action.

3. The performer TAKEs the action WHILE BEING DIRECTLY OBSERVED by the verifier.

4. When the action is complete, then the verifier will VERIFY the desired action was performed correctly on the correct component and REMOVE any marking device placed as part of the Concurrent Verification process.

3.2.16 Concurrent Verification (continued)

3.2.17 Independent Verification

Independent Verification is used to DETECT an error by the worker involving the condition or status of a component.

A. Independent Verification (IV) is typically performed for tasks that are reversible and have little immediate consequence.

B. Both individuals must be qualified to operate the component.

C. IV involves the following process:

1. Time and/or physical barriers separate the performer of the component manipulation from the verifier.

2. The performer, with the use of controlling documents or equivalent direction:

   a. LOCATEs the component and identify each unique identifier on the component label.

   b. PERFORMs the intended action.

   c. CONFIRM expected results.

   d. SIGNs or PLACE KEEPs the controlling document.

3. The verifier, with the use of the controlling document or equivalent direction:

   a. LOCATEs the component and identify each unique identifier on the component label.

   b. DETERMINEs the as-found condition.

   c. CONFIRMs the expected as found condition with the controlling document.

   d. SIGNs or PLACE KEEPs the controlling document as appropriate.

3.2.18 Flagging / Operational Barriers

Flagging is defined as a distinct form of marking that is used to identify components that are to be worked or manipulated.

Operational Barriers are used to mark or cover components that are not to be worked on or manipulated during the evolution. They ensure workers to not work on or manipulate wrong components that are similar in location or appearance.

A. Flagging and Operational Barriers also help workers return to the correct component after being distracted or interrupted during a task.

B. The method to be used for flagging / Operational Barriers will be determined at the pre-job brief. The lead worker will determine component identification method(s).

3.2.18 Flagging / Operational Barriers (continued)

C. Perform Flagging as follows:

1. IDENTIFY the component to be Flagged using appropriate verification / human performance tools. The verification tools include Touch STAR, Peer Check, and Concurrent Verification.

2. FLAG the designated component that is to be manipulated. Any of the following may be used: color dots, Post-it notes, magnetic placard, rope surrounding component, etc. Each individual must be 100% certain that the correct component has been flagged prior to performing work or manipulation.

D. Perform Operational Barriers as follows:

1. IDENTIFY the components to have Operational Barriers applied using appropriate Human Performance tools

2. APPLY Robust Operational Barriers to designated components that are not to be manipulated (i.e., rope, paper, or other physical barrier). Electrical safety and effect on sensitive equipment should be considered

3. PERFORM the work assignment. Remember, Flagging or Operational Barriers shall remain in place while work is "in progress"

4. REMOVE the Flagging or Operational Barrier when work is completed

3.2.18 Flagging / Operational Barriers (continued)

Examples: Equipment Flagging
Operations • Controller Adjustments - marking with a sticker during frequent adjustments in manual • Alarm Windows - when expected alarms will be received due to maintenance or tests being performed
Electrical Maintenance • Breakers - Streamer, magnetic sign or placard • Fuse Blocks - Adhesive tape, streamer
I&C Maintenance • Rack Instruments - streamer, post-it, etc. • Cabinet Instruments - colored tape, marker or unique identification device or adhesive dots for circuit cards
Mechanical Maintenance • Pump Maintenance - rope off area and hang "Work in Progress" signs in place to identify the proper equipment • Valves or Spring Cans - mark with streamers

3.2.19 Place Keeping

Place Keeping is used to mark the steps in a procedure or work document that have been completed or that are not applicable, so that steps are not accidentally omitted or repeated.

When to use Place Keeping

Use Place Keeping when using a procedure or work document to perform critical activities as specified by the Pre-Job brief. When suspending performance of a procedure, use Place Keeping to identify the last step completed.

Place Keeping is performed as follows:

A. **IDENTIFY** and clearly **MARK** (in a conspicuous manner) any *critical steps* during the pre-job briefing.

B. **READ** and understand the step in its entirety before performing the action

C. For steps that are "not applicable"

1. **IDENTIFY** and **CROSS OUT** steps that are "not applicable".

3.2.19 Place Keeping (continued)

2. **HAVE** your supervisor initial these steps to confirm that the proper approvals have been obtained.

D. **PERFORM** the step as written.

E. **MARK** each step as it is completed using one of the following techniques:

DR ¤	**SIGN** or **INITIAL** a sign-off blank for each step or each action, where blanks are provided. Include time and date, if required.
☑ ¤	**CHECK** a check box for each step or each action in a step, where check boxes are provided.
⌀	**USE** the circle / slash method where blanks (for signatures or initials) and checkboxes are not provided.

F. Put a **CIRCLE** around the step number or in the left margin of the procedure or work document step to be performed next.

G. Put a **SLASH** through the CIRCLE when the step has been completed. For example:

⌀ • Step 1
⌀ • Step 2
O • Step 3
• Step 4

H. The Place Keeping indicates that Steps 1 and 2 have been completed, Step 3 will be done next or is underway (but is not yet completed), and Step 4 will not be started until Step 3 has been marked 'complete' with a slash.

I. **RE-READ** and **VERIFY** completion of the previous few steps performed if distracted or interrupted.

J. When resuming an activity that has been suspended, **CONFIRM** that performance conditions and requirements are met, and that any required approvals are obtained before proceeding.

K. If a page is not completed, **DRAW** a line under the last step completed and **WRITE** "Completed to this step", sign and date.

L. A good practice is to **INITIAL** completion of the page in the margin once a page has been completed, to **CONFIRM** all required steps are complete.

M. **A good practice is to IDENTIFY** the last page in the procedure or work document and conspicuously **WRITE** "Last Page" on the last page.

3.2.19 Place Keeping (continued)

N. It is permissible to **USE** coloured adhesive page markers (such as Post-It Notes®), to help trace progress through the procedure or work document or to denote reference sections.

O. **HIGHLIGHT** the flow path up to the next step to denote the path taken via decision boxes.

3.2.20 Post-Job Review

A Post-Job Review is a self-assessment conducted after a work activity to solicit and record feedback from the workers to identify opportunities for future improvements when performing similar tasks.

A. Following task completion, a post-job review is conducted for high hazard jobs to determine if planning and briefings were effective. The post-job review is performed with those who participated in the pre-job briefing and performed the work. The person who conducted the pre-job briefing will normally conduct the post-job review. Feedback will be solicited from all employees to identify any problems encountered during the task.

B. The post-job review for high hazard jobs will cover, as a minimum, items on the TVA Post-Job Review Checklist form.

C. Results of this review are documented for high hazard jobs using a checklist similar to, the TVA Post-Job Review Checklist form. Documentation must be maintained in accordance with SBU retention requirements.

D. Consistent with recommendations from the post-job review, appropriate adjustments are made in task performance, job procedures, JSA, training, etc. When problems or issues are identified, the supervisors/foreman/employee will record and establish the responsibility and method for resolving deficiencies in the post-job review section of the form. It is the supervisor/foreman/employee's responsibility to ensure that corrective action is performed on identified problems/issues.

3.2.21 First Check

First Check can be thought of as a remote peer check and is used to ensure the first component manipulation for a specific task is performed on the proper unit / channel / component. Simply put, First Check is used to validate you are in the right place before you begin working alone.

When to Use First Check

Use this tool when you arrive at the location of an assigned task, when you are alone, and prior to the first manipulation of plant equipment. Call or radio back to the person that dispatched you for the task and review briefly where you are, specifically, and what you intend to do to ensure the proper equipment is to be manipulated.

Working alone, with multiple units, channels, trains, and components, presents multiple opportunities to manipulate an unintended component. Use First Check as an additional barrier for this type of error-likely situation.

3.2.21 First Check (continued)

First Check is performed as follows:

- Prior to the performance of the first manipulation of an in-field evolution, as determined by the Pre-Job Briefing, use self-checking techniques to VERIFY the proper work document step intended to be performed, the proper unit, channel, and component about to be manipulated.
- CONTACT the Control Room or dispatching facility to validate, First Check, your location and component label information against the proper operational document. Also, validate, First Check, your assigned task.
- After confirming your location and intended actions, CONTINUE with the assigned task, rigorously applying self-checking techniques throughout the completion of the assignment.

4.0 RECORDS

4.1 QA Records

None

4.2 Non-QA Records

None

5.0 DEFINITIONS

Active Error – action (behavior) that changes equipment, system or equipment state triggering immediate undesired consequences.

At-Risk Practice – a behavior, belief, assumption, or condition that tends to diminish the effectiveness of a HU tool or increase the chance of error during an action, usually adopted for expedience, habit, comfort, or convenience.

Coaching – providing feedback in a facilitative way that gives the performer an opportunity to change behavior.

Conditional Tools – provide individuals with error-management methods that depend on the situation, the needs of the task or job, or the risk involved.

Critical Step – a procedure step, series of steps, or action that, if performed improperly, will cause irreversible harm to equipment or people or significantly affect power system operation.

Error – an action that unintentionally departs from an expected behavior.

5.0 DEFINITIONS (continued)

Error-Likely Situation - A work situation in which there is greater opportunity for error when performing a specific action or task due to error precursors (also known as 'error trap'). An error-likely situation (an error about to happen) typically exists when the demands of the task exceed the capabilities of the individual, or when work conditions exist that aggravate the limitations of human nature, or when task-related environmental factors exceed the capabilities and limitations of the individual (a mismatch) at the point of performing work on the power system.

Error Precursors – unfavorable factors embedded in the job site that increase the chances of error during the performance of a specific task by a particular individual; otherwise referred to as "risk factors." Undesirable, prior conditions that reduce the opportunity for success (i.e., provoke or drive errant behaviors), usually characterized by task demands, work environment, individual capabilities, and human nature. Examples are time pressure, first-time activity, lack of knowledge or experience, and interruptions.

Expectations – an explicit description of acceptable power system outcomes, business goals, process performance, safety performance, or individual behavior established by management.

Flawed Defenses – Defects with engineered, administrative, cultural or oversight controls that, under the right circumstances:

- fail to protect power system equipment or people against hazards (e.g., energy, chemicals, heat)
- fail to prevent the occurrence of active errors
- fail to mitigate the consequences of error (e.g., reduced reactor safety margin, personal injury, equipment damage, cost)

Fundamental Tools – provide individuals with HU tools that are used regularly for any work activity, regardless of the risk or complexity of the task, and without prompting. These tools establish the foundation for excellent human performance.

Human Error – a phrase that generally means the slips, lapses, and mistakes of humankind.

Human Performance – a series of behaviors executed to accomplish specific results.

Latent Condition – undetected circumstances and deficiencies that remain hidden until revealed by periodic testing, self-assessment processes, operating experience, or an event.

Latent Error – an error, act, or decision disguised to the individual that results in a latent condition until revealed later either by an event, active errors, testing, or self-assessments.

Latent Organizational Weakness - Undetected deficiencies in organizational processes or values that create job-site conditions that either provoke error or degrade the integrity of defenses. These are undetected deficiencies in *management control processes* (e.g., strategy, policies, work control, training, and resource allocation) or *values* (shared beliefs, attitudes, norms, and assumptions) creating workplace conditions that can provoke error (Error Precursors) and degrade the integrity of defenses (Flawed Defenses).

5.0 DEFINITIONS (continued)

Manager – an employee who is given the positional responsibility and accountability for the performance of the organization.

Positive Control – an active measure to ensure that what is intended to happen is what happens and that is all that happens when an action is performed.

Operating Experience Review - an evaluation of the history leading up to an event to determine if it has occurred before. One or a combination of activities such as plant document review, review of events that have occurred at other TVA facilities, nonpower plant environments, regulatory bodies, vendors, EPRI, and EEI, can accomplish this.

Safety culture – an organization's values and behaviors – modeled by its leaders and internalized by its members – that serve to make safety the overriding priority.

Situational Awareness – the accuracy of a person's current knowledge and understanding of working conditions compared to actual conditions at a given time.

Supervisor – a member of first-line management who directs and monitors the performance of individual performers in the conduct of assigned work activities.

Uneasiness – an attitude of wariness or apprehension regarding our capacity to err.

Verification – the act of confirming that the condition of a component, or other product of human performance, conforms to the condition required by a guiding document.

Worker – an individual who performs physical work on power system equipment, having direct contact (touching) with equipment, and is capable of altering its condition (compare with *Knowledge Worker*) -- includes operators, electricians, chemistry technicians, etc.

Walkdown – physically visiting and inspecting the job site and the materials and references to be used, in light of the proposed work objectives, to assess the impact of environmental and working conditions on human performance.

6.0 REFERENCES

A. TVA-SPP-18.005, Plan Jobs Safely

B. COO-SPP-03.1.1 Corrective Action Program

C. COO-SPP-03.1.10, Incident Prompt Investigation

D. TVA Form 40899, Post-Job Review Checklist

E. TVA Form 40896 River Operations Pre-Job Brief Checklist

F. TVA Form 20309 FPG Pre-Job Briefing form

G. INPO 06-002, Human Performance Tools For Workers

H. INPO 06-003, Human Performance Reference Manual

6.0 REFERENCES (continued)

I. INPO 08-004 Human Performance Key Performance Indicators

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COO Common Human Performance Tools

Fundamental HU Tool	
2-Minute Rule	
WHY	• Acquaints workers with the work area • Improves job site situational awareness • Establishes healthy sense of uneasiness
WHEN	• Arrival at the physical work site • Before touching risk-important equipment • Walking down a work package • Near potential safety hazards • After a break, such as lunch
HOW	1. **Explore** the job site to identify: • Right unit, train, and component • Safety and trip hazards • Error precursors (for *critical steps*) • Matches the procedure and PJB 2. **Talk** with coworkers / supervisor about hazards and extra precautions to take 3. **Eliminate** hazards, **install** appropriate defenses, or **develop** contingencies
AVOID	• Hurrying, no time to look around • Believing "routine" jobs have "no risk" • Not talking about "gut feelings"

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COO Common Human Performance Tools

Fundamental HU Tool	
STOP When Unsure	
WHY	• Odds for error could be 1-in-2 (a coin flip) • Prompts you to get accurate information • So knowledgeable people resolve issues
WHEN	• If uncertain, confused or in doubt • Outside bounds of a technical procedure • Outside the bounds of key parameters • Not sure of expectations or procedures • Inexperienced or lack knowledge of task • Someone expresses doubt or concern
HOW	1. **Stop** the activity 2. **Place** the job in a safe condition 3. **Notify** your immediate supervisor
AVOID	• Dismissing contrary points of view • Discounting concerns of junior individuals • Not asking for help from those who know • Being too embarrassed to ask for help • Believing nothing bad can happen • Not having clear abort criteria

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COO Common Human Performance Tools

Fundamental HU Tool	
Self-Checking (S-T-A-R/ Touch-STAR))	
WHY	• Boosts attention and thought process • Resolves questions before acting • Confirms the right result was obtained
WHEN	• Touching equipment • Entering or recording data • Performing a calculation • Revising drawings or procedures • Changing equipment status • Assembling components
HOW	**Caution: self-check again if contact is lost** 1. **Stop** and focus 2. **Think** what will happen with right or wrong action 3. **Act** correctly 4. **Review** that the result is as-expected
AVOID	• Several steps/actions done at same time • Action done when not sure • Talking while performing the action • Not looking at the item being acted on • Not self-checking after losing contact • Not verifying that results are correct • Not self-checking when flagging is used

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COO Common Human Performance Tools

Fundamental HU Tool	
Procedure Use and Adherence	
WHY	• Keeps the system within safety margins • Improves worker safety
WHEN	• Manipulating or analyzing equipment • A procedure exists for the work • No procedure exists but one should
HOW	**1.** **Verify** the procedure being used is the correct revision **2.** **Review** all before starting work: • Prerequisites, limits, precautions, initial conditions • Instructions • *Critical steps* **3.** **Use** effective Place Keeping **4.** **Follow** each step as written without deviating from the original intent and purpose **5.** **Do not deviate** from the sequence of steps, unless approved **6.** **Do not "N/A"** any step, unless approved **7.** **STOP When Unsure** and contact a supervisor if a procedure step: • Is technically incorrect • Might injure someone • Might damage equipment • Cannot be performed as written • Leads to incorrect parameters or configuration • Conflicts with another procedure • Does not achieve desired or anticipated results • Is otherwise unsafe
AVOID	• Assuming procedures are accurate • Not reviewing procedure before starting • Performing steps without understanding • Keeping procedure feedback to yourself • Using an attachment or data sheet alone • Using multiple procedures at one time • Skipping "routine" or "unnecessary" steps • Using old revisions • Marking steps "N/A" without approval • Following harmful steps as written

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COO Common Human Performance Tools

Fundamental HU Tool	
Three-Way Communication	
WHY	• Ensures reliable transfer of information • Promotes mutual understanding
WHEN	• Safety is involved (person/system/property) • Operating or altering equipment • Giving an important value or parameter • Performing steps in a procedure • Assigning tasks that impact equipment
	1. Sender states the message: • Face to face if practical • Gets Receiver's attention (first name) • Clearly and concisely • Use noun names with equipment identifiers **2. Receiver acknowledges** the sender: • Paraphrases in own words • Repeats UNIDs / device labels word for word • Asks question if necessary to verify **3. Sender acknowledges** the reply: • If right, "*CORRECT!*" • If wrong, "*WRONG!*" and repeats **#1**
AVOID	• Sender not getting Receiver's attention • Sender talking over another conversation • Sender stating too much in one message • Receiver reluctant to clarify the message • Receiver acting before Sender agrees • Receiver not writing the message down • Overusing 3-way for ordinary information • Skipping 3-way to speed up the task • Speaking too softly or slurring words • Conflict in what is said with how it is said

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COO Common Human Performance Tools

Fundamental HU Tool

Phonetic Alphabet

WHY
- Many letters sound alike
- Minimizes interfering noise or accents
- Provides unique component identifiers

WHEN
- Speaking alpha-numeric information
- Specifying trains, phases, and channels
- If interference could block the message

HOW

Letter	Spoken	Letter	Spoken
A	*Alpha*	N	*November*
B	*Bravo*	O	*Oscar*
C	*Charlie*	P	*Papa*
D	*Delta*	Q	*Quebec*
E	*Echo*	R	*Romeo*
F	*Foxtrot*	S	*Sierra*
G	*Golf*	T	*Tango*
H	*Hotel*	U	*Uniform*
I	*India*	V	*Victor*
J	*Juliet*	W	*Whiskey*
K	*Kilo*	X	*X-ray*
L	*Lima*	Y	*Yankee*
M	*Mike*	Z	*Zulu*

AVOID
- Not using phonetics for equipment labels
- Using different phonetic words than these
- Non-standard acronyms and abbreviations
- Similar words like *increase* and *decrease*
- Slang terms in place of standard terms

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COO Common Human Performance Tools

	Conditional HU Tool
Pre-Job Briefing (PJB)	
WHY	• Meet before performing a job to discuss the tasks, hazards, and safety precautions to: • Clarify what to accomplish and to avoid • Avoid surprises in the field • Reinforce no "routine" activities exist • Improve error recognition • Ensure all know right HU tools to use
WHEN	• Prior to working on power system equipment • Each shift (if it is turned over) • After long delays in a job
HOW	Refer to **TVA-SPP-18.005** for full requirements for each COO SBU.
AVOID	• Lecturing rather than discussing the job • A separate PJB for some workers • Checking every item regardless of need • No responsibilities for abort decisions • Supervisor leading instead of lead worker • Meeting in a noisy, distracting place • Meeting more than 30 minutes • Ignoring Operating Experience (OE) or worker familiarity w/task • Covering OE irrelevant to the task

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COO Common Human Performance Tools

	Conditional HU Tool
	Peer-Checking
WHY	• *Prevents* an error by the Performer • Augments Self-Checking • Less formal than Concurrent Verification
WHEN	• *Critical steps* & reactivity manipulations • Requested by the Performer • Comparing test data against criteria • Starting or stopping major components • Installing similar components • Error-likely situations with *critical steps*

HOW	1. **Both Self-Check** on the correct item
	  • Performer
	  • Peer
	2. **Both agree** on the item / action to take
	3. **Peer observes** before / during to confirm the right action is taken on the right item
	4. **Performer acts** correctly
	  • If wrong, Peer STOPS Performer
	  • If right, Peer says, *"That is correct!"*

AVOID	• An inexperienced Peer • A distracted Peer • Peer cannot see the item or action • Peer reluctant to correct senior Performer • Peer not ready to stop an error • Performer acts before the Peer is ready • Swapping roles during the task • Both do not use proper Self-Checking • Performer relies on Peer to stop his error • Overuse of Peer-Checks

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COO Common Human Performance Tools

	Conditional HU Tool
	Concurrent Verification (CV)
WHY	• Separately confirms component status • *Prevents* immediate / irreversible harm to equipment or to people • Positively controls risk-important items
WHEN	• Actions with irreversible consequences: • Industrial safety: Death; Injury • Environmental safety: Uncontrolled release of harmful substances • Plant safety: Plant trip or reduction in power; Equipment damage/property loss
HOW	1. **Performer and Verifier 3-Way** on the action, component and purpose 2. **Each separately Self-Check** the correct item, and agree on the action to take 3. **Verifier watches** the action to confirm 4. **Performer acts** correctly 5. **Verifier confirms** the action is right by: hands-on check (valve), remote indicator (lights), or system response (flow, current, voltage) 6. **Both confirm and sign** the document
AVOID	• A Verifier inexperienced with the task • Verifier not closely observing the action • Verifier unable to view the action • One reluctant to correct "senior" other • Verifier not prepared to stop wrong action • Team mates don't Self-Check each other • One uses cues rather than observations • One believes other will catch his error • Performer and Verifier changing roles

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COO Common Human Performance Tools

	Conditional HU Tool
Independent Verification (IV)	
WHY	• Confirms condition of required equipment • *Catches* error after it has been made • More likely to catch an error
WHEN	• During important system alignments • Placing and removing clearance tags • Verifying calculations • Restoring equipment after maintenance • Aligning fire protection systems • Installing temporary modifications
HOW	1. **Performer Self-Checks** the correct item 2. **Performer acts** correctly 3. **Performer confirms** expected results and signs document 4. **Verifier Self-Checks** the item separately 5. **Verifier verifies** as-found status by: hands-on check (valve) - *preferred*; remote (lights); system response (flow, current, voltage) 6. **Verifier confirms** status, agrees and signs document 7. **Verifier notifies** supervisor if error made
AVOID	• Verifier near when the Performer acts • Both travel to the component together • Performer discusses actions with Verifier • Performer trusts Verifier to catch errors

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COO Common Human Performance Tools

	Conditional HU Tool
Flagging/Operational Barriers	
WHY	• Helps consistently touch correct item and avoid similar nearby components • Shields items from inadvertent touching • Informs others of ongoing work
WHEN	• Handling one of similar items nearby • Working on multiple trains nearby • Manipulating a component multiple times • Working near "trip-sensitive" equipment
HOW	1. **Self-Check** the item to be flagged/or designated not to be manipulated 2. **Flag** or **Mark** the correct item or area 3. **Perform** the work 4. **Remove** the flagging or barrier when done
AVOID	• Same flag for both Touch and No Touch • Flagging an item touched only once • Flagging Touch/No Touch items in 1 job • No Self-Check or Peer Check for flagging or operational barriers • Using a flag or barrier that is not securely attached • Using a flag or barrier that blocks indicators • Using unapproved flags or barriers • Not removing a flag or operational barrier after completion of work

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COO Common Human Performance Tools

	Conditional HU Tool
Place Keeping	
WHY	• Prevents omitting or duplicating steps • Aids in navigating a detailed procedure • Prevents incorrect sequencing of steps • Helps return to last step if interrupted
WHEN	• The circle/slash method is used at a minimum • For continuous-use instructions • For work order steps

HOW	**For the <u>Circle/Slash</u> Method:**
	1. **Circle** over or by the step number to be performed
	2. **Read** and understand the entire step
	3. **Perform** the step as written
	  • Do NOT Slash continuous steps
	  • N/A ***IF/Then*** steps if not needed
	4. **Slash** the Circle after step completion
	For the <u>Blank/Check Box</u> Method:
	1. **Read** and understand the entire step including Notes
	2. **Perform** the step as written
	  • N/A ***IF/Then*** steps if not needed
	3. **Sign** the blank or **Check** the box after step completion

AVOID	Using procedures without page-checking Signing many blanks with a single arrow Circling more than one step at a time Slashing a Circle before it is completed Circle/Slashing several steps together Not verifying the last step if interrupted

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COO Common Human Performance Tools

	Conditional HU Tool
Post-Job Review	
WHY	• Prevents future significant events • Fixes procedure / equipment problems • Fixes latent errors • Makes the next job easier and safer
WHEN	• After emergent and important work • After a high-risk phase of a project • After routine work that could be improved
HOW	Refer to **TVA-SPP-18.005** for full requirements of a Post-Job Review for each COO SBU.
AVOID	• Not documenting feedback after working on risk-important power system equipment • No principal workers involved • No time allotted for the Post-Job Critique • No follow-up for high-interest issues • Not done face-to-face

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COO Common Human Performance Tools

	Conditional HU Tool
First Check	
WHY	• Prevents an error by the performer • Augments Self-Checking
WHEN	• When you are alone or a peer check is not practical • Prior to the first manipulation of equipment
HOW	**1.** **Verify** the proper work document step intended to be performed and component to manipulate. **2.** **Contact** supervisor, control room, or person who sent you to the location. **3.** **Validate** your location, component, and task. **4.** Continue with assigned task using **self-check** techniques.
AVOID	• Believing it is not possible to get on the wrong unit/train/equipment • Failing to recognize First Check opportunities when working alone

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Human Performance Significant Event Criteria

The table on the next several pages, *COO Organization Human Performance Significant Human Performance Events* lists criteria for a COO Site or Business Unit (BU) Level HU Event. An HU Event is an event that meets the criteria in the table below and occurs because of the following:

- An initiating action (not an error) by an individual or group of individuals during an activity conducted as planned (event resulting from a flawed defense or latent organizational weakness created within the last 18 months, e.g., a design miscalculation causes damage a month later)

OR

- An initiating action (error) by an individual or group of individuals (event resulting from an active error).

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Human Performance Significant Event Criteria

	INPO 08-004	Nuclear	Fossil	River Ops	PSO	FGDC	NGDC	OSFG
Nuclear Safety	Event requiring emergency plan activation	Event requiring emergency plan activation	N/A	N/A	Event requiring emergency plan activation.	N/A	Event requiring emergency plan activation.	Event requiring emergency plan activation.
	Unplanned mode change	Unplanned mode change	N/A	N/A	Unplanned mode change.	N/A	Unplanned mode change.	Unplanned mode change.
	Unexpected /unplanned reactivity change >= 3% power	Unexpected /unplanned reactivity change >= 3% power	N/A	N/A	Unexpected /unplanned reactivity change >= 3% power.	N/A	Unexpected /unplanned reactivity change >= 3% power.	Unexpected /unplanned reactivity change >= 3% power.
	Unplanned entry into a TS S/D action statement <= 72 hours	Unplanned entry into a TS S/D action statement <= 72 hours	N/A	N/A	Unplanned entry into a TS S/D action statement <= 72 hours. If NGDC determined to be responsible.	N/A	Unplanned entry into a TS S/D action statement <= 72 hours. If NGDC determined to be responsible.	Unplanned entry into a TS S/D action statement <= 72 hours. If NGDC determined to be responsible.
	Errors resulting in a damaged fuel bundle or a misplaced, ungrappled bundle	Errors resulting in a damaged fuel bundle or a misplaced, ungrappled bundle	N/A	N/A	Errors resulting in a damaged fuel bundle or a misplaced, ungrappled bundle.	N/A	Errors resulting in a damaged fuel bundle or a misplaced, ungrappled bundle.	Errors resulting in a damaged fuel bundle or a misplaced, ungrappled bundle.
	Unplanned increase to either of the two highest on-line or shutdown risk threshold colors/numbers	Unplanned increase to either of the two highest on-line or shutdown risk threshold colors/numbers	N/A	N/A	Unplanned increase to either of the two highest on-line or shutdown risk threshold colors/numbers	N/A	Unplanned increase to either of the two highest on-line or shutdown risk threshold colors/numbers	Unplanned increase to either of the two highest on-line or shutdown risk threshold colors/numbers

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Human Performance Significant Event Criteria

	INPO 08-004	Nuclear	Fossil	River Ops	PSO	FGDC	NGDC	OSFG
	Misoperation, misposition, or improper configuration of equipment needed for nuclear safety, such that it would not perform its design function.	Misoperation, misposition, or improper configuration of equipment needed for nuclear safety, such that it would not perform its design function.	N/A	N/A	Misoperation, misposition, or improper configuration of equipment needed for nuclear safety, such that it would not perform its design function.	N/A	Misoperation, misposition, or improper configuration of equipment needed for nuclear safety, such that it would not perform its design function.	Misoperation, misposition, or improper configuration of equipment needed for nuclear safety, such that it would not perform its design function.
Radiological Safety	A loss of radioactive material that create a measurable exposure rate at 30 cm outside the protected area.	A loss of radioactive material that create a measurable exposure rate at 30 cm outside the protected area.	N/A	N/A	A loss of radioactive material that create a measurable exposure rate at 30 cm outside the protected area.	N/A	A loss of radioactive material that create a measurable exposure rate at 30 cm outside the protected area.	A loss of radioactive material that create a measurable exposure rate at 30 cm outside the protected area.
	Any TS high radiation area (>1 rem per hr) or very high radiation area occurrence that requires a LER or any notification per 10CFR20	Any TS high radiation area (>1 rem per hr) or very high radiation area occurrence that requires a LER or any notification per 10CFR20	N/A	N/A	Any TS high radiation area (>1 rem per hr) or very high radiation area occurrence that requires a LER or any notification per 10CFR20	N/A	Any TS high radiation area (>1 rem per hr) or very high radiation area occurrence that requires a LER or any notification per 10CFR20	Any TS high radiation area (>1 rem per hr) or very high radiation area occurrence that requires a LER or any notification per 10CFR20
	A radiological effluent TS or off-site dose calculation manual effluent occurrence	A radiological effluent TS or off-site dose calculation manual effluent occurrence	N/A	N/A	A radiological effluent TS or off-site dose calculation manual effluent occurrence	N/A	A radiological effluent TS or off-site dose calculation manual effluent occurrence	A radiological effluent TS or off-site dose calculation manual effluent occurrence
	Unplanned exposure (unintended exposure occurrence) >= 100 mrem over the estimate for an individual's exposure.	Unplanned exposure (unintended exposure occurrence) >= 100 mrem over the estimate for an individual's exposure.	N/A	N/A	Unplanned exposure (unintended exposure occurrence) >= 100 mrem over the estimate for an individual's exposure.	N/A	Unplanned exposure (unintended exposure occurrence) >= 100 mrem over the estimate for an individual's exposure.	Unplanned exposure (unintended exposure occurrence) >= 100 mrem over the estimate for an individual's exposure.

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Human Performance Significant Event Criteria

	INPO 08-004	Nuclear	Fossil	River Ops	PSO	FGDC	NGDC	OSFG
								A significant regulatory finding or event, over exposure as defined in 10 CFR Part 20 and Part 34, or the loss of an NDE Radiography (RT) source.
Industrial Safety	An occupational fatality, lost-time accident, or injury resulting in restricted duty.	An occupational fatality, lost-time accident, or injury resulting in restricted duty.	An occupational fatality, lost-time accident, or injury resulting in restricted duty.	An occupational fatality, lost-time accident, or injury resulting in restricted duty.	An occupational fatality, lost-time accident, or injury resulting in restricted duty.	An occupational fatality, lost-time accident, or injury resulting in restricted duty.	An occupational fatality, lost-time accident, or injury resulting in restricted duty.	An occupational fatality, lost-time accident, or injury resulting in restricted duty.
Facility Operation	Misoperation, misposition, or improper configuration of equipment that results in power reduction >= 10%	Misoperation, misposition, or improper configuration of equipment that results in power reduction >= 10%	Misoperation, misposition, or improper configuration of equipment that results in power reduction >= 10%MWe	Misoperation, misposition, or improper configuration of equipment that results in power reduction >= 10% MWe and 10 MWe	Momentary or sustained interruption of customer load >2MW	Misoperation, misposition, or improper configuration of equipment that results in power reduction >= 10%	Misoperation, misposition, or improper configuration of equipment that results in power reduction >= 10%	Misoperation, misposition, or improper configuration of equipment that results in power reduction >= 10%
	Unplanned or unscheduled reactor trip or turbine trip	Unplanned or unscheduled reactor trip or turbine trip	Unplanned or unscheduled Loss of fire or turbine trip	An unplanned or unscheduled turbine trip.	An unplanned or unscheduled loss of generating unit	Unplanned or unscheduled loss of fire or turbine trip	Unplanned or unscheduled reactor trip or turbine trip	Unplanned or unscheduled reactor trip or turbine trip
		N/A	Misposition or improper configuration of equipment that results in a failed start of a CC/CT unit.	Misposition or improper configuration of equipment that results in a failed start.	Unplanned or unscheduled transmission line trip that results in rescheduling of interchange	N/A	N/A	N/A