Expert Performance Transfer – Making Knowledge Transfer Count with ExPerT Methodology

for

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Opportunities and Challenges

for Water Cooled Reactors in

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Problem

- ❖ Large wave of retirements forming – the "silver tsunami"
  - One-third of the US population will be over 50 by 2010

  - One in five will be over 65 by 2010

  - By 2010, several industrial nations, including Germany, Japan, Austria, Spain, Italy, Sweden, and Greece, will for the first time in modern memory experience a contraction of their working populations

  - By 2030, the EU can expect to have 14% fewer workers; Japan, 18% fewer

- ❖ Many industrial nations are facing a demographic juggernaut
  - Experience and institutional knowledge leave when the work force leaves

  - **Knowledge and skill retire with the "boomers"**

Replacements for retiring personnel –

❖ Education foundations in the US

- 95% of junior college graduates (only 55% of those who start) are in some sort of remediation course 1st year in college

- 53% of those in 4-year colleges graduate in SIX years

- Only 52% of students in nation's 50 largest high school systems graduate in four years

❖ 60 percent of employers report that recruiting competent job applicants is their biggest human resources challenge

- More than 25 percent of U.S. businesses have done little to plan for the effects of an aging workforce

- There exists a relatively small pool of new workers and fierce competition for new talent is likely to result

What are the options to solve the problem?

❖ Emphasis on recruiting replacements

❖ Emphasis on improving human performance often concentrates on "support" and "controls" rather than the business value chain –

- Ignores business processes and procedures
- Assumes the current environment of guidance and training will be effective with new recruits

you can't recruit legacy knowledge

What are the options to solve the problem? cont'd…

Performance Approach –

✝ "Performance Transfer" is the better goal

✝ There is a need for a process that is predictable and repeatable:

- Analytic model for **analysis, design, development** which virtually guarantees success

- Cost-effective to use without jeopardizing results

- Comprehensive documentation for consistent, predictable and reproducible accomplishments

- Captures **LEGACY** knowledge investment before it leaves the enterprise

- Optimum state-of-technology solution for **NEW**

Characteristics of ExPerT System

❖ Targets human PERFORMANCE directly via an analytic procedure that first specifies accomplished (high quality) performance for the job accomplishments in the organization

❖ COMPREHENSIVE in scope. Targets all components in the enterprise value chain whose work impacts each other as well as the ultimate receiver of the organization's goods and/or services

❖ Involves all LEVELS of the organization — top-down and bottom-up

Characteristics of ExPerT System…cont'd

❖ RIGOROUS and detailed methods assure high levels of success

❖ Differing interpretations of the goals and guidelines are minimized through development of a "shared vision"

❖ Contains rigorous and detailed guidelines that include analysis of needs for both **EXISTING** performance and the planning of **NEW** performance requirements due to changes in the organization's goals and work

❖ A single COHESIVE approach that welds all fragmented approaches into one effort

Characteristics of ExPerT System…cont'd

❖ Considers all INFLUENCES on performance including:

- Personnel selection
- Skills/knowledge of performers
- How the work is designed (inputs-processes-outputs-feedback)
- The physical environment of the work
- Ergonomic aspects of the work
- The motivation, incentive, and attitudinal aspects of performance

❖ FLEXIBLE enough to accommodate technical and cultural differences in organizations without compromising success

❖ EFFICIENT methodology to deploy: **"Value received is far greater than the resources consumed"**

ExPerT Task Description

Additional suggestions:

- Do NOT try to use the worksheets by themselves. Always use them in concert with this ExPerT system.

- Do NOT try to recall the steps and procedures herein. Use the ExPerT system every time.

- Try to follow the directions literally.

CONTENTS

ExPerT Example of Aux Feed Pump Maintenance

Before ExPerT

- Sequence and subsequence of conditional statements

- The best language editing possible still results in ambiguous guidance

2. IF governor was not previously removed, THEN remove governor as follows:

   a. Record the As Found position of the governor speed knob per one of the following as applicable: [1.4]

   1) IF the knob has a numbered dial, THEN record indicated dial setting.

      Dial Number Setting _____ As Found

   2) IF the knob does not have a numbered dial, THEN the knob should already be matchmarked.

      - IF not already matchmarked, THEN matchmark knob to governor.

      - Draw below the approximate orientation of the knob and governor matchmarks.
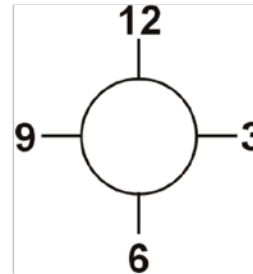
   b. Measure and record as found linkage dimensions "C" and "D" on Attachment 13.

   c. Loosen locknut and remove linkage pin at disconnect point "A" on Attachment 13.

   d. Remove the four governor to pump bracket capscrews.

   e. Remove governor.

ExPerT Example of Aux Feed Pump Maintenance

After ExPerT

•Performance analysis rather than language editing

•Decision table and work sheet

•Unambiguous performance description

2.

IF the governor:	THEN:		
Has been REMOVED	Proceed to Step 3.		
Has NOT been REMOVED	Record the As Found position of the governor speed knob per one of the following methods as applicable: (I.4)		

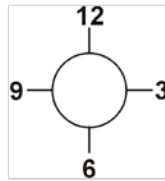| IF the knob:	AND the knob is:	THEN:
Has a numbered dial	→	Record indicated dial setting HERE. Dial Number Setting _____ As Found
Does NOT have a numbered dial	Already match-marked	a. Measure and record as found linkage dimensions "C" and "D" on Attachment 13. b. Loosen locknut and remove linkage pin at disconnect point "A" on Attachment 13. c. Remove the four governor to pump bracket capscrews. d. Remove governor.
	NOT already match-marked	a. Matchmark knob to governor: Draw the approximate orientation of the knob and governor matchmarks HERE. 12 9 3 6 b. Loosen locknut and remove linkage pin at disconnect point "A" on Attachment 13. c. Remove the four governor to pump bracket capscrews. d. Remove governor.

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ExPerT Example of Thermocouple Surveillance

Before ExPerT

- Conditional statements written in sequence

- Difficult to assimilate and follow in real-time

- Subject to variable interpretation

- Variable performance and documentation

9.1.17   Verify the following AND record on MA-3-3484-01-F-1:

- THERMOCOUPLE RESET light (L1-TC) is NOT lit.
- K1-TC relay contacts are closed as indicated by 0.5 ohms or less across the following points as read on Fluke 87:
    — TBK2-15 to TBK2-16 (control box)
    — TBK2-17 to TBK2-18 (control box)
- Heater/chiller contactor (42-TC) is closed as indicated by 0.5 ohms or less across the following points as read on Fluke 87:
    — 1L1 to 2T1
    — 3L2 to 4T2
    — 5L3 to 6T3

9.1.18   IF As-Found value is greater than 94°C, THEN perform the following:

a.   Stop work.

b.   Notify Shift Manager, Maintenance Supervisor and System Engineering.

c.   Initiate Condition Report per CA-3-1000-01, Performance Improvement Program and Nonconformance Reports.

9.1.19   IF As-Found value is less than 44°C or greater than 56°C OR results are unexpected, THEN perform the following:

a.   Notify Maintenance Supervisor and System Engineering.

b.   Record actions taken and acceptability on MA-3-3484-01-F-1.

9.1.20   IF As-Found value is less than 47°C OR greater than 53°C OR calibration is desired, THEN go to Section 9.2.

9.1.21   Transfer As-Found value to As-Left column on MA-3-3484-01-F-1 AND go to Section 10.2.

ExPerT Example of Thermocouple Surveillance

After ExPerT

• Non-linear performance is involved – a large discrimination (decision)

• Appropriate format selected based on type of behavior (algorithm)

• Clarifies directions to eliminate misinterpretations

• Clearly specifies correct sequence

• Specifies *normal* range

9.1.18

IS As-Found value greater than 94°C ? — Yes > 94°C →

Perform the following:
a. Stop work.
b. Notify Shift Manager, Maintenance Supervisor and System Engineering.
c. Initiate Condition Report per CA-3-1000-01, Performance Improvement Program and Nonconformance Reports.

No 94°C or less

IS As-Found value greater than 56°C OR results are unexpected ? — Yes > 56°C →

Perform the following:
a. Notify Maintenance Supervisor and System Engineering.
b. Record actions taken and acceptability on MA-3-3484-01-F-1.

No 56°C or less

IS As-Found value greater than 53°C OR calibration is desired ? — Yes > 53°C → Go to Section 9.2.

No 53°C or less

IS As-Found value less than 47°C OR calibration is desired ? — Yes < 47°C

No 47°C or more

IS As-Found value less than 44°C OR results are unexpected ? — Yes < 44°C

No

As-Found value in the range 47°C to 53°C →

Transfer As-Found value to As-Left column on MA-3-3438-01-F-1
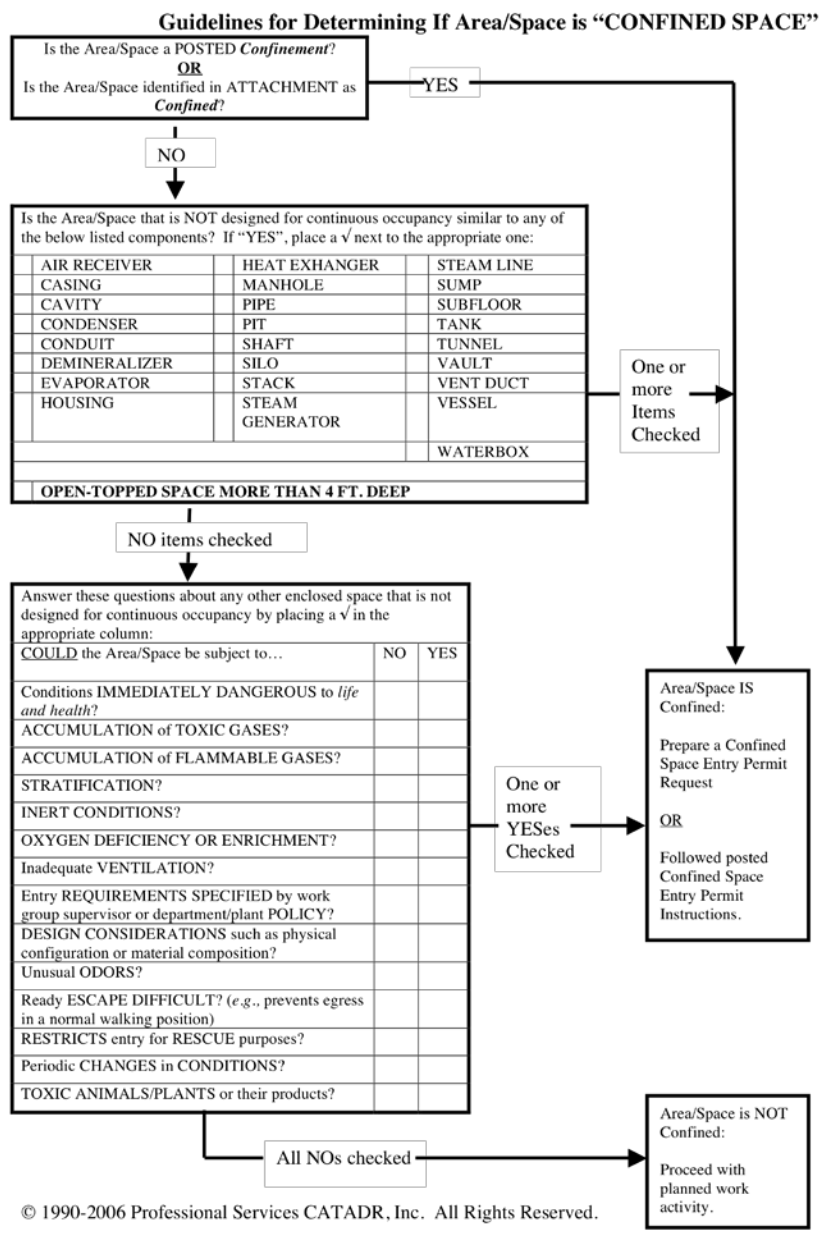AND
go to Section 10.2.

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ExPerT Example Determining "Confined Space"

After ExPerT

- Complex rules and decisions

- Algorithms and checklist with worksheet

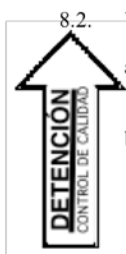- Part of work permitting and work control

Guidelines for Determining If Area/Space is "CONFINED SPACE"

Is the Area/Space a POSTED *Confinement*?
OR
Is the Area/Space identified in ATTACHMENT as *Confined*?

YES

NO

Is the Area/Space that is NOT designed for continuous occupancy similar to any of the below listed components? If "YES", place a √ next to the appropriate one:

AIR RECEIVER	HEAT EXHANGER	STEAM LINE
CASING	MANHOLE	SUMP
CAVITY	PIPE	SUBFLOOR
CONDENSER	PIT	TANK
CONDUIT	SHAFT	TUNNEL
DEMINERALIZER	SILO	VAULT
EVAPORATOR	STACK	VENT DUCT
HOUSING	STEAM GENERATOR	VESSEL
		WATERBOX

OPEN-TOPPED SPACE MORE THAN 4 FT. DEEP

One or more Items Checked →

NO items checked

Answer these questions about any other enclosed space that is not designed for continuous occupancy by placing a √ in the appropriate column:

COULD the Area/Space be subject to…	NO	YES
Conditions IMMEDIATELY DANGEROUS to *life and health*?		
ACCUMULATION of TOXIC GASES?		
ACCUMULATION of FLAMMABLE GASES?		
STRATIFICATION?		
INERT CONDITIONS?		
OXYGEN DEFICIENCY OR ENRICHMENT?		
Inadequate VENTILATION?		
Entry REQUIREMENTS SPECIFIED by work group supervisor or department/plant POLICY?		
DESIGN CONSIDERATIONS such as physical configuration or material composition?		
Unusual ODORS?		
Ready ESCAPE DIFFICULT? (*e.g.*, prevents egress in a normal walking position)		
RESTRICTS entry for RESCUE purposes?		
Periodic CHANGES in CONDITIONS?		
TOXIC ANIMALS/PLANTS or their products?		

One or more YESes Checked →

Area/Space IS Confined:

Prepare a Confined Space Entry Permit Request

OR

Followed posted Confined Space Entry Permit Instructions.

All NOs checked →

Area/Space is NOT Confined:

Proceed with planned work activity.

ExPerT mejora procedimientos en español, también

después ExPerT

8.0 INSTRUCCIONES

8.1. Preparar verificaciones del instrumento.

a. Compruebe que todos los prerrequisitos han sido cumplidos.

b. Comunique al Jefe de Turno ó su designado que va a iniciar la Prueba Funcional y sobre qué instrumento lo hará, así como también que tendrá 1/2 Scram.

c. Establezca la comunicación entre el Cuarto de Control y el Bastidor de Instrumentos donde se localiza el interruptor por verificar.

¡Nota!

Siga Sección 8.2 y Sección 8.3 para cada instrumento
(l-B22C-PS-**N023A**, - **NO23B**, - **NO23C**, - **NO23D**)
en secuencia.

8.2. Verificación del instrumento.

EJECUTO|FECHA

a. Verifique el **multímetro** seleccionado para medición de **voltaje** de **corriente alterna** (deberá indicar cero volts). Referencia CWD 1385. _____ _____

DETENCIÓN CONTROL DE CALIDAD

b.

Si el instrumento es:	Entonces:	
	En el:	**Conecte el multímetro en las terminales:**
l-B22C-PS-**N023A**	**1-IR-97**	**DD-9, DD-10**
l-B22C-PS-**N023B**	**1-IR-98**	**CC-7, CC-8**
l-B22C-PS-**N023C**	**1-IR-99**	**DD-1, DD-2**
l-B22C-PS-**N023D**	**1-IR-100**	**DD-4, DD-5**

SÓLO PARA INFORMACIÓN

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Questions?