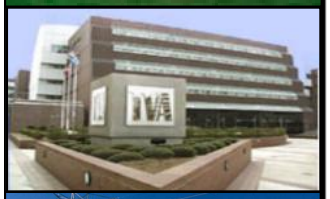
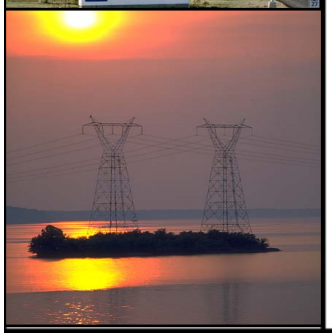




# KNOWLEDGE RETENTION

## TVA's Approach to Retaining the Critical Knowledge of an Aging Workforce

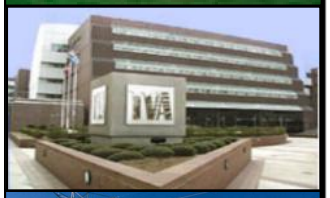
Andy Wright
Senior Manager, Leadership Development
Tennessee Valley Authority

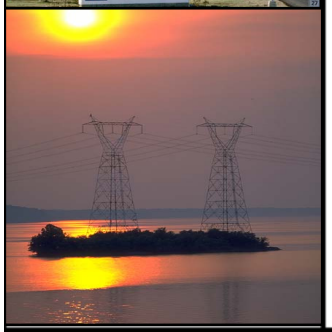
**Northeast Public Power Association**

March 2, 2007

# Agenda



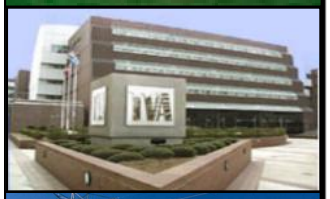


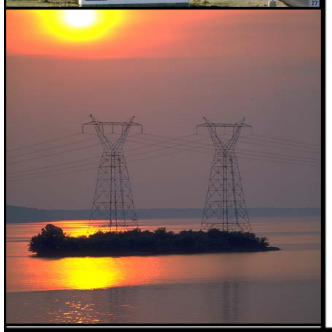


- Who's TVA?
- The Attrition Challenge
- Integrated Staffing Plan
- Retaining Critical Knowledge
- Questions

# Who is TVA?



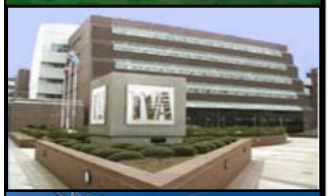


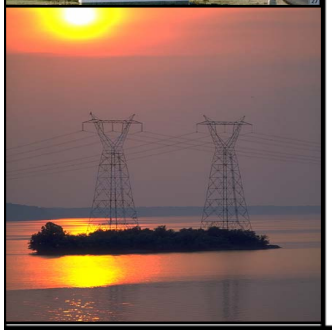



- America's largest public power producer
- 8.5 million customers; 7 states
- $8 Billion in Revenue
- Wholesale power through a network of 158 municipal and cooperative power distributors
- 12,300 Employees
- Capacity – 31,000 MW
  - 3 nuclear plants
  - 11 coal-fired plants
  - 29 hydroelectric dams
  - 1 pump storage facility

# The Attrition Challenge
# National Issue: Graying of America



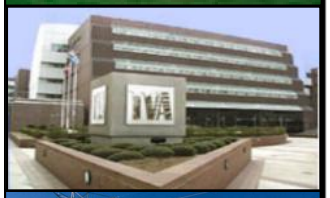


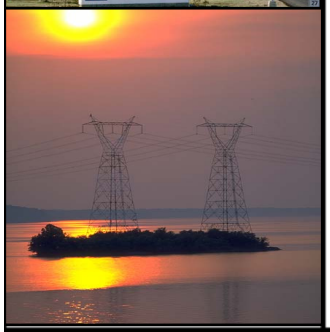



- "Baby Boomers" reaching retirement age
- Median age of the US worker is 41
- Number of workers over 55 is growing 4 times than the workforce as a whole
- Retiring Earlier and Working Longer
- "Echo Boom" significantly smaller

# Labor Supply "Retirement Shock"

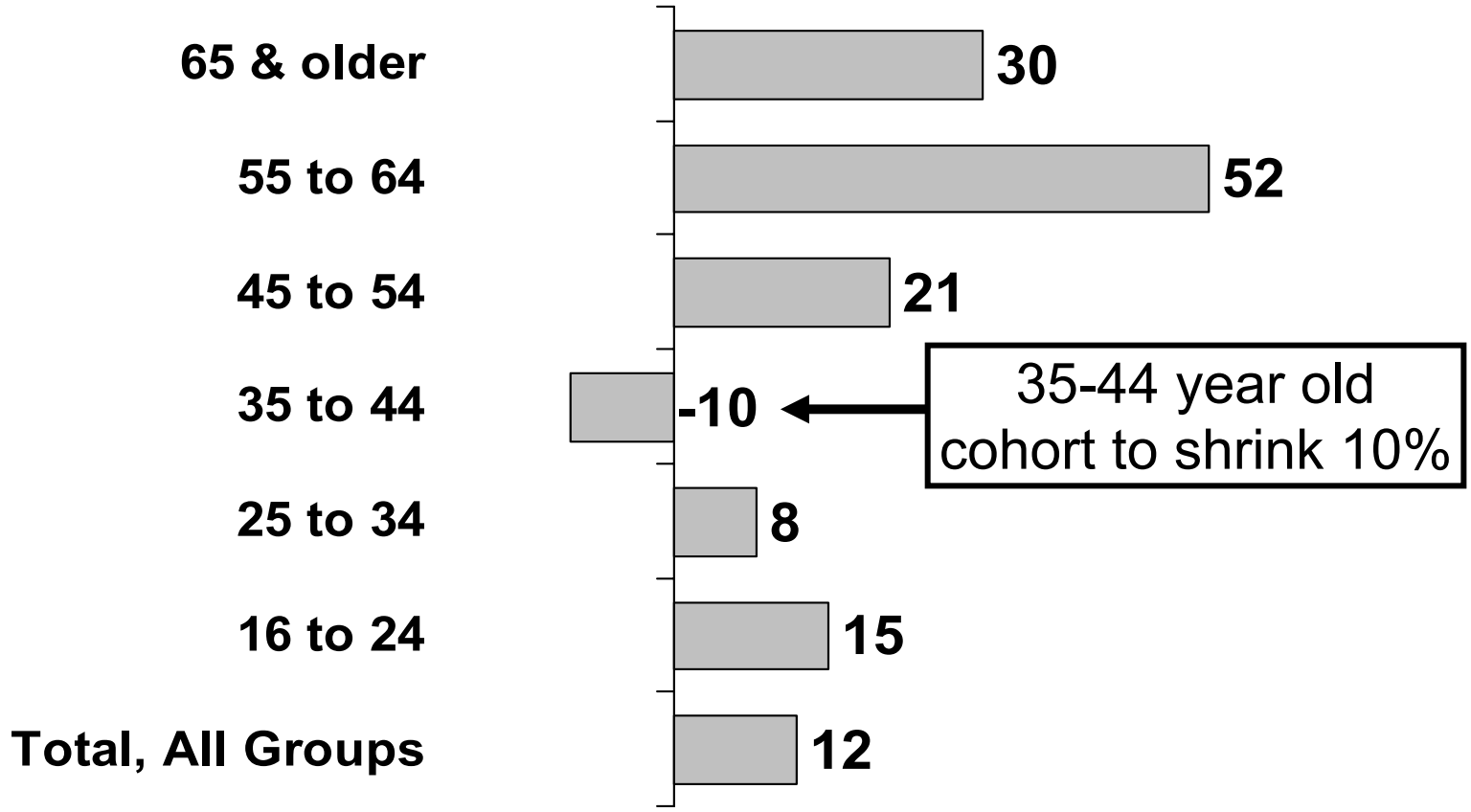






## Aging workforce will thin current pipeline

% change 2000 - 2010



# The Attrition Challenge

## Utility Industry-wide Issue

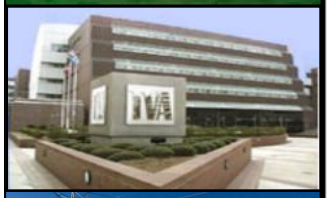
- Average utility worker is 44 years old. Average craft worker is 50. (Average U.S. worker is 37.)
- By 2010, as many as 60 percent of today's experienced utility workers will retire
- Shrinking labor force = Increased competition for talent
- 80% utility HR Executives identified the aging work force as their biggest worry. Less than 50% have a plan.

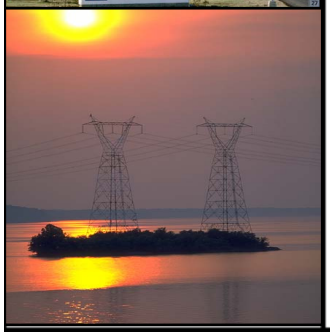
# TVA's Attrition Challenge

- Significant downsizing over 15+ years
- Various Retirement Incentives to Aid Downsizing
- Very Limited Entry Level Recruiting
- Average Age – 47+
- Approximately 1/3 of work force eligible to retire within next 5 years
- Pressure to Reduce Labor Cost = Not all retirees will be replaced

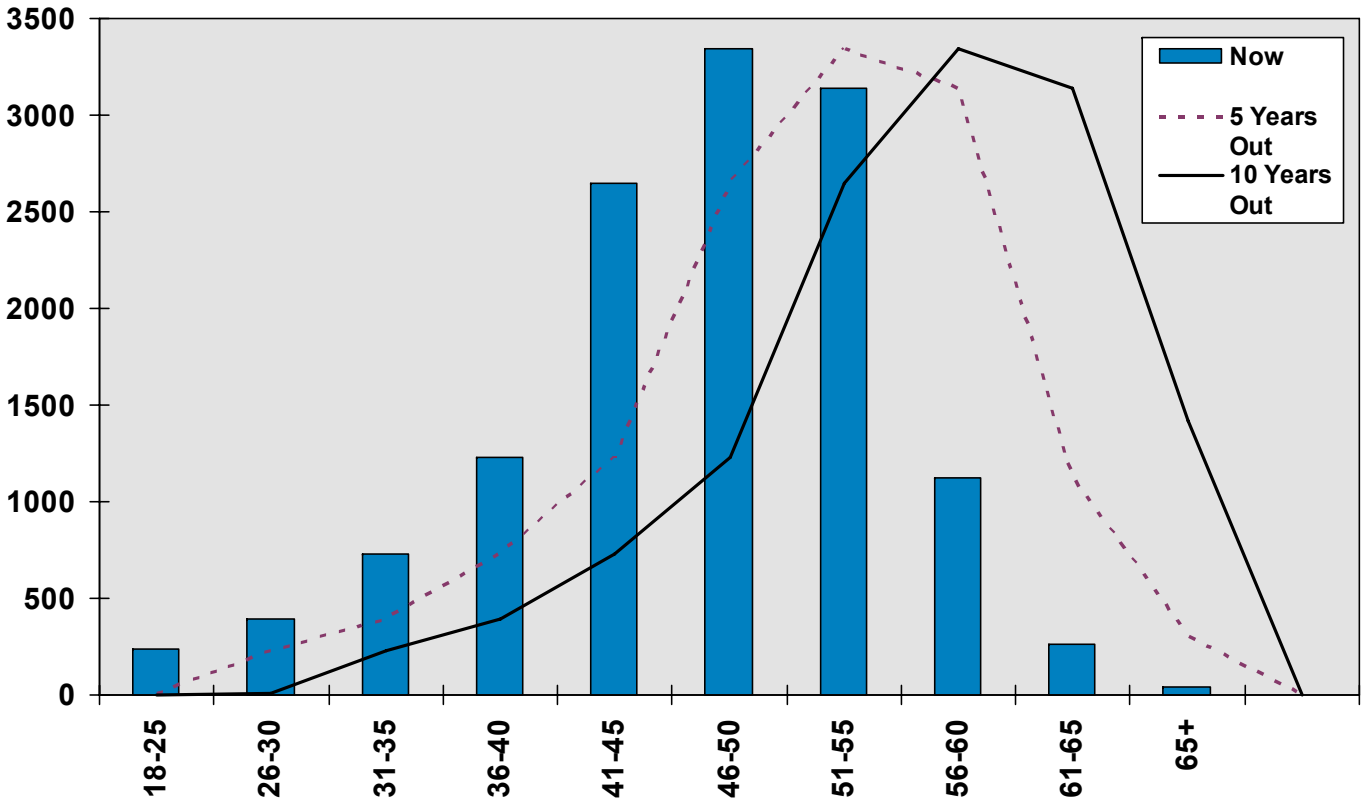
# The Attrition Challenge







## An Aging Work Force Nearing Retirement



# Integrated Staffing Plan

Developed in 1998, TVA's Integrated approach to Staffing includes:

- Work Force Planning
- Recruiting Initiatives
- Training Pipeline
- Key Leadership / Succession Planning
- Knowledge Retention

# Knowledge Retention

## Process Focus

- Focusing on the critical positions where knowledge loss is the greatest threat
- Identifying and prioritizing the specific knowledge and skills at risk
- Developing concrete, actionable responses to mitigate this loss.

# Knowledge Retention

## TVA's Knowledge Retention Process - Retaining Critical Knowledge

Three main subprocesses/activities:

**Step 1.** Conduct a ***Knowledge Loss Risk Assessment***

**Step 2.** ***Determine Approach*** to Capture Critical Knowledge

**Step 3.** ***Monitor*** and ***Evaluate***

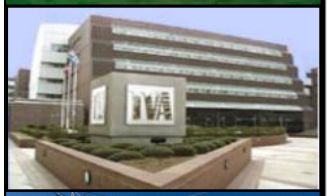
# Knowledge Retention

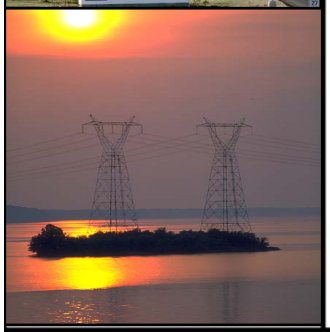
Step 1 | Step 2 | Step 3

## "Knowledge Loss Risk Assessment"

- The "Knowledge Loss Risk Assessment" is designed to identify positions/people where the potential knowledge loss is greatest and most imminent.
- Includes Ratings based on two factors:
  - Time until Retirement
  - Position Criticality
- Provides focus - Identifies positions where steps to mitigate knowledge loss may be needed.





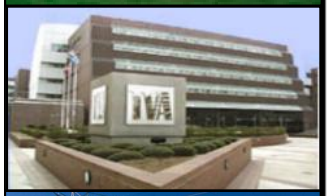



# Attrition Estimates …

# Just ask

# Just Ask
# "High Tech" and "High Touch"

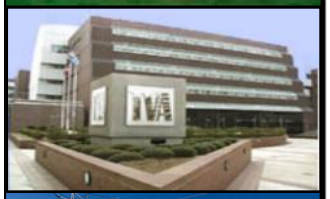


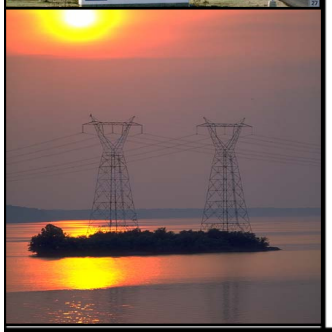


- **"High Tech" campaign using electronic survey.**
- **"High Touch" Follow-up**
  - ✓ **Face-to-face**
  - ✓ **Target "worst case" high risk positions**

# Knowledge Retention







Step 1 Step 2 Step 3

## "Knowledge Loss Risk Assessment"

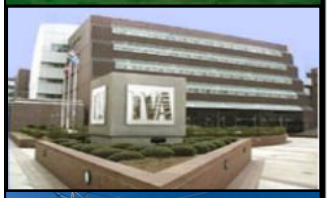
| Retirement Factor | X | Position Risk Factor | = | Total Attrition Factor |
|---|---|---|---|---|

**Retirement Factor** -- The projected retirement dates in the work force planning system (whether based upon employee estimates or calculated based on age and tenure data) will be assigned a retirement factor as follows:

| | |
|---|---|
| 5 - year | Projected retirement date within current or next fiscal |
| 4 - year | Projected retirement date within 3rd fiscal |
| 3 - year | Projected retirement date within 4th fiscal |
| 2 - year | Projected retirement date within 5th fiscal |

# Knowledge Retention





Step 1 | Step 2 | Step 3

## "Knowledge Loss Risk Assessment"

Retirement Factor x Position Risk Factor = Total Attrition Factor

**Position Risk Factor --** An estimate of the difficulty or level of effort required to replace the position incumbent. Managers/supervisors are responsible for making these ratings based upon the following criteria:

5 - Critical and unique knowledge and skills. Mission-critical knowledge/skills with the potential for significant reliability or safety impacts. TVA- or site-specific knowledge. Knowledge undocumented. Requires 3-5 years of training and experience. No ready replacements available.

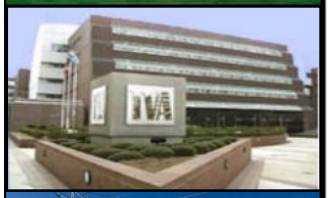
4 - Critical knowledge and skills. Mission-critical knowledge/skills. Some limited duplication exists at other plans/sites and/or some documentation exists. Requires 2-4 years of focused training and experience.

3 - Important, systematized knowledge and skills. Documentation exists and/or other personnel on-site possess the knowledge/skills. Recruits generally available and can be trained in 1 to 2 years.

2 - Proceduralized or non-mission critical knowledge and skills. Clear, up-to-date procedures exist. Training programs are current and effective and can be completed in less than one year.

# Knowledge Retention





Step 1 | Step 2 | Step 3

## "Knowledge Loss Risk Assessment"

Retirement Factor X Position Risk Factor = Total Attrition Factor

**Total Attrition Factor --** An estimate of the effort and urgency necessary to effectively manage the attrition.

20-25 High Priority - Immediate action needed. Specific replacement action plans with due dates will be developed to include: method of replacement, knowledge management assessment, specific training required, on-the-job training/shadowing with incumbent.

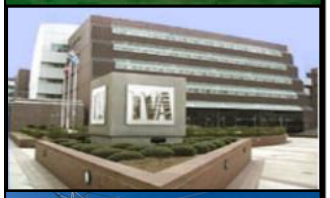
16-19 Priority - Staffing plans should be established to address method and timing of replacement, recruitment efforts, training, shadowing with current incumbent.

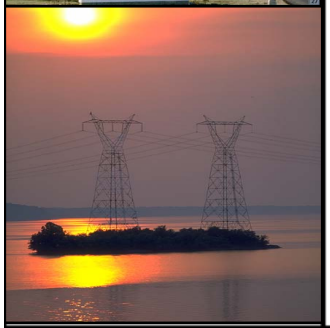
10-15 High Importance- Look ahead on how the position will be filled/ work be accomplished. College recruiting, training programs, process improvements, reinvestment

1-9 Important - Recognize the functions of the position and determine the replacement need.

# Knowledge Retention







Step 1 | Step 2 | Step 3

## "Knowledge Loss Risk Assessment"

Position Risk Factor

| Retirement Factor | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 5 | 5 | 10 | 15 | 20 | 25 |
| 4 | 4 | 8 | 12 | 16 | 20 |
| 3 | 3 | 6 | 9 | 12 | 15 |
| 2 | 2 | 4 | 6 | 8 | 10 |
| 1 | 1 | 2 | 3 | 4 | 5 |

# Knowledge Retention

Step 1 | Step 2 | Step 3

**"Determine Approach to Capture Critical Knowledge"**

- Conduct Interview to ID potential knowledge loss areas
- Assess consequences of loss using interview results and organization specific critical skills inventories
- Prioritize and ID options to retain or mitigate
- Develop and implement action plans

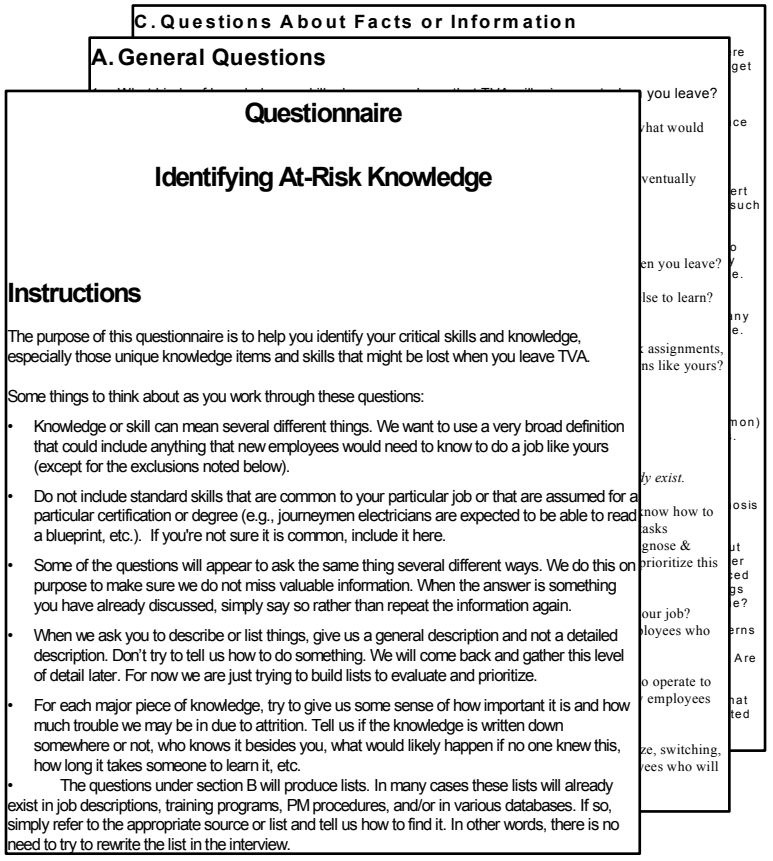
# Knowledge Retention

Step 1 | Step 2 | Step 3

## *Conduct Interview to ID potential Knowledge Loss Areas*

### Interview Questionnaire

- General questions
- Task questions (how….)
- Fact or information questions (what…who…)
- Pattern recognition / lessons-learned questions



C. Questions About Facts or Information

A. General Questions

Questionnaire

Identifying At-Risk Knowledge

Instructions

The purpose of this questionnaire is to help you identify your critical skills and knowledge, especially those unique knowledge items and skills that might be lost when you leave TVA.

Some things to think about as you work through these questions:

- Knowledge or skill can mean several different things. We want to use a very broad definition that could include anything that new employees would need to know to do a job like yours (except for the exclusions noted below).
- Do not include standard skills that are common to your particular job or that are assumed for a particular certification or degree (e.g., journeymen electricians are expected to be able to read a blueprint, etc.). If you're not sure it is common, include it here.
- Some of the questions will appear to ask the same thing several different ways. We do this on purpose to make sure we do not miss valuable information. When the answer is something you have already discussed, simply say so rather than repeat the information again.
- When we ask you to describe or list things, give us a general description and not a detailed description. Don't try to tell us how to do something. We will come back and gather this level of detail later. For now we are just trying to build lists to evaluate and prioritize.
- For each major piece of knowledge, try to give us some sense of how important it is and how much trouble we may be in due to attrition. Tell us if the knowledge is written down somewhere or not, who knows it besides you, what would likely happen if no one knew this, how long it takes someone to learn it, etc.
- The questions under section B will produce lists. In many cases these lists will already exist in job descriptions, training programs, PM procedures, and/or in various databases. If so, simply refer to the appropriate source or list and tell us how to find it. In other words, there is no need to try to rewrite the list in the interview.

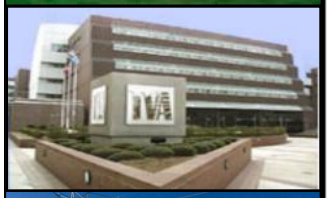
# Assessing Knowledge Criticality

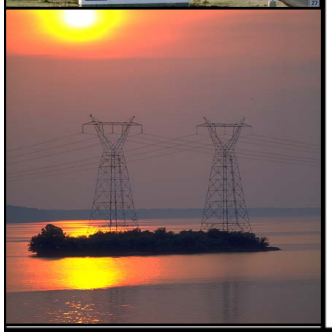
- ✓**Importance**
- ✓**Rarity of Knowledge**
- ✓**Difficulty of Recovery**

# Knowledge Retention

Step 1 | Step 2 | Step 3







***ID Options to Retain or Mitigate Knowledge Loss***

## Codification

- Documentation & Procedures
- Checklists, Inventories, etc.
- Performance Support Systems
- Concept Mapping

## Alternative Resources

- Agency/site/department expert
- Rotational or "Visiting" Staff
- Multi-skilling or Cross-training
- Contractors, part-timers, retirees

## Engineer It Out

- Process Improvement
- Update Equipment
- "Smart" tools and technology
- Eliminate task, product or service

## Education & Training

- Classroom and Simulator Training
- CBT, Video-based, and alternative delivery
- Coaching and Mentoring
- OJT and Targeted Work Assignments
- Coaching, Shadowing & Mentoring
- Apprenticeship Programs

# Sample KR Plan – SQN Engineer




**KNOWLEDGE RETENTION PLAN**

| **Employee:** | **Position: Engr. Mech. General (NUC)** | **Position Risk Factor: 4**<br>**Retirement Factor: 5** | **Total Attrition Factor: 20** |
|---|---|---|---|

Summary and Situation Assessment:

The incumbent has in depth knowledge of and expertise in piping analysis with emphasis on use of the T Pipe software. This software is unique to SQN and little duplication of knowledge exists. Though a replacement person with an engineering degree could become proficient in the use of this software in about six months, at least two years on-the-job training is needed to respond quickly to urgent questions related to piping analysis. In addition to the T Pipe system, there must be extensive knowledge of the Class II computer system, SDP – NEDP9, and SQN LDC 13.1 and 24.2. Though a person with a two year degree may be knowledgeable, it is preferable to have someone with a four year degree in either Civil or Mechanical Engineering.

Currently Employee A is being cross-trained on the T Pipe system. Employee B also works with this system and has significant knowledge. Employee C and Employee D work in the Chattanooga TVAN Corporate office and also have knowledge of the system.

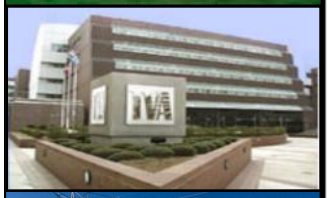
Because the T Pipe system is unique to SQN there is no external training on its use. However ASME does provide training on piping analysis and code requirements.

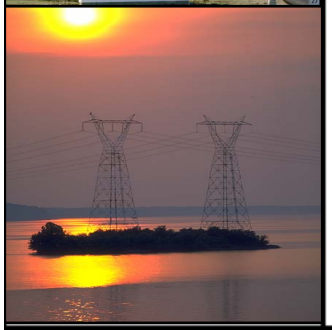
| **Knowledge or Skill** | **Criticality (1-5)** | **Actions** ***(Required of Criticality 4-5)*** List steps which can and will be taken to retain this critical knowledge/skill and/or minimize the impact of its loss) | **Target Date(s) for Completion** | **Status and Issues** |
|---|---|---|---|---|
| Rigorous and alternate piping analysis, component qualification of code components and pipe rupture analysis skills | 5 | • Identify a replacement person for the critical skills<br>• Replacement person complete ASME courses in piping analysis and code requirements<br>• Replacement person develop a working knowledge of T-Pipe Code, ASME Code, procedures and criteria through reading and mentoring of _____ and _____. | Dec 2004<br>Sept 2005<br><br>Sept 2005 | Employee A and Employee B are being crossed trained in T-Pipe.<br><br>Will send both to ASME Course when offered by TVA Training.<br><br>Both being Mentored |
| **Development Plans** | 5 | • Supervisor assign replacement person "trail tasks" under the direction of _____ and/or ____<br>• Replacement complete qualification card under mentor sponsorship<br>• Include mentoring in _____ and ___ PR&D and developmental goals in replacement individual<br>• Recruit/hire person to replace replacement person | March 2005<br><br>Dec 2005<br><br>Sept 2004<br><br>Oct 2005 | On going replacements are |
| **Documentation** | 5 | Incumbent to develop a piping analysis, component qualification and pipe rupture reference library of handbooks, procedures, criteria and process in conjunction with replacement person. | Sept 2004 | On going will be completed by Sept. |

Knowledge Retention Plan Prepared by: _OE Consultant_____ Date: November 6, 2003
Last Update: _7/22/04; Manager__

# Examples of KR Options Used





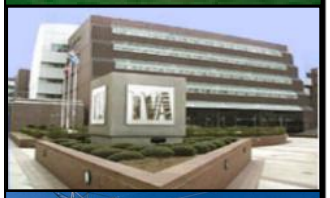


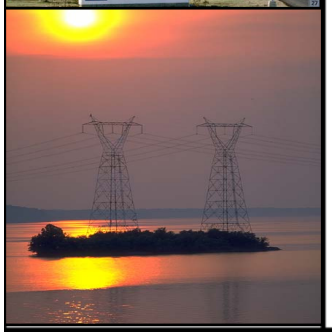
- Identify Co-worker to Cross-train
- Provide Formal Education & Training
- Structured Self-Study and Mentoring
- Update/Develop Documentation and Procedures

# Knowledge Retention

Step 1 | Step 2 | Step 3







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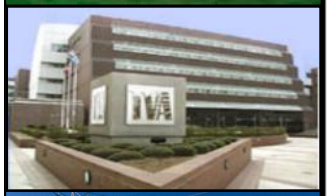
# Knowledge Retention





## Knowledge Retention

Step 1 | Step 2 | Step 3

***Monitor and evaluate knowledge retention plans***

- Review updated Work Force Planning Attrition Data
- Monitor previous Knowledge Retention Plans
- ID areas that need to be reassessed
- Coordinate and replicate

# Knowledge Retention

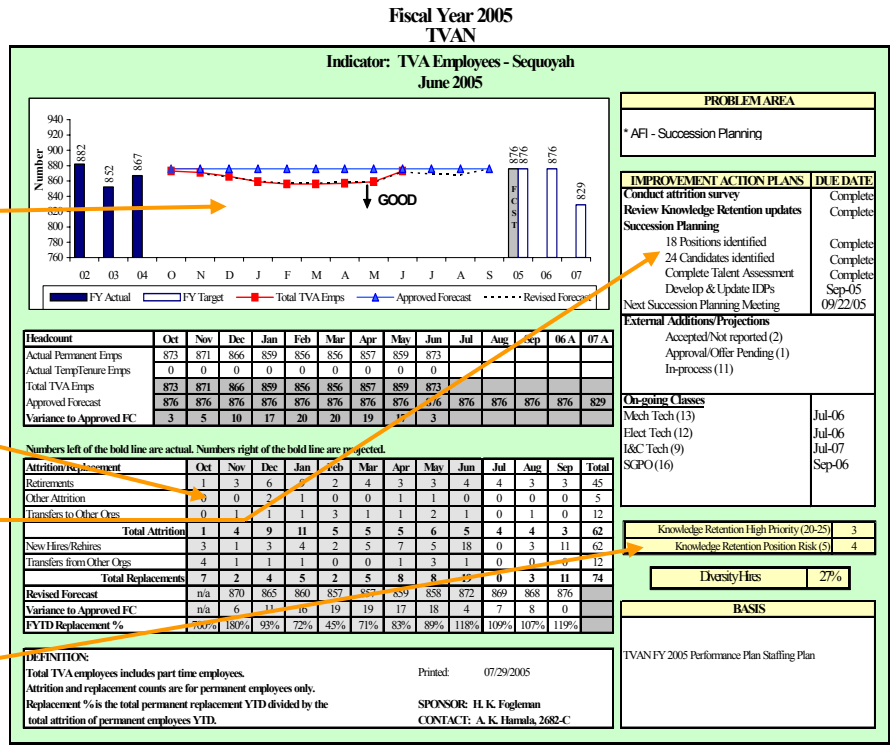
## Knowledge Retention

Step 1 | Step 2 | Step 3

***Monitor and evaluate knowledge retention plans***

Work Force Metrics provides senior management data to manage the aging work force challenge

- Headcount vs. Business Plan
- Attrition and Replacements
- Problem areas and actions planned
- Knowledge retention status (High Priority and Position Criticality)



**Fiscal Year 2005**
**TVAN**

**Indicator: TVA Employees - Sequoyah**
**June 2005**



| Headcount | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | 06 A | 07 A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Actual Permanent Emps | 873 | 871 | 866 | 859 | 856 | 856 | 857 | 859 | 873 | | | | | |
| Actual Temp/Tenure Emps | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | |
| Total TVA Emps | 873 | 871 | 866 | 859 | 856 | 856 | 857 | 859 | 873 | | | | | |
| Approved Forecast | 876 | 876 | 876 | 876 | 876 | 876 | 876 | 876 | 876 | 876 | 876 | 876 | 876 | 829 |
| Variance to Approved FC | 3 | 5 | 10 | 17 | 20 | 20 | 19 | 17 | 3 | | | | | |

Numbers left of the bold line are actual. Numbers right of the bold line are projected.

| Attrition/Replacement | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Retirements | 1 | 3 | 6 | 4 | 2 | 4 | 3 | 3 | 4 | 4 | 3 | 3 | 45 |
| Other Attrition | 0 | 0 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 5 |
| Transfers to Other Orgs | 0 | 1 | 1 | 1 | 3 | 1 | 1 | 2 | 1 | 0 | 1 | 0 | 12 |
| Total Attrition | 1 | 4 | 9 | 11 | 5 | 5 | 5 | 6 | 5 | 4 | 4 | 3 | 62 |
| New Hires/Rehires | 3 | 1 | 3 | 4 | 2 | 5 | 7 | 5 | 18 | 0 | 3 | 11 | 62 |
| Transfers from Other Orgs | 4 | 1 | 1 | 1 | 0 | 0 | 1 | 3 | 1 | 0 | 0 | 0 | 12 |
| Total Replacements | 7 | 2 | 4 | 5 | 2 | 5 | 8 | 8 | 19 | 0 | 3 | 11 | 74 |
| Revised Forecast | n/a | 870 | 865 | 860 | 857 | 857 | 859 | 858 | 872 | 869 | 868 | 876 | |
| Variance to Approved FC | n/a | 6 | 11 | 16 | 19 | 19 | 17 | 18 | 4 | 7 | 8 | 0 | |
| FYTD Replacement % | 200% | 180% | 93% | 72% | 45% | 71% | 83% | 89% | 118% | 109% | 107% | 119% | |

**DEFINITION:**
Total TVA employees includes part time employees.
Attrition and replacement counts are for permanent employees only.
Replacement % is the total permanent replacement YTD divided by the total attrition of permanent employees YTD.

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**PROBLEM AREA**
* AFI - Succession Planning

| IMPROVEMENT ACTION PLANS | DUE DATE |
|---|---|
| **Conduct attrition survey** | Complete |
| **Review Knowledge Retention updates** | Complete |
| **Succession Planning** | |
| 18 Positions identified | Complete |
| 24 Candidates identified | Complete |
| Complete Talent Assessment | Complete |
| Develop & Update IDPs | Sep-05 |
| Next Succession Planning Meeting | 09/22/05 |

**External Additions/Projections**
Accepted/Not reported (2)
Approval/Offer Pending (1)
In-process (11)

| On-going Classes | |
|---|---|
| Mech Tech (13) | Jul-06 |
| Elect Tech (12) | Jul-06 |
| I&C Tech (9) | Jul-07 |
| SGPO (16) | Sep-06 |

| | |
|---|---|
| Knowledge Retention High Priority (20-25) | 3 |
| Knowledge Retention Position Risk (5) | 4 |
| Diversity Hires | 27% |

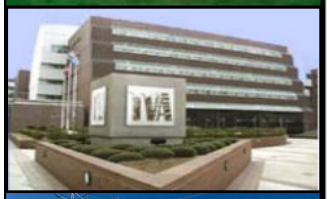
**BASIS**
TVAN FY 2005 Performance Plan Staffing Plan

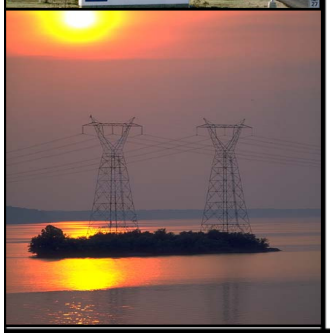
# Process Self-assessment

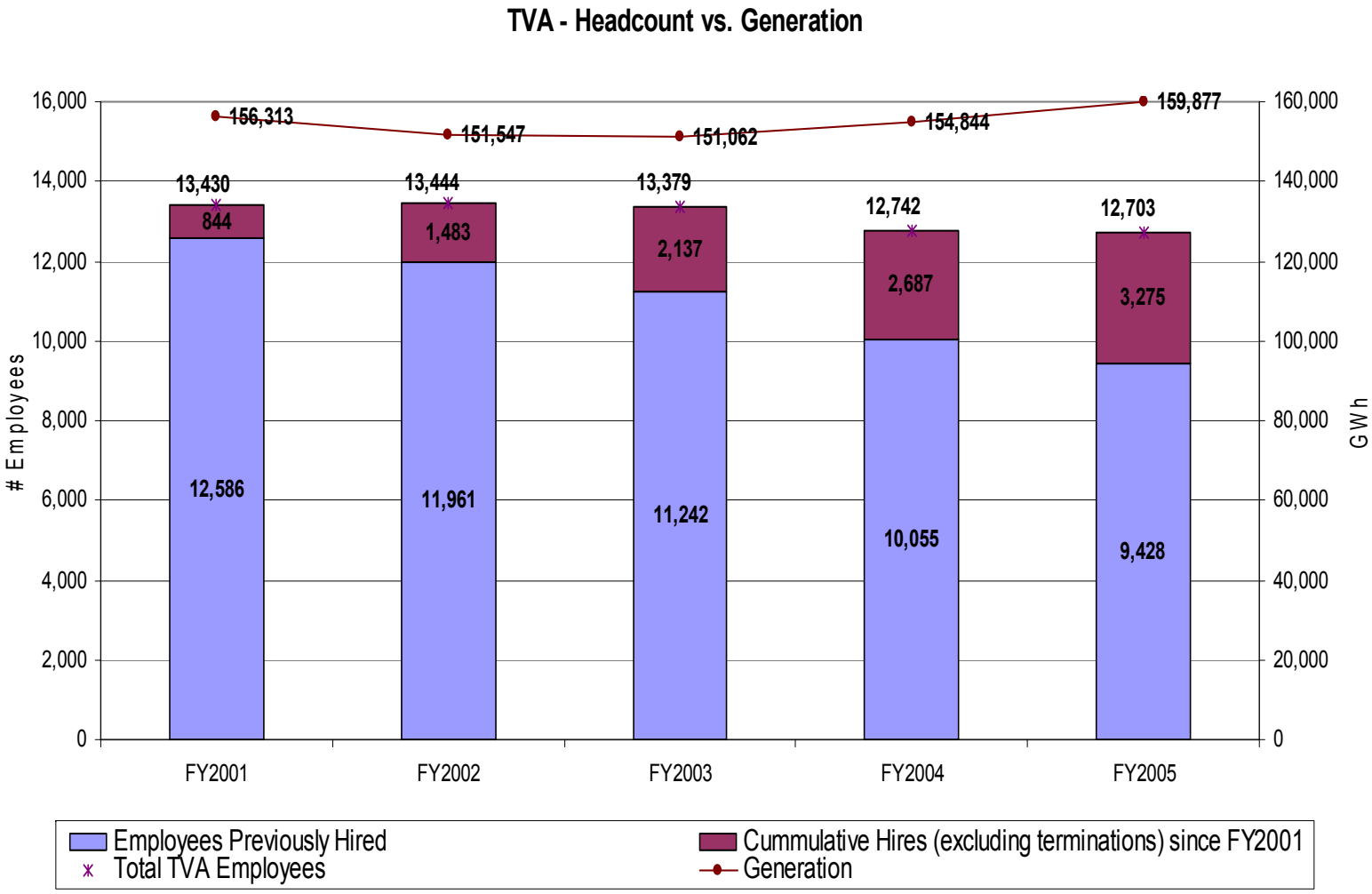
- Examined 57 employees who left from one division in January 2006
- Results
  - 35 as expected and not critical
  - 14 before anticipated date but not critical
  - 7 as expected, potential critical loss, and knowledge transfer had occurred
  - 1 unexpected, lost some knowledge

# TVA Headcount vs Generation



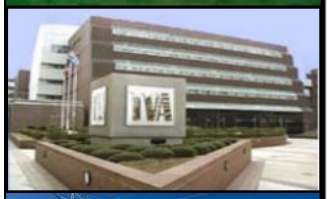


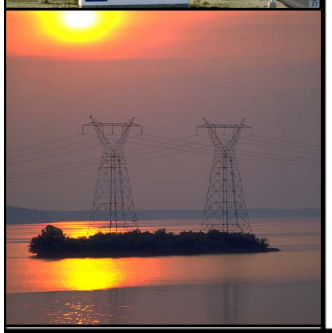





# Lessons Learned

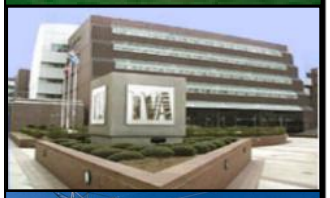


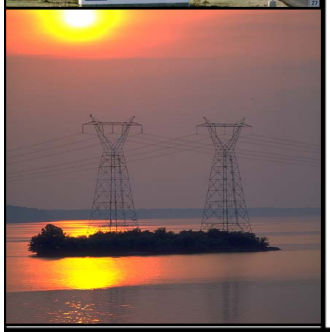




- Less at-risk knowledge than suspected
- Risk greatest in specialized technical positions and in problem solving strategies
- Wider range of options to mitigate knowledge loss than is typically considered
- Process and  procedures often weak – An over-reliance on “tribal knowledge” and individual expertise
- Pockets, or Functional Areas, of risk
- Line Managers must own the solutions





# *Questions?*

**For more information …**

**www.tva.gov/knowledgeretention**