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The Secretary of Energy

Washington, DC 20585

December 3, 1990

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DNF SAFETY BOARD

The Honorable John T. Conway  
Chairman  
Defense Nuclear Facilities Safety Board  
625 Indiana Avenue, N.W.  
Washington, D.C. 20004

Dear Mr. Chairman:

I am in receipt of your letter and recommendations of October 12, 1990 (Recommendation 90-7). As you know, the Department of Energy (DOE) submitted an Implementation Plan on August 10, 1990, that responded to four recommendations made by the Defense Nuclear Facilities Safety Board (DNFSB) concerning ferrocyanide in the single-shell tanks used to store high-level radioactive waste (HLW) at the Hanford Site.

The Department agrees with the need to accelerate and expand its programs to address HLW safety issues and will submit a supplement to its original Implementation Plan that is responsive to DNFSB Recommendation 90-7. The Department accepts the six recommendations that comprise DNFSB Recommendation 90-7, although the Department cannot implement immediately one recommendation given an unreviewed safety question involving the single-shell HLW tanks at Hanford that contain ferrocyanide. Preparation and approval of detailed safety evaluations are required to support work on these tanks. The Department believes that tank temperatures are well below any known temperature which could cause a reaction and maintenance is controlled until the required safety evaluations are completed. Detailed responses to each section of DNFSB Recommendation 90-7 are provided as Enclosure 1.

The Department has undertaken many management actions to aggressively address HLW safety issues. A HLW Tanks Task Force and a HLW Tanks Advisory Panel have been established to ensure that potential safety concerns with HLW tanks are identified and addressed in a systematic and timely manner. The Task Force, established in August 1990 under the direction of the Director of Environmental Restoration and Waste Management, Mr. Leo P. Duffy, is working with all facilities having HLW tanks to identify and address potential safety issues and to perform a detailed reanalysis of the postulated hydrogen and ferrocyanide accidents at the Hanford Site. The Advisory Panel, originally formed in June 1990 and expanded in August, will work with the Task Force and with Mr. Duffy to ensure technical credibility as well as to make certain that the latest scientific and technological knowledge are considered. Professor Mujid Kazimi of the Massachusetts Institute of Technology chairs this Advisory Panel. These initiatives are described in the HLW Tanks Task Force Work Plan, which was provided to the Board previously.

The DOE Richland Operations Office has established a new project office to address HLW tanks management and safety issues. (The proposed organization structure and mission statements for this new office is provided for your information as Enclosure 2.)

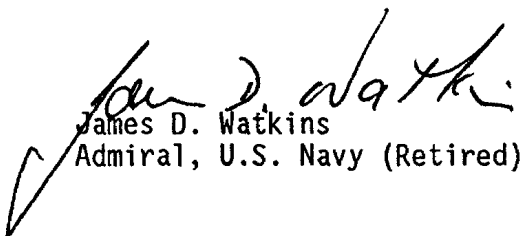
I have discussed the importance of the Hanford HLW tanks safety issues with senior Westinghouse Electric Corporation executives and have received their commitment for managerial and technical support. The Westinghouse Hanford Company (WHC), in recognition of the seriousness and urgency of reaching an acceptable resolution to issues relating to waste tank safety and remediation, will implement a new organizational structure on December 1, 1990. (A copy of the new WHC organizational structure is provided for your information as Enclosure 3). This new structure is designed to address concerns expressed by the Board and by the Department. Management of HLW will become the responsibility of a separate organization reporting directly to the WHC President. New senior management with proven related technical, scientific, operating, and project experience are identified to head the organization. This organization will be responsible also for obtaining the technical resources, both internally (WHC and Westinghouse corporate) and externally, necessary to assist in the resolution of identified concerns, and to respond promptly to new issues. Although reorganization was not a DNFSB-identified issue, the lack of a focused contractor organization is believed to be the root cause of many of the Hanford deficiencies.

My policy and actions continue to emphasize that safety is the number one priority at DOE. All operations in and around the Hanford HLW tanks that have been identified as being of a safety concern are now strictly controlled, with extensive safety reviews and senior management approvals required before operation. Certain operations have been curtailed, including the deferral of pumping interstitial liquid from two single-shell tanks containing ferrocyanide, until a safety analysis has been completed. Hanford has been developing integrated program plans to address both the ferrocyanide and the hydrogen issues.

The Department has initiated programs to aggressively identify for resolution any potential safety issues concerning the HLW tanks in the DOE complex with the initial focus on the Hanford tanks, i.e., the ferrocyanide and hydrogen issues. All actions will be conducted in accordance with all applicable requirements. Internal safety oversight organizations are being kept informed so that they can discharge their independent review function. We continue to work closely with the State of Washington and the U.S. Environmental Protection Agency in implementing any programs that may potentially affect regulatory compliance with Federal and state environmental requirements at the Hanford Site.

As you may know, I visited Tank 101-SY recently with Washington Governor Booth Gardner. Resolution of the Hanford HLW safety issues is one of my top priorities, and I am committed to working closely with the DNFSB to address these safety issues. Please contact me or Mr. Duffy if we can be of further assistance to the Board in this matter.

Sincerely,

  
James D. Watkins  
Admiral, U.S. Navy (Retired)

Enclosures

**ENCLOSURE 1**

RESPONSE TO  
DEFENSE NUCLEAR FACILITIES SAFETY BOARD RECOMMENDATION 90-7  
Issued on October 12, 1990

In September 1990, the Westinghouse Hanford Company (WHC) established a Ferrocyanide Task Team to manage activities related to resolving the ferrocyanide issue. A program plan is being prepared by this Task Team that will incorporate recommendations made by the Defense Nuclear Facilities Safety Board (DNFSB), a General Accounting Office consultant, and Department of Energy (DOE) experts. The program plan will be developed with detailed information on activities, milestones, and schedules on a rolling 3-month basis as well as planning schedules for the remainder of the program. The DOE High-Level Waste (HLW) Tank Task Force is working closely with the Westinghouse Ferrocyanide Task Team to ensure adequacy of this ferrocyanide program plan, which will be the basis for supplementing the Implementation Plan submitted in August and will be responsive to DNFSB Recommendation 90-7.

Many actions related to the ferrocyanide issue have been undertaken since submittal of the Implementation Plan in August 1990. Some of these actions, together with DOE's response to each DNFSB recommendation, follow.

*DNFSB Recommendation 90-7.1 Immediate steps should be taken to add instrumentation as necessary to the single-shell tanks containing ferrocyanide that will establish whether hot spots exist or may develop in the future in the stored waste. The instrumentation should include, as a minimum, additional thermocouple trees. Trees should be introduced at several radial locations in all tanks containing substantial amounts of ferrocyanide to measure the temperature as a function of elevation at these radii. The use of infra-red techniques to survey the surface of waste in tanks should continue to be investigated as a priority matter, and on the assumption that this method will be found valuable, monitors based on it should be installed now in the ferrocyanide bearing tanks.*

**DOE Response to DNFSB Recommendation 90-7.1** DOE accepts the intent of this recommendation, although DOE cannot add instrumentation to the "ferrocyanide" tanks immediately because of an unreviewed safety question involving these tanks. DOE is moving as quickly as possible to install improved temperature sensors at several radii in four tanks (104-, 105-, 106-, and 110-BY) that have substantial amounts of ferrocyanide and higher temperatures (130°F). The schedule for installing the improved temperature sensors in these four tanks (as well as planned actions for the other 18 HLW tanks at Hanford that contain substantial amounts of ferrocyanide) will be identified in the Implementation Plan. Work in and around any of the 22 ferrocyanide tanks will require performance of a detailed safety analysis and top management approval. Analyses of postulated accidents have been initiated to support preparation of procedures for work in and around those tanks that contain a substantial amount of ferrocyanide (e.g., monitoring for flammable gases and moisture in the dome space, core sampling, insertion of instrument trees). DOE estimates that it will take about 6 to 9 months to complete the safety analysis for installing the new instrument tree currently under development.

DOE believes that this delay is acceptable since preliminary modeling results indicate that the temperature inertia of these tanks is large and takes long periods of time to heat up and that heat transfer within a tank is sufficient

to keep any localized "hot spots" well below the initial ferrocyanide reaction temperature of 430°F.

The instrumentation trees will be capable of measuring temperature at various levels in the waste as well as performing other functions. WHC is continuing to investigate the feasibility of using infra-red techniques for possible early application. In addition, Hanford is working with Westinghouse Science and Technology Center personnel, scientists from national laboratories, and manufacturers to obtain spark-proof instrumentation, such as ultrasonic detectors, and video cameras, including use of fiber optics technology, for use in the HLW tanks.

*DNFSB Recommendation 90-7.2 The temperature sensors referred to above should have continuous recorded readouts and alarms that would signal at a permanently manned location any abnormally high temperatures and any failed temperature instrumentation.*

**DOE Response to DNFSB Recommendation 90-7.2** DOE accepts this recommendation. Temperature data from these four critical ferrocyanide tanks will be recorded, monitored, and alarmed at an existing, continuously manned control room. Because this capability may take up to 9 months to design, procure and install, an interim monitoring and alarm capability (not continuously manned) will be installed in the BY Tank Farm for existing thermocouples in the 104-, 105-, 106- and 110-BY tanks during the first quarter in 1991. WHC had previously implemented stricter procedures to ensure quality of thermocouple data from all HLW tanks. Operational procedures are being implemented to require same day analysis of the temperature data from the HLW tanks for detection of early trends.

*DNFSB Recommendation 90-7.3 Instrumentation should also be installed to monitor the composition of cover gas in the tanks, to establish if flammable gas is present.*

**DOE Response to DNFSB Recommendation 90-7.3** DOE accepts this recommendation. This capability is included in the design of the new instrument tree discussed above. Alternative instrumentation being considered to study the flammable gas accumulation issue for Tank 101-SY will be directly applicable to the ferrocyanide tanks.

*DNFSB Recommendation 90-7.4 The program of sampling the contents of these tanks should be greatly accelerated. The proposed schedule whereby analysis of two core samples from each single-shell tank is to be completed by September 1998, is seriously inadequate in light of the uncertainties as to the safety of these tanks. Furthermore, additional samples are required at several radii and at a range of elevations for the tanks containing substantial amounts of ferrocyanide.*

**DOE Response to DNFSB Recommendation 90-7.4** DOE accepts this recommendation. The Waste Characterization Plan for the Hanford Site Single-Shell Tanks (WHC-EP-0210, Rev. 1) will be revised to reflect the critical need to obtain core samples from the tanks containing ferrocyanide as soon as possible, in accordance with procedural requirements. Sampling of ferrocyanide tanks will

be initiated within the next 3 to 12 months, after completion of safety evaluations and the development of appropriate sampling techniques. Several core samples from different radii will be collected from the first few tanks considering the availability of riser locations, and need for statistically valid samples. The sampling and analysis protocol identified in the Hanford Federal Facility Agreement and Consent Order (commonly referred to as the Hanford Tri-Party Agreement, or TPA) are being reviewed to ensure that needed information is collected to address safety issues as well as TPA needs.

**DNFSB Recommendation 90-7.5** *The schedule for the program on the study of the chemical properties and explosive behavior of the waste in these tanks is indefinite and does not reflect the urgent need for a comprehensive and definitive assessment of the probability of a violent chemical reaction. The study should be extended to other metallic compounds of ferrocyanide that are known or believed to be present in the tanks, so that conclusions can be generalized as to the range of temperature and other properties needed for a rapid chemical reaction with sodium nitrate.*

**DOE Response to DNFSB Recommendation 90-7.5** DOE accepts this recommendation. A greatly expanded program is being aggressively pursued at the Hanford Site, the Los Alamos National Laboratory, and by Fauske and Associates, Inc., a firm under contract to Westinghouse Hanford Company. Resulting studies will include effects of possible catalysts and diluents on reaction initiation temperature. These studies are part of the overall ferrocyanide program plan; a draft will be available in December 1990 for DOE review.

**DNFSB Recommendation 90-7.6** *The Board had recommended ". . . that an action plan be devised for the measures to be taken to neutralize the conditions that may be signaled by alarms." Two types of measures are implied: actions to respond to unexpected degradation of a tank or its contents, and actions to be taken if an explosion were to occur. Your implementation plan stated that ". . . current contingency plans . . . will be reviewed and revised if needed." We do not consider that this proposed implementation of the Board's recommendation is adequately responsive. It is recommended that a written action plan founded on demonstrated principles be prepared as soon as possible, that would respond to indications of onset of abnormal temperatures or other unusual conditions in a ferrocyanide-bearing tank, to counter any perceived growth in hazard. A separate emergency plan should be formulated and instituted, covering measures that would be taken in the event of an explosion or other event leading to an airborne release of radioactive material from the tanks, and that would protect personnel both on and off the Hanford site. The Board believes that even though it is considered that the probability is small that such an event will occur, prudence dictates that steps be taken at this time to prepare the means to mitigate the unacceptable results that could ensue.*

**DOE Response to DNFSB Recommendation 90-7.6** DOE accepts this recommendation. Existing plans and procedures are being reviewed and an interim action plan to respond to the onset of abnormal conditions has been prepared and is undergoing internal Hanford review. DOE believes that the existing emergency preparedness plan for the Hanford Site is effective for previously identified potential accidents associated with waste tank operations. Joint exercises

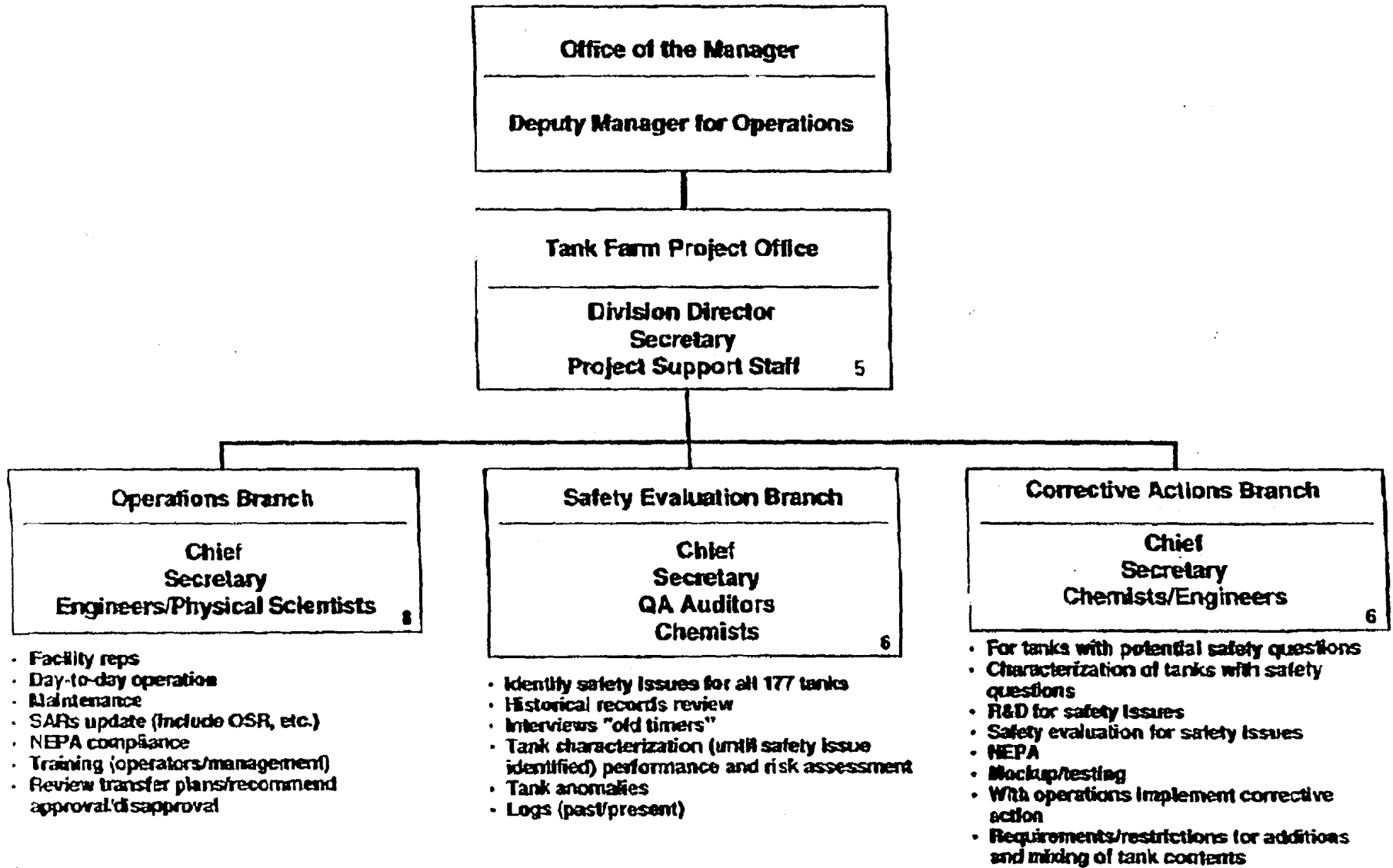
have been held with the State of Washington and local public safety agencies over the past few years. Given the potential for higher consequences of the postulated ferrocyanide accidents, DOE will review and update these procedures to ensure that they are adequate to respond to possible accidents in HLW tank farms.



ENCLOSURE 2

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**DRAFT****MISSION AND FUNCTION STATEMENT****TANK FARM PROJECT OFFICE (TFPO)****MISSION**

The Tank Farm Project Office (TFPO) plans, coordinates and provides general direction and integration of programs for the management, budgeting and storage of Hanford radioactive liquid waste in underground storage tanks. TFPO assures that all Tank Farm operations and maintenance are conducted in a safe and environmentally sound manner and are in compliance with the letter and interest of applicable regulations and standards.

The project support staff responsibilities include developing, planning and preparing budgets for the TFPO activities. Also, provides input to the Hanford Five-Year Plan for TFPO; performs schedule and budget performance activities for TFPO; provides document control services for the project office; provides interface with DOE-HQ and regulatory agencies for reporting and coordination; and prepares and disseminates reports to the proper agencies on TFPO activities.

**ORGANIZATIONAL STRUCTURE**

1. Operations Branch
2. Safety Evaluation Branch
3. Corrective Actions Branch.

**FUNCTIONS**

1. Operations Branch
  - a. Provides technical guidance during functional designs activities related to assigned waste storage facilities. Provides DOE approved functional design criteria to the contractor.
  - b. Plans, coordinates and provides general direction for the proper management of plant-generated radioactive liquid waste stored underground in Single Shell and Double Shell Tanks. The Tank Farm Project Office also manages the Evaporator Facility located in the Tank Farms.
  - c. Assures that current approved safety analyses and operational safety requirements are in place for Tank Farm facilities.
  - d. Assures compliance with applicable environmental regulations for all Tank Farm operations.
  - e. Ensures that day-to-day operations and maintenance of the Tank Farms is in accordance with requirements.

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### 2. Safety Evaluation Branch

- a. Responsible for identifying safety issues for all single and double-shell storage tanks at Hanford.
- b. Responsible for auditing existing records for each tank and establishing a historical file on each tank.
- c. Responsible for analyzing data collected in the audits and personal interviews to identify any new safety or environmental issues that need to be resolved.
- d. Establishes auditable records for each tank that can be used as reference files in the present and future.
- e. Identifies all tank anomalies and conducts performance and risk assessment for tank characterization.

### 3. Corrective Actions Branch

- a. Responsible for resolving all tank safety and operational concerns for tanks with potential safety questions.
- b. Characterizes chemical and physical properties of tank contents.
- c. Performs research and development activities on Single Shell and Double Shell tanks where needed to meet mission objectives.
- d. Conducts engineering evaluations and safety analyses.
- e. Conducts mock-up testing where necessary.
- f. Implements corrective actions in conjunction with the Operations Branch.
- g. Arranges for independent assessment review (peer) and oversight evaluations.
- h. Issues requirement and restrictions for additions to tanks and mixing of tank contents.

**ENCLOSURE 3**

PRIORITY MESSAGE  
November 16, 1990

To: All Westinghouse Hanford/BCSR Employees

Subject: WE'RE RESTRUCTURING FOR SUCCESS IN NEW ENVIRONMENTAL MISSION

Effective December 1, we are reorganizing to achieve success in carrying out our mission of waste management and environmental restoration. Our new organizational structure aggressively addresses the concerns of our DOE customer and oversight groups, including the DOE Tiger Team. I think you will agree that the new structure is a positive step in our transition.

In part, the reorganization results from our ongoing self-assessment, which indicates that we need to realign our talents and skills to focus on some major technical issues. It also is a product of listening to DOE, the states of Washington and Oregon, the public, various stakeholders and to you, our employees.

In the new organization, we have formed a staff-level organization dedicated to the waste tank farms; established an internal "Tiger Team"; restructured two groups that have key roles in our long-term environmental restoration and remediation mission; created a resource planning and integration department; consolidated employee development and technical training activities in a central organization; and set up dedicated maintenance support in two line organizations.

Media reports of our restructuring will no doubt highlight some aspects of the new organization over others. I want you to know, however, that I consider every element of the new organization to be extremely important to achieving success. Our expectation is that the new organization will help all of us to be even more effective in doing our jobs.

I am pleased to announce that we have successfully recruited Dr. Harry Harmon to join us as vice president, Waste Tank Safety, Operations and Remediation. We are also fortunate to have Steve Marchetti join us as the director of the new Tank Farm Project, which will report to Harry, as will the tank safety group and others. Together, they will provide the leadership and technical expertise necessary for effectively resolving tank farm issues.

We selected Harry, who is manager of the Chemical Processes and Environmental Technology Department at the Westinghouse Savannah River Company, for his technical knowledge, reputation and demonstrated ability to solve tough problems involving nuclear and hazardous materials. His extensive research in nuclear materials processing will serve him well in effectively meeting the scientific and technical challenges associated with the tank farms, and in interacting with scientific oversight groups. His broad network of contacts in the chemical industry, developed in 17 years with du Pont and Westinghouse at Savannah River, will assist us in recruiting additional technical expertise. Harry holds a Ph.D. in inorganic and nuclear chemistry from the University of Tennessee.

Steve, who earned his bachelor's degree at St. Francis College in Pennsylvania and a master's at Duquesne University, is currently manager of the Projects Management Department at Savannah River. He has been with Westinghouse for 19 years, serving in a variety of waste management and radiation safety positions at the Bettis Atomic Power Laboratory, the Naval Reactors Facility at Idaho Falls, the Waste Isolation Pilot Plant, the West Valley Nuclear Services Company and other sites before going to Savannah River two years ago. Steve was also here at Hanford for three years in the late 1970s with Atlantic Richfield and Rockwell.

The new Tank Farm Project will have the dedicated resources necessary to direct all aspects of tank farm operations in 200 East and West. This will include maintenance, engineering, safety, health protection, environmental and quality assurance support, as well as planning and cost schedule/control systems to ensure all activities are defined, costed, scheduled and controlled in a disciplined manner.

Ron Bliss is appointed vice president, Restoration and Remediation. This organization is responsible for the central, long-term mission of Westinghouse Hanford -- the environmental remediation of the Hanford Site -- which is embodied in the 30-year Tri-Party Agreement between the DOE and the Environmental Protection Agency and the Washington Department of Ecology.

Ron's organization will comprise current operations engaged in environmental restoration, waste storage and processing operations, such as the Central Waste Complex, T Plant and Grout; project activities such as B Plant, the Liquid Effluent Retention Facility, the Hanford Waste Vitrification Plant (HWVP) and Waste Receiving and Packaging (WRAP) facility, which will be involved in future processing of waste; and the engineering, permitting and environmental resources needed to support remediation activities. This group will be responsible for meeting the key milestones of the Tri-Party Agreement. Ron is currently vice president of the Environmental and Waste Management organization.

Dr. Mike Korenko is appointed vice president of a newly structured Engineered Applications organization. It will have a key role in environmental restoration as it focuses our technical resources on developing and applying technology to waste management and environmental restoration and on addressing alternative technologies. It will also make recommendations on waste prevention, characterization, stabilization, retrieval, processing, disposal and utilization. It will support remediation activities through analytical laboratories management, safety analysis and configuration control. It will work closely with Battelle and other DOE sites, national labs, universities and the commercial sector in developing solutions to Hanford remediation problems. Mike is currently vice president, Engineering and Development.

The reorganization involves the consolidation of major facilities and projects, such as the FFTF, N Reactor, PUREX, PFP, SP-100 and FMEF, into a new Facility Operations Division. Wally Ruff is appointed the acting director of the division. This group will have its own dedicated maintenance support staff. Wally currently manages the Waste Management Division.

Roger Knight will continue as director of Operations Support Services, which will now encompass Safeguards and Security, the Fire Department and Emergency

Preparedness -- functions which support all Hanford contractors -- as well as existing OSS activities. Maintenance support assigned to the Waste Tank Safety, Operations and Remediation and Facility Operations groups, however, will report directly to those line organizations. OSS will continue to provide maintenance support for the Restoration and Remediation organization and for other sitewide activities.

Dr. Ken Jordan is appointed director of Environment, Safety, Health and Quality Assurance. This department will assist all organizations in complying with environmental, safety, quality assurance, health protection and operational performance requirements called for by DOE Orders and federal and state regulations. It will be responsible for establishing our standards in these areas. Ken is currently manager of Quality Assurance.

Rich Slocum is appointed director of a new organization, the Performance Assessment and Oversight Department. This new activity, totally independent of all other parts of the Company, represents an innovative approach to overall Company performance assessments. The department will perform an independent oversight function separate from that of Environment, Safety, Health and Quality Assurance. In effect, it will be an internal "Tiger Team." It will also have the responsibility of assessing the overall performance and effectiveness of all elements of the Westinghouse Hanford Company in managing the engineering and operations contract for the DOE. We want this group to find our problems so that we can fix them ourselves. We expect this group to be professional, thorough and tough. Rich is currently Support Services manager.

Hank McGuire is appointed director of a new department, Resource Planning and Program Integration. The primary job of this department will be comprehensive, realistic, long-term planning for effective use of resources. It will develop a system to help management set priorities, make recommendations on resource allocation in view of budget constraints, consolidate out-year programs for financial planning and provide management the tools and information to evaluate needs versus resources. Hank is currently manager of Environmental and Waste Program Integration.

Human Resources and Administration will continue to be directed by Jim Cassidy, with added responsibility as the focal point for training related to the new mission. All employee training and retraining activities, with the exception of on-the-job or plant-specific training, will be consolidated within Human Resources Development. This will enable us to effectively develop and implement a retraining plan due to Secretary Watkins February 1.

The functions of Controller, Communications, General Counsel and Information Resources Management remain essentially unchanged under Ernie Vodney, John Burk, Karen Hoewing and Ben Dole, respectively. However, the General Counsel's Office will assume responsibility for internal investigations.

In a related move, Dan Simpson has announced his intention to retire July 1, 1991, after 25 years with Westinghouse. He has been vice president, Safety, Quality Assurance and Security, since September 1988. He will serve as special assistant to the President's Office until his retirement, and focus on assisting the new Performance Assessment and Oversight and the Resource



Planning and Program Integration departments with startup activities and other special assignments.

Also, Norm Boyter, who has been manager of the Defense Operations Division since August 1989, has accepted a new opportunity as manager of the Projects Management Department at Savannah River. He has made significant contributions here at Hanford in several key staff positions since 1987. We wish him well in his new assignment.

There will be a number of related reassignments and appointments made in the coming weeks to complete this restructuring. Your managers will be meeting with you to define any effect on your organization.

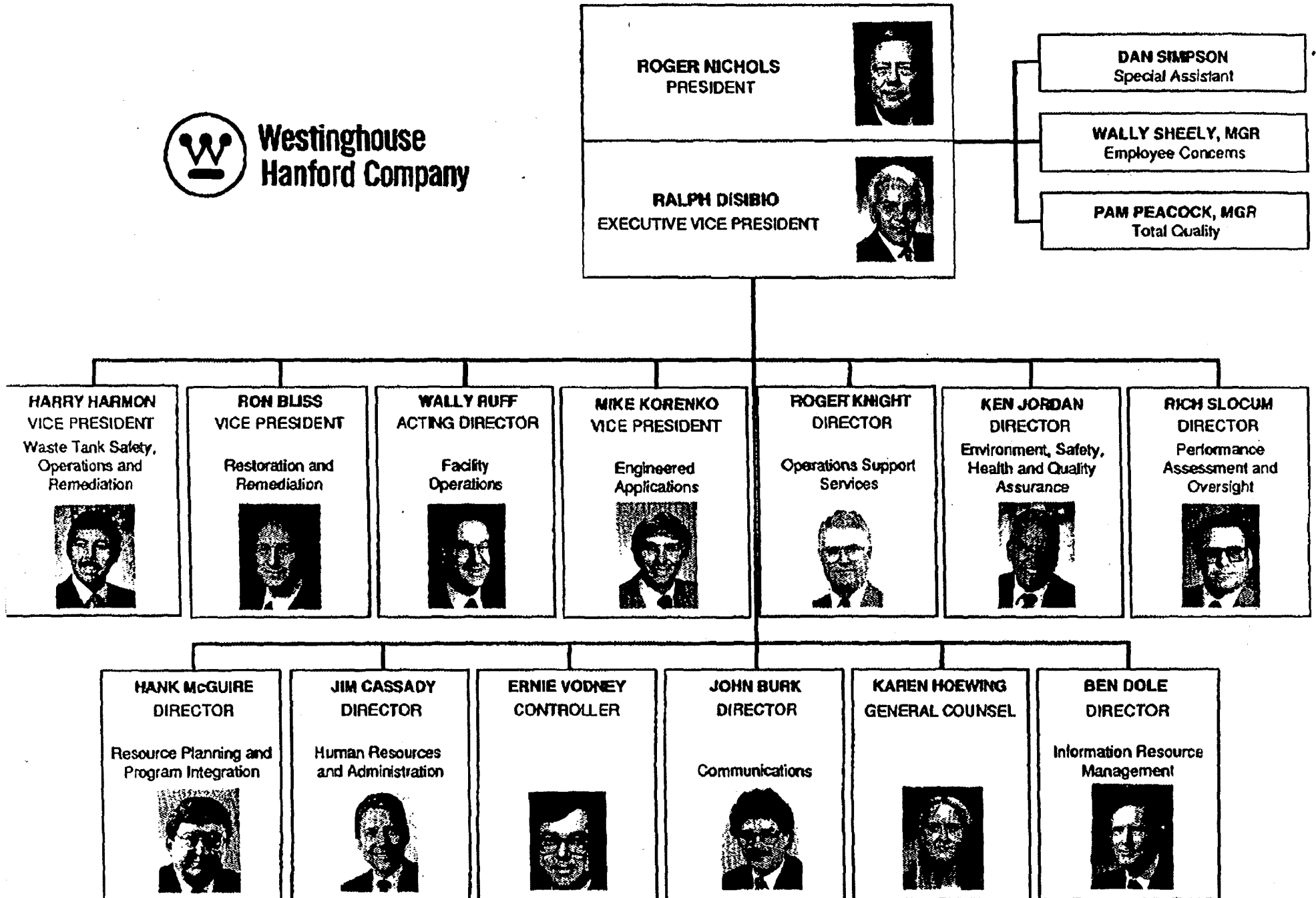
I am confident we have developed a framework for success in our new mission as well as for addressing several current and long-term priority issues. It is my hope that you will also see strengthened team efforts with the other Hanford contractors evolve through this reorganization.

I recognize the disruptive effects of changes such as these, but I am certain that your continued cooperation, patience and support will help us stay the course to leadership in environmental management. Each of you is key to making our new vision a reality, and to our success in carrying out the mission and meeting our commitments. Together, we can help create a positive legacy for future generations.

Roger Nichols  
President



**Westinghouse  
Hanford Company**



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