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Necessary and Sufficient Standards Closure Process Pilot: F- and H-Area Groundwater Remediation(U)

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Prepared for the U.S. Department of Energy under contract no. DE-AC09-89SR18035

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Executive Summary

The DOE Standards Committee's Necessary and Sufficient (N&S) Standards Closure Process was piloted at SRS on the F- and H- Area Seepage Basins Groundwater Remediation Project. For this existing Environmental Restoration project, the set of N&S standards for design and safety documentation were identified, independently confirmed and approved. Implementation of these standards on the project can lead to a $2.8 Million cost savings on the design, construction/installation, and safety documentation scope of $18 Million. These savings were primarily from site design of power distribution and piping for the water treatment units. Also contributing to the savings were a more appropriate level of safety documentation and the alternate "commercial" bids made by vendors in response to a request for proposals for water treatment units.

The use of the N&S Process on an ER activity, details on the cost savings, lessons learned and recommendations for broader implementation of the N&S Process are described herein.

1.0 Introduction

Activities and facilities at the Savannah River Site (SRS) vary from complex nuclear processing facilities unique to the Department of Energy (DOE) complex to simple water treatment and construction activities common in the commercial sector. Standards and requirements for all SRS activities and facilities are documented in the SRS Standards/Requirements Identification Document (S/RID), which has been prepared in accordance with DOE's response to the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 90-2. The majority of the requirements identified in the SRS S/RID are from DOE orders.

Prior to completion of the SRS S/RID, WSRC-Environmental Restoration (ER) Engineering responded to the EM-40 "Standdown" in January 1994 with a commitment to develop a "generic" ER S/RID to promote consensus on applicability of commercial standards and federal regulations versus DOE Order-based requirements. This Codes/Standards Initiative was proposed by WSRC because of the burdens and redundancy that DOE order requirements often cause for simple, low-hazard scope, such as ER activities. The result of this initiative was the "top-down" identification of codes and standards that can be used in lieu of 14 DOE orders in the areas of design, safety documentation, quality assurance, operations/maintenance, general environmental, safety and health, and training (Ref. 1, 2, 3).

Concurrent to WSRC-ER's Codes/Standards Initiative and SRS S/RID development, the DOE Standards Committee developed a process for identifying and closing on the necessary and sufficient (N&S) set of standards for activities or facilities.

To merge the SRS S/RID and the Codes/Standards Initiative and to demonstrate the viability and cost-effectiveness of the use of the Necessary and Sufficient Standards Closure Process, WSRC-ER implemented a pilot project on an existing ER groundwater remediation project. DOE-HQ approved the use this groundwater remediation project as the pilot (Ref. 4, 5). Subsequently, the DOE-SR Contracting Officer granted exemption to certain DOE orders, with the requirement that the N&S Process be used to determine the set of standards (Ref. 6, 7).

This report presents the results of the use of the N&S Process for the Codes/Standards Initiative, cost savings, lessons learned, and recommendations for broader implementation of the Process.

2.0 Necessary and Sufficient Standards for Environmental Restoration Activities

Activities within the DOE Complex are performed to environmental regulations, national consensus standards, and DOE orders. At times, though, combined application of these regulations, standards, and orders to ER activities causes duplication of effort or burdensome requirements, especially since most ER activities at SRS are simple and have low hazard levels (DOE orders are generally geared toward high hazard nuclear facilities). To avoid this, ER activities need to be managed to a set of necessary and sufficient (N&S) standards which will lead to technically-sound work being performed safely and more cost-effectively.

WSRC-ER selected the F - and H- Areas Seepage Basins Groundwater Remediation project (hereafter called F/H Groundwater Remediation) as the N&S pilot because it is typical of ER activities at SRS in terms of contamination levels and design considerations.

Because this project is currently in the definitive design stage, the pilot involves the identification of N&S standards for design and safety documentation, which are mainly covered by the SRS S/RID functional areas of engineering and nuclear safety and health.

The standards for the F/H Groundwater Remediation pilot were chosen from DOE orders and standards, SRS Engineering Standards and consensus codes and standards. The opportunity to avoid the expenditure of funds on redundant or unnecessary requirements is substantial. On the F/H Groundwater pilot project alone, WSRC-ER preliminarily determined that a cost savings/avoidance of $3 Million out of the $18 Million design, procurement, construction and safety documentation scope may be realized.

3.0 Necessary and Sufficient Standards Process

An explanation of how each process step was implemented on the F/H Groundwater Remediation N&S Pilot is described below. The N&S process steps are:

- Define Scope and Hazards
- Create Teams
- Establish Protocol and Documentation Requirements
- Identify the Set of N&S Standards
- Confirm the Set of N&S Standards
- Approve the Set of N&S Standards

3.1. Define Scope and Hazards

Based on the criteria established in the N&S Process Description (Ref. 8), a decision was made as to whether the N&S Process should be applied to a particular activity. For F/H Groundwater Remediation, use of the N&S Process was needed because the existing set of standards was not appropriate for the scope. Because the N&S Process was piloted on an existing SRS project (F/H Groundwater Remediation), the scope and the hazards were already well documented. (Ref. 9, 10, 11).

3.1.1 Activity Background

The F/H Areas Seepage Basins were shallow earthen pits that received hazardous and radioactive waste streams from SRS Chemical Separations facilities from 1955 - 1988. These seven seepage basins covered approximately 20 acres and received approximately 40 million gallons of wastewater per year. In 1988, the F/H Areas Effluent Treatment Facility began operations to receive this wastewater. The Seepage Basins were then closed per Resource Conservation and Recovery Act (RCRA) regulations. Completed in 1991, this closure consists of physical and chemical stabilization of the basin sediments and a low-permeability closure cap.

The operation of the F/H Areas Seepage Basins resulted in the contamination of the groundwater between the seepage basins and Four Mile Branch. The contamination consists of nitrates, metals, and radionuclides (e.g., tritium, cesium, and uranium) at concentrations exceeding protection standards. The contamination plumes for Phase I of the RCRA permit required corrective action cover approximately 100 acres in F- and H- Areas.

3.1.2 Activity Scope

The F/H Groundwater project includes the design and installation of two water treatment units and support services, such as piping, roads, electrical, etc. The groundwater treatment units, using a pump and treat process, are being designed and will be installed to remediate groundwater contaminated with hazardous and radioactive constituents to levels agreed upon by the South Carolina Department of Health and Environmental Control (Ref. 12).

This groundwater remediation project will meet the Phase I objectives of the 1992 RCRA Part B Permit Renewal Application for the F- and H- Area Hazardous Waste Management Facilities (seepage basins), which are to (1) provide adequate hydraulic control of the specified contaminated groundwater plumes, (2) remediate the extracted groundwater to specified cleanup levels, (3) inject the treated groundwater into the aquifer from where it originated, and (4) prepare the secondary waste generated by the treatment process for disposal.

This project will provide the following in each of the F/H Areas Seepage Basins areas:

- Groundwater Extraction and Collection System, including wells
- Modular Groundwater and Secondary Waste Treatment Facility
- Secondary Waste (Sludge) Collection and Packaging System
- Treated Water Distribution and Injection System, including wells
- Stand-alone Process and Domestic Water Supply Systems
- Electrical Power
- Control and Alarm Systems

3.1.3 Activity Hazards

The worker hazards associated with the operation of these units will be from the process chemicals, low levels of radioactivity in the process waste, and the typical occupational hazards associated with an outdoor operation. The amount of process chemicals were determined by a conservative assumption before the remediation technology was chosen. The assumed process chemicals, sulfuric acid and sodium hydroxide, exceed the 40 CFR 302 Reportable Quantities, but are still below the Emergency Response Planning Guideline thresholds. The typical occupational hazards associated with an outdoor operation include electrical hazards, heat stress, and hazardous plants and animals; these types of hazards are common to other SRS activities and are sufficiently covered in site safety programs. The radiological hazard potential to the worker is also minimal. A presumed line break would cause exposures of 0.14 mrem to an F- Area worker and 0.056 mrem to an H- Area worker, which are well below natural background doses of 300 mrem and the SRS administrative annual dose limit of 800 mrem (Ref. 13). The above hazards, plus ALARA concerns from the process waste, will be covered in the Health and Safety Program for operation of these units (Ref. 14).

To meet the RCRA permit, the project is scheduled to begin construction in FY96 and operations in FY97. Because the F/H Groundwater Remediation project is in the design stage, the scope of this N&S pilot is for the standards used for design and safety documentation. The design standards are further subdivided into:

- standards used for the site design (environmental, civil, architectural, electrical, and mechanical)
- standards used for the design of the groundwater treatment units to be designed and built by a vendor.

3.2 Create Teams

Team functions are described and specific members for this pilot are listed below.

Convened Group

Consists of the Process Team and Steering Committee as described below:

Process Team

This team managed the pilot process, selected the Standards Identification and Confirmation Teams, and interfaced with the Steering Committee. For the F/H Groundwater Remediation N&S Pilot, the team was:

- Michele Bullington, WSRC-ER, Process Team Leader
- Robert Baker, DOE-SR, ER Representative
- Mosi Dayani, DOE-SR, Quality Programs Division (QPD) Representative

Steering Committee

This committee provided guidance on the process and implementation constraints on the project. For the F/H Groundwater Remediation N&S Pilot, the committee was:

- Frank McCoy, DOE-SR, Environmental, Safety, Health and Quality (ESH&Q), Administrative Manager
- Mark Barlow, WSRC-Solid Waste and Environmental Restoration (SW&ER), Engineering Manager
- Jim Clark, WSRC-ER, Engineering Design Authority Manager
- John Pierpoint, WSRC- ER, F/H Groundwater Remediation Project Manager

Standards Identification Teams

These teams of qualified personnel identified the set of N&S standards and described the environmental, safety, and health protection provided by the standards.

Considering the intent of the N&S process, the scope and hazards associated with environmental management activities, and qualifications statements for related activities, the following were the qualification criteria for standards identifiers and confirmers:

- Baccalaureate degree in engineering, related science, or an appropriate field.
- Two years of experience in applying standards to environmental management activities.

Considering these qualification criteria and the scope of the F/H Groundwater Remediation design (electrical, mechanical, environmental) and safety documentation, the following personnel were selected by the process team and the steering committee for the F/H Groundwater Remediation N&S Process pilot (Ref. 15, 16, 17):

Site Design

- Eric Schiefer, WSRC-ER, Engineer
- Michael Hartz, WSRC-ER, Engineer

Vendor Design

- Vendor, to be determined through procurement process

Safety Documentation

- Andrew Vincent, WSRC-SW&ER, Safety Compliance Manager

The qualifications for these team members, except for the vendors, are listed in Appendix A.

Standards Confirmation Teams

These teams of qualified personnel confirmed that identified set of standards is N&S for the scope and hazards and are protective of the environment, safety and health.

The independent confirmation teams met the above criteria and were independent, meaning that they did not provide significant input to the identification of the N&S standards. The following personnel were selected by the process team and the steering committee for the F/H Groundwater Remediation N&S Process pilot (Ref. 15, 16, 17):

Site Design

- John Adams, WSRC-ER, Engineer
- Gerald Elysee, WSRC-ER, Engineer

Vendor Design

- Michael Hartz, WSRC-ER, Engineer
- Gerald Elysee, WSRC-ER, Engineer

Safety Documentation

- John Adams, WSRC-ER, Engineer

The qualifications for these team members are also listed in Appendix A.

Approval Authorities

The approval authorities approved the set of N&S standards for implementation. Their approval indicates that the N&S process has been followed and that the set of standards is appropriate for the scope. The following approval authorities were selected for this pilot because they are responsible for both the technical content and resource allocation for ER technical activities.

- WSRC - Bruce Schappell, WSRC-ER, Engineering Manager
- DOE - Cynthia Anderson, DOE-SR, ER Division Director

3.3 Establish Protocol and Documentation Requirements

The process team, steering committee, standards identifiers, and confirmers decided on the protocol and documentation requirements. This decision was based on the scope, hazard levels and stakeholder concerns. These decisions were continually communicated to N&S team members through orientation meetings, update meetings, and status reports (Ref. 18, 19, 20, 21, 22).

For the F/H Groundwater Remediation N&S Pilot, the protocol and documentation requirements were:

Documentation Requirements

Standards identification documentation includes the standards, a synopsis of the requirement including its environmental, safety, and health impact, and any implementation guidance or assumptions.

Identify, Justify, and Confirm Set of Standards

Considering the scope and hazards associated with the pilot, the standards identifiers used their expertise, comments from project team members and stakeholders, manufacturers recommendations, and other resources to identify the set of N&S standards. The standards identifier also described how the standards are adequate for the scope and hazards and protective of the environment, safety, and health. The standards confirmers independently verified that the identified standards are adequate for the scope and hazards and are protective of the environment, safety, and health.

Additional Expertise

The standards identifiers and confirmers were chosen based on their qualifications as applicable to the scope of the pilot. While the identifiers and confirmers could certainly consult with other experts not involved with this N&S Pilot on specific issues, they understood that additional expertise could be assigned to this Pilot as needed to complete the standards activities

Issue Resolution

The WSRC-ER Engineering Manager was responsible for resolving internal technical issues for design and safety documentation. Issues and comments between WSRC and DOE were resolved at the standards identifier and reviewer level. Any issues still unresolved would then be elevated to the Approval Authority level.

Approval Authority

The WSRC-ER Engineering Manager and DOE-SR, ER Division Director were the approval authorities.

Approve Set of Standards

The approval authorities received briefings from the process team and standards identifiers/confirmers, if requested, justifying the set of N&S standards. Satisfied that these are the appropriate standards for the scope and hazards and that the N&S process has been implemented, the Approval Authorities approved the standards for implementation.

Schedule

The N&S team members were updated on any changes to the schedule. The process schedule, as implemented, is presented as a Chronology of Events in Appendix B.

Stakeholder Involvement

The process team, steering committee, standards identifiers, and confirmers determined the appropriate level of stakeholder involvement for the scope and hazards being considered. For the F/H Groundwater Remediation N&S Pilot, the stakeholders, their roles, and specific interactions with the N&S teams are described in Appendix C.

Revision of Set of Standards

For proposed revisions to the sets of standards, the process team determined the level of approval needed based on any impacts to safety or to the resources needed to implement use of the standards. For minor revisions, which would include standards additions to make the set more complete and editorial changes, the process team could issue the changes. For significant changes, based on a change in the scope or hazards, the original approval authorities would have had to approve the revised set of standards.

3.4 Identify the Sets of N&S Standards

The final set of standards is in Appendix D. The identified set of N&S standards includes applicable regulations, consensus codes/standards, and any other requirements appropriate for the scope and hazards. It is important to note that the N&S Process is not intended to be a means for "getting out of" DOE orders; this process allows qualified personnel to chose the appropriate set of requirements, which may or may not include DOE orders. Because SRS is exempted from specific DOE orders for this pilot (approval from Contracting Officer), the standards identification team was given the freedom to determine if these orders were appropriate for inclusion in the N&S set.

The set of standards for the site design and safety documentation were identified as described in the protocol section. The standards identifiers divided the pilot scope into discrete elements or components. For each element, N&S standards were identified, and described in terms of environmental, safety, and health protection (Ref. 23, 24).

For the vendor design, the standards identifiers were the commercial vendors who bid on the procurement specification prepared by the F/H Groundwater Remediation Project Team. The vendors provided bids based on the primary specification and an alternate specification, which allowed the vendors to propose standards other than those listed in the specification. Appendix E describes the chronology of the vendor bid process for the primary and alternates and the results. The alternate standards identified by the vendors included commercial consensus standards, the vendors' company standards, and common commercial practices.

3.5 Confirm the Sets of N&S Standards

The engineers selected to confirm the set of standards were independent of the standards identification, even though they were members of the same department. This level of independent confirmation was determined to be adequate because the scope involves relatively low hazards and the technical personnel involved are experienced in environmental management activities.

For the site design and safety documentation standards, the independent reviewers confirmed that the sets of standards are implementable, adequate for the scope, and protective of worker safety and health and the environment. The standards confirmers documented their comments and discussed them with the standards identifiers. The standards identifiers then dispositioned the comments (Ref. 25 - 35).

For the vendor design, the standards confirmers used the information in the specification and the vendor bids to generate documentation with a format consistent with that for the site design and safety documentation. To meet the pilot schedule, the standards confirmers documented the set of standards based on the vendors' initial alternate bids. Because the vendor to be awarded the contract was not yet selected, the set of standards confirmed was applicable to all four of the vendors' bids. This confirmation assured that the set of standards is implementable, adequate for the scope, and protective of worker safety and health and the environment (Ref. 36).

After the vendors' best and final bids were received and the project team made a preliminary determination of which vendor would be awarded the contract, one of the standards confirmers reviewed that vendor's bid to assure that the set of standards initially confirmed for the vendor design was still adequate. The standards confirmer determined that minor modifications needed to be made to the set of vendor design standards to make it consistent with the alternate bid provided by the vendor expected to be awarded the water treatment unit contract (Ref 37). After the contract is awarded to the primary bid, modifications will be made, as needed, and agreed upon by the F/H Groundwater Remediation Project Manager to the specification and contract to make them consistent with the set of standards and the proposals represented in the alternate bids.

3.6 Approve the Sets of N&S Standards

The final sets of standards are in Appendix D.

The WSRC approval authority approved the sets of standards based on the recommendation of the standards identifiers/confirmers and the process team leader. The DOE approval authority approved the set of standards based on the recommendation of the DOE member on the process team and DOE personnel responsible for the subject areas covered by this pilot (DOE Engineering & Projects for design and DOE Environment, Safety, and Health for safety documentation). Any comments these DOE reviewers had were dispositioned by the standards identifiers prior to approval by either approval authority (WSRC or DOE) (Ref. 38, 39, 40, 41, 42, 43).

Minor revisions were made to the sets of site design and vendor design standards. The N&S Process team agreed that the proposed changes were minor and did not need to be approved by the original approval authorities (Ref. 44).

4.0 Implementation

The set of approved standards are being used to complete the site design, to initiate the vendor design, and to budget for the appropriate level of safety documentation. Scope changes identified as a result of the N&S Process will be formally cost estimated and incorporated into the project as the schedule allows.

The set of N&S standards for F/H Groundwater Remediation Design and Safety Documentation will be maintained (updated and distributed as necessary) by a WSRC-ER Engineering member of the F/H Groundwater Remediation Project Team. Project documentation (Functional Design Criteria, Procurement Specification/Contract) will be modified to reflect the N&S sets of standards as needed.

As a condition of performing this N&S pilot, the SRS S/RID process was to be used. This was done by requesting that those requirements in the SRS S/RID determined to *not* be necessary and sufficient for the F/H Groundwater Remediation Design and Safety Documentation be footnoted. The requested footnote read "This requirement is not in the set of necessary and sufficient standards for F/H Area Seepage Basins Groundwater Remediation, which is a pilot project for the Necessary and Sufficient Standards Closure Process. The sets of standards for F/H Groundwater Remediation Design and Safety Documentation are documented in documents G-ESR-G-00018, Rev. 2, and G-ESR-G-00019, Rev. 1" (Ref. 45). All of the SRS S/RID requirements determined to not be necessary and sufficient for this Pilot were in the Engineering Functional Area. Because the Nuclear Safety functional area focuses on nuclear facilities, it does not contain requirements applicable to F/H Groundwater Remediation, which is a non-nuclear activity.

5.0 Performance Indicators

5.1 Approval of the Sets of Standards

Approval of the sets of standards by the approval authorities means that the standards are appropriate for the scope and that the N&S process was followed in determining these standards.

5.2 Cost Savings

In January 1995, prior to initiation of the N&S Pilot at SRS, WSRC-ER estimated that a cost savings of $3 Million out of the $18 Million design, procurement, construction, and safety documentation scope can be realized on F/H Groundwater Remediation as a result of the Codes/Standards Initiative. This estimate was based on the hazard category at that time, commercial benchmarking for air strippers (which are not being considered for F/H Groundwater Remediation), and potential scope changes. Since that estimate, there have been several initiatives on the F/H Groundwater Remediation project and at SRS to eliminate burdensome or no-value-added requirements.

In an effort to identify savings opportunities on F/H Groundwater Remediation from the Codes/Standards Initiative, the hazard category of this activity was revisited and potential project scope changes were identified (Ref. 46). Because several DOE standards interpreting the definition of nuclear facilities and "less than nuclear" facilities have been issued in recent years, WSRC took this opportunity to re-evaluate the hazard category of F/H Groundwater Remediation (Ref. 47, 48). The hazard category had been determined to be low hazard nuclear in accordance with the HAD guide, DOE Order 6430.1A - General Design Criteria, and DOE Order 5480.5 - Safety of Nuclear Facilities (Ref. 49). In January 1995, upon re-evaluation based on DOE-STD-92-1027, the category was downgraded to radiological (Ref. 50). In May 1995, the hazard category was further evaluated to DOE-EM-STD-94-5502 and determined to be a non-nuclear (Ref. 11). These changes in the hazard category have lessened some of the design and safety documentation requirements, and thus costs, as described below:

1. **Tank Pad Curb Height**

"Nuclear" Requirement	DOE Order 6430.1A-1300 requires 10' pad curb heights
"Non-Nuclear" Requirement	SCDHEC requires 3.5' curb heights.
Cost Difference	$24,000 (Ref. 48)

2. **Change Rooms**

"Nuclear" Requirement	DOE Order 6430.1A-1300 requires two change rooms with showers.
"Non-Nuclear" Requirement	The project only needs one change room without showers.
Cost Difference	$87,000

3. **Pipe Walls**

"Nuclear" Requirement	DOE Order 6430.1A-1300 requires double-walled piping for "nuclear" liquids.
"Non-Nuclear" Requirement	SCDHEC allows single-walled pipe with F/H Groundwater Remediation contaminant levels.
Cost Difference	$1,298,000 (Ref. 49)

Note: Changing the pipe walls then lead to designing the pipes to be installed underground instead of above ground; this change eliminated the need for supports and clearing/grubbing. Also, by eliminating supports, thinner, less rigid pipe can be used (schedule 40, instead of schedule 80). These resulting design changes were initiated by the change from double-walled to single-walled pipe, but were not included in the cost difference estimate. These design changes will be included in the project's definitive estimate scheduled for early FY96.

4. **Safety Documentation**

"Nuclear" Requirement	DOE Order 5480.23 requires a Safety Analysis Report
"Non-Nuclear" Requirement	DOE Order 5481.1B requires a Safety Analysis
Cost Difference	Approx. $300,000 (Ref. 53)

Note: DOE Order 5480.23 - Nuclear Safety Analysis Reports;
DOE Order 5481.1B - Safety Analysis and Review System

Concurrent to the N&S Pilot, the SRS Engineering Standards (SRSES) program was being modified (Ref. 54). SRS Engineering Standards include specifications, design, construction, inspection, or test methods; test or acceptance criteria; or design details. These standards have been developed over many years of operations at SRS to implement DOE orders, commercial consensus codes and standards, "best practices" information and methods/criteria unique to SRS. In 1995, WSRC initiated an effort to increase the direct use of commercial consensus codes and standards for engineering work at SRS. The intended results are the elimination of standards that mainly reference commercial standards and the revision of standards that contain SRS unique or "best practices" information. SRSES have been used as design criteria for the F/H Groundwater Remediation project because SRSES were requirements when the project design was initiated. In February, 1995, which is the same month the N&S Pilot on F/H Groundwater was initiated, WSRC changed the application requirements for the standards; use of these standards for the lower functional classifications (General Services, Production Support) is no longer mandatory. Consequently, the F/H Groundwater Remediation site design that has been completed to date has been reviewed to determine if the SRSES were indeed part of the set of N&S standards. Several SRSES were determined to not be needed and were deleted from the project requirements, and thus, the set of N&S standards. The following standards deletions resulted in scope changes and cost savings:

1. **Clearing/Grubbing**

Previous Requirement	SRSES requires removal trees/brush with >1.5" diameter to 18" below grade.
N&S Requirement	Remove trees/brush with >2" diameter to grade.
Cost Difference	$213,000

2. **Electrical Right-of-Way**

Previous Requirement	SRSES requires clearing and grubbing for a 50' right-of-way on each side of above ground power lines >13.8 kV.
N&S Requirement	Per the National Electric Safety Code, use a 15' right-of-way on each side and a re-closer to stop power in case a tree does fall on power line.
Cost Difference	$30,000

3. 13.8 kV Power Lines

Previous Requirement	Traditionally installed overhead, DOE Order 6430.1A allows burial of these power lines if encased on concrete.
N&S Requirement	National Electric Code and National Electric Safety Code allows direct burial (without encasement); will be used in H- Area.
Cost Difference	$215,000 (Ref. 55)

4. Cable Type

Previous Requirement	DOE Order 6430.1A requires that <600 volt cable be solid and single cable.
N&S Requirement	National Electric Code allows the use of multi-conductor, stranded cable.
Cost Difference	$18,000

5. Grounding

Previous Requirement	DOE Order 6430.1A requires more lightning protection and more grounding than commercial codes require.
N&S Requirement	National Electric Code and National Electric Safety Code requirements for acceptable grounding impedance for medium voltage areas and a safe minimum grounding system for low voltage areas.
Cost Difference	To be determined at a later date.

6. Safety Documentation

Previous Requirement	DOE Order 5481.1B, Safety Analysis and Review System and DOE Standard EM-5502, Hazard Baseline Documentation, require a safety analysis in addition to an Occupational Safety and Health Act/Administration (OSHA) Health and Safety Program.
N&S Requirement	The OSHA (29 CFR 1910.120) Health and Safety Program, including a hazards analysis, and Process Safety Management (29 CFR 1910.119) provide an adequate level of safety documentation for the F/H Groundwater scope.
Cost Difference	Approx. $215,000

7. Vendor Design

Previous Requirement	Vendor primary bids based on F/H Groundwater Remediation Water Treatment Unit design specification, which included DOE orders and SRS Engineering Standards.
N&S Requirement	Vendor alternate bids based on the F/H Groundwater Remediation Water Treatment Unit design specification with exception to certain DOE orders, SRS Engineering Standards, and project specific requirements (i.e. - off-site testing, distributive control system).
Cost Difference	$373,000 (as described in Appendix E)

TOTAL SAVINGS (approx.) $2,800,000

The total savings on F/H Groundwater Remediation from the N&S Pilot is at least $2.8 Million, which is within 7% of the original $3 Million estimate, as shown in the table below.

	Preliminary savings estimate before N&S Pilot (1/95)	Savings estimate after N&S Pilot (9/95)
Site Design	$1687 K	$1885 K
Vendor Design	$885 K	$373 K
Safety Documentation	$437 K	$515 K
TOTAL	$3 Million	$2.8 Million

The fact that the vendor design specification was already commercialized to some extent is the main reason that the vendor design did not yield the savings expected.

The cost savings/avoidances identified by the N&S Pilot are from planning quality estimates. A definitive estimate will be completed for the entire F/H Groundwater Remediation Project in early FY96 and formal hard dollar cost savings will be processed at that time.

5.3 Other Changes Resulting from Use of N&S Process

In addition to the cost savings changes described above, there were changes in standards and in work processes which did not result in quantifiable changes to the project cost. Examples of these include the following:

- The Standard Building Code (SBC), which is the predominant code in the SRS area, was determined to be adequate, instead of the Uniform Building Code (UBC), which is invoked by DOE Order 6430.1A, General Design Criteria. Both of these building codes invoke the same consensus standards. The SBC was chosen as N&S for this pilot

because it is the local building code and local vendors/subcontractors will be more familiar with it. The UBC will be used, however, for topics that the SBC does not address, such as seismic considerations.

- The South Carolina Land Resources and Conservation Commission's (SCLRCC) regulations on stormwater management were determined to be adequate, instead of using both the SCLRCC regulations and DOE Order 6430.1A. While both the regulation and the DOE order have the same goal of effective stormwater management, they use different criteria for storm intensity and frequency. By applying both the regulations and the order, an overly conservative design can result. The SCLRCC regulations were identified as N&S for this pilot because they are the law and they provide an adequate level of environmental protection for stormwater management.

- The majority of the document, approval, and comment transmittals between WSRC and DOE on this pilot were on the team level, instead of at the program manager level. Currently, within WSRC and DOE, certain documents and requests for comment/approval are transmitted at the program manager level. WSRC and DOE decided that was not necessary for most of the activities being documented for this N&S Pilot. While WSRC and DOE management are kept informed by their pilot team members, the document and signature system has not been burdened any further by this N&S pilot.

- Approvals of minor changes to the sets of standards were made at the process team level. Typically, when changes are made to documents, the same level of approvals obtained for the original document is obtained for the revisions. For the changes made for this N&S Pilot, the process team informed the approval authorities of the nature of the changes, but did not go back through the formal approval cycle.

6.0 Lessons Learned and Feedback on the Process

1. Appoint a member of the DOE line management to the convened group (steering committee). While management of the Environmental Restoration Division at DOE-SR were not appointed to the steering committee to the F/H Groundwater Remediation N&S Pilot, they became involved in decision-making for the pilot on issues such as public involvement.

2. While the process is intended to be flexible and a tool for breaking paradigms, these positive aspects could be lost if the process is "over-proceduralized" during implementation. In addition, the process should take advantage of existing work practices that are effective (do not change them just for the sake of change or because this is a "new" process):

    - The process emphasizes the use of "teams" when individual qualified personnel can sufficiently do the job. The N&S Process Description states that "it is intended that the team perform its activities face-to-face as a group in determining ... the N&S set of standards." Standard identification/confirmation can be more of an individual activity than a group activity; this was the case for the N&S Pilot on F/H Groundwater Remediation. The members of the teams identified the standards for scope that they are qualified for (i.e. - the civil/environmental engineer identifies civil/environmental standards; the mechanical engineer identifies mechanical standards). This comment also applies to the convened group. The process implies that this group is to function as a team. In practice on the F/H Groundwater Remediation N&S Pilot, we addressed issues with the appropriate member of the convened group, instead of with the group as a team. For example,

questions dealing with the N&S Process were directed toward the DOE-ESH&Q representatives on the convened group, while questions associated with the impact of the N&S pilot on the F/H Groundwater Remediation project schedule were directed toward the WSRC-ER project management representative on the convened group.

- A graded approach for documenting protocols should be emphasized. For example, the process description calls for "a procedure for how comments and differing opinions are to be resolved, and a procedure for how team member qualifications are to be documented". A one line statement on issue resolution and simply documenting the qualifications would be sufficient.

- The existing teamwork between WSRC-ER and DOE-ER for this pilot is effective, so the teamwork protocol "encouraged" by the N&S Process were not needed. The N&S Process Team at SRS initially established a protocol that after the standards confirmation, the WSRC Approval Authority would approve the set of N&S standards prior to issuing the set to DOE for review, comment, and approval. This is contrary to the natural teamwork approach we normally take, which is to have DOE review the product prior to obtaining approvals. As confirmation was being completed and the approval phase was approaching, the Process Team realized that a change in planned approval method was needed. The resulting approval process included an informal "presentation" of the standards to DOE, DOE review and comment, WSRC disposition of comments, then approval by WSRC and DOE .

- Other experts (not members of the N&S team) can be used to some extent without formally involving them in the process. At SRS, there are several technical experts that were called upon during this pilot by the standards identifiers and confirmers to provide assistance on specific questions. This is a common practice at SRS and should not necessitate the formal inclusion of these experts on the N&S team. If there had been enough questions addressed to certain site experts, the N&S Process Team would have considered adding them to the Standards Identification or Confirmation Teams. In recognition of this resource availability, the qualification criteria for standards identifiers and confirmers was changed. Originally, the one of the criteria was that the technical expert be assigned to organization directly responsible for implementing the N&S Standards, or to an organization that provides direct support to the implementing organization. This requirement has been omitted from the qualification criteria to reflect that technical experts from any SRS organization or even independent of SRS could be called upon for assistance, if necessary.

3. Evaluating relevant sources of existing standards should be better emphasized as just that. The tendency is to revert an evaluation of the universe of requirements, which is neither technically feasible nor cost effective.

4. Emphasize that the set of standards is a "living document" and can change as scope, hazards, agreements, or other conditions dictate. Also, establish a protocol for how to change the set of standards and what level of approval is needed for that revised set. This was important during the SRS N&S Pilot. During the N&S pilot: the project hazards were re-assessed and the category was downgraded; the SRS system of engineering standards was re-vamped, making former requirements into guidance; and the project schedule was delayed, which effected the timing of the vendor proposals. These changes impacted the set of standards identified during this pilot. As described earlier, the set of standards for both the site design and vendor design were revised. The N&S Pilot Process Team established a protocol as the situation arose on this pilot. For future applications of the N&S Process, this protocol should be established in advance.

5. Stakeholder involvement should be described as being both inherent to the process and being an additional process step. For the SRS N&S Pilot, some of the stakeholders (DOE, Project Manager) were on the process team and the steering committee. Their involvement was natural because it is normally the way we do business at SRS. The involvement of other stakeholders, such as the Environmental Advisory Committee and the public, was a result of meetings held specifically for this purpose. To make these meetings effective, the intended goals must be clearly advertised so the correct audience participates. For the SRS N&S Pilot, the only topic of the public meeting was the use of the process on the F/H Groundwater Remediation Project. The intended audience was facility workers and the public. Other forums for reaching this audience should be considered. These forums may include worker roundtable discussions at SRS facilities, presentations to advisory committees and local chapters of standards organizations, and public meetings at which there are many topics being addressed.

6. Establish the approval process early in the project to be sure that all personnel are oriented to the N&S Process. Initially, the N&S Pilot Process Team did not identify the DOE reviewers who would be involved prior to approval by the DOE Approval Authority. Consequently, these personnel were not involved in the entire process, as would have been ideal. Additional orientation sessions were held later in the process to orient new personnel to the process, scope, and hazards.

7. While the cost of implementing this pilot was approximately $125,000, future application of this process should be less once it is more established. The activities completed during this pilot that may not be done upon full scale implementation include: update meetings and status reports for DOE, process issue resolution, and the public meeting. The breakdown of expenditures is:

   - WSRC Technical Support (standards identification, confirmation, cost savings scope and estimating, support of presentations/briefings) = $30,000
   - WSRC Process Leadership (overall management of the pilot, updates, presentations) = $72,000
   - DOE-ER Process Leadership, technical review of standards, public meeting support = $18,000
   - The costs associated with organizing and advertising the public meeting was tracked separately. Public meeting arrangements = approximately $4000.

7.0 Recommendations for Broader Implementation of the N&S Process at SRS

The Department Standards Committee intends to make a recommendation to Secretary O'Leary in December 1995 on further implementation of the N&S Process. Assuming that the recommendation for further implementation is approved and is implemented at SRS, the following approach for ER activities is suggested:

- Determine which projects or specific aspects (functional areas) of the ER program meet the criteria described in the N&S Process Description. In summary, the criteria for use of the N&S Process are: if a set of standards does not exist, if the existing set of standards is no longer appropriate, or if the existing set of standards is not sufficient. Obviously, the Process can be used if the contract with DOE specifies it.

- Determining a set of standards for a particular project would be most effective if the project involves a unique activity not applicable to other ER waste units, such as the use of dynamic compaction for the Low Level Radioactive Waste Disposal Facility closure. Otherwise, developing a set of standards for an activity or a functional area would be more cost-effective as this set could be used repetitively for ER projects, as would be the case for waste site closure earthwork or for QA requirements. By doing this, DOE approval of the set of standards would only be needed once for each activity/functional area as long as the project specific use of that set did not include any additional or alternate standards.

- The use of the N&S Process is specifically recommended for:

  - Development of a Quality Assurance (QA) Program Plan for ER. ERQA is planning to do most of this in early FY96. The intent of this program plan is to determine which QA requirements are appropriate for ER activities. Site QA, ERQA, and other ER personnel should be considered for inclusion on the N&S team determining QA standards for ER.

  - Determination of an Operations and Maintenance Requirements Baseline for ER's A - and M- Area Facilities. These requirements will drive a program implemented by subcontractors, on-site forces, or a combination thereof. This activity is currently being planned without the use of the N&S Process, meaning that a top-down approach to Conduct of Operations, Work Control and other requirements is being taken. By using qualified personnel on the team determining the requirements, the top-down set could readily be modified to an N&S set to ensure that the set is not burdensome for the scope. ER Operations, ER QA, site Conduct of Operations, site Maintenance, Procurement, and safety/industrial hygiene personnel should be considered for inclusion on this team.

  - Determination of Appropriate Radiological Controls Requirements for ER Activities. The WSRC 5Q, Radiological Controls Manual acknowledges the special nature of ER activities and the need for some radiological considerations different from other activities governed by the Radiological Controls Manual. Section 371 of the 5Q Manual lists specific subject areas for which radiological control requirements may need to be modified for ER activities, as approved by the Radiological Controls Manager. These subject areas include: use of certain personnel protective equipment as normal conduct of operations due to lack of engineering controls and the temporary nature of the work; precedence of state and federally mandated soil clean-up criteria over surface contamination criteria that otherwise apply; and monitoring and survey frequency for inactive facilities or large areas that are infrequently occupied. The N&S Process could be used to determine which radiological control requirements are appropriate for specific ER activities. The use of the N&S Process would provide the "documentation of technical equivalency" required by the 5Q Manual. Specific topics (potentially burdensome) that should be considered by an N&S review of Radiological Control requirements include: requirements for work planners (engineers, project managers) to be trained to the same level as the field workers; requirements for comprehensive ALARA reviews for each radiological activity; and requirements for extra fences for buffer zones. ER Waste Sites, ER Groundwater, ER Operations, ER Engineering, Construction and Radiological Control personnel should be considered for inclusion on the N&S team determining Radiological Control requirements for ER activities.

- By using the N&S process on the above mentioned aspects of the ER program, the N&S set for the entire ER program will be started. The same approach can be used to determine the remaining aspects of the ER program, such as design, characterization, and regulatory decision documents. Eventually, the set of standards for the entire ER program would be determined by the N&S Process.

8.0 References

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A10. "Engineer: Rules Drive Up Clean Up Costs", K. Schill, Augusta Chronicle (newspaper), September 8, 1995.

Appendix A. Qualifications of Standards Identifiers and Confirmers

Eric P. Schiefer

Degree: B.S., Civil Engineering, 1975

Organization: ER Engineering

Experience: 20 years of experience in engineering design in the civil/structural/architectural disciplines.

Prior to SRS, 15 years of experience was gained designing commercial nuclear plants which followed Nuclear Regulatory Commission rules. National commercial consensus codes and standards were also used, in particular with the design of Not Important to (Nuclear) Safety structures, systems and components.

5 years of experience with WSRC, including: Lead engineer for the Center of Excellence and the Standard Design Criteria Committees for the civil/architectural/environmental disciplines, which ensured all pre-conceptual engineering documents produced by Systems Engineering specified the proper applicable DOE Orders, regulatory requirements and national consensus codes and standards; and Acting Manager for the (Environmental) Project Activities and Systems Engineering Group in the Site Geotechnical Services Department, which provided the Environmental Restoration Department pre-conceptual engineering documents which in part specified the proper applicable DOE Orders, regulatory requirements and national consensus codes and standards.

Michael Hartz

Degree: B.S. Mechanical Engineering, 1985
M.S. Environmental Systems Engineering, 1991

Organization: ER Engineering

Experience: Prior to SRS, 2 years of experience in laboratory research on transport of dissolved, vapor, and non-aqueous phases of volatile compounds in bench scale aquifer models.

5 years of experience with WSRC, including: Design authority for RCRA landfill investigation/closure, underground storage tank closure, soil gas investigations, soil borings, and other geotechnical investigations; design agency for electrical and mechanical design, Health and Safety support, and NPDES/air permit calculations to support demonstration of vendor's Electron Beam technology for destruction of organic contaminants in water; technical support of various groundwater remediation projects; technical oversight of drilling activities; and managed/disposed of hazardous waste generated during investigations.

Appendix A. Qualifications of Standards Identifiers and Confirmers (Contd)

John A. Adams

Degree: B. S. Environmental Engineering, 1989

Organization: ER Engineering

Experience: Prior to SRS, 2 years experience with an electrical authority preparing environmental permit applications, performing environmental audits at the generating plants, running an air dispersion model for Clean Air Act compliance at all facilities, and performing engineering calculations.

5 years of experience at WSRC including: Project sponsor and design authority for Environmental Restoration groundwater projects. Responsibilities have included development of pre-conceptual engineering documents and safety documentation, and review and approval of design and compliance documentation. Some specific tasks include Functional Performance Requirements for a groundwater remediation and a bioremediation facility, regulatory documents for remedial actions, a readiness review evaluation for ER activities, and identification of ER freeze protection requirements . In addition, attended required and continual training in environmental regulations, occupational safety and health, and DOE orders, codes and standards, general engineering for the civil, electrical, and plant design disciplines.

Gerald E. Elysee

Degree: B. S. Electrical Engineering, 1989
B. S. Physical Science, 1989

Organization: ER Engineering

Experience: 5 years of experience at WSRC including: Systems Engineering responsibilities for a computer support facility addition, and standby and emergency lighting systems' upgrades for nuclear facility; Systems Engineering responsibilities include developing Functional Design Criteria (FDC) documents which define the applicable codes and standards necessary to ensure regulatory compliance. Replacement Tritium Facility technical support for the timely resolution of technical, safety, and programmatic issues associated with process systems during construction and startup testing. Design Authority activities for Environmental Restoration Groundwater projects and operating facilities. Specific design authority activities include preparing design input documentation to establish the technical criteria necessary to ensure projects meet the design objectives and customer requirements; and exercising review and approval authority for technical acceptance, and issuance of final design output documents to be used in the field for construction. Other duties include originating, reviewing, and approving electrical design work associated with changes and upgrades to ER Groundwater facilities' electrical systems.

Appendix A. Qualifications of Standards Identifiers and Confirmers (Contd)

Andrew M. Vincent

Degree: B. S. Nuclear Engineering, 1980
M. S. Nuclear Engineering, 1982

Organization: Solid Waste and Environmental Restoration Engineering

Experience: 13 years of experience at SRS including: 11 years of safety analysis development, safety documentation development and interpretation, and safety oversight for SRS reactors; 2 years as Manager of Solid Waste Safety Compliance Group, with responsibility for development and maintenance of Division Safety Documentation. Within SW&ER, developed the E-Area Vaults Safety Analysis Report (SAR), the Consolidated Incineration Facility SAR, and currently developing the Solid Waste Management Facility (SWMF) SAR. The SWMF SAR includes several ER facilities, namely the Mixed Waste Management Facility and the Old Burial Ground. Also responsible for SW&ER order compliance and Price Anderson Act implementation program. The order compliance program requires familiarity with requirements beyond the DOE order system to develop the relevant S/RID's for the Division. Hold position on both SW and ER "Facility Operations Safety Committees", which address safety documentation issues. At these meetings, I provide the primary perspective on the adequacy of safety documentation. Relevant Training includes "Understanding Nuclear Licensing" (spanned the Code of Federal Regulations and the DOE Order system) and "Unreviewed Safety Questions"

Appendix B. Chronology of Events

2/6/95	WSRC transmits a contracting officer letter to DOE requesting approval of the use of the F/H Groundwater Remediation project as a codes/standards pilot, exempting the project from specific DOE orders.
2/8/95	DOE-SR (ESH&Q) endorses the ER Codes/Standards pilot as one of the DOE complex Necessary and Sufficient Standards Process pilots.
2/17/95	DOE-SR (ESH&Q) provides WSRC-ER with information on the N&S Process.
3/24/95	WSRC-ER selects standards identification and confirmation teams based on project scope and personnel qualifications.
3/30/95	WSRC-ER holds an orientation session for the process team, identification team, and confirmation team.
4/1/95 - 5/7/95	WSRC-ER identification teams review standards used for previous projects, communicate with other site personnel, and begin identifying standards.
4/25/95	DOE-HQ approves implementation of N&S Pilot on F/H Groundwater Remediation.
5/8/95	Standards identification work is delayed because of the F/H Groundwater Remediation procurement schedule and a funding shortfall within the ER Program.
5/25/95	DOE-SR approves implementation of N&S Pilot on F/H Groundwater Remediation.
6/20/95	DOE-HQ visits SRS to discuss the ER N&S Pilot.
6/26/95 - 7/27/95	WSRC-ER identifies and confirms set of N&S standards for site design and safety documentation.
7/13/95	WSRC-ER Standards Identifiers present standards to "internal customers" ER Operations Manager and ER Project Manager. WSRC-ER Process Team Leader provides a draft set of identified standards to DOE.
7/27/96	WSRC-ER Standards Confirmers complete independent review and Standards Identifiers complete comment resolution. WSRC-ER Process Team Leader provides a set of confirmed standards to DOE.
7/27/95 - 8/4/95	DOE-SR (ER) reviews set of N&S standards for site design and safety documentation.
7/28/95	Vendor submit initial proposals (standards identification) to WSRC for groundwater treatment unit.
7/31/95 - 8/16/95	WSRC-ER confirms set of N&S standards for vendor design of groundwater treatment unit.
8/15/95 - 8/21/95	The WSRC and DOE approval authorities approve the set of site design and safety documentation standards.
8/17/95 - 8/28/95	DOE-SR (ER) reviews set of N&S standards for vendor design of groundwater treatment unit.
8/28/95 - 8/31/95	Bid clarification meetings held with vendors. Intent and significance of the alternate proposals (for the set of standards for vendor design) are discussed.

Appendix B. Chronology of Events (Contd)

9/7/95	WSRC-ER pursues further stakeholder participation by presenting to the public and SRS workers the use of the N&S process for identification of standards for F/H Groundwater Remediation.
9/11/95	Vendors submit best and final proposals to WSRC for water treatment unit.
9/13/95	WSRC and DOE approval of the vendor set of standards (based on initial proposals)
9/20/95	WSRC Process Team Leader issues final sets of standards incorporating minor changes (editorial, and based on best and final proposals from chosen vendor).
9/20/95	WSRC-ER submits a revision to the SRS S/RID for site design and vendor design indicating which requirements were determined to *not* be necessary and sufficient for F/H Groundwater Remediation.
9/25/95	WSRC-ER completes final report on SRS N&S pilot and prepares for September 28, 1995 presentation to DOE-HQ (Department Standards Committee).

Appendix C. Stakeholder Involvement

Approval Authorities

The WSRC-ER and DOE-SR approval authorities for the set of N&S standards for this pilot were stakeholders because they are responsible for the set of standards and its implementation. Communications with the approval authorities were through WSRC-ER and DOE-SR process team members and the steering committee.

Project Manager and Operations Manager

The WSRC-ER Project Manager and Operations Manager were stakeholders because they are responsible for safe installation and operation of the treatment unit and supporting structures. The Operations Manager represents the workers who will eventually operate the F/H Groundwater Water Treatment Units; these operators are not yet identified. Communications with the Project Manager and Operations Manager were through the WSRC-ER process team leader and by the members of the standards identification/confirmation teams. These continual communications lead to better definition of the project scope, schedule, and operational requirements. Both the Project Manager and Operations Manager were involved in design decisions throughout the F/H Groundwater Remediation project. (Ref. 22, 5/5/95) A presentation of the set of site design and safety documentation N&S standards was made to the Project Manager and Operations on July 13 (Ref. A1)

Engineering

The various engineering organizations within WSRC were stakeholders because they can affect and may be affected by the results of this process. Other engineering organizations that can affect the outcome include the design engineers that are responsible for using the identified standards in the project design and other engineering organizations that may want to implement this process in the future on their facilities/activities. Communications with the engineering organizations were through the WSRC-ER process team leader and by the members of the standards identification/confirmation teams. For example, several of the standards for the electrical scope of F/H Groundwater Remediation were discussed with the Power Engineering Department, as they are the custodians of most of the power lines at SRS. Their input provided the ER N&S standards identifiers with a better understanding of site requirements and commercial practices (Ref. A2).

Environment, Safety, Health, and Quality Assurance

Various Environment, Safety, Health, and Quality Assurance (ESH&QA) organizations within WSRC and DOE are stakeholders because they may affect or be affected by the results of this process. ESH&QA is responsible for the SRS approach to a standards-based program, in response to DNFSB recommendation 90-2. The Standards/Requirements Identification Document is the SRS response to 90-2. The WSRC-ER process team leader is also the ER S/RID point of contact and ensured that SRS S/RID requirements determined to not be N&S as a result of this F/H Groundwater Remediation N&S pilot are identified as such (Ref. 41, A3).

Department of Energy - Headquarters

Various organizations and committees within DOE-HQ are stakeholders because they can affect the results of this process. DOE-Environmental Management (EM) authorized the use of the DOE Standards Committee's N&S process on an SRS-ER project. (Ref. 5) In July, 1995, DOE-EM-23 initiated bi-weekly conference calls with all of the EM N&S pilots across the complex. These calls were effective forums for learning the status, issues and lessons learned from other pilots. DOE-Environment, Safety and Health (DOE-EH), which endorses a standards based

Appendix C. Stakeholder Involvement (Contd)

program, met with the SRS N&S pilot team in June 1995 to monitor the progress of this pilot (Ref. 22 - 6/22/95) . WSRC provided DOE with feedback on the process and DOE provided WSRC with feedback on our implementation of the process. In addition, DOE-EH's Office of Oversight conducted a scheduled surveillance on the N&S Pilot Public Meeting held on September 7, 1995. The results of this surveillance was that the meeting was informative, conducted professionally, and afforded the public the opportunity to become knowledgable of SRS activities which may affect their health, safety, environment or quality of life (Ref. A4). DOE-Defense Programs visited SRS in January 1995 to investigate the use of commercial codes/standards within the DOE complex; WSRC-ER presented information on this ER N&S pilot to the DOE-DP Industry Codes/Standards committee. Communications with DOE-HQ were through the DOE-SR (ER and EH) process team members and the DOE-SR (EH) steering committee member.

Environmental Advisory Committee

The Environmental Advisory Committee (EAC) consists of nationally recognized experts in the environmental field. The purpose of the committee is to provide independent review and consultation on strategic and long-range environmental issues affecting SRS. The EAC was a stakeholder because it can affect the outcome of the work through their recommendations process. The EAC's comments were related to the level of safety ensured by commercial standards and the commitment by DOE to implement a standards based program. Their endorsement of this process was a significant recognition that a standards-based program is a safe, technically sound, and cost-effective method to manage ER activities. The WSRC-ER process team leader presented this N&S pilot to the EAC in May, 1995 (Ref. 22 - 5/5/95; Ref. A5).

Regulators, Federal and State

The regulators were stakeholders because they define the scope, requirements, and schedule of ER activities at SRS. EPA and SCDHEC regulations, as they apply to this pilot, are part of the N&S set of standards. Communications with the regulators on this pilot were through DOE-SR (ER). In February 1995, DOE-SR briefed the regulators on the pilot and requested their participation, but they declined the invitation (Ref. 22 - 2/23/95; A6). Also, the regulators were invited to the September 7 public meeting, but did not send a representative. The EPA did, however, call WSRC to verify that environmental laws and regulations would still be met. EPA supports a process that streamlines the current remedial process while ensuring compliance with all environmental laws and regulations.

Defense Nuclear Facilities Safety Board

The DNFSB is a stakeholder because it can affect the outcome of the work through their recommendations process. The DNFSB supports a standards-based program, as stated in recommendation 90-2. Communications with the DNFSB on this pilot were through the DOE-SR (EH) representative on the Pilot Steering Committee.

Public

Although the specific scope of this pilot does not impact the public from a hazards standpoint, the public is a stakeholder in all ER activities at SRS. Communications with the public are usually in the form of public meetings, as organized by the appropriate WSRC and DOE departments. The scope, permit conditions, and schedule of the F/H Area Seepage Basins Groundwater Remediation project has been the subject of numerous public meetings in 1995. These have focused on the RCRA Part B Permit renewal, the CERCLA proposed plans, and the intent of the Citizens Advisory Board to do an independent technical review of the project. A separate public meeting was held on September 7, 1995 to obtain stakeholder feedback on the use of the N&S Process on the F/H Groundwater Remediation Project. The primary goal of this meeting was to reach the site workers ("valve turners") and members of the public. This meeting was extensively advertised through

Appendix C. Stakeholder Involvement (Contd)

individual invitations to approximately 800 SRS stakeholders (companies and individuals), news releases and newspaper advertisements, and an announcement to employees over the SRS electronic mail system. The 800 stakeholder invitations included 280 invitations to an internal RCRA related WSRC distribution, 485 to the other (non SRS) individuals on the RCRA mailing list (i.e. Citizens Advisory Board, local elected officials, contiguous landowners, and interested members of the public), and 60 to area construction and environmental contractors. Additionally, local union presidents and members of professional societies were invited. The news releases issued by WSRC were not published by the local newspapers.

15 stakeholders representing unions, local newspapers, members of the public, and WSRC employees who will be responsible for future implementation of the N&S Process attended the meeting. Two members of the SRS N&S Pilot Process Team presented information on the current use of DOE orders, the need for change, the N&S process, how it was used on F/H Groundwater Remediation, and technical changes (and cost savings) resulting from the use of the process.

Questions and answers discussed at the Public Meeting, as well as questions and comments received in phone calls both before and after the public meeting are listed below:

1) Meeting Question

Q: Who resolves dispute if agreement on standards can't be reached?

A: A third party, who is technically qualified, is used to resolve disputes.

2) Meeting Question

Q: Is there a connection to the Committee for External Regulations? Are activities of DOE and FAC parallel?

A: The Committee for External Regulations is aware of the DOE Standards Program and the N&S Pilots. There is no direct connection.

3) Meeting Question

Q: What qualifications should a stakeholder have to get involved with the system? Sounds like stakeholder purpose would be to have input into the process but not the standards. Is the stakeholder to review the process or the standards?

A: Any stakeholder can comment on the process. We don't set qualification criteria for stakeholders who want to comment. If the public has a concern, we will try address it.

Appendix C. Stakeholder Involvement (Contd)

4) Meeting Question

Q: What is the benefit stakeholders will bring to the process? What value is there in stakeholder comment?

A: We will listen to anyone's concerns. If the stakeholder has a technical background, of course we'll discuss the standards selection. If the stakeholder is not technically oriented, we'll explain the situation and listen to their concerns.

5) Meeting Question

Q: Is the Defense Board going to be consulted? What is their role?

A: The DNFSB has been briefed on the process and the scope of the pilots. DOE is considering their input.

6) Meeting Question

Q: What is SRS doing relative to bringing different standards to the Site? (i.e., how will non-SRS subject matter experts be brought into the picture--outside groups, agencies, companies N&S standards)

A: The process allows and encourages us to get experts from the outside if necessary. In addition, we've done commercial benchmarking to find out what standards are used in commercial sector

7) Meeting Question

Q: What are you doing to broaden use of SMEs? I recognize this is a significant difference, but there is still lots that is being done differently outside of SRS. It will require extensive work (go out and beat the bushes) to bring in outside SMEs.

A: The process allows and encourages us to get experts from the outside if necessary.

8) Meeting Comment

The process defined is useful and worthwhile. But decision to initiate should be made much earlier, e.g., at F&H should this process have begun when the basins were closed. You need to look at higher risk sites. Timing is off for F&H; should pick another project that isn't as far along. We're spending short dollars on this and not doing something else. Look at another project, concentrate effort on highest risk projects (TRU waste, DWPF). Process is good.

9) Meeting Comment

The problem of DOE is credibility. If this process will improve DOE credibility and will generate credibility with public, then you should do it.

Appendix C. Stakeholder Involvement (Contd)

10) Meeting Question

Q: Why wasn't a Chemical Engineer on your standards teams? A Chemical Engineer needs to be involved in the water treatment unit process.

A: The Environmental Engineer on the standards team is knowledgable of processes used for groundwater remediation.

11) Written Question (on Meeting Comment Card)

Q: Will process ultimately result in a needed overhaul of DOE orders?

A: In parallel to the efforts in development of the Necessary and Sufficient standards Closure Process, DOE is also re-evaluating and upgrading the current Orders. Newly revised Orders will more clearly delineate the policies, requirements and guidelines to facilitate more efficient implementation by the field. While the Necessary and Sufficient Closure Process allows application of the most appropriate standards (based on the hazards and activities) to provide adequate protection of the public, workers, and the environment, the new Orders will be available and may be used where deemed appropriate by the team of qualified personnel.

12) Pre-Meeting Comments and Questions

On September 5, Brian Costner, leader of the Energy Research Foundation environmental activist group called the WSRC- SW&ER Public Involvement Manager, to request a chart describing the technical changes as a result of the N&S Process (Ref. A7). Mr. Costner also questioned whether a public meeting was really needed for this issue. After reviewing the chart, Brian Costner offered that this proposed design and construction standards appeared to be a reasonable way to plan and complete remediation work. His support was limited on the health and safety requirements under OSHA though. He expressed some doubt as to the thoroughness and the level of protection offered/provided to SRS waste site workers, as SRS is currently implementing/satisfying OSHA requirements. He is not convinced that our current methods of giving waste site workers a site-specific document, such as a HASP, to read and a 15 minute site-specific briefing is adequate to ensure the health and safety of workers is protected. He acknowledged these workers receive general OSHA training, but questioned whether the site-specific training, outlining the risks at each site was adequate to ensure worker protection. WSRC acknowledged is concern. Satisfied that his input was being considered, Mr. Costner stated that he would not need to attend the public meeting.

13) Post-Meeting Question and Comment

Jeff Crane, EPA, called the WSRC- SW&ER Public Involvement Manager to ask general questions about whether compliance with environmental regulations/laws would be an objective of this proposed process. The Public Involvement Manager assured him that legal requirements would be met. He said EPA supports a process that streamlines the current remedial process while ensuring compliance with all environmental laws and regulations.

14) Pre- and Post- Meeting Requests for Information

About ten (10) requests from SRS employees for additional information and copies of meeting handouts were received. The information was mailed to the requesters.

Appendix C. Stakeholder Involvement (Contd)

15) Post- Meeting Written Comments

One of the more vocal meeting attenders also sent a letter to WSRC with additional comments on the process (Ref. A8). He suggests that independent oversight be conducted to validate the standards that are selected.

WSRC Response to Comment: The level of independent review used for the F/H Groundwater Remediation N&S Pilot was adequate for the scope and hazards addressed. Should this process be implemented further, the level of independent review will be considered on a case-by-case basis. The N&S Process Description recognizes the need for varying levels of independent review - "The use of a team for confirmation of the necessary and sufficient set of standards is intended to provide an adequate basis for approval of the set. The criteria for the team members, and the degree of individual and team independence needed for this purpose will have to be determined by the convened group [steering committee] in each case. For simple cases, the identification process itself may provide sufficient evidence of the adequacy and feasibility of the set. For more complex or controversial cases, it will be necessary to use more rigorous and independent methods for confirmation, for example, a formal, independent peer review."

16) Post-Meeting Comments

The day after the public meeting, both local newspapers published positive articles about the meeting, the N&S Process, and the benefits resulting from the use of the Process (Ref. A9, A10).

Appendix D. Sets of N&S Standards

Site Design and Safety Documentation - G-ESR-G00018

Rev. 0, 7/25/95 is attached to Ref. 31

Rev. 1, 8/15/95, Approval Copy, is Ref. 42

Rev. 2, 9/20/95, Approval Copy with minor revisions is in this appendix

Vendor Design - G-ESR-G-00019

Rev. 0, 8/22/95, DOE review and approval copy (DOE had no comments) is Ref. 43

Rev. 1, 9/20/95, Approval Copy with minor revisions is in this appendix

WESTINGHOUSE SAVANNAH RIVER COMPANY
INTER-OFFICE MEMORANDUM

SWE-ERE-950260

September 20, 1995

TO: Robert Baker, 703-A

FROM: Michele Bullington, 992-4W, x4-6799

CODES/STANDARDS PILOT ON F/H GROUNDWATER REMEDIATION
FINAL SETS OF NECESSARY AND SUFFICIENT STANDARDS

(Ref. 1 - Site Design and Safety Doc. Standards, G-ESR-G-00018, Rev. 2, 9/20/95;
Ref. 2 - Vendor Design Standards, G-ESR-G-00019, Rev. 1, 9/20/95)

Attached are the final sets of design and safety documentation standards as identified, confirmed, and approved by the Necessary and Sufficient Standards Process Pilot on the F/H Groundwater Remediation project. These sets of standards are referenced above.

Minor revisions have been made to the sets of standards to reflect recent information on the versions of the standards used and on the vendor to be chosen for the water treatment unit contract. As we have discussed, because these changes do not affect the scope, hazards, or how the N&S process was used, re-approval by the original approval authorities is not needed. Approval signatures are in the previous revisions of these sets of standards. Modifications to project documentation (such as the Functional Design Criteria, procurement specification/contract) will be made as necessary to ensure consistency with the set of standards. Note that the set of standards may change again as the design progresses. All revisions of the sets of standards have been filed in the ER File Room and at the Site Records Management Files in 773-52A.

Summary of Changes:

The editions and dates of the following standards for site design were modified to reflect what was actually used in the definitive design:

- American Concrete Institute 318, 1989
- American Institute of Steel Construction - Load Resistance and Factor Design, 1st Edition, 1986
- American Society of Civil Engineers 7, 1988
- American Welding Society D1.1, 1992.

INTER-OFFICE MEMORANDUM

After further review of the best and final proposal from the vendor preliminarily chosen to receive the contract award, the following standards have been added to the vendor design standards:

- For pumps, Hydraulic Institute Standards for Centrifugal, Rotary, and Reciprocating Pumps, 1983.
- For process water tanks, American Water Works Association D100, 1994 and D120, Thermosetting Fiberglass-Reinforced Plastic Tanks, 1984

Please contact me with any questions.

cc (w/attach):
J. G. Pierpoint, 992-W
J. A. Adams, 992-W
M. J. Hartz, 992-W
W. L. Luce, 719-2A
ERE Files

cc (w/o attach):

J. M. Clark, 992-4W
B. G. Schappell, 992-4W
M. Dayani, 703-47A

SITE DESIGN AND SAFETY DOCUMENTATION

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Site Design - Environmental			
Treated Water Disposal - Injection Wells	SCDHEC Underground Injection Control Permit, Clean Water Restoration Act, Federal Water Pollution Control Act, Resource Conservation and Recovery Act	SRSES 01110-01-R, 5.17, Civil Site Design Criteria (all)	regulations to be protective of the environment
Secondary Waste Disposal - @ E-Area Vaults	WSRC 1S Manual, Waste Acceptance Criteria	SRSES 01110-01-R, 5.17, Civil Site Design Criteria	
Air Emissions - from Water Treatment Unit (WTU)	Clean Air Act 40 CFR 61 - NESHAP 40 CFR 60 - Standards of Performance for New Stationary Sources ANSI N13.1 - Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities	SRSES 01063-09-R - Guidelines for Air Emissions Data SRSES 01063-09-R - Guidelines for Air Emissions Data; SRSES 01063-15-R - NESHAPs Particulate Sampling System Configuration WSRC 3Q Manual - Environmental Compliance, ECM 4.7 - Environmental Compliance SRSES 01063-14-R - Design Criteria for Radioactive Airborne Effluent Monitoring Systems	regulations to be protective of the environment

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Environmental (Contd) Air Emissions-from Water Treatment Unit (WTU) (Contd)	ANSI N42.18 - Specification and Performance of Onsite Instrumentation for Continuously Monitoring Radioactivity in Effluent None	SRSES 01063-14-R - Design Criteria for Radioactive Airborne Effluent Monitoring Systems WSRC E7 Manual, Proc 2.25 - Conduct of Engineering and Technical Support	
Spill Control - Confinement Areas for Tanks and WTU	Clean Water Act	WSRC 3Q Manual, Proc. 2.3 - Environmental Compliance	regulations to be protective of the environment
Health Protection - radiation hazards from predominantly tritium	ANSI N13.1 - Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities 10 CFR 835 - Occupational Radiation Protection	WSRC 5Q Manual - Radiological Control	personnel protection from tritium
Industrial Safety	ANSI Z358.1 - Emergency Eyewash and Shower Equipment 29 CFR 1910 - Occupational Safety and Health Standards NFPA 101 - Life Safety Code, NFPA 70 - National Electric Code	WSRC 4Q Manual - Industrial Hygiene WSRC 8Q Manual - Employee Safety	eye wash and shower equip OSHA Life Safety, National Electrical Code

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Site Design - Civil Location - Layout for WTU, Wells, Piping, Roads	SFM - Standard for Floodplain Management	SRSES 01110-01-R, 5.1 - Civil Site Design Criteria	WSRC reqm'ts identifies WSRC interface
Subsurface Investigation - borings and testing below WTU, extraction and injection tanks	ASTM D1586 - Method for Penetration Test and Split-Barrel Sampling of Soils ASTM D1587 - Practice of Thin-Walled Tube Sampling of Soils, ASTM D2113 Practice for Diamond Core Drilling for Site Investigation, ASTM D2488 - Practice for Description and Identification of Soils	SRSES 01060-02-R, 5.2.5 - Structural Design Criteria SRSES 01110-01-R, 5.2 - Civil Site Design Criteria (all)	testing methods to ensure adequate soil sampling and soil strength, WSRC reqm'ts identifies WSRC interface
Surveying	NOAA NGS SP 247 - Manual of Geodetic Triangulation NOAA NGS 1, Geodetic Bench Marks NOAA NGS 3, Geodetic Leveling USGS - U. S. Geological Survey	SRSES 01110-01-R, 5.3 - Civil Site Design Criteria SRSES 01330-01-R - Topographic Surveys SRSES 01330-02-R - Topographic Surveys Photogrammetric Methods SRSES 01702-02-R - Civil Site Coordinates and Dimensions (all)	surveying, WSRC reqm'ts identifies WSRC interface
Site Preparation	None	SRSES 01110-01-R, 5.6 - Civil Site Design Criteria	provides a safe, stable base for the unit and operations

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Civil (Contd) Earthwork	None	SRSES 01110-01-R, 5.9 - Civil Site Design Criteria	provides a safe, stable base for the unit and operations
Site Clearing and Grubbing	None	SRSES 02111-01-R - Site Clearing and Grubbing	provides a safe, stable base for the unit and operations
Site Grading: Fill - soil Fill - CLSM	ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils ASTM D422 - Particle-Size Analysis of Soils ASTM D2922 - Density of Soil and Soil Aggregate In-Place by Nuclear Method ASTM D1556 - Density of Soil In-Place by Sand Cone Method ASTM C39 - Compressive Strength of Molded Concrete	SRSES 02210-01-R - Site Grading (all)	material specifications ensure adequate soil properties
Moisture Control	ASTM D2216 - Laboratory Determination of Moisture Content of Soil ASTM D4643 - Determine of Water Content by the Microwave Oven Method ASTM D1557 - Moisture Density Relations of Soils and Soil-Aggregate Mixture Using 10 lb Rammer and 18-in. Drop		

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Civil (Contd) Moisture Control (Contd)	ASTM D3017 - Water Content of Soil and Rock by Nuclear Methods		
Compaction	ASTM D1557 - Moisture Density Relations of Soils and Soil-Aggregate Mixture Using 10 lb Rammer and 18-in. Drop ASTM D1556 - Density of Soil In-Place by Sand Cone Method ASTM D2922 - Density of Soil and Soil Aggregate In-Place by Nuclear Method ASTM C1883 - California Bearing Ratio of Laboratory Compacted Soils		
Excavation - structural aspect	Same ASTM spec's as Site Grading	SRSES 02224-01-R - Excavation and Backfill	
Excavation - Shoring and Sloping - worker safety	29 CFR 1926 - Safety Health Regulations for Construction, Parts 650-653 ASTM D653 - Terminology Relating to Soil, Rock, and Contained Fluids ASTM D2488 - Practice for Description and Identification of Soils	SRSES 02161-01-R - Shoring and Sloping of Excavations	OSHA - ensures adequate construction personnel safety

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Civil (Contd)			
Stormwater Management	SC LRCC R.72-300, Standards for Stormwater Management and Sediment Reduction ASCE 37 - Design and Construction of Storm Sewers	SRSES 01110-01-R, 5.11 - Civil Site Design Criteria WSRC 3Q, ECM 12.2 - Environmental Compliance	regulations to be protective of the environment
Erosion Control	SC LRCC R.72-300, Standards for Stormwater Management and Sediment Reduction	SRSES 01110-01-R, 5.35.3 - Civil Site Design Criteria	regulations to be protective of the environment
Stormwater Runoff	SCS NEH - Soil Conservation Service - National Engineering Handbook, Section 4 "Hydrology"	None	regulations to be protective of the environment
Roads - Access from SRS road to WTU and parking at WTU - Gravel; and from WTU to wells - Dirt	SCDHPT - South Carolina Department of Highways and Public Transportation AASHTO - American Association of State Highway and Transportation Officials ASTM D1241 - Specification for Materials for Soil-Aggregate Subbase, Base, and Surface Courses ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils, ASTM D1557 - Moisture Density Relations of Soils and Soil-Aggregate Mixture Using 10 lb Rammer and 18-in. Drop	SRSES 01110-01-R, 5.12.3 - Civil Site Design Criteria SRSES 02500-01-R - Roads - Design and Installation; C-SPS-G-00027; C-SPS-G-00033 (all)	personnel safety

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Civil (Contd) Fences and Gates around WTU	None	SRSES 01110-01-R, 5.13 - Civil Site Design Criteria WSRC 7Q - Security and Safeguards, 2, PP201, 5.4	property protection
Emergency Exit Gates	NFPA 101 - Life Safety Code, 5-7.1	None	emergency exits - life safety
Wells - extraction and injection wells	SC Well Standards and Regulations R.61-71 SC Underground Injection Control Regulations R.61-87	WSRC 3Q5 - Hydrogeologic Data Collection	extraction wells, injection wells
Domestic Water	SPC - Standard Plumbing Code 40 CFR 141 - National Primary Drinking Water Regulations 40 CFR 142 - National Interim Primary Drinking Water Regulations Implementation	None	local plumbing code
Structural Building Code	SBC - Standard Building Code UBC - Uniform Building Code MBMA - Metal Building Systems Manual	SRSES 01060-02-R - Structural Design Criteria	local building code Used only for scope items which SBC does not address pre-engineered metal building code

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Civil (Contd)	steel building codes:		
Structural Steel - Rain Covers	AISC - Manual of Steel Construction AISI - Specifications for the Design of Cold-Formed Steel Structural Members SDI - Diaphragm Design Manual SJI - Standard Specification Load Tables and Weight Tables for Steel Joists and Joist Girders	SRSES 01060-02-R, 3.12 - Structural Design Criteria SRSES 01060-02-R, 3.18 - Structural Design Criteria SRSES 01060-02-R, 3.19 - Structural Design Criteria SRSES 01060-02-R, 3.24 - Structural Design Criteria	ensures safe structures built with: structural steel cold-formed steel steel decking steel joists
Welding	Welding Codes: AWS D1.1 - Structural Welding Code - Steel AWS D1.3 - Structural Welding Code - Sheet Steel AWS D1.4 - Structural Welding Code - Reinforcing Steel	SRSES 01060-02-R, 3.20 - Structural Design Criteria SRSES 01060-02-R, 3.21 - Structural Design Criteria SRSES 01060-02-R, 3.22 - Structural Design Criteria	ensures safe welds: structural welding, sheet steel welding, reinforcing steel welding

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Civil (Contd)			
Loading Conditions - Roof Live, Roof Snow, and Wind Seismic loads Uplift Resistance	ASCE 7 - Minimum Design Loads for Buildings and Other Structures SBC, Chapter 12 - Minimum Design Loads SCDHEC R.61-104 - Hazardous Waste Management Location Standards UL 580 - Safety Tests for Uplift Resistance of Roof Assemblies	SRSES 01060-02-R - Structural Design Criteria, Div. II, 5.2	ensures structural safety under given loading conditions ensures confinement under seismic loading
Concrete Anchorages - Expansion anchor bolts, cast-in-place anchor bolts	UBC, Chapter 1925 - Anchorage to Concrete UBC, Chapter 1630 - Lateral Forces of Elements of Structural and Non-Structural Components Supported by Structures ASTMs referenced in UBC	SRSES 03251-01-R - Concrete Expansion Anchors or SRSES 03251-02-R - Cast-in-Place Anchors and Grouted Anchor Bolts	ensures safe structures
Concrete - Confinement Areas, pads and curbs for WTU and tanks, transformers	Concrete building codes: ACI 318 - Building Code Requirements for Reinforced Concrete	SRSES 01060-02-R, 3.7 - Structural Design Criteria SRSES 03010-02-R - Forming, Placing, Finishing, and Curing of Concrete	ensures adequate strength and crack control: bldg. code,

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Civil (Contd)			
Concrete - Confinement Areas, pads and curbs for WTU and tanks, transformers (Contd)	ACI 350R - Environmental Engineering Concrete Structures	SRSES 01060-02-R, 5.2.4 - Structural Design Criteria	water tight concrete
	ACI 209 - Prediction of Creep, Shrinkage, and Temperature Effects in Concrete Structures	SRSES 01060-02-R, 3.6 - Structural Design Criteria	crack control tolerances
	ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials	SRSES 03010-02-R - Forming, Placing, Finishing, and Curing of Concrete	crack control tolerances
	ACI 308 - Standard Practice for Curing Concrete,	SRSES 03010-02-R - Forming, Placing, Finishing, and Curing of Concrete	curing
	Referenced ASTMs		material specifications

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Site Design - Architectural			
Concrete Coatings - Architectural	PCA - Portland Cement Association (CC, ES, PC)	SRSES 09900-00-R - Architectural Field Painting	investment protection
Painting High Performance Painting		SRSES 09900-03-R - Protective Coatings for Concrete/Masonry	personnel protection
Material Specifications	ASTMs	SRSES 09900-00-R - Architectural Field Painting or SRSES 09900-03-R - Protective Coatings for Concrete/Masonry	performance objectives
Steel Coatings - Architectural Painting High Performance Painting Material Specifications	SSPC - Steel Structures Painting Council Specifications ASTMs as referenced in the SSPC	SRSES 09900-00-R - Architectural Field Painting SRSES 09900-02-R - Protective Coatings - Steel, Above Ground SRSES 09900-00-R - Architectural Field Painting or 09900-02-R - Protective Coatings - Steel, Above Ground	investment protection personnel protection performance objectives
Change Room	DOE Order 6430.1A, 1300-6.8 - General Design Criteria (used as guidance where appropriate)	SRSES 13120-01-R - Office Trailers	ensures worker protection from small risk of rad contamination
Building Furnishings	NFPA 101, Chap 31 - Life Safety Code	None	fire resistance

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Architectural Contd) Rain Cover, HP Shed, Nitrogen Cylinder Shed Roofing and Flashing	SBC, Chap. 32 - Installation of Roof Coverings	None	ensures structural safety
Roof drains, gutters and interior drains for tank rain covers, HP shed, nitrogen cylinder shed	SMACNA - Architectural Sheet Metal Manual, NRCA - National Roofing Contractors Association - Roofing and Waterproofing Manual, SC 212, 213	None	provides investment protection
Energy Conservation	ASHRAE Std. 90.1 - Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings	None	energy efficient design
Security Barriers, Access, Fence Lighting	None	WSRC 7Q Manual - Security and Safeguards	property protection
Security Signs	None	WSRC 7Q Manual - Security and Safeguards	

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Site Design - Electrical All electrical work	NFPA 70 - National Electrical Code ANSI C2 - National Electric Safety Code	None	requirements for wiring provides personnel safety, equipment protection, fire protection.
Power distribution	IEEE 141 - Recommended Practice for Electrical Power Distribution for Industrial Plants.	None	guidance for providing reliability, maintainability and safety
Power, grounding for equipment lightning protection & other	IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems	None	recommendations for grounding methods. Provides personnel safety and equipment protection
Power, overcurrent Protection	IEEE 242 - Recommended Practice for Protection & Coordination of Industrial & Commercial Power Systems	None	recommendations for protection of equipment from surges and faults
Lightning protection	NFPA 780 - Lightning Protection Code	None	recommendations for protection of equipment and personnel
Motors/ starters	NEMA MG 1-93, Motors and Generators IEEE C37.96-1988, Guide for AC Motor Protection	None	Assists in selection & application
Distributed control system	NEMA Industrial Controls and Systems	None	Selection/ installation of equipment
Distributed control system displays	ISA S5.3, Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems	None	standardization/ ease of operation

(Note that NFPA 70 - National Electrical Code and ANSI C2 - National Electric Safety Code apply to all electrical scope)

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Electrical (Contd) Transformers	Factory Mutual FM 5-4/14-8, Transformers	None	reduces financial loss from fires
Wire, switches, and electrical equipment	shall be listed by Underwriter Laboratory, National Electrical Manufacturers Association, or other recognized entity.	None	standards for manufacture of equipment. assures safety, consistency, and reliability.
Lighting	IES - Lighting Handbook See "Fire Protection" for emergency lighting	None	assures adequate lighting
Fire protection /electrical scope	NFPA 72 - National Fire Alarm Code	None	Application, installation, performance and maintenance of fire alarm systems

(Note that NFPA 70 - National Electrical Code and ANSI C2 - National Electric Safety Code apply to all electrical scope)

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Site Design - Mechanical Material specifications	Applicable ASTMs as referenced in ASME B31.3 -Standard Code for Chemical Plant and Petroleum Refinery Piping and ASME Boiler and Pressure Vessel Code	None	ensures strength, corrosion resistance and other properties
Process piping, tanks, and valves	ASME B31.3, Chemical Plant and Petroleum Refinery Piping ASME Boiler and Pressure Vessel Code, section II	None	Assure correct materials, sizing and other design parameters. Also construction, QA & testing
Process water tanks (fiberglass reinforced)	API SPEC-12P-86 Specification for Fiberglass Reinforced Plastic Tanks	None	guidance on materials, and design
Steam heat exchangers/ pressure vessels	ASME Boiler and Pressure Vessel Code, sections II and VIII	None	Assure correct materials, sizing and other design parameters. Also construction, QA & testing
Insulation		SRSES 15250-01-Mechanical Insulation	Guidance on thermal insulation for piping and valves
Instrumentation	ISA S5.1, Instrumentation Symbols and Identification,	None	provides standardization of drawing symbols for ease of reading, communication

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Mechanical (Contd) Instrumentation (Contd)	ISA S5.3, Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems		
Coatings		WSRC-TM-92-10-5-BK1, SRS Engineering Standards Manual, Material-Coatings-Doors-Finishes Specialties Preferred above-ground steel protection: SRSES 09900-02-R - Protective Coatings - Steel, Above Ground	Provides guidance on paints/coatings to be used on motors, pipes tanks etc.
Plumbing	Standard Plumbing Code		specifies materials, methods
HVAC	ASHRAE: Std. 15 - Safety Code for Mechanical Refrigeration Std. 55 - Thermal Environmental Conditions for Human Occupancy Std. 62, Ventilation for Acceptable Indoor Air Quality Std. 90.1, Energy Efficient Design in New Building Except Low-Rise Residential Buildings	None	insures adequate ventilation and environment for occupation. guidance on selection, installation, and design.

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Mechanical (Contd)			
HVAC (Contd)	Applications Handbook Fundamentals Handbook, HVAC Systems and Equipment Handbook Refrigeration Handbook Publication GRP 158, Cooling and Heating Load Calculation Manual AABC - Volume A-82, National Standards for Total System Balance Air Distribution - Hydraulic Systems - Sound - Vibration - Field Surveys for Energy Audits ARI 410, Forced Circulation Air Cooling and Air Heating Coils, 1987 UL standards as applicable		
Fire protection	NFPA 80A, Protection of Buildings from Exterior Fire Exposure NFPA 101, Life Safety Code NFPA 75, Standard for Protection of Electronic Computer/Data Processing Equipment	None	Provides guidance on preventing spread of fires Guidance on emergency egress Guidance on protecting computer systems & data from fire damage.
Fire extinguishers	NFPA 10 Portable Fire Extinguishers	WSRC 2Q Manual - Fire Protection Program	provides guidance on selection, installation, maintenance and use

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Safety Documentation Risk or Hazard Analysis	29 CFR 1910.119 - Process Safety Management of Highly Hazardous Chemicals 29 CFR 1910.120 - Hazardous Waste Operations and Emerg. Response	WSRC-IM-90-135 - Process Safety Management Manual WSRC 20Q Manual - Health and Safety Manual for Hazardous Waste Operations	Health and Safety Plan, including Process Hazards Review results, provides adequate assessment and control.
Process Description	29 CFR 1910.120 - Hazardous Waste Operations and Emergency Response	WSRC 20Q Manual - Health and Safety Manual for Hazardous Waste Operations	Prescribes scope and content of a H&S Program, including administrative and procedural controls.
Administrative Controls	29 CFR 1910.119 - Process Safety Management of Highly Hazardous Chemicals 29 CFR 1910.120 - Hazardous Waste Operations and Emerg. Response	WSRC-IM-90-135 - Process Safety Management Manual WSRC 20Q Manual - Health and Safety Manual for Hazardous Waste Operations	PHR plus HASP provide complete set of controls for personnel safety and health and environmental release controls.
Change Control Process	29 CFR 1910.120 - Hazardous Waste Operations and Emergency Response	WSRC 20Q Manual - Health and Safety Manual for Hazardous Waste Operations WSRC E7, Proc. 3.14 - Conduct of Engineering and Technical Support - Design Authority Technical Reviews (DATR)	HASP recognizes the necessity of change control and provides opportunity to address change within HASP system. DATR requires evaluation of the change against the Authorization Basis, which includes safety doc.

(for more information, refer to SWE-SWE-95-0330, N&S Requirements for Safety Documentation, A. Vincent)

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Referenced Codes and Standards

AABC - Associated Air Balance Council

Volume A-82, National Standards for Total System Balance Air Distribution - Hydraulic Systems - Sound - Vibration - Field Surveys for Energy Audits, 1989

AASHTO - American Association of State Highway and Transportation Officials, "A Policy on Geometric Design of Highways and Streets", 1990

ACI - American Concrete Institute

ACI 117-90, "Standard Specifications for Tolerances for Concrete Construction and Materials"

ACI 209R-92, "Prediction of Creep, Shrinkage, and Temperature Effects in Concrete Structures"

ACI 308-92, "Standard Practice for Curing Concrete"

ACI 318-89 "Building Code Requirements for Reinforced Concrete"

ACI 350R-89, "Environmental Engineering Concrete Structures"

ACSM - American Congress Surveying and Mapping

"Horizontal Control as Applied to Local Surveying Needs", 1973.

AISC - American Institute of Steel Construction

AISC - ASD "Manual of Steel Construction - Allowable Stress Design", 9th edition, 1989.

AISC - LRFD "Manual of Steel Construction - Load Resistance and Factor Design", 1st ed..

AISI - American Iron and Steel Institute

"Specifications for the Design of Cold-Formed Steel Structural Members", 1986.

ANSI - American National Standards Institute

ANSI C2, "National Electric Safety Code", 1993.

ANSI N13.1, "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities", 1969.

ANSI N42.18, "Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluent", 1980.

ANSI Z358.1, "Emergency Eyewash and Shower Equipment", 1981.

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Referenced Codes and Standards (Contd)

API - American Petroleum Institute

API 610 "Centrifugal Pumps for General Refinery Service", 7th edition, 1989.

API SPEC-12P-86 Specification for Fiberglass Reinforced Plastic Tanks

ARI - Air Conditioning and Refrigeration Institute

ARI 410, "Forced Circulation Air Cooling and Air Heating Coils", 1987.

ASCE - American Society of Civil Engineers

ASCE 7, "Minimum Design Loads for Buildings and Other Structures", 1988.

ASCE 37, "Design and Construction of Storm Sewers", 1979.

ASHRAE - American Society of Heating, Refrigeration and Air-Conditioning Engineers

ASHRAE Handbooks

Applications, 1991.

Fundamentals, 1993.

HVAC Systems and Equipment, 1992.

Refrigeration, 1994.

Publication GRP 158, Cooling and Heating Load Calculation Manual

ASHRAE Standards

15 Safety Code for Mechanical Refrigeration, 1992.

55 Thermal Environmental Conditions for Human Occupancy, 1992.

62 Ventilation for Acceptable Indoor Air Quality, 1989.

90.1 Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings, 1989.

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Referenced Codes and Standards (Contd)

ASME - American Society of Mechanical Engineers

ASME B31.3, "Standard Code for Chemical Plant and Petroleum Refinery Piping", 1990.

ASME Boiler and Pressure Vessel Code, 1992

Section VIII, Divisions 1 and 2, "Process Vessel Tanks"

Section X, "Fiber-Reinforced Plastic Pressure Vessels"

ASTM - American Society for Testing and Materials

ASTM C39-86, "Compressive Strength of Molded Concrete"

ASTM C1883-87, "California Bearing Ratio of Laboratory Compacted Soils"

ASTM D422-90, "Particle-Size Analysis of Soils"

ASTM D653-90, "Terminology Relating to Soil, Rock, and Contained Fluids"

ASTM D1241-68 (1989), "Specification for Materials for Soil-Aggregate Subbase, Base, and Surface Courses"

ASTM D1556-90, "Density of Soil In-Place by Sand Cone Method"

ASTM D1557-78, "Moisture Density Relations of Soils and Soil- Aggregate Mixture Using 10 lb Rammer and 18-in. Drop"

ASTM D1452-80 (1990), "Practice for Soil Investigation and Sampling by Auger Borings"

ASTM D1586-84 (1992), " Method for Penetration Test and Split-Barrel Sampling of Soils"

ASTM D1587-83, "Practice of Thin-Walled Tube Sampling of Soils"

ASTM D2113-83 (1993), "Practice for Diamond Core Drilling for Site Investigation"

ASTM D2216-90, "Laboratory Determination of Moisture Content of Soil"

ASTM D2487-93, "Test Method for Classification of Soils for Engineering Purposes"

ASTM D2488-93, "Practice for Description and Identification of Soils" (Visual-Manual Procedure)

ASTM D2922-81, "Density of Soil and Soil Aggregate In-Place by Nuclear Method (Shallow Depth)"

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Referenced Codes and Standards (Contd)

ASTM D3017-88, "Water Content of Soil and Rock by Nuclear Methods (Shallow Depth)

ASTM D4318-93, "Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils"

ASTM D4643-87, "Determination of Water Content by the Microwave Oven Method"

AWS - American Welding Society

AWS D1.1 "Structural Welding Code - Steel", 1992.

AWS D1.3 "Structural Welding Code - Sheet Steel", 1989.

AWS D1.4 "Structural Welding Code - Reinforcing Steel", 1979.

AWS D5.2 "Standard for Welded Steel, Elevated Tanks, Standpipes, and Reservoirs for Water Storage", 1984.

AWWA - American Water Works Association

AWWA D100, "Welded Steel Tanks for Water Storage", 1994.

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act, Public Law 96-510, 42 U.S.C. 9601 et seq. as amended by SARA - Superfund Amendments and Reauthorization Act, 10/17/86.

CFR - Code of Federal Regulations

10 CFR 835, "Occupational Radiation Protection", 12/1993

29 CFR 1910, "Occupational Safety and Health Standards", 1988

29 CFR 1926, "Safety Health Regulations for Construction", 1989

40 CFR 60, "Standards of Performance for New Stationary Sources", 7/1/93

40 CFR 61, "National Emission Standards for Hazardous Air Pollutants", 7/1/93

40 CFR 141 - "National Primary Drinking Water Regulations", 7/1/93

40 CFR 142 - "National Interim Primary Drinking Water Regulations Implementation" 7/1/93

CWA - Clean Water Restoration Act, Public Law 89-753, 43 U.S.C. 431 et seq.

DOE Order 6430.1A, General Design Criteria, 4/6/89

FM - Factory Mutual 5-4/14-8, Transformers, 1986

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Referenced Codes and Standards (Contd)

FGCC - Federal Geodetic Control Committee

"Standards and Specifications for Geodetic Control Networks", 9/84.

"Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques", version 5.0, 5/11/88 (with corrections 8/1/89).

FWPCA - Federal Water Pollution Control Act, Public Law 86-70, 33 U.S.C. 1157 et seq.

IEEE - Institute of Electrical and Electronic Engineers

IEEE 141, "Recommended Practice for Electrical Power Distribution for Industrial Plants", 1986.

IEEE 142, "Recommended Practice for Electric Power Distribution for Industrial Plants", 1982.

IEEE 242, "Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems", 1986.

IEEE 1100, "Recommended Practice for Powering and Grounding of Sensitive Electronic Equipment", 1992.

IEEE C37.96, "Guide for AC Motor Protection", 1988

IES - Illuminating Engineering Society of America

"Lighting Handbook", application and reference volumes, 1993.

ISA - Instrumentation Society of America

ISA S5.1, "Instrumentation Symbols and Identification", 1984.

ISA S5.3, "Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems, 1983.

MBMA - Metal Building Manufacturers Association

"Metal Building Systems Manual", 1990

NEMA - National Electronics Manufacturers Association

ICS1, "Industrial Controls and Systems - General Requirements", 1993.

MG 1-93, "Motors and Generators", 1989

NOAA - National Oceanic and Atmospheric Administration

Manual NOS NGS (National Ocean Service - National Geodetic Survey) 1, "Geodetic Bench Marks", 9/78.

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Referenced Codes and Standards (Contd)

Manual NOS NGS 3, "Geodetic Leveling", 8/81.

NGS Special Publication 247, "Manual of Geodetic Triangulation", 1950.

NFPA - National Fire Protection Association

NFPA 10, "Portable Fire Extinguishers", 1988.

NFPA 70, "National Electric Code", 1993.

NFPA 72, "National Fire Alarm Code", 1990.

NFPA 75, "Standard for Protection of Electronic Computer/Data Processing Equipment", 1992.

NFPA 780, "Lightning Protection Code", 1986.

NFPA 80A, "Protection from Exposure Fires", 1987.

NFPA 101, "Life Safety Code", 1988.

NRCA - National Roofing Contractors Association, "Roofing and Waterproofing Manual", 3rd Edition.

PCA - Portland Cement Association

PCA CC, "Clear Coatings for Exposed Architectural Concrete", 1968

PCA ES, "Effect of Substances on Concrete and Guide to Protective Treatment", IS001T, 1990.

PCA PC, "Painting Concrete", IS134T, 1992.

RCRA - Resource Conservation and Recovery Act, Public Law 94-580, 42 U.S.C. 6901 et seq.

SBC - Southern Building Code Congress International, Inc., "Standard Building Code" (1994):

Section 808 (Plumbing Installations)

Section 1113 (Doors)

Section 1209 (Floodplain)

Chapter 12 Minimum Design Loads

Chapter 13 (Foundations)

Section 1312 (Waterproofing and Dampproofing)

Chapter 15 (Steel Construction)

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Referenced Codes and Standards (Contd)

Chapter 16 (Concrete Construction)

Chapter 17 (Wood Construction)

Chapter 18 (Lathing, Plastering, and Gypsum Construction)

Section 2001.5 (Mechanical Ventilation)

Chapter 21 (Light and Ventilation)

Chapter 27 (Glass)

Chapter 32 (Installation of Roof Coverings).

SCDHEC - South Carolina Department of Health and Environmental Controls

SCDHEC R.61-62, "Air Pollution Control Regulations and Standards", 6/26/92.

SCDHEC R.61-71, "Well Standards and Regulations", 6/2/85.

SCDHEC R.61-104, "Hazardous Waste Management Location Standards"

SCDHEC R.61-87, "Underground Injection Control Regulations", 3/90

SCDHPT - South Carolina Department of Highways and Public Transportation

Standard Specification for Highway Construction, 1986

Design Standards for Road Construction, 7/1/91

SCHWMR - South Carolina Hazardous Waste Management Regulations, 5/28/93

R.61-79.265 Interim Status Standards for Owners and Operators of Hazardous Waste Facilities

SCLRCC R.72-300 - South Carolina Land Resources Conservation Commission "Standards for Stormwater Management and Sediment Reduction", 5/92.

SCS NEH - Soil Conservation Service - National Engineering Handbook, 3/85

SDI - Steel Deck Institute

"Diaphragm Design Manual", 2nd edition, 1989.

"Manual of Construction with Steel Deck", 1994.

SDWA - Safe Drinking Water Act, Public Law 93-523, 42 U.S.C. 201 et seq.

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Referenced Codes and Standards (Contd)

SFM - Southern Building Code Congress International, Inc., "Standard for Floodplain Management", 1989.

SJI - Standard Joist Institute, "Standard Specification Load Tables and Weight Tables for Steel Joists and Joist Girders", 40th Edition, 1994.

SMACNA - Sheet Metal and Air Conditioning Contractors National Association

SMACNA ASMM, "Architectural Sheet Metal Manual", 1987

SMC - Southern Building Code Congress International, Inc., "Standard Mechanical Code", 1991.

SPC - Southern Building Code Congress International, Inc., "Standard Plumbing Code", 1991.

SRSES - Savannah River Site Engineering Standards

- SRSES 01060-02-R Structural Design Criteria (Revision 0)
- 01063-09-R Guidelines for Air Emissions Data (Revision 0)
- 01063-14-R Design Criteria for Radioactive Airborne Effluent Monitoring Systems (Revision 0)
- 01063-15-R NESHAPs Particulate Sampling System Configuration (Revision 0)
- 01110-01-R Civil Site Design Criteria (Revision 1)
- 01330-01-R Topographic Surveys (Revision 0)
- 01330-02-R Topographic Surveys Photogrammetric Methods (Revision 0)
- 01702-02-R Civil Site Coordinates and Dimensions (Revision 0)
- 02111-01-R Site Clearing and Grubbing (Revision 0)
- 02161-01-R Shoring and Sloping of Excavations (Revision 0)
- 02210-01-R Site Grading (Revision 0)
- 02224-01-R Excavation and Backfill (Revision 0)
- 02500-01-R Roads - Design and Installation (Revision 0)
- 03010-02-R Forming, Placing, Finishing and Curing of Concrete (Revision 2)
- 03251-01-R Concrete Expansion Anchors (Revision 0)
- 03251-02-R Cast-in-Place Anchors and Grouted Anchor Bolts (Revision 0)
- 09900-00-R Architectural Field Painting (Revision 0)

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Referenced Codes and Standards (Contd)

- 09900-02-R Protective Coatings - Steel, Above Ground (Revision 0)
- 09900-03-R Protective Coatings for Concrete/Masonry (Revision 3)
- 13120-01-R Office Trailers (Revision 0)
- 15060-01-R Process and Service Piping (Revision 0)
- 15101-01-R Manual Operated Valves (Revision 1)
- 15250-01-R Mechanical Insulation (Revision 1)

• PDEC - Process Digital Equipment Committee

SSPC - Steel Structures Painting Council Specifications

UBC - Uniform Building Code, International Conference of Building Officials, 1994.

UL 580 - Safety Tests for Uplift Resistance of Roof Assemblies, 1988

USGS - U. S. Geological Survey, Mapping Division, "Standard Mapping Specifications," 5/15/74.

WSRC-IM-90-135 - Process Safety Management Manual

WSRC Manuals

- E7 Conduct of Engineering and Technical Support, 5/95
- 2Q Fire Protection Program, 2/95
- 3Q Environmental Compliance, 6/95
- 3Q5 Hydrogeologic Data Collection, 10/92
- 4Q Industrial Hygiene, 7/95
- 5Q Radiological Control, 1/95

SITE DESIGN AND SAFETY DOCUMENTATION (Contd)

Referenced Codes and Standards (Contd)

- 7Q Security and Safeguards, 6/95
- 8Q Employee Safety, 6/95
- 20Q Health and Safety Manual for Hazardous Waste Operations, 3/93
- 1S Waste Acceptance Criteria, 6/95

WSRC-TM-92-10-5-BK1, SRS Engineering Standards Manual, Material-Coatings-Doors-Finishes Specialties, 1992

VENDOR DESIGN OF THE WATER TREATMENT UNITS

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Vendor Design - Electrical All electrical work	NFPA 70 - National Electrical Code ANSI C2 - National Electric Safety Code		Requirements for wiring provides personnel safety, equipment protection, fire protection.
Power, grounding for equipment lightning protection & other	IEEE Std 142-1982 - IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems IEEE Std 422 - Guide for the Design and Installation of Cable Systems in Power Generating Systems"		Recommendations for grounding methods. Provides personnel safety and equipment protection.
Uninterruptible Power Supply	IEEE Std 446 - Recommended Practice for Emergency and Standby Power for Industrial and Commercial Applications		Determination of need & type of system.
Lightning protection	NFPA 780 - Lightning Protection Code		Recommendations for protection of equipment and personnel.
Static electricity	NFPA 77 - Recommended Practice on Static Electricity		Prevention of fire.
Distributed control system displays	ISA S5.3 - Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems		Standardization/ease of operation.

VENDOR DESIGN OF THE WATER TREATMENT UNITS (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Electrical (Contd) DCS signals	SRSES 16660-01-G - Electromagnetic Interference Control		Lists applicable industry and military standards.
Distributed control system, power supply	IEEE 1100 - Recommended Practice for Powering and Grounding of Sensitive Electronic Equipment		Sensitive electronic equipment protection.
Distributed control system. general	IEEE 1023 -Guide for the Application of Human Factor Engineering ISA S5.1 - Instrumentation Symbols and Identification ISA S5.2 - Binary Logic Diagrams for Process Operations ISA S5.3, "Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems" ISA S5.4 - Instrument Loop Diagrams ISA S5.5 - Graphic Symbols for Process Displays ISA MC96.1 - Temperature Measurement Thermocouples		Guidance on human factors of DCS interfaces ISA: Uniformity, guidance in specification preparation, test procedures, safety of measuring and test equipment, insurance of accuracy of measuring equipment.

VENDOR DESIGN OF THE WATER TREATMENT UNITS (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Electrical (Contd) Distributed control system. general (Contd)	ISA RP 60.8 - Electrical Guide for Control Centers ISA S18.1 - Anunciator Sequences and Specifications ISA S20 - Specification Forms for Process Management and Controls Instruments, Primary Elements, and Control Valves ISA S26 - Dynamic Response Testing of Process Control Instrumentation		
	ISA S71.01 - Environmental Conditions for Process Measurement and Control Systems: Temperature and Humidity ISA 82.01 - Safety Standard for Electrical and Electronic Test, Measurement, Controlling and Related Equipment - General Requirements		

VENDOR DESIGN OF THE WATER TREATMENT UNITS (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Electrical (Contd) Distributed control system. general (Contd)	ISA 81.02 - Safety Standard for Electrical and Electronic Test, Measuring, Controlling and Related Equipment - Electrical and Electronic Test and Measuring Equipment ISA 82.03 - Safety Standard for Electrical and Electronic Test, Measuring, Controlling and Related Equipment UL 508 - Industrial Control of Equipment		
Wire, switches, and electrical components	shall be listed by Underwriter Laboratory, National Electrical Manufacturers Association, or Factory Mutual.		Standards for manufacture of equipment. assures safety, consistency, and reliability.
Transformers	Factory Mutual FM 5-4/14-8, Transformers, 1986 see also wires/switches/electrical components		Reduces financial loss from fires.
Motor control centers	SRSES 16482-01-R - Motor Control Centers, 600 Volt Class		General requirements for design, selection and installation.
Lighting	Illuminating Engineering Society of North America lighting handbook		Assures adequate lighting.

VENDOR DESIGN OF THE WATER TREATMENT UNITS (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Vendor Design - Mechanical Material specifications	Applicable ASTMs, see also process piping and valves		Ensures strength, corrosion resistance and other properties.
Process piping & valves	ASME B31.3 - Chemical Plant and Petroleum Refinery Piping SRSES 05950-03-R - Practices to Minimize Chloride Induced Stress Corrosion Cracking of Type 300 Series Austenitic Stainless Steel		Assure correct materials, sizing & other design parameters. Also construction, QA & testing.
Pumps	Hydraulic Institute Standards for Centrifugal, Rotary, and Reciprocating Pumps		
Process water tanks atmospheric pressure	ASME Boiler and Pressure Vessel Code, Sections VIII & X API SPEC-12P-86 Specification for Fiberglass Reinforced Plastic Tanks API-620 Design and Construction of Large Welded, Low-Pressure Storage Tanks API 650 Welded Tanks for Oil Storage, AWWA D100 Welded Steel Tanks for Water Storage AWWA D120 Thermosetting Fiberglass-Reinforced Plastic Tanks		Guidance on materials, & design.

VENDOR DESIGN OF THE WATER TREATMENT UNITS (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Mechanical (Contd) Process water tanks 0-15 psi	API-620 Design and Construction of Large Welded, Low-Pressure Storage Tanks		Guidance on materials, & design.
Pressure vessels, heat exchangers sandfilter housings, Reverse osmosis units etc.	ASME Boiler and Pressure Vessel Code, Section VIII		Assure correct materials, sizing & other design parameters. Also construction, QA & testing.
Instrumentation	ISA S5.1 - Instrumentation Symbols and Identification ISA S5.3 - Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems		Provides standardization of drawing symbols for ease of reading, communication.
HVAC	ASHRAE Standard 15 - Safety Code for Mechanical Refrigeration ASHRAE Standard 55 - Thermal Environmental Conditions for Human Occupancy ASHRAE Standard 62 - Ventilation for Acceptable Indoor Air Quality ASHRAE Applications Handbook		Insures adequate ventilation and environment for occupation. guidance on selection, installation, & design.
Air filters	UL 900 - Standard for Safety Test Performance of Air Filter Units		Assures safety of filters.

VENDOR DESIGN OF THE WATER TREATMENT UNITS (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Mechanical (Contd) Fume hoods	ACGIH - Industrial Ventilation Manual		Insures adequate capture of fumes.
Breathing air system	SRSES 11595-04-R - Breathing Air Distribution		Site standardization, implementation of national standards.
HEPA Filter Housings	ASME 509 - Nuclear Power plant Air Cleaning Units and Components		Minimum requirements for design maintainability, operability.
Pipe/equipment insulation	None	SRSES 15250-01-R, Mechanical Insulation	Guidance on thermal insulation for piping and valves.
Coatings	SRSESM 09900-02-R - Protective Coatings		Provides guidance on paints/coatings to be used on motors, pipes tanks etc.
Fire Protection	NFPA 10 - Portable Fire Extinguishers		Provides guidance on selection, installation, maintenance and use control of combustible liquids.
	NFPA 30 - Flammable and Combustible Liquids Code		Provides guidance on preventing spread of fires.

VENDOR DESIGN OF THE WATER TREATMENT UNITS (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Mechanical (Contd) Fire Protection (Contd)	NFPA 80A - Protection of Buildings from Exterior Fire Exposure NFPA 101 - Life Safety Code		Egress requirements, fire and smoke barriers, alarms etc.
Rotating equipment, vibration control	ASHRAE Applications Handbook, 1991 Chapter 42		Guidance on vibration and noise control.
Welding	AWS D1.1 Structural Welding Code		Adequate quality welds.

VENDOR DESIGN OF THE WATER TREATMENT UNITS (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Vendor Design - Civil/Architectural Structural features	SBC, Standard Building Code UBC, Uniform Building Code (for scope items that SBC doesn't cover)		Insures safety and welfare, structural loading
	ASCE 7, "Minimum Design Loads for Buildings and Other Structures"		Insures safety and welfare, dead, live & wind loads, seismic loads
Structural steel design	AISC-ASD or AISC-LRFD		Adequate structural design.
Structural wood design	SBC 17 - Wood Construction		Adequate structural design.
Lifting lugs, fixtures and equipment	ASME/ANSI B30.20 - Below the Hook Lifting Devices, Chapter 20-1		Adequate strength and safety features.
Office/control trailer roof	NRCA - Handbook of Accepted Roofing Knowledge NRCA - Roofing and Waterproofing Manual SBC Chapter 32 - Installation of Roof Coverings		Waterproofing assures adequate structural design.
Trailer windows	AAMA 101 - Voluntary Specifications for Aluminum and Polyvinyl Chloride Prime Windows and Glass Doors		
Gutters	SMACNA - Architectural Sheet Metal Manual		

VENDOR DESIGN OF THE WATER TREATMENT UNITS (Contd)

Scope (Component)	Necessary and Sufficient Standard	Implementing Guidance	Description of Applicability
Vendor Design - Environmental Secondary waste characteristics	SCHWMR R.61-79.261 - Identification and Listing of Hazardous Waste		
Radiation instrumentation	DOE Order 5480.11, section 9.G ANSI N13.1 - Guide to Sampling Airborne Radioactive Materials at Nuclear Facilities		Insure sensitivity, response and detection capabilities of radiation instrumentation.
Stack isokinetic probe	40 CFR Part 60, appendix A (Method 1 and 1A) ASNI 13.1 - Guide to Sampling Airborne Radioactive Materials at Nuclear Facilities		

VENDOR DESIGN OF THE WATER TREATMENT UNITS (Contd)

Referenced Codes and Standards

AAMA - American Architectural Manufacturers Association, 101, "Voluntary Specifications for Aluminum and Polyvinyl Chloride Prime Windows and Glass Doors" 1993

ACGIH - American Conference of Governmental Hygienists, Industrial Ventilation Manual, 21st edition

AISC - American Institute of Steel Construction

AISC - ASD "Manual of Steel Construction - Allowable Stress Design", 9th edition, 1989.

AISC - LRFD "Manual of Steel Construction - Load Resistance and Factor Design", 2nd ed., 1993.

ANSI - American National Standards Institute

ASME/ANSI B30.20, "Below the Hook Lifting Devices," Chapter 20-1

ANSI C2, "National Electric Safety Code", 1993. not specified by vendor or specification

ANSI N13.1, "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities", 1969.

API - American Petroleum Institute

API SPEC-12P-86 Specification for Fiberglass Reinforced Plastic Tanks

API-620 Design and Construction of Large Welded, Low-Pressure Storage Tanks, 1990

API 650 Welded Tanks for Oil Storage, 8th ed., 1992

ASCE - American Society of Civil Engineers

ASCE 7, "Minimum Design Loads for Buildings and Other Structures", 1993.

ASHRAE - American Society of Heating, Refrigeration and Air-Conditioning Engineers

ASHRAE Handbooks

Applications, 1991.

ASHRAE Standards

15 Safety Code for Mechanical Refrigeration, 1992. not specified by vendor or specification

55 Thermal Environmental Conditions for Human Occupancy, 1992.

62, Ventilation for Acceptable Indoor Air Quality, 1989

ASME - American Society of Mechanical Engineers

VENDOR DESIGN OF THE WATER TREATMENT UNITS (Contd)

Referenced Codes and Standards (Contd)

ASME B31.3, "Standard Code for Chemical Plant and Petroleum Refinery Piping", 1990.

ASME Boiler and Pressure Vessel Code, 1992

Section VIII, Divisions 1 and 2, "Process Vessel Tanks"

Section X, "Fiber-Reinforced Plastic Pressure Vessels"

ASME 509, Nuclear Power plant Air Cleaning Units and Components,' 1989

ASTM - American Society for Testing and Materials

ASTM C39-86, "Compressive Strength of Molded Concrete"

ASTM C1883-87, "California Bearing Ratio of Laboratory Compacted Soils"

ASTM D422-90, "Particle-Size Analysis of Soils"

ASTM D653-90, "Terminology Relating to Soil, Rock, and Contained Fluids"

ASTM D1241-68 (1989), "Specification for Materials for Soil-Aggregate Subbase, Base, and Surface Courses"

ASTM D1556-90, "Density of Soil In-Place by Sand Cone Method"

ASTM D1557-78, "Moisture Density Relations of Soils and Soil- Aggregate Mixture Using 10 lb Rammer and 18-in. Drop"

ASTM D1452-80 (1990), "Practice for Soil Investigation and Sampling by Auger Borings"

ASTM D1586-84 (1992), " Method for Penetration Test and Split-Barrel Sampling of Soils"

ASTM D1587-83, "Practice of Thin-Walled Tube Sampling of Soils"

ASTM D2113-83 (1993), "Practice for Diamond Core Drilling for Site Investigation"

ASTM D2216-90, "Laboratory Determination of Moisture Content of Soil"

ASTM D2487-93, "Test Method for Classification of Soils for Engineering Purposes"

ASTM D2488-93, "Practice for Description and Identification of Soils (Visual-Manual Procedure)"

ASTM D2922-81, "Density of Soil and Soil Aggregate In-Place by Nuclear Method (Shallow Depth)"

ASTM D3017-88, "Water Content of Soil and Rock by Nuclear Methods (Shallow Depth)"

VENDOR DESIGN OF THE WATER TREATMENT UNITS (Contd)

Referenced Codes and Standards (Contd)

ASTM D4318-93, "Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils"

ASTM D4643-87, "Determination of Water Content by the Microwave Oven Method"

AWS - American Welding Society

AWS D1.1 "Structural Welding Code - Steel", 1990.

AWWA - American Water Works Association

AWWA D100, "Welded Steel Tanks for Water Storage", 1994.

AWWA D120, " Thermosetting Fiberglass-Reinforced Plastic Tanks", 1984.

CFR - Code of Federal Regulations

40 CFR 60, "Standards of Performance for New Stationary Sources", 7/1/93

40 CFR 61, "National Emission Standards for Hazardous Air Pollutants", 7/1/93

DOE Order 5480.11, "Radiation Protection for Occupational Workers," 12-21-88

FM - Factory Mutual 5-4/14-8, Transformers, 1986

Hydraulic Institute Standards for Centrifugal, Rotary, and Reciprocating Pumps, 14th ed., 1983

IEEE - Institute of Electrical and Electronic Engineers

IEEE 142, "IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems", 1982.

IEEE 422. "Guide for the Design and Installation of Cable Systems in Power Generating Systems," 1986

IEEE 446. "Recommended Practice for Emergency and Standby Power for Industrial and Commercial Applications," 1987

IEEE 1023, "Guide for the Application of Human Factor Engineering," 1988

IEEE 1100, "Recommended Practice for Powering and Grounding of Sensitive Electronic Equipment", 1992.

IES - Illuminating Engineering Society of America "Lighting Handbook", application and reference volumes, 1993.

ISA - Instrumentation Society of America

VENDOR DESIGN OF THE WATER TREATMENT UNITS (Contd)

Referenced Codes and Standards (Contd)

ISA S5.1 "Instrumentation Symbols and Identification", 1989

ISA S 5.2 "Binary Logic Diagrams for process operations," 1981

ISA S5.3, "Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems, 1983. ISA S5.4 "Instrument Loop Diagrams," 1989

ISA S5.5 "Graphic Symbols for Process Displays," 1985

ISA MC96.1 "Temperature Measurement Thermocouples," 1989

ISA RP 60.8 "Electrical Guide for Control Centers," 1989

ISA S18.1 "Anunciator Sequences and Specifications," 1979

ISA S20 "Specification Forms for Process management and Controls Instruments, Primary Elements , and Control Valves," 1989

ISA S26 "Dynamic Response Testing of Process Control Instrumentation" 1989

ISA S71.01 "Environmental Conditions for Process Measurement and Control Systems: Temperature and Humidity," 1989

ISA 82.01 Safety Standard for Electrical and Electronic Test, Measurement, Controlling and Related Equipment - General Requirements," 1989

ISA 81.02 "Safety Standard for Electrical and Electronic Test, Measuring, Controlling and Related Equipment - Electrical and Electronic Test and Measuring Equipment," 1989

ISA 82.03 "Safety Standard for Electrical and Electronic Test, Measuring, Controlling and Related Equipment - Electrical and Electronic Process Measurement and Control Equipment," 1989

NFPA - National Fire Protection Association

NFPA 10, "Portable Fire Extinguishers", 1988.

NFPA 30, "Flammable and Combustible Liquids Code," 1993

NFPA 70, "National Electric Code", 1993.

NFPA 77, "Recommended Practice on Static Electricity" 1993

NFPA 80A, "Protection from Exposure Fires", 1987.

NFPA 101, "Life Safety Code", 1988.

NFPA 780, "Lightning Protection Code", 1992.

VENDOR DESIGN OF THE WATER TREATMENT UNITS (Contd)

Referenced Codes and Standards (Contd)

NRCA - National Roofing Contractors Association,

"Roofing and Waterproofing Manual", 3rd Edition. 1990

"Handbook of Accepted Roofing Knowledge," 1990

RCRA - Resource Conservation and Recovery Act, Public Law 94-580, 42 U.S.C. 6901 et seq.

SBC - Southern Building Code Congress International, Inc., "Standard Building Code" (1994):

Section 408 (Hazardous Occupancy - Group H)

Section 511 (Hazardous Production Materials Facilities)

Chapter 12 Minimum Design Loads

Section 1312 (Waterproofing and Dampproofing)

Chapter 17 (Wood Construction)

Chapter 32 (Installation of Roof Coverings).

SCHWMR - South Carolina Hazardous Waste Management Regulations, 5/28/93

R.61-79.261 - Identification and Listing of Hazardous Waste

SMACNA - Sheet Metal and Air Conditioning Contractors National Association

SMACNA ASMM, "Architectural Sheet Metal Manual", 1987

SMC - Southern Building Code Congress International, Inc., "Standard Mechanical Code", 1991.

SPC - Southern Building Code Congress International, Inc., "Standard Plumbing Code", 1991.

VENDOR DESIGN OF THE WATER TREATMENT UNITS (Contd)

Referenced Codes and Standards (Contd)

SRSES - Savannah River Site Engineering Standards

- SRSES

05950-03-R	Practices to Minimize Chloride Induced Stress Corrosion Cracking of Type 300 Series Austenitic Stainless Steel
09900-02-R	Protective Coatings - Steel, Above Ground (Revision 0)
11595-04-R	Breathing Air Distribution
15250-01-R	Mechanical Insulation (Revision 1)
16482-01-R	Motor Control Centers, 600 Volt Class
16660-02-G	Electromagnetic Interference Control. section 10, attachment 35

UBC - Uniform Building Code, International Conference of Building Officials, 1994.

UL 508 - Industrial Control of Equipment, 1990

UL 900 - "Standard for Safety Test Performance of Air Filter Units" 1987

Appendix E.
F/H Groundwater Remediation:
Results of Primary and Alternate Bids from Vendors

Executive Summary

For the F/H Groundwater Remediation Project, a request for proposals was issued for designing and installing water treatment units. Vendors provided primary bids, complying with the DOE orders and standards, and alternate bids, using commercial requirements and practices. The specification requirements that caused the most cost differences were for the distributive control system, the off-site testing, and administrative/documentation practices. A cost savings of approximately 5% ($373K) may result on the vendor portion of the F/H Groundwater Remediation Project from implementing the results of this comparison. The process used to obtain these proposals from the vendors, meetings with the vendors, and analysis of the results are discussed herein.

Introduction

In January, 1995, WSRC-ER performed some commercial benchmarking and determined that a savings of up to 15% could result if commercial requirements/practices were used in lieu of DOE requirements and practices for a procured water treatment unit for the F/H Groundwater Remediation Project. Also, in January, the request for proposals for the F/H Water Treatment Units was being finalized. The design/install specification for this RFP was performance based, meaning that the contamination levels and resulting clean-up levels were specified and the technology were to be determined by the vendors. Because design requirements were one of the areas chosen to pilot the Codes/Standards Initiative, an "alternate bid" requirement was inserted into the request for proposals, which read:

> The awardee shall perform the work described in Specification M-SPP-G-0019, Rev. 1, Attachment H to this section. However, the awardee shall use commercial codes and standards in lieu of the following requirements identified in the specification:
>
> - DOE Order 6430.1A, "General Design Criteria"
> - DOE Standard EV-00443, "Standard for Fire Protection for Portable Structures"
> - DOE Order 5480.4, "Environmental Protection, Safety and Health Protection Standards"
> - DOE Order 5480.7A, "Fire Protection"
> - All SRS Engineering requirements, specifications, and guides listed in Section 2.3 of the Specification
>
> The offeror shall provide, for each requirement which will be replaced, a written explanation of what commercial code or standard applies. In addition, the offeror shall identify those items in attachment 7 of the specification which a cannot be supplied due to the commercial code or standard selected.
>
> NOTE: The DOE will select for award the proposal that is technically acceptable and offers the most lucrative advantage to the DOE. Even though proposed offers for the Alternate Specification may be lower than the proposed offers for the Primary Specification, if the difference in price is not deemed to be significant enough in savings, the DOE may chose the lowest priced technically acceptable Primary Specifications offer."

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The intent of the alternate bid was to determine what standards vendors would use if they did not use these DOE orders and standards. WSRC-ER was concentrating on commercializing the technical aspects of the water treatment unit, not the government procurement process itself.

During the pre-bid meetings in February/March 1995, the requirement for the alternate bids was explained to the vendors. The vendors did not have any comments or questions on the alternate proposal. Proposals were due for submittal to WSRC in April. After so few vendors indicated serious interest in responding to the RFP, the RFP was re-issued to the vendors associated with the Basic Ordering Agreement, which had recently been completed and instituted. This delayed the proposal due date to July 1995.

In the meantime, the ER Codes/Standards Initiative was approved as a pilot by DOE-HQ for the Necessary and Sufficient Standards Closure Process. The Codes/Standards Initiative was carried out in 1994 in an effort to determine which codes/standards would be used in lieu of DOE orders. This was a "top-down" approach to determining standards and requirements. The alternate proposal in for the F/H Water Treatment Units was a "top-down" question of "what would you use instead of DOE orders." At the same time, other programs across SRS and the DOE complex were:

- modifying the prescriptive nature of some DOE orders
- eliminating SRS Engineering Requirements for the lower functional class systems at SRS, and
- developing a Standards Based Management Program to assure that the standards the DOE complex operates to are supportive of missions, not barriers or burdens.

A result of the DOE Standards Committee's commitment to standards based management is the proposed Necessary and Sufficient Standards Closure Process. This is a "bottoms-up" approach to determining which standards are appropriate for a specific scope and its hazards. This process does not require that DOE orders/standards be chosen to be part of the N&S set and it does not require justification of orders/standards not selected. WSRC-ER used the F/H Groundwater Remediation Project vendor design as part of a pilot of the N&S Process.

Initial Proposals

The vendor proposals (primary and alternate) were received in July. In general, the vendors did not identify any code/standard change based on the deletion of the DOE orders/standards; thus, the vendors reported minimal, if any, change to the cost for the alternate proposal. Summary of the vendors initial alternate bids:

Vendor #1 This vendor's alternate bid was simply a copy of their primary bid, but placed in a separate binder with a different title. In the text, the only explanation of a difference between the primary and alternate was that "all specification requirements will be met except that certain NQA-1 quality program records, audits, inspection reports, and document control programs will be relaxed." This vendor quoted a price difference of $10,000 between the primary and alternate bids for the WTU design.

Appendix E.
F/H Groundwater Remediation:
Results of Primary and Alternate Bids from Vendors (Contd)

Vendor #2 This vendor did not provide a statement or a cost difference.

Vendor #3 This vendor provided a statement that "the costs of this proposal are largely 'technology driven' -- that is, a majority of the cost is attributable to process equipment and materials of construction which are required to satisfy the performance criteria set forth in this specification ... . Therefore no significant cost savings have been identified in connection with using the commercial codes and standards in lieu of DOE/SRS documents identified above." This vendor did not quote a price difference between the primary and alternate bids for the WTU design.

Vendor #4 This vendor provided a statement that "the potential impact on cost for this project is minimal, and is primarily related to a reduction in documentation." This vendor then provided the details for each standard/order which supported that conclusion. This vendor quoted a price difference of $26,000 between the primary and alternate bids for the WTU design.

After reviewing the initial alternate proposals, WSRC-ER determined that the following may be the cause of the insignificant changes in the alternate proposal:

- The phrasing of the alternate proposal had the vendors answering the "top-down" question of "what would you use instead of DOE orders?" Since initiation of the N&S Pilot, the question became "what standards would you use to complete a similar activity in the commercial world?" While this may appear to be a small change, the original question forced the vendors into the paradigm that we're trying to change.

- The specification may have already been so "commercialized" that there is little room for change. The specification attached to the RFP contains both DOE requirements and commercial codes and standards. In many cases, the DOE order just invokes the commercial codes and standards so no difference is apparent.

- Even without the option of the alternate proposal, vendors have the opportunity to take exception from specific or contradictory requirements, as stated in section IV.8 of the F/H WTU RFP and in section 2.4 of the F/H WTU specification. Vendors may not take advantage of these options, as they will just add the cost of the burdensome requirement or contradiction resolution to their bid price.

Because the vendors did not provide significant alternate bids, WSRC issued the following alternate bid request clarification to each of the vendors in August:

> "As part of a commercialization initiative, SRS is identifying the necessary and sufficient set of standards for certain environmental remediation activities. The DOE orders and standards, based on the historical zero risk policy for nuclear production operations, have been perceived to be a "more than sufficient" set of standards for environmental management activities. Because environmental remediation activities at SRS are more similar to those in the commercial sector than they are to DOE nuclear production operations, SRS is trying to determine which standards

Appendix E.
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are used for commercial remediation activities. In Section IIIB. of the RFP, the alternate specification was provided to determine if the listed codes/standards/DOE orders were causing cost or schedule burdens. Are there any codes or standards listed in M-SPP-G-00194 that you would not follow for similar scope for commercial firms? If so, what is the substitute standard (if any)? Would there be any cost or schedule impact based on use of this substitute standard?"

Clarification Meetings With Vendors

In August, each of the vendors visited SRS for bid clarification meetings. At these meetings, we discussed the intent of the alternate proposals and requested further information. The overall intent was to find out why ER work within the DOE complex is more expensive than in the commercial sector. The specific intent of the alternate bid request was piloting the N&S Process. Issues that came up at several of the vendor meetings were the burdensome nature of NQA-1 and the lengthy review times required by WSRC. NQA-1 has been interpreted, in the past, to be required by DOE Order 6430.1A. Some of the vendors' QA programs were developed to comply with NQA-1. After reviewing the RFP and the specification, ERQA concluded that NQA-1 is not a requirement for this project. Although the review times are not required by an order/standard, they are required in the specification. Each vendor told us that these review times would be much less in the commercial sector (although SRS's increased review time does not necessarily affect the vendors costs). While WSRC recognizes this, the lengthy review times are needed to accommodate the extensive reviews that many WSRC and BSRI personnel will be making and the SRS document control system. Also at each meeting, the F/H Groundwater Remediation Project Manager stressed that the vendors should use the alternate bids as a means to propose a commercial service/product. A summary of the meetings is described below:

Vendor #1 This vendor did not realize that exemption from orders had been granted, so his alternate bid did not truly consider the impact of not following DOE orders. This vendor thought there might be opportunity for changes or savings for equipment coatings, welding certifications, certain ASME B31.1 requirements and engineering costs. He did not think there would be any change in the hardware, as it is fabricated as a commercial item.

Vendor #2 This vendor provided a written response to the alternate bid request clarification. In summary, this vendor states that "an alternate proposal is inappropriate because ... (we) self-imposed our typical commercial client standards to the WTU conceptual design. Our standards are rigorous, similar to DOE and/or WSRC standards. Alternate standards would not significantly reduce project costs or impact schedule." This vendor made very conservative assumptions in preparing their primary bids, because, as stated in the meeting, they anticipate many burdens as shown by previous experience with the government. This vendor did say that with a commercial customer, there would be much more partnering and the vendor would have a role in determining requirements, so fewer assumptions would be necessary.

Vendor #3 This vendor has previous experience at SRS and realized that there is redundancy in some requirements. He did point out that some equipment suppliers are already set up to provide materials per NQA-1 and it would be more expensive for them to change their QA system to be "less than" NQA-1.

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Vendor #4 This vendor does most of its business for DOE. He acknowledged that they did not take the request for an alternate bid all that seriously, because they did not think WSRC could be granted exemption from these orders.

BEST AND FINAL OFFERS

With the information and clarification provided at these meetings, the vendors provided best and final offers to WSRC (for primary and alternate) in September. The vendors' proposals, both primary and alternate, varied greatly in cost. The vendors proposed prices for design, fabrication, distributive control system hardware/software, startup/testing, operator training, control room trailers and air sampling systems. For the primary proposals, the bidders' proposed prices ranged from $6 Million to $34 Million. The alternate proposals were within similar ranges. The design and fabrication costs caused the significant difference between the two low and two high bidders. Per a technical evaluation by a wastewater treatment expert of each vendor's technologies, the two high bidders were proposing technologies that are more expensive than other available technologies and excessive for the types and levels of contaminants requiring clean-up. For example, one vendor proposed a waste reduction technique that is expensive in both initial and operating costs, while other reduction techniques would do an equivalent job while being less capital and energy intensive. Start-up testing and isokinetic air samplers also contributed to the large difference between bids.

While the range of prices between the vendors varied greatly, the range between each vendors primary and alternate bids generally did not. Except for the high bidder, each vendor proposed a price difference between the best and final primary and best and final alternate bids. There was also a varying level of detail in the explanations of the cost differences.

Vendor #1 This vendor explained that the cost savings offered (difference between primary and alternate proposals) was due to the "less rigid programmatic, administrative, and documentation requirements that are realized during project execution considering reduced management and engineering oversight. In either case, compliance with applicable Federal, state, and local laws is considered mandatory." During a follow-up conversation, the vendor said his price difference was primarily from not having to determine what the orders unique requirements are and having to price order compliance. In addition, cost savings were proposed based on a change from the specified distributive control system to a programmable logic controller (PLC). All of the other vendors also proposed this change in control systems because of recent technical advances in PLCs and the cost/benefit ratio of using a PLC for virtually the same service. This vendor quoted a cost difference of $373,431 between the primary and alternate bids, which represents a 5% savings for the vendor design. This vendor did not quote any price differences for testing/start-up or any of the line items other than design and fabrication.

Vendor #2 This vendor only provided one proposal initially, which is considered the primary. For the best and final proposal, this vendor provided again provided only one proposal, which will be considered the alternate. This is appropriate because the compliance matrix included in the best and final proposal includes exceptions to the specification requirements, with explanation of the commercial, manufacturer, or vendor standards that will be used instead.

Appendix E. F/H Groundwater Remediation: Results of Primary and Alternate Bids from Vendors (Contd)

Vendor #2 (Contd) This is the vendor that made many conservative assumptions in developing its initial primary proposal. For example, while the specification calls for a 5 year design life of the unit, this vendor made its initial proposal for a 30 year design life. By reducing the design life, commercializing its materials of construction, modifying its treatment process scheme, and proposing a programmable logic controller instead of the specified distributive control system, this vendor quoted a $9.7 Million cost difference, which represents a 28% cost savings. It is important to note that this vendors primary and alternate bids were 6 and 4 times that of the low bidder, respectively. This is one of the vendors that proposed technologies that are considered to be overkill and expensive.

Vendor #3 This vendor provided detailed explanations on the cost savings that could be realized by changing the specified requirements for the distributive control system, off-site testing, and re-manufactured equipment. As some of the other vendors have done, this vendor proposed the use of a programmable logic controller instead of a distributive control system. This vendor proposed the a reduction in off-site testing requirements, inferring that all of this testing is not needed due to the performance bond supplied by the vendor. This vendor also proposed the use of re-manufactured equipment which would be backed-up by an original manufacturer's warranty. This vendor quoted a cost difference of $830,000 between the primary and alternate bids, which represents a 5.4% cost savings. This vendors prices were about 3 times those of the low-bidder.

Vendor #4 Although this vendor did not provide any explanation of the differences between its primary and alternate proposals, price differences were quoted for each of the line items on the price table. The most significant differences were for the design, distributive control system software, and start-up/testing. This vendor was the low bidder and quoted the difference between the primary and alternate as $151,000, which represents a 2.6% savings. It is important to note that this vendor disqualified itself during WSRC's review of the best and final offers because its proposed technology could not meet one of the clean-up levels.

Table 1. Summary

Vendor	Proposed Difference between Primary and Alternate and % Savings	Reasons for Difference	Notes
#1	$373,000 (5.2%)	DCS, programmatic, administrative, documentation	was awarded the contract on September 21, 1995, within 25% of low bid
#2	$9,700,000 (28%) (original proposal - overdesigned)	design life, commercial materials, DCS	high bid; 6 times price of low bid
#3	$830,000 (5.4%)	DCS, testing, equipment	3 times price of low bid
#4	$151,000 (2.6%)	design, DCS, start-up/testing	low bid; disqualified self for technical reason

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Conclusions

Based on commercial benchmarking, WSRC-ER originally estimated that there would be a 15% difference in price between the alternate and primary bids. Design codes/standards were thought to be the main driver for the difference. The final results do not show this level of savings. The savings indicted were caused mainly by administrative and other F/H Groundwater Remediation project specific requirements that may not be consistent with commercial practices. For example:

- The specification was already commercialized, in terms of the design codes/standards identified.
- Requirements for the distributive control system and off-site testing caused the most cost burdens.

In addition, vendors proposed overkill/expensive technologies and NQA-1 systems, which are not needed for the F/H Groundwater Remediation project. These proposals were likely based on the vendors' previous experiences with jobs inside the DOE complex.

Recommendations

For Future Projects Involving Vendor Designs,

- Encourage the vendors to propose alternate methods/items that may be more cost effective and consistent with commercial practices.
- Give strong consideration to vendors alternate proposals.

Pathforward

On September 21, 1995, WSRC award a contract for the water treatment unit to Vendor #1. In early FY96, the contract and specification will be modified to incorporate some of the changes based on the alternate bid from that vendor. A final cost savings determination for the alternate bids can then be made.