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Revision 1

Integrated Data Center Project Execution Plan

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1.0 PROJECT OVERVIEW

1.1 Project Description/Summary of Work Scope

1.1.1 Background

Washington TRU Solutions, LLC (WTS) is under contract to the U.S. Department of Energy (DOE) for the operation and management of the Waste Isolation Pilot Plant (WIPP), the nation's first deep geological nuclear waste repository. The WIPP is instrumental in the cleanup, shipping, and permanent storage of transuranic (TRU) nuclear waste that was generated and is stored at current and former DOE nuclear materials-production and research facilities located around the country. WTS responsibilities include the nationwide characterization of TRU waste and the coordination of the National TRU Program (NTP) to ship those wastes to the WIPP. In fulfilling the former responsibility, the Central Characterization Project (CCP) assists generator sites with the characterization of TRU waste for disposal at WIPP.

CCP has been in existence since 1999. An early attempt at automation of the characterization process involved the [redacted] system from [redacted] that was developed as a web application in conjunction with [redacted] a proprietary product, used for the data store. The [redacted] system was abandoned due to the high cost of ownership and because of the dynamic nature of system requirements during the early days of CCP. The current CCP Data Center has evolved over the lifecycle, beginning simply as a [redacted] database that was created for one person to track where a batch data report (BDR) was in the characterization process. The CCP Data Center is now a collection of databases, applications, and utilities that evolved over time as functions and automation steps were added in support of the CCP mission.

Major databases, platforms, and computing hardware that are used at other DOE sites were reviewed to determine the feasibility of using similar products in the CCP Waste Information Tracking System (WITS). It was decided that a number of issues, as a whole, indicated a better decision to continue using [redacted] products rather than a programming preference. The majority of technologies currently employed by the Data Center are [redacted] products that are covered under the DOE Enterprise Agreement, and current Data Center members are familiar with [redacted] programming in these products, are a few of the key reasons for this decision.

The current Data Center is based on Active Server Page (ASP) code and Structured Query Language (SQL) stored procedures. That ASP technology is known as "classic" ASP and is also based on Visual Basic 6 (VB6). The CCP Data Center's technology was last updated prior to 2001. [redacted] replacement for this technology resides in its [redacted] The [redacted] technology was first introduced in 2001 and encompasses the modern version of ASP which is significantly different from "classic" ASP. There have been four subsequent updates to the [redacted] technology. The first in March, 2003 (version 1.1) and the latest in November, 2007 (version 3.5). The support for the "classic" ASP has been dropped.

When [redacted] turns support over to a third party, new features are unlikely to be added to the product. Working with older technology may lead to issues with updates or service packs for the underlying operating system (OS), further limiting technology choices. Constrained to old technologies, new features cannot be utilized, such as improved error handling, presentation, Object Oriented Programming (OOP), and integration to the web. Finally, the pool of available talent dwindles as developers are trained using new industry accepted technologies. While somewhat more stable, the [redacted] is also aging. Mainstream support for [redacted] was discontinued in April, 2008. In November 2005, [redacted] released SQL Server 2005 and August 2008, [redacted] The new versions provide, among other features, better diagnostics for errors and improved reporting services.

1.1.2 Scope

All software and software systems have a limited lifetime because technology changes at a rapid pace. To keep pace with technology changes, application software is maintained through vendor upgrades.

The scope of this project is for the development of a new quality assurance (QA) approved Integrated Data Center (IDC) based on CCP processes, using updated technology and application software. This will be accomplished by recreating the computerized automation system that will become the new standard for CCP. This encompasses planning, designing, building, and testing for a complete new system to replace the existing CCP Data Center.

The system shall be able to incorporate multiple databases, integrating them so that it appears as one large database, and must be capable of importing and exporting data to and from the WIPPNet network.

The following are some of the features of the new system that shall be incorporated:

- Functionality, as identified with the current Data Center
- Provide a database with the main key field being Waste Container ID, as indicated in CCP-TP-005, *CCP Acceptable Knowledge Documentation*, Attachment 8, Waste Containers List – Example Form
- Allow users to import data electronically, when available, or input/edit data manually
- Allow users to easily query, sort, filter, and export data by waste containers, using tools such as Microsoft Excel®
- Automatically identify "candidate" containers ready for sub-lot evaluation
- Allow users to input nonconformance report (NCR) and corrective action report (CAR) data for tracking
- Allow users to perform a complete search of NCR and CAR data for containers ready for sub-lot evaluation or certification
- Allow users to input sub-lot evaluation data for tracking
- Automatically poll the WIPP Waste Information System (WWIS) and/or Waste Data System (WDS) for certification and shipping status for containers
- Authorized users will access the IDC and utilize standardized screens to facilitate timely BDR project-level review and reporting
- Protection of, and access to, data is controlled via standard security features, such as authentication servers, roles that the users perform, and management systems (MS) SQL Server Access-protection

It is anticipated that many of the current methods of individually transferring data between the Project Office systems and the WWIS/WDS can be streamlined into the IDC. Effective handling of the data between systems will reduce any error rate introduced by human intervention.

The IDC will not be designed to eliminate human intervention, only to aid in the reduction of errors by keeping the data centralized in one location prior to WWIS/WDS submission. CCP and IDC personnel recognize that raw machine-generated data is not certifiable data. The IDC will not make certifiable calculations; however, it may make the same calculations to aid CCP staff in determining issues prior to WWIS/WDS submission.

The IDC will be engineered to effectively transfer certified data into the WWIS/WDS, as necessary.

1.2 Mission Statement

To provide upgraded computing services to assist CCP personnel in more efficient tracking and certification of waste designated for potential disposal at the WIPP.

1.3 Management Overview of the Project Execution

Front line management oversight activities and lines of reporting are provided by the manager of the WITS. The direction and management of project activities are conducted in accordance with URS Washington Division/WTS Project Management Policies and approved WIPP procedures. The Project Manager will maintain an active communications program to assure DOE and WTS management and personnel are apprised of performance and other issues affecting project execution.

1.4 Critical Issues and Challenges

Resources are limited for the IDC development effort, which will result in an extended software development and database rebuild process. Personnel directly involved with software development are also required to maintain the current CCP Data Center database needs and revisions.

Maintaining up-to-date training for personnel directly involved with the software development and hardware maintenance is also required.

Interfacing with multiple Data Generation Level (DGL) sites, Third-Party Organizations (see Section 1.6), and CCP Project Office business practices presents unknown challenges.

1.5 Client Identification

DOE, Carlsbad Field Office (CBFO)

1.6 Third-Party Organizations

- WIPP Computer Security
- WIPP Computer Subcontractor
- WWIS/WDS
- CCP Records
- DGL Sites/DGL Contractors

1.7 Partnering

CCP is providing an interface point-of-contact as well as chairs for the IDC Change Control Board (CCB).

1.8 Applicable Reference Documents

- National Institute of Standards and Technology (NIST) 800 Series Documentation
- CCP-QP-022, *CCP Software Quality Assurance Plan*
- DOE/WIPP-07-3361 Cyber Security Risk: Assessment and Mitigation
- Office of Environmental Management (EM) – Program Security Plan (PSP)
- DOE Program Cyber Security Plan (PCSP)
- User Documentation
- Individual Project Plans
- Detailed Project Plans as identified in Section 5.0

1.9 Mechanism for Alignment of Project Goals

Complex-Wide Integration Tool (CWIT) Integrated Schedule

1.10 Known Potential Problems

- Maintaining adequate strategic resources, (resources that are essential for the success of a business endeavor). Typically, these include all, but not limited to the following assets: personnel, operability, budget, capabilities, knowledge, and availability.
- Maintaining uninterrupted momentum on IDC development

- Inconsistency between DGLs
- Third-Party Organizations (see Section 1.6)

1.11 Overview of Project Schedule Milestones

See CWIT Integrated Schedule – also maintained by Project Manager

2.0 CONTRACT OVERVIEW

The CBFO work breakdown structure (WBS) is provided on the WIPP Project Management home page.

Project support, and the associated CCP activities described in this Project Execution Plan, will be implemented as part of the Retrieval, Characterization, and Transportation (RCT) scope of work, which is funded within the Waste Services WBS, element 1.1.

The CCP will continue to characterize and certify contact-handled (CH) and remote-handled (RH) TRU waste. Support for this activity is the primary purpose of the CCP Database and the forthcoming IDC.

3.0 PROJECT ORGANIZATION

3.1 Key Project Personnel

- [redacted] – WITS Manager
- [redacted] – Project Manager**
- [redacted] – Software Developer**
- [redacted] – Software Developer**
- [redacted] – Testing/Documentation**
- [redacted] – Lead Interface with CCP
- [redacted] – Co-Chair IDC CCB
- [redacted] – Co-Chair IDC CCB
- [redacted] – Configuration Management
- [redacted] – Software Quality Assurance (SQA) Advisor

*Or current holder of this position
**Denotes core project staff

4.0 PROJECT ORGANIZATION

4.1 Document Control

Primary document control is handled through the WIPP Q&MIS® for CCP program documents, and the [redacted] (WITS requirements traceability tool), for system requirements and issue tracking.

4.2 Correspondence

Correspondence is primarily handled through the WIPP email system. This includes questions, input, and requests regarding the IDC. Meeting notifications and minutes (i.e., IDC CCB) are also scheduled and distributed through the email system.

5.0 PROJECT SCHEDULE

The CWIT Integrated Schedule is maintained and available as a link in the current Data Center or from the Project Manager. The IDC scheduled deliveries, based on a start date of August 2008 and a 25 month construction schedule, are projected to occur on August 30, 2010. To enable the construction in September 2008, preliminary designs and requirements had begun in August 2008. Initial prototyping and development builds were initiated in the 1st quarter FY2009. Beta testing is projected to begin the 3rd quarter FY2010 with the acceptance testing in the 4th quarter FY2010. The projected completion of the rebuild and approval for operational use should happen by August 2010.

6.0 PROJECT RESOURCES

6.1 Project Staffing Plan

Staff is described in Section 3.0. Key individuals make up the core staff for this project. Four full-time equivalent (FTE) personnel in the CCP Data Center group are utilized to enhance the group's ability to move forward on the IDC project. Additional staff, primarily from CCP, are used to supplement the core staff for tasks such as requirements development, prototype reviews, beta testing, etc.

6.2 Computer Requirements

See Section 8.3.

7.0 UNIQUE PROJECT CONSIDERATIONS

7.1 Confidentiality of Information

As with the CCP Database, classified data, sensitive unclassified information such as UCNI, NNPI, FOUO or other similar information will not be permitted in the IDC. Additional confidentiality issues exist, but must be managed within the context of access by users to the system. The best practice method of restricting database access to only the individuals required to input and/or review the data is provided in Section 7.2.2.

7.2 Security/Safety/Risks

7.2.1 Overall

The current CCP Database, and subsequent IDC, are covered under the DOE/WIPP-07-3353, *CBFO General Support System Accreditation Boundary*, which has received certification and accreditation by the Office of Management and Budget (OMB).

7.2.2 Software

[A] General

Authorized users will access the IDC via a standard, WIPP-approved web browser and utilize standardized screens to facilitate timely BDR project level review and reporting. Protection of, and access to data, is controlled via [redacted] built-in security features, such as authentication servers, user/password controls, and MS SQL Server Access-protection. Rare cases of direct SQL database access will be granted after all security and contention plans have been approved, as applicable and other connection methods via standard interfaces have been exhausted.

[B] Operating System

Core machine OS will be restricted to WIPPNet network administrators, DOE Computer Security, and IDC administrators.

Monthly OS patches, as directed by the OMB, are identified "at risk" until deemed not applicable by the IDC CCB, Project Manager, and the information technology (IT) CCB.

[C] Database

Database security and rights are assigned by the IDC staff. The SQL administrative account will be protected per the [redacted] series recommendations. No user account will have authority or rights greater than, or equal to, the system administrator.

General access to the IDC database, outside of the interface provided, will be accessed by database views to protect the database structure and integrity.

Write access to the IDC database with any method other than the interface provided is deemed not acceptable.

Protection against SQL injections are addressed by the NIST 800 series documentation.

7.2.3 Hardware

Physical hardware access will be restricted per controls of the CBFO System Security Plan.

7.3 Complexity

The current system, and subsequent IDC and supporting systems, are very complex and unique systems. The current system is a multi-purpose data repository and record keeping system. The addition of CCP as the only (or primary) characterization and certification entity at most generator sites, the addition of new generator sites, and the addition of the RH waste program, has further increased the complexity of the system.

Automating business practices programmatically into the software design, will free staff to focus on the business process rather than complex issues.

8.0 ENGINEERING AND DESIGN

8.1 General Description

The IDC automates the tracking and reporting of CCP project-level characterization data for all WIPP characterization activities. The system tracks project BDRs and DGL raw output values. It also uses standardized reporting, data formats, data updating, and editing methodologies to ensure data integrity.

8.2 Permits, Laws, and Regulations

- NMED Hazardous Waste Facility Permit (HWFP)
- 40 CFR Part 191, *Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes* (U.S. EPA)
- 49 CFR Part 173, *Shippers – General Requirements for Shipments and Packagings*
- Public Law 102-579, *Waste Isolation Pilot Plant Land Withdrawal Act* (as amended)
- DOE Orders (per WTS Prime Contract)
- OMB (Security)

8.3 System Descriptions

8.4 Hardware

Production and development hardware will consist of approved vendor [redacted] servers utilizing large capacity hard drives and maximum available random access memory (RAM). The hardware will be configured for positive recovery, such as redundant power supplies, to ensure reliability. The IDC hardware is based on off-the-shelf components for production and development server systems; consequently, maintenance or repairs can be readily performed using available replacement components.

This project will utilize established WIPPnet network infrastructure.

8.4.1 Software

The IDC team will use commercial off-the-shelf software and components consistent with industry standards. Software that is capable of project protection to prevent inadvertent deletion, revision tracking with revision history auditing of code changing, and control of programming environment will be used.

Specific software technologies that will be used include: a high performance, multi-user relational database; MS SQL Server 2005 or greater (Enterprise Editions) database; a web-based user interface; ASP with [redacted] for file sharing; a traditional networking interface for file browsing and video streaming.

8.4.2 Software Lifecycle

The IDC software development process will follow the established CCP QA software program while largely emulating the agile software development methods. Agile software development refers to a group of software development methodologies that promotes development iterations, open collaboration, and process adaptability throughout the life-cycle of the project. It chooses to do things in small increments, with minimal planning, rather than plan at length. This helps to minimize the overall risk, and allows the project to adapt to changes more quickly. There is also an emphasis on stakeholder involvement. Meaning, at the end of each iteration, the stakeholder is consulted about the product and comments are noted. The programming development work is completed by the IDC staff, while software requirements development is a team effort generated by the CCP staff in conjunction with the IDC staff.

8.5 Determination of Requirements

Agile development has few similarities with the commonly used waterfall method. The waterfall model is the most predictive of the methods, stepping through requirements capture, analysis, and design, coding, and testing in a strict, pre-planned sequence. Progress is generally measured in terms of deliverable artifacts: requirement specifications, design documents, test plans, code reviews, and the like.

The main problem with the waterfall model is the inflexible division of a project into separate stages, so that commitments are made early on, and it is difficult to react to changes in requirements. Any iterations are expensive. This means that the waterfall model is likely to be unsuitable if requirements are not well understood or are likely to change in the course of the project.

Agile methods, in contrast, produce completely developed and tested features (but a very small subset of the whole) every few weeks. The emphasis is on obtaining the smallest workable piece of functionality to deliver business value early, and continually improving it/adding further functionality throughout the life of the project.

See Attachment 1, Agile Requirements Method, for the process used to determine requirements.

8.6 Definition of Deliverable

The deliverable is a fully operational IDC, as described in Section 1.0. The database must be fully tested, including beta acceptance testing and QA paperwork completed, before full implementation and unrestricted use is allowed. Deliverables for this project are identified and addressed in Section 5.0.

8.7 Computer Systems and Methods Needed

Components specific to the CCP Project Office are addressed in Section 8.3.

Network infrastructures, telecommunications, internet methods, and other components outside the CBFO System Security Plan are outside of the scope of the project.

8.8 Design Reviews

Design reviews will be performed under the guidance of the IDC CCB and subject to CCP-QP-022, *CCP Software Quality Assurance Plan*. Regularly scheduled meetings will be held to discuss the design and progress.

8.9 Operations Manuals

Access and data input processes for the IDC will be developed and provided in CCP procedures, and user documentation will be created or revised, as necessary.

8.10 Operator Training

IDC users receive training and qualifications provided by the CCP Training program, as applicable.

The IDC personnel will also provide demonstrations of the new database before implementation, and will be available to respond to questions and/or issues with the IDC after implementation.

9.0 PROCUREMENT AND MATERIALS MANAGEMENT

9.1 Procurement Systems

The standard WIPP procurement process is used. This includes procurement of hardware and software.

10.0 PROJECT CONTROLS

10.1 Methods of Estimating Scope

The scope of the IDC project is derived from the current contents of the CCP Database. Although additional requirements are expected, it is difficult to estimate the increase in the number of requirements from the current users. It is necessary to control the number of additional requirements to minimize the effect on the project schedule. Requirements that are compliance driven shall be addressed. Requirements that are "nice to have" to enhance ease-of-use will be considered on a case-by-case basis by the IDC CCB.

10.2 Methods of Change Control/Management

A CCB has been established to ensure that the end users of the IDC are provided with a database that is user friendly and productive. The CCP IDC core staff will be responsible for initiating a Software Change Order (SCO), as required by CCP-QP-022, to initiate the development phase. During the development phase, the CCB will address and make decisions regarding priorities, requirements, design, and issues related to the IDC project.

11.0 PROJECT QUALITY PLAN

SQA must meet the requirements of the latest version of CCP-QP-022.

12.0 CONSTRUCTION

Physical construction activities are not applicable to this project. Hardware installations in support of the activities involved in start-up, development, and/or production operations do not constitute construction activities.

Networking infrastructures outside of the CBFO System Security Plan are the responsibility of the individual hosts.

Networking infrastructures inside of the CBFO System Security Plan are the responsibility of the WIPPnet computer subcontractor.

13.0 COMMISSIONING AND START-UP

13.1 Pre-commissioning

Prior to startup of the IDC, select users are given fully functional beta test versions of the software in stages, incremental to Attachment 1, for a two week period prior to implementation. Users are encouraged to work through needed procedure and software changes to maintain compatibility.

13.2 Commissioning

Final, formal testing is performed in a test instance built by running the same database structure that will be used in the final production instance.

When the final production instance is built, random checks of data integrity (record counts) and basic functionality are performed to verify a successful build.

14.0 ENVIRONMENT, SAFETY, AND HEALTH

14.1 Safety Policy

Compliance with all aspects of WIPP safety policies is required.

15.0 RISK MANAGEMENT PLAN

WTS managers, and the project manager involved in the project execution process, participate in the identification and assessment of program risks. They review program documents, evaluate lessons learned, and use brainstorming and personal experience to identify risks.

Project risks are identified in the following areas:

- Cost and Schedule
- Technical

- Programmatic (Obtaining and utilizing resources outside the control of the project manager)
- Support
- Safety
- Regulatory/Permitting

Once risks are identified, WTS categorizes the identified risks by probability and severity (consequences) of each event. After risks have been identified and categorized, a risk management approach and mitigation actions are developed for each high and medium risk. For low risk elements not judged to require documented mitigation actions, WTS Managers assure that they are controlled through the normal management functions and work processes. All major risks and mitigation actions are identified in the CBFO Risk Management Plan. In addition, periodic reassessments of programs are performed to determine if new areas of risk need to be identified and assessed.

A specific risk is associated with the implementation of this PXP:

- An insufficient allocation of time dedicated to this project due to the ongoing maintenance of the current CCP Data Center database. Mitigation includes close monitoring of the project progress by management and the IDC CCB, the control of the number of modifications to the current system, and the consideration of additional resources.

16.0 PROJECT CLOSEOUT

The project will be closed out when the appropriate software has been written and tested, procedures have been revised and implemented, and the IDC is fully implemented and documented per CCP-QP-022.

17.0 PROJECT PROCEDURES

See program documents referenced in Section 1.8.

Attachment 1 – Agile Requirements Method

1. Determine Initial Application Requirements
    1.1 Create Initial Application Prototype
        1.1.1 Developer Tests Initial Application Prototype
            1.1.1.1 Demonstrate Prototype to Users & Management
        1.1.2 Collect Requirements from Users Based on First Prototype
2. Begin Application Requirements Document
    2.1 Revise Prototype Based on Requirements from Initial Prototype Demonstration
        2.1.1 Develop Revised Prototype Based on User Feedback
            2.1.1.1 Test Revised Prototype
            2.1.1.2 Demonstrate Application Prototype Second Time
        2.1.2 Collect Requirements from Users Based on Second Prototype
    2.2 Revise Requirements Document Based on Feedback from Second Prototype Demonstration
    2.3 Begin Design Document
    2.4 Begin Test Plan
3. Conduct Requirements Review
    3.1 Revise Requirements Based on Requirements Review
4. Finalize Requirements Document
5. Conduct Design Review
    5.1 Revise Design Document Based on Comments from Design Review

Attachment 1 – Agile Requirements Method (Continued)

6. Finalize Design Documentation

    6.1 Revise Prototype Based on Input from Users from Second Prototype Demonstration to Create Final Application

7. Developer Performs Testing to Ensure Application is Ready for Official Test

8. Perform and Document Software Code Inspection

9. Finalize Test Plan

10. Conduct Test Plan Review

    10.1 Revise Test Plan Based on Input from Test Plan Review

        10.1.1 Perform Official Test with Approved Test Plan

    10.2 Tester Provides Feedback to Developer

    10.3 Developer Fixes Problems Encountered by Tester

11. Complete Test Report

    11.1 Review Test Report

12. Determine if Application is Ready for Production

    12.1 Install Application in Production Environment

13. Complete CCP-QP-022 SCO Paperwork for Application

14. Start Work on Determining Initial Application Requirements for Second Application